

EU-MORE



**European Motor
REnovation initiative**

Motor Policy Review

Review of past and existing policy options for the acceleration of electric motor renovation

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List of Acronyms

Text	Text
EE	Energy Efficiency
EED	Energy Efficiency Directive
EEM	Energy Efficiency Measure
EMS	Energy Management System
ESM	Energy Saving Measure
EU	European Union
IE	International Efficiency standards for motors
MS	Member States
NEB	Non-Energy Benefits
NECP	National Energy and Climate Plans
SME	Small and Medium Enterprises
VSD	Variable Speed Drive



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Executive Summary

Electric motors for industrial applications have the tendency to stay in service longer than their expected lifetime and be replaced only at their end-of-life, limiting the benefits of the higher efficiency of new motors. The EU-MORE project aims to capture the benefits of accelerating the replacement rate of old, inefficient motors through the development of new policies. To accomplish this, a review of past and existing policies targeting industrial electric motors has been conducted for 27 European Member States. The review encompasses 64 policy measures targeting directly and indirectly the early replacement of motors as a measure to improve energy efficiency in industries. Each policy measure is presented with a short description, responsible authority, status, issue date, start date, end date, duration, and reference to the official publication. Additionally, a preliminary estimation of the impact of the analysed measures has been conducted.

The review methodology is based on the contribution of several country experts able to provide a high-level perspective on the national policies under exam.

The results show a strong predominance of financial measures, mostly subsidies and loans (or combinations of them), followed by mandatory standards, fiscal measures and voluntary agreements. The review highlighted a very low implementation of measures targeting trainings and information, particularly relevant for industrial SMEs. On a national level, Germany resulted the country with the highest number of measures involving electric motors, followed by Austria. Very few national policies include systemic approaches to motor systems (i.e. including the overall supply of motive power as well as the demand side for motive power), which generate usually the highest energy savings, as evidenced from case studies.

The report is complemented by an in-depth presentation of measures directly targeting industrial electric motors across the Member States.



1. Introduction

1.1 The EUROpean MOtor RENovation initiative (EU-MORE)

The EUROpean MOtor RENovation initiative (EU-MORE) aims to capture the benefits of accelerating the replacement rate of old, inefficient motors through the development of new policies. The initiative, which started in October 2022, will develop tools for policy impact projection, monitoring and evaluation and promote knowledge exchange on the topic between energy efficiency policy actors at Member State, European and international level. Through these actions, the project will assist Member States (MS) to fulfil their obligations under articles 4 (Energy efficiency targets), 8-10 (Energy savings obligations and alternative measures) and 11 (Energy management systems and energy audits) of the revised Energy Efficiency Directive (EED)¹.

Electric motors have the tendency to stay in service for way longer than their intended lifetime and are typically only replaced when they reach their natural end-of-life, usually about 30-40 years, which is much longer than is typically assumed and has significant energy efficiency implications. Through swift action, the replacement rate of old motors, can be improved. In the European Union (EU), the accelerated replacement of these old electric motors would offer additional energy savings on top of the savings potential of existing regulations (which address, at first, new motors), with all the associated benefits.

An increasing awareness by policy makers, manufacturers, and industry end-users of the extent of this consumption and its associated emissions has led to the introduction of minimum energy efficiency regulations and energy-efficient technologies to meet and exceed these standards. However, penetration of these highly efficient technologies is slower than they could be because motors are often an essential part of the production process, and replacement is seen as complex, and therefore often not considered as viable Energy Saving Measure (ESM) for companies in the industry and service sectors. This issue is amplified by the fact they are often not considered in existing (national) regulation.

In 2015 53% of electricity worldwide was consumed by electric motor systems (10,700 TWh) representing 5.5 Gton CO₂eq in emissions. In 2020 electric motors and their applications represented approximately 70% (650 TWh/yr) of industry's electricity consumption in the EU27 and more than 40% (255 TWh/yr) of the service sector's electricity consumption².

In the drive to replace old motors with new efficient motor technologies, the barriers involve the identification of the total energy efficiency savings potential, the economic barriers and the lack of awareness about the co-benefits of energy efficient motors.

Potential savings are even greater when the efficiency of the entire motor system is improved. Measures addressing systems include appropriate sizing of the motor, digitalisation, proper sensorisation, eliminating unnecessary transmissions, and equipping motors with variable speed drives (VSDs) are all viable improvements and can be expected to offer further energy performance gains. Digitalisation plays an important role in maximising the potential savings resulting from motor renovation^{3 4 5}.

Last, there is the importance of efficient and sustainable use of materials. Electric motors are, for the majority, built with materials that are recyclable and have high residual value, such as cast iron, electrical steel, plain carbon steel, aluminum, and copper. Recirculating these metals and introducing automatized processes for motor recycling and remanufacturing⁶ would greatly reduce the emissions currently

¹ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766

² https://www.iea-4e.org/wp-content/uploads/2022/06/EMSA_report_classification_2022june.pdf

³ <https://ee-ip.org/en/article/key-findings-on-digitalisation-technologies-to-increase-energy-efficiency-in-electric-motor-driven-systems-6914>

⁴ https://www.iea-4e.org/wp-content/uploads/2022/06/EMSA_report_classification_2022june.pdf

⁵ https://www.eceee.org/library/conference_proceedings/eceee_Industrial_Summer_Study/2020/4-technology-products-and-systems/digital-technologies-driving-efficiency-in-electric-motor-driven-systems/

⁶ <https://www.mdpi.com/2071-1050/13/17/9668>



associated with producing primary metals, since recycling requires less energy than producing from virgin materials.

1.2 Legislative Framework (EU/EED)

The revised Energy Efficiency Directive (EED), published in the Official Journal of the EC on 20 September 2023, significantly raises the EU's ambition on energy efficiency. The revised directive more than doubles the annual energy savings obligation (Article 8) by 2028, and therefore plays a major role for the overall transition of industry and service companies across the EU to address energy efficiency and the replacement of inefficient electric motors currently in operation.

The EED is the main driver for MS to design and implement policy measures targeting businesses and promote uptake of Energy Saving Measures (ESMs), making it binding for EU countries to collectively ensure an additional 11.7% reduction in energy demand by 2030 compared to the projections of the 2020 EU Reference Scenario (i.e. compared to the energy demand otherwise reached in the PRIMES reference projections established in 2020). As a result, overall EU energy consumption by 2030 should not exceed 992.5 million tonnes of oil equivalent (Mtoe) for primary energy and 763 Mtoe for final energy⁷. By extension, it establishes *energy efficiency first*⁸ as a fundamental principle of EU energy policy, giving it legal standing for the first time, meaning energy efficiency must be considered by EU countries in all relevant policy decisions.

The EED was first adopted in 2012, and later updated in 2018 and again in 2023 to include energy audit obligations for large, energy intensive, companies. In the latest revision ('23), all companies, regardless of their size, that are consuming energy above a certain threshold⁹ are obliged to carry out an energy audit, whereas the situation before ('18) this obligation applied only to the larger energy intensive companies which is also reflected in these observed measures in this policy review.

Although the mandatory audits increased the general consideration of electric motor upgrades for energy performance gains, it did not yet lead to significant improvements in the overall uptake and replacement by newer, higher efficiency classed (IE3 or better) motors in industry, though the mandatory standards for electric motors have largely favored the penetration of IE3 motor classes in the EU (Figure 1).

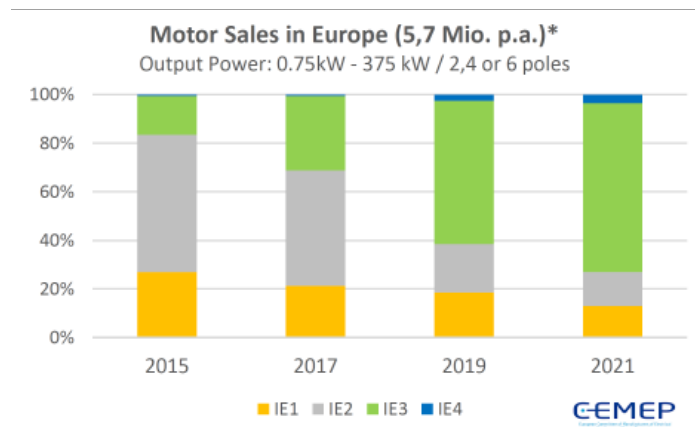


Figure 1: Sales trend of electric motors in Europe across the different efficiency classes¹⁰

What might be a reason for this is that they are seen as being too complex as they are often an essential part of the main production process, and/or too capital intensive to be considered as a viable ESM which

⁷ https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

⁸ https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-first-principle_en

⁹ Enterprises with an average annual consumption higher than 10 TJ of energy over the previous three years, taking all energy carriers together, which do not implement an energy management system, are subject to an energy audit. Enterprises with an average annual consumption higher than 85 TJ of energy over the previous three years, taking all energy carriers together, shall implement an energy management system.

¹⁰ <https://cemep.eu/wp-content/uploads/2022/07/CEMEP-Motor-IE-Class-report-202207.pdf>



is often only due to lack of knowledge/competence, also at the auditor's side. This last issue is also seen by the fact that motor upgrades are often simply not included in the final energy audit report as they were simply overlooked.

The latest EED revision seeks to improve on all these aspects by making the introduction of an Energy Management Systems (EMS) a mandatory requirement for large industrial energy consumers to monitor and optimise their energy efficiency. Also, EU MS countries are now required to ensure a level of competence for auditors, aligning them with market needs and enforcing clearer and stricter requirements. Besides auditors, these competence requirements also include energy service providers, energy managers, and installers.

Part of this development is for MS to include dedicated sections for consideration of motors in the mandatory audit reports. Where the EED requires companies to complete a report every 4 years, depending on national law, some MS require more frequent reports as they have set more ambitious targets.

A critical issue that arises is the fact that only a few of the recommended ESMs coming out of the energy audit reports lead to actual actions by companies. This is typically found to be due to uncertainty of the actual savings, the long payback times, difficulties accessing finance, and the limited public incentives.¹¹

To overcome these obstacles, new measures to encourage the uptake of audit recommendations are introduced which includes voluntary agreements, (potentially) tied to financial incentives (often tax related), and obligations to implement the recommended actions with short payback time (e.g. less than three years) within a given period (e.g. 3 to 5 years).¹²

National Energy and Climate Plans

As part of the [Clean Energy for all Europeans Package](#)¹³ adopted in 2019, National Energy and Climate Plans (NECPs) outline how EU countries intend to meet the EU energy and climate targets for 2030 and provide a mid-term planning (10 years), and overview into the steps taken which includes the policy measures introduced to achieve the energy targets set.¹⁴

The first round of submissions happened early 2019, after which the commission prepared an evaluation, and give recommendations to each of the submitted proposals and communicated this in June, leading to the re-submission of the final NECPs by December 2019 – solidifying countries plans and ambitions to achieve its climate goals in the next 10 years.

EU countries were expected to submit their draft updated NECPs by the end of June 2023 (article 14 of the Governance Regulation), overlapping with this reviews data collection timeline, and only happened in part by the MS.

1.3 Project Structure

Key objectives of EU-MORE are to propose new policies for national and EU regulators, to develop (new) tools which predict their impact, and to monitor and evaluate the uptake-, replacement- and implementation-rate in the industry and service sectors.

For this purpose, three distinct actions are defined and carried out over the project duration:

- **1st** is the development of new policies based on desk research, identifying impacts, barriers, and best practices which are already in place.

¹¹ <https://ensmov.eu/wp-content/uploads/2022/11/D5.4-ensmov-policy-recos.pdf>

¹² <https://ieecp.org/projects/audit-to-measure/>

¹³ https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en

¹⁴ https://energy.ec.europa.eu/topics/energy-strategy/national-energy-and-climate-plans-necps_en



- **2nd** is the provision and moderation of a well-informed, well-structured knowledge exchange amongst stakeholders. Peer-to-peer dialogues, webinars, related events, and other related activities are organised and hosted through a knowledge exchange platform.
- **3rd** Tools for projection, monitoring and evaluation are created allowing for further granularity required for adequate calculation, monitoring, and evaluation of policy results.

This report is part of the 1st action and provides an overview of past, current, and future related policies within the EU-27 MS. In parallel, a technical analysis of the European motor system market is carried out, providing a comprehensive assessment of the current situation and characteristics on the sector-, national- and EU-level. Specifically, data and information are gathered on the electricity consumption, electricity consumption trends, share of electricity consumption, energy intensity, and new and upcoming technological developments for electric motors or motor systems. See the project website¹⁵ for more information.

1.4 Report Structure

The review method for past and existing electric motor policy measures implemented by 27 EU MS is provided in section (2), while an overview of the findings and results is presented in section (3).

Section (4) presents noteworthy observations from the country reviews.

Section (5) identifies topics for further discussion on the interpretation of the results, while section (6) closes the report and draws some conclusions from the review.

¹⁵ <https://eu-more.eu/>



2. Review Method for Past and Existing Electric Motor Policies

A review of past and existing electric motor policy measures implemented by 27 EU MS has been carried out. For each identified measure a general description of the measure characteristics, an impact evaluation, and lessons learnt are complemented by an introduction to the national policy framework and related national programmes, measures and/or developments of that country. An evaluation of the overall size and scope of the national actions in relation to the replacement of electric motors in industry and service companies is also given.

The review is carried out through a literary desk review of (publicly) available information through (national government) websites, and with (publicly) available assessment reports, data sources and/or impact studies.

This initial assessment is further reviewed through external stakeholders, dubbed 'national experts', which have been approached by the reviewers to provide further information on the measures found, the review takes place through a combination of (where applicable) semi-structured interviews, and or a general assessment of the measure information found for each country. When approached, the national experts contacted are asked beforehand to provide, where possible, further assessment and/or insights into the electric motor policy measures considered in each country.

What follows in this chapter is a description of the main sources used (2.1), the timeline of activities (2.2), delimitation of scope (2.3), and a detailed description of the fields used in the collection template (2.4) and an explanation of the impact calculation method used (2.5).

2.1 Information Sources

Typical sources used over the course of the measure review are the National Energy and Climate Plans (NECPs)¹⁶, Annual Energy and/or Climate Reports submitted by the respective national governments, the International Energy Agency (IEA) policy database¹⁷, the ODYSSEE-MURE policy database¹⁸, past experiences and personal contacts/networks of the country reviewing author. In addition, policy descriptions and official legislative acts by the national implementing authorities (e.g., ministries, energy agencies) have been consulted. Due to the overlap of the review activity with the publication of the updated NECPs by MS, only a limited number of country reports consider the newly published NECPs. The ambition of the project is to review and include these in a follow-up activity in 2024 when all the updated NECP reports are made available by the EC and MS (as of end of September, 15 countries have submitted their 2023 NECP update).

Furthermore, the extended network of contacts available through the EU-MORE consortium is leveraged during the assessment. An overview of the partner organizations that contributed to the development of this report is provided:

Table 1: Contributing Partners

Partner	Description	Country
ISR-UC	Institute of Systems and Robotics (ISR) is a Portuguese private, non-profit research institution, associated with the University of Coimbra (UC), founded in 1992 with the global purpose of setting up a first-class multi-disciplinary research team, to carry out leading edge research in areas of science and technology.	Portugal
IEECP	The Institute for European Energy and Climate Policy (IEECP) is a non-for-profit, independent research foundation working on climate change mitigation, energy efficiency and renewable energy policy.	Netherlands

¹⁶ https://energy.ec.europa.eu/topics/energy-strategy/national-energy-and-climate-plans-necps_en

¹⁷ <https://www.iea.org/policies>

¹⁸ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/>



AEA	Founded in 1977, the Austrian Energy Agency (AEA) is a non-profit scientific association whose purpose is to develop, support and implement measures that foster sustainable energy supply and use.	Austria
Fraunhofer- ISI	The Fraunhofer Institute for Systems and Innovation Research (ISI) analyses the origins and impacts of innovations. Researching the short- and long-term developments of innovation processes and the impacts of new technologies and services on society.	Germany
ECI	The European Copper Institute (ECI) is the leading advocate for the copper industry in Europe. Through a team of policy, industry and scientific experts, ECI acts to support copper's role in achieving the EU's policy goals	Belgium
CRES	The Centre for Renewable Energy Sources and Saving (CRES) is the Greek national co-ordination centre in the areas of Renewable Energy Sources (RES), Rational Use of Energy (RUE) and Energy Saving (ES). Role in EU-MORE: CRES will mainly be involved in the development of policies for accelerating the electric motor renovation rate by carrying out an analysis of past experiences building on them. It will also be involved in project communication and dissemination of results.	Greece

IEECP is the lead organization of this motor policy review and acts as central coordinator of all related research activities.

The sources above are the (most) typical sources used over the course of the review with specific reference to the original source materials stated and included in the individual country reports.

2.2 Timeline for Information Gathering

Information gathering happened in the period between April – September 2023, in which related policy measures were identified and described using a common collection template (section 2.4).

Collection is done through a series of in parallel running desk research activities, and related exchanges between country stakeholders, more general energy saving measure experts, and the assigned country lead reviewers.

The assigned country lead reviewers are a combination of the EU-MORE partners (5), from which much of the data was gathered by the member colleagues of the coordinating partner IEECP (8), contributing to individual country reports.

Flexibility was given to each reviewer to find the best suitable method for data collection, either through the exploitation of existing contacts, networks, source materials or other adequate methods that fitted the timeline (availability).

Downstream the research performed by national experts, an additional internal review was conducted by IEECP to guarantee the quality, coherence and adequacy of the results to the research purposes.

An issue with all policy review activities such as this one is that they tend to provide a snapshot in time of ongoing number of activities and changes. Identified source materials, and/or measure descriptions might have changed or no longer be available. Within the specific country reports a clear statement of the collection period is provided.

2.3 Scope of Electric Motors

Per country reports covering of 27 EU MS are created, feeding into this final overview report and providing a comparison of the status, laggards, leaders, typical barriers, and other shortcomings that surround the identified policy implementation practices.



Any policy measure that affects the replacement rate of old, inefficient electric motors used in the industry and/or services sectors are within scope of this policy review. Measures targeting electric motors used in transport (i.e. electric vehicles), or households are not considered, even though the residential sector may be targeted by general cross-cutting measures. Measures covering multiple sectors and that affect electric motors used in industry or the services sector are also included.

This is not a technical review, though given the nature of the topic some technical criteria are included, the goal of this review is not to provide a technical analysis of electric motors, but analysis of applicable policy options for further consideration. Visit the project website for more information on the technical market analysis of electric motors (D2.1).

2.4 Collection Template for Motor Policies and Measures

In each country report a summary description is provided on the national policy framework and related programmes, measures, and/or developments. This includes:

- General information on the implementing- and regulating authorities,
- the underlying framework,
- a description of the general direction and/or course of actions taken,
- an overview of the major national programmes related to Energy Efficiency (EE) measures,
- key takeaways or highlights in relation to the EU-MORE objectives such as national EE targets.

Furthermore, a brief evaluation is provided by the reviewing author on the overall size and scope of the national actions in relation to the replacement of electric motors.

On the individual policy level data is collected and divided into four topics:

- The general overview of the measure (section 2.4.1),
- The detailed description (section 2.4.2),
- The expected and/or measured impacts (section 2.4.3),
- The lessons learnt (section 2.4.4).

2.4.1 Overview

A simple overview of the measure is presented. Included are a short description, the responsible authority, the measure status, issue date, start date, end date, duration and (main) reference(s) to the official publication(s).

Table 2: Measure Overview

	Overview
Short Description	[Brief summary of the policy measure related to motor replacement](2-3 lines max)
Responsible Authority	[(national) authority responsible for implementation](text)
Status	[Ongoing / Proposed (definitive) / Proposed (early-stage) / Completed](pick one)
Issue Date	[Month, Year](date of announcement)
Start Date	[Month, Year](confirmed/expected)
Ending Date	[Month, Year](confirmed/expected)
Duration	[# Months](confirmed/expected)
Reference:	[Link to main resource](official government publication/announcement/website with information)

2.4.2 Main Description

This section hosts an open textbox section including detailed information on the measure under consideration, the target sector(s), drawing reference(s) to anchoring national law(s), EU directives and/or other legislation(s). Further information included in this field are the measures scope, underlying



conditions, criteria for participation in the scheme, a description of the concrete actions, and data on the specific type of motor(s) addressed, like year of construction, efficiency class(es), power, operating hours, use cases, amongst others. Important developments like continuations, follow-ups, extension, delays, early termination of the measure etc., are also included here.

Key data on the characteristics of the measure are collected through the following:

Table 3: Measure Characteristics

	Characteristics
Budget	[Total amount in EUR](total budgeted/actual amount in EUR; Include any relevant details on the budget distribution. If possible, try to include budgets specific to motor renovation (like range of funding/budget available per beneficiary))
Financing of the measure	[How is the measure funded](i.e. through national funds, ESCOs, trade-in-schemes, tax incentive, other...)
Policy focusses	[Product / service](Indication if the policy support package targets/focuses on product ('physical') interventions or service ('soft') interventions.
Intervention Type	[short keyword that best captures the intervention](equipment upgrade, capacity building, awareness raising, mandatory replacement, ...)
Main Barriers Addressed	[Brief description of the main barriers addressed by the measure e.g. high initial cost, lack of information, general financial viability, return on investment, ease of regulation, emission reduction, waste reduction, ...]
Key Driver(s)	[what "forced" the implementation of the measure](a court ruling, a national law, EU Directive, other?)
Replicability	[high / medium / low](a simple 'gut feeling' assessment of the potential for replication or transfer to other countries; are there any specific local conditions)
EU Inclusion	[Yes/No, + short description](Included in NECP? EED? Other EU wide policy directives?)
Related Characteristics	[open text]

2.4.3 Impacts

Description of the final (expected) results of the measure implementation and any achievements related to the measure implementation in the broadest sense of the word. Data is provided in the form of free textbox format, and where available, a description of the method used for calculating the final energy- and/or cost-savings achieved through the measure is included as well.

As before, some of the key factors from the impacts section are summarised in the following structure table:

Table 4: Measure Impacts

	Impacts
Case level impact	[High (>20%)/ Medium (5-20%)/ Low (<5%)/ Unknown](indicative value based on the expected total % reduction in energy consumption through measure introduction at the case level)
Policy level impact	[High (>0.5%)/ Medium (0.1-0.5%)/ Low (<0.1%)](indicative value based on the expected total % reduction in energy consumption through measure introduction at the industry/sector level)
Size	[Number of electric motors impacted by the action, where possible disaggregated by efficiency level, power range]



Energy	[Estimation of overall Energy / GHG savings through the measure](in MWh or tCO ₂) Where available specify the estimation specific to motors.
Impact evaluation	[Short, bulleted list of the main (expected) results and/or key achievements of the measure implementation](see detailed impacts description section above)

2.4.4 Lessons Learnt

Details on the learnings and/or (initial) feedback are gathered in response to the measure's implementation and are included in an open textbox section. (Where applicable) The main barriers found and/or the conditions that are necessary for the implementation of the measure, are described. A summary overview of lessons learnt specific to that measure are collected and provided in the following structure table:

Table 5: Measure Lessons Learnt

	Lessons Learnt
Key takeaways	[List of key takeaways/learnings](summarized list)
Recommendations	[for the specific improvement of existing National and/or EU policies](please specify)
Linked measures	[list of affiliated measures](follow-up interventions, finalized, discontinued, or planned measures associated with the action)
Reference(s)	[weblink(s)](weblink for further reading e.g. reports, studies, publications, policy evaluations, ...).
Other	[Key associated contacts, organizations, ministries, responsible authorities]
Thoughts, comments, considerations ...	[Links to successful cases, case studies, success stories, further research, or any other relevant reports]

The collection template used for the country measures is included in annex I.

2.5 Impact Calculation Method

The method adopted to estimate the impact of the analysed policy measures involving the replacement of electric motors in industry is reported in this section. The purpose of this method is to quantitatively assess or estimate the impact in terms of reduction of electricity consumption provided by the analysed policy measure at sector- and country-level. This analysis is viewed as a potential indicator for gauging the effects of motor replacement as part of the analysed policy measures. The information provided by Table 4 in the country reports has served as basis to estimate the impact in terms of electricity consumption reduction introduced by each policy measure at sector level. In conducting this analysis, the categorization of policy target sectors reported in Table 6 has been employed. This categorization is primarily drawn from the Odyssee-MURE database's classification¹⁹, integrated with specific sub-sectors when explicitly targeted by a measure, such as "Industry – Energy Intensive Companies" and "Municipalities", which have been defined to better describe the measure from a qualitative viewpoint.

¹⁹ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/>



Table 6: Target sectors categorization adopted for impact calculation

Target Sectors
Industry – All
Industry – SMEs
Industry – Large Companies
Industry – Energy Intensive Companies
Municipalities
Services
Buildings – Public
Buildings – All
All Sectors (excluding Transport)

The “Policy Level Impact” score (Table 4) has been employed to estimate the electricity consumption reduction introduced by each measure as described in the following.

In the first place, data of electricity consumption has been retrieved for each MS for the industrial²⁰, service and residential²¹ sectors. “*Industry – SMEs*” sub-sectorial data²² of final energy consumption has been used as well for Austria, Croatia, Greece, Italy, Poland, Portugal and Slovakia. In this case, the national electricity share in final consumption has been used as proxy to estimate the electricity consumption in the SMEs sub-sector. For the same countries, electricity consumption in the “*Industry – Large Companies*” sub-sector has been estimated as the difference between the total industrial one and the SMEs-related one. For the sub-sectors “*Industry – Energy Intensive Companies*”, “*Buildings – Public*” and “*Municipalities*” no electricity consumption data were publicly available.

The electricity consumption data has been used to quantify the electricity savings introduced by the measure at (sub-)sector level based on the qualitative Policy Level Impact ranking employed in Table 4: High Impact (more than 0.5% of electricity consumption), Medium (between 0.3% and 0.5%) and Low (below 0.1%). For instance, in the case in which a policy measure targeted to the whole industrial sector received a High Policy Level Impact, its savings have been estimated as (at least) 0.5% of the national industrial electricity consumption. Such calculation has been possible for MS and sub-sectors with available data of electricity consumption.

Given a policy measure, its overall impact (i.e., the sum of the impact on each targeted sector) has been thus calculated when all the sector-specific impacts were available. This approach has allowed us to estimate the overall impact of about 60% of the analysed policy measures.

The impact of the combined policy measures at country level has been calculated as well. Since the impact estimation was not feasible for all the (sub-)sectors, these results provide just a lower bound for the actual impact on electricity savings at national level.

²⁰ <https://www.indicators.odyssee-mure.eu/energy-efficiency-database.html>

²¹ <https://ec.europa.eu/eurostat/web/energy/database>

²² <https://leap4sme.eu/wp-content/uploads/2021/07/LEAP4SME-D2.1-SME-energy-and-economic-mapping-in-Europe.pdf>



3. Policy Measures in Numbers (Results)

A complete overview table of all measures included in this review is attached in annex II, this section (3.1) provides an in brief overview, presenting some simple observations. Section (3.2) goes one step further presenting impact calculations.

3.1 In brief

64 measures were found across the EU relating to and promoting the replacement of inefficient electric motors:

Table 7: Number of policy measures found for each MS

Country Index	Country	N. of Measures
1	Austria	5
2	Belgium	4
3	Bulgaria	2
4	Croatia	3
5	Cyprus	3
6	Czech Republic	1
7	Denmark	4
8	Estonia	1
9	Finland	1
10	France	1
11	Germany	7
12	Greece	3
13	Hungary	3
14	Ireland	2
15	Italy	1
16	Latvia	3
17	Lithuania	2
18	Luxembourg	1
19	Malta	1
20	Netherlands	3
21	Poland	1
22	Portugal	3
23	Romania	1
24	Slovakia	1
25	Slovenia	3
26	Spain	1
27	Sweden	3

Out of the measures found, 42 (69%) were included in the final 2019, and/or draft 2023 NECP reports, giving some indication for their relevance in achieving the national 2030 energy targets. Another 21 (34%) of the measures were reported as being a direct adaptation of the EED rules and legislation, showing the EED is an important driver for policy introduction. 41 (64%) focus on product interventions, and another 18



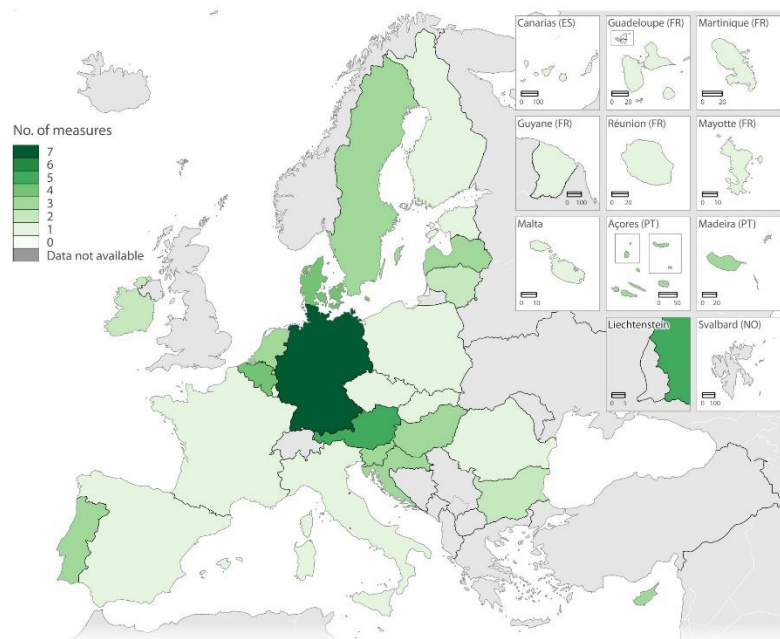
(28%) cover both product and service interventions for a total of 57 (89%) measures tagged as having a 'product' focus.

In terms of the assigned type categories, considering the measure type categorization reported in Table 8, we see a clear preference toward financial measures 36 (56%), consisting of subsidies 30 (45%), combination of Subsidies & Loans 3 (5%) and just loans 3 (5%). With the next category tier covering mandatory standards 7 (11%), and information requirements 4 (6%) for a combined total of 11 (17%) of found measures.

Table 8: Policy Type categorization adopted

Policy Type
General Programme
Mandatory Information
Mandatory Standards
Financial - Subsidies & Loans
Financial - Subsidies
Financial - Loans
Fiscal
Market-based Instruments
Information/Trainings
Voluntary Agreements
Other

Electric Motor Policies



EU-MORE Electric Motor Policy Review

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat – IMAGE, 01/2024

Figure 2: EU-27 Country Map of Policy Measures



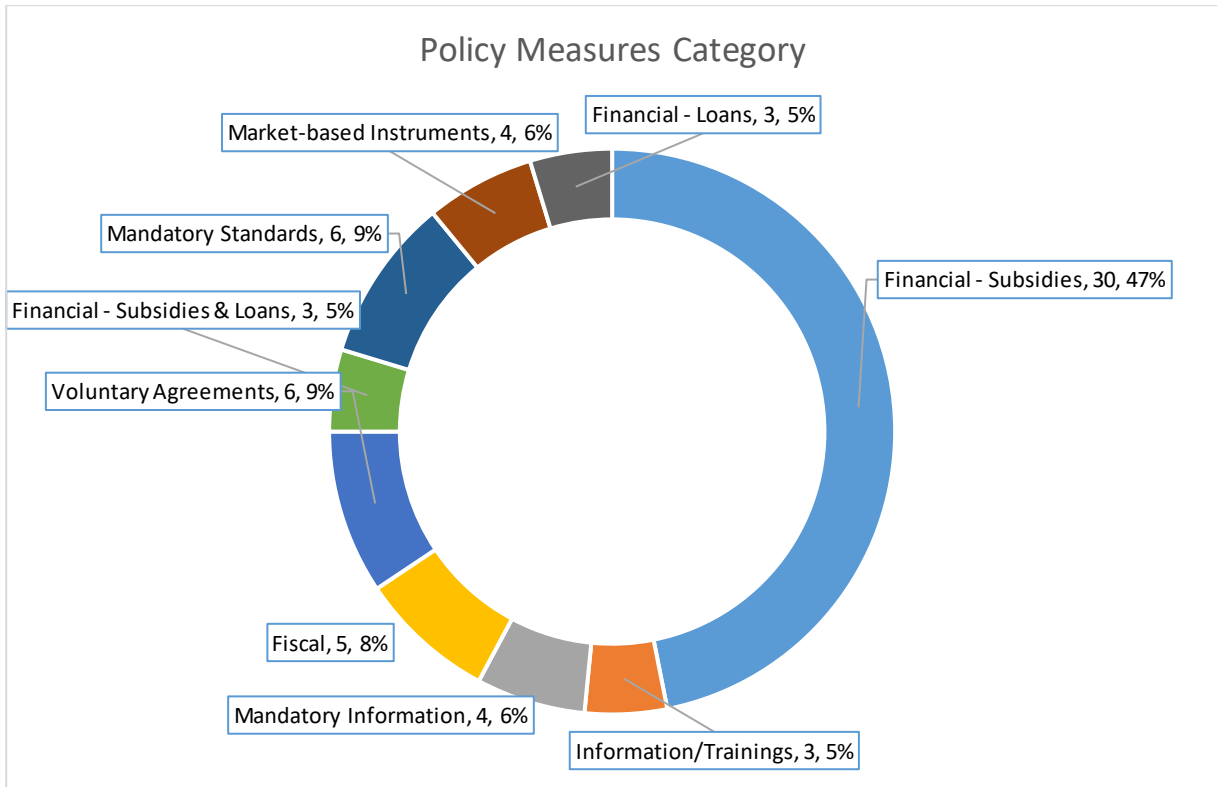


Figure 3: Overview of the policy measures categories

Looking at the defined target groups, 34 (53%) affect companies of the whole industrial sector, with another 11 (17%) focusing on SMEs. 6 measures are specifically targeted to large industrial companies and 4 to energy intensive ones. When combined, 55 (86%) of the measures affect companies active in the

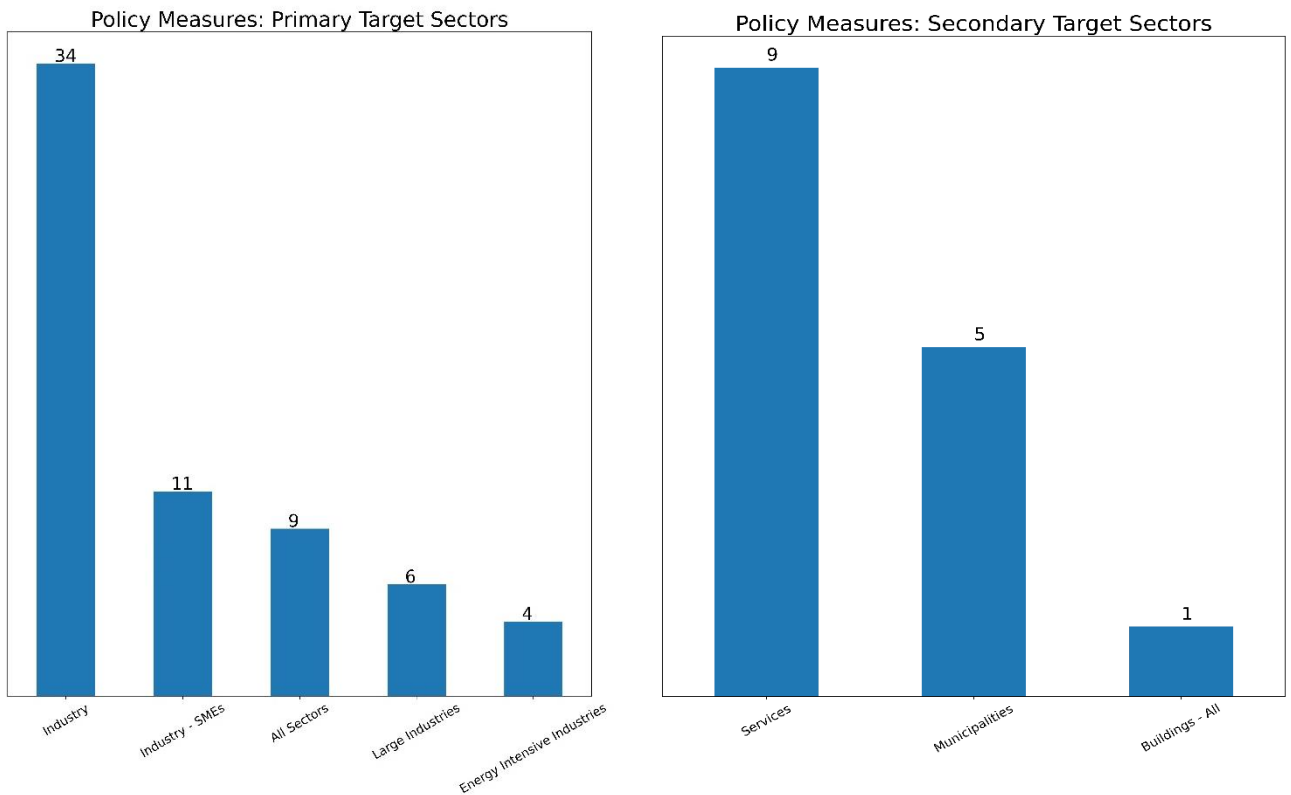


Figure 4: Summary of the primary and secondary sectors targeted by the policy measures



industry sector, with the only other major category being cross-sectoral 9 (14%) and 1 involving primarily public buildings.

At first glance Germany (7), Austria (5), and Denmark (4), appear to be among the frontrunners, in terms of number of measures historically implemented. The oldest measure still active today dates to 1991 and was introduced in the Netherlands, with Austria a close second with a measure included in the review stemming from 1993. 8 (12%) have ended and are no longer supported. 10 measures (16%) have been reported to be active until 2030, while 19 (31%) do not have a defined ending year.

3.2 Impact Calculation (Results)

The results obtained from the application of the methodology of section 2.5 are presented here. Figure 5 shows the impact of each policy measure, codified as reported in Annex II. The *System of white certificates in Poland*, the *Eco-design requirement for energy-using products* and the *KfW Energy Efficiency Programme - Production Plants/Processes* results to be the three policy measures with the highest impact.

When examining the effects of different policy measures on the primary target sector by measure type (

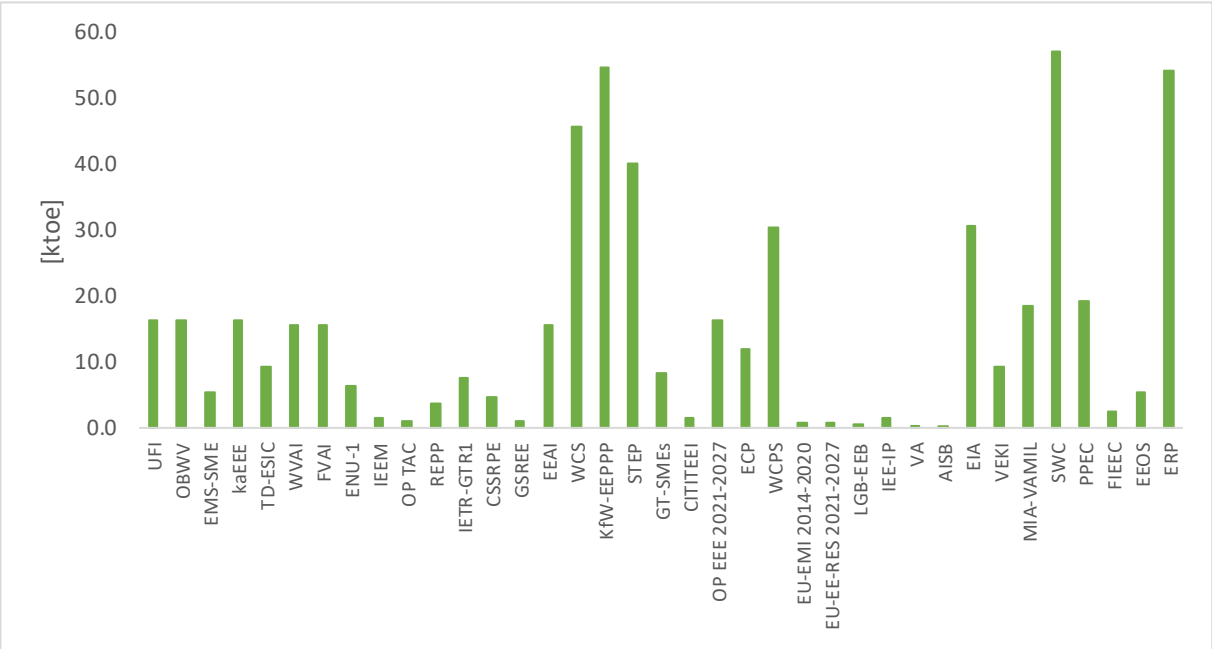


Figure 5: Overall policy impact (ktoe), by analysed policy measure



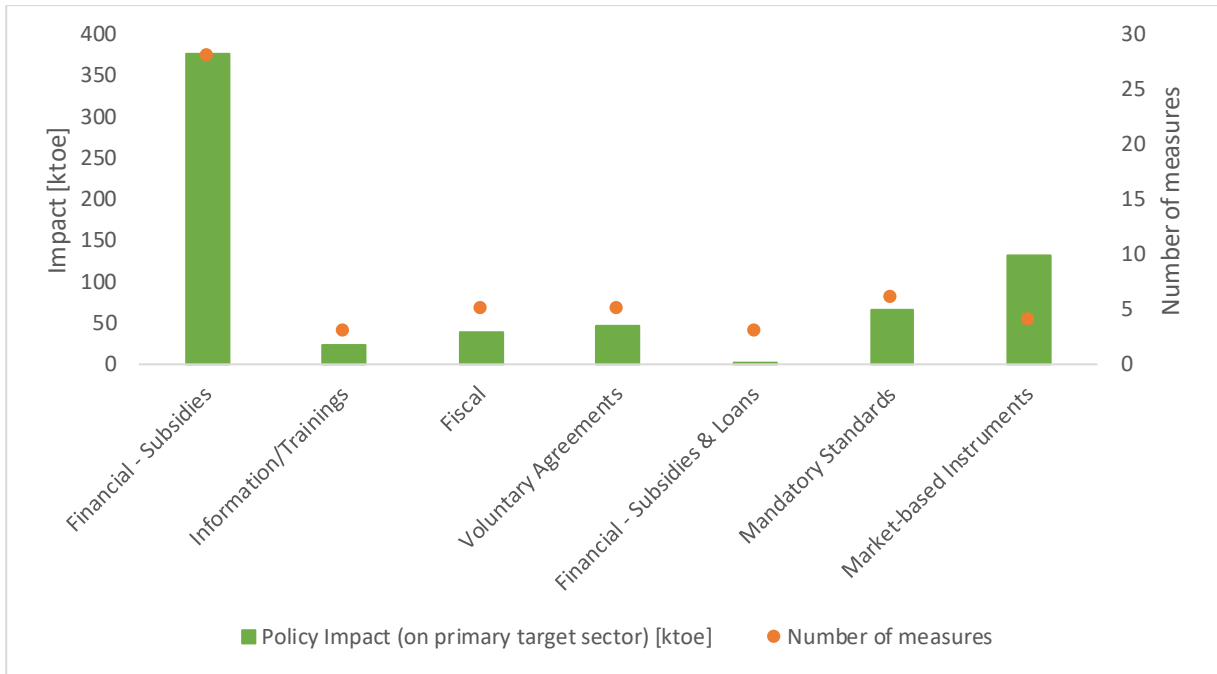


Figure 6), subsidies and market-based strategies exhibit the most significant influence. Subsidies account for their substantial impact mainly because they constitute a substantial portion of the measures (comprising 44% of the total). Nonetheless, the impact of subsidy measures varies considerably depending on the Member State and the specific sector they target. In contrast, market-based instruments (white certificate programmes in this case), despite their limited number, tend to be cross-sectoral and can result in substantial impact.

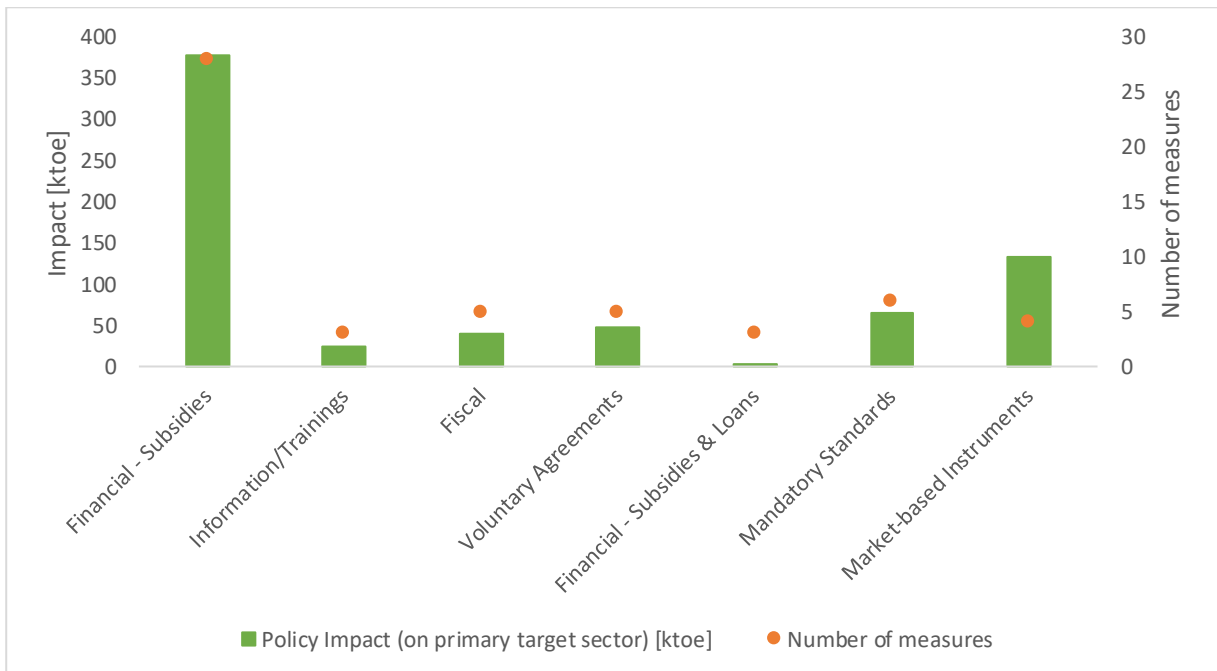


Figure 6: Estimated policy measure impact and number of measures by measure category

In Figure 7 the estimated country-level impact is represented for the EU Member States. The estimation, due to data availability, was possible for 23 MS out of 27. Germany (331 ktoe), Poland (57 ktoe) and Austria (54 ktoe) have implemented the measures resulting in the highest country-level impact. This is due to the



high number of measures implemented, for Germany and Austria, and the high impact and cross-sectoral feature of the white certificate scheme implemented in Poland.

The impacts for the mandatory standards are underestimated, as appears from a quick calculation based on Figure 1 (and data on previous shares of IE-labels for 2010). Between 2010 and 2021, one can estimate that for 200 kW motors (4 poles) the average increase in efficiency was 1.2 percentage points. Taking industry only and assuming that 70% of the industrial electricity consumption in 2021 was used in electric motors (about 650 TWh), the savings calculated from the improved standards from 2010 to 2021 was about 695 ktoe, as compared to 65 ktoe reported in Figure 6. This is due to fact that mandatory technical standards have only partially been captured through the interviews, which were focusing on other mandatory measures.

These results are based on qualitative impact scores provided by policy review experts. The estimation of the impact may be subject to biases and uncertainties in the following areas:

- Bias in the impact score attribution by the country expert: The impact evaluation may differ by Member State depending on the score attribution method of the expert when quantitative data for the measure is lacking.
- Bias in the overall policy impact by country: The lack of impact scores for certain measures prevents the quantitative estimation of the impact, leading to underrepresentation of Member States with fewer measures with attributed impact scores in the overall policy impact.
- Bias in accounting for sub-sectors without final energy consumption data: Sub-sectors without available final energy consumption data were not considered in the overall impact calculation, potentially resulting in the underestimation of the impact for measures targeting multiple sub-sectors.

Overall Policy Measures Impact

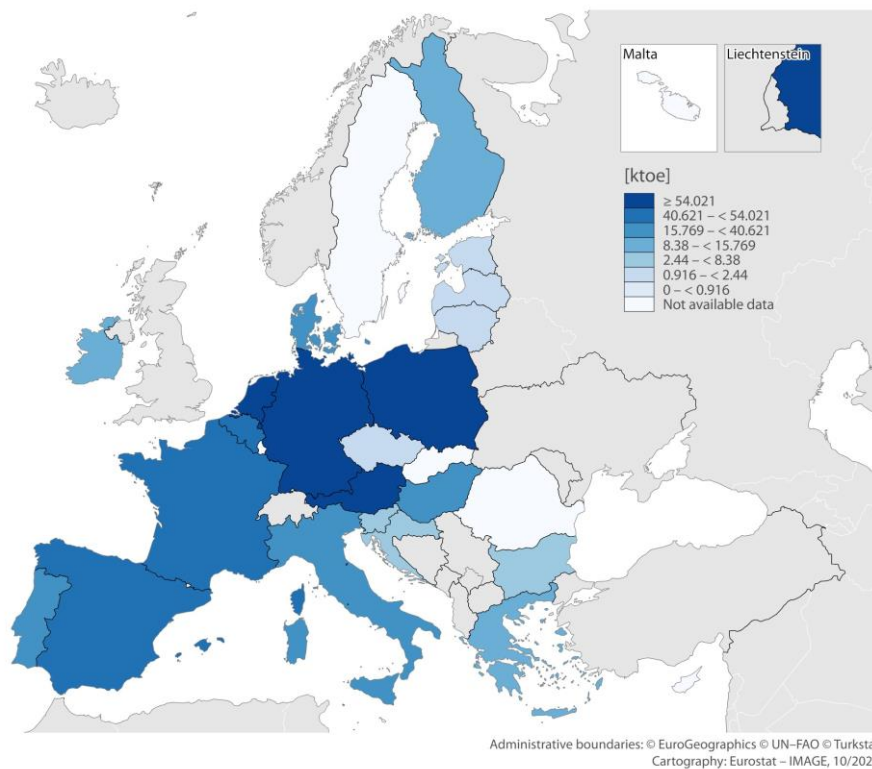


Figure 7: Overall impact of policy measures including motor replacement across European countries

Top-down calculation of energy savings from electric motors

Electricity savings in industry can also be calculated top-down, by making use of the evolution of electricity demand, taken from the ODYSSEE-MURE database (2023) and combining it with the evolution of the industrial production index. By decomposition analysis, top-down savings can be calculated. Given the fact that electric motors and motor systems account for around 70% of the industrial electricity savings, the so calculated top-down electricity savings constitute a relatively good proxy in the case of industry. In the case of services, the correlation is much less pronounced given that electricity demand in services is largely dominated by other end-uses than electricity uses for motor systems. The time frame considered is from 2010-2021, which corresponds to the period, from the [Regulation on ecodesign for electric motors \(EC\) No 640/2009](#) to the [Regulation on electric motors and variable speed drives \(EU\) 2019/1781](#) and its 2021 revision.

Table 9: Top-down savings calculated from electricity indicators in industry

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Electricity consumption of industry (TWh)	925,6	936,5	920,3	906,4	910,1	913,9	925,9	942,5	945,4	933,1	884,3	928,4
Industrial production index normalised to 2015)	97,84	100,46	97,68	96,68	97,86	100,00	101,80	105,26	106,86	107,26	100,04	108,34
Electricity savings related to electric motors (TWh)	0	9,7	2,7	5,8	11,0	22,5	26,0	37,4	45,9	57,1	43,5	67,6

Source: [ODYSSEE-MURE database](#)

Table 9 shows that the savings which have been built up to 2021 (avoiding 2020 as a very specific year due to Covid-19), are in the range of 68 TWh annual savings (5814 ktoe). This also includes autonomous savings. This is why top-down savings tend to be higher than savings calculated bottom-up from policy measures.

4. Noteworthy Country Observations

This section presents briefly in an exemplary manner several electric motor programmes for a selected number of countries. Details for each country and each programme are provided in Annex III: Policy Reviews Collection.

Austria

Related policy developments in the past, present, or (near) future

The most important policies/programmes to promote are subsidies in the field of energy efficiency investments, within the "Umweltförderung Inland". Here, motor replacement and certain motor optimisation measures can be subsidised.

In 2011/2012 the "Energy-efficient drives" programme subsidised the replacement of electric motors and the installation of frequency converters with a flat rate per kW. The programme was not continued.

Within the klimaaktiv programme audit guides for pumps, fans were published around 2010, including information on motor replacement and high efficient motors. For these audit guides trainings for consultants were and are still organized.

In December 2023 potential energy savings by the replacement of electric motors and other saving measures (as insulation of pipes, introduction of building automation systems, hydraulic optimisation of heating systems) in Austria were discussed, including a potential subsidy programme for these purposes.

Brief Evaluation

In principle, energy efficiency measures also in the electricity sector, where Austria has a high share of renewables, are promoted by the BMK (Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology).

Energy consultancy, energy auditing, awareness raising, and investment subsidies are in place, but, for all these instruments no specific motor replacement programme exists. One exception are the specific



motor replacement tips within the klimaaktiv pumps and fan system audit guides. Within this programme awards are given for measures in the optimisation of such systems.

France

White Certificates Scheme [Certificats d'Economies d'Energie – CEE]

The catalogue of the scheme includes several action types related to electric motors, including one about high efficiency motors (IE4 class) up to 1 MW. However, the way this action is counted does not differentiate whether this would be an early replacement or not. Larger motors can be eligible as a specific action, requiring an energy audit.

The scheme has been created by the national Energy Law adopted in 2005 and started officially in July 2006. It sets mandatory energy savings targets on energy suppliers. The energy suppliers can meet their target by acquiring white certificates, either with their own programmes or buying them on the market. The most common way to get certificates is to use the catalogue of the 200+ types of standardised actions (88% of the white certificates in 2018-2021). It is also possible to get certificates from specific actions reported with energy audits (3.6%), or by funding accompanying programmes selected by the ministry through calls for programmes on topics defined by the ministry (8.4%).

The scheme covers all end-use sectors, including the industry. Until 2019, the industrial sites covered by the EU ETS were not eligible. They can now be eligible under certain conditions. It should be noted that, even if the scheme is cross-cutting, it has aimed primarily to achieve energy savings in buildings (where it is possible for end-users to cumulate incentives from white certificates with public incentives). Nevertheless, the amount of white certificates from actions in industry has increased over time.

The parties that can apply for white certificates are the obligated parties (energy suppliers), delegated parties (organisations contracted by obligated parties to meet part or all of their energy savings target) and eligible parties (local authorities, social housing body and the national housing agency). End-users cannot apply for white certificates, however they can benefit from the support offered by the obligated, delegated or eligible parties. This support is most often a financial support (e.g. grant or soft loan). It can also be a tailored technical support, but this is rare as it is more difficult for the obligated parties to demonstrate that they had a material role in the implementation of the energy efficiency actions.

The standardised actions are defined with technical specifications (e.g. minimum efficiency requirements, capacity range, installation by a professional, applicable technical standard(s) to be met). These specifications also set the data to be reported for each action. The specifications' factsheets (in French) are given below as hyperlink on the catalogue's code of each action type.

List of standardised actions related to electric motors (as of July 2023), with their code in the catalogue:

Most of these action types are about industry:

- IND-UT-132: asynchronous motor of class IE4
- IND-UT-102: variable speed drive on asynchronous motor
- IND-UT-114: permanent magnet or reluctance synchronous motorised variable speed drive
- IND-UT-133: electronic control system for an electric motor with energy recovery
- IND-UT-136: motor-controlled systems

There are also two action types about services:

- BAT-EQ-123: permanent magnet or reluctance synchronous motorised variable speed drive
- BAT-TH-112: variable speed drive on asynchronous motor

In case of actions not covered by the catalogue, they can be submitted as specific actions. The submission file shall then include an energy audit, and the payback time shall not be less than 3 years. The methodology to document a specific action has been defined by ADEME (French agency for ecological transition).



Germany – multiple measures, see country report (annex III)

Several national programs support energy efficiency initiatives in Germany's industry, where notably the programme on "Federal Funding for Energy and Resource Efficiency in the Economy" supports both, components and systemic aspects related to motors:

- The "KfW Energy Efficiency Programme for Production Plants/Processes" is a German national program that provides low-interest loans to commercial enterprises for implementing energy efficiency measures in their production facilities and processes. The program is ongoing and is available for companies of any size and is open to companies and individual entrepreneurs in the commercial sector who are majority privately owned, as well as freelancers. The program requires all investment measures to achieve energy savings of at least 10 %
- The "Federal Funding for Energy and Resource Efficiency in the Economy" is another German national program that aims to increase energy efficiency in the industry. The program receives over 10,000 applications per year and consists of different modules. The purpose of module 1 is to support the replacement or acquisition of high-efficiency units for industrial and commercial applications on the company premises in cross-sectional technologies. The program is ongoing and has been successful in supporting smaller projects with a very high attractiveness for applicants. Module 4 (Energy- and resource-related optimisation of facilities and processes) complements with a systemic approach: Funding is provided for investment measures for the energy and resource-oriented optimisation of industrial and commercial facilities and processes that contribute to increasing energy or resource efficiency. The funding is open to all technologies and can also include the measures listed under modules 1.
- The "Energy-efficient and climate-friendly production processes" programme, which is designed to improve energy efficiency in production processes. It supports companies in investing in the most energy-efficient and environmentally friendly solutions in the design of their production processes.
- The "STEP up! - Utilizing electricity efficiency potentials" programme aims to increase the efficiency of electricity use by promoting the use of energy-efficient technologies and practices. It provides funding for projects that reduce energy consumption and greenhouse gas emissions by improving the energy efficiency¹⁰. The programme was running from 2016-2019.
- The "PIUS Advice and Invest" programme subsidises investment projects by SMEs which increase resource efficiency and reduce CO₂ emissions through process and/or organisational changes. SMEs in production, commerce and the service sector are supported with consulting in their efforts to cut their resource consumption and reduce emissions of harmful substances through 11.

According to "Regulation on Securing Energy Supply through Medium-Term Effective Measures (EnSimiMaV)" (Verordnung zur Sicherung der Energieversorgung über mittelfristig wirksame Maßnahmen) companies are required to promptly implement identified and economically feasible energy efficiency measures within 18 months. The feasibility is determined based on an economic viability assessment as outlined in DIN EN 17463 12.

Germany has further developed a unique policy instrument based on "[Learning Networks for Energy Efficiency](#)". This instrument consists in company networks including 10-15 companies, which set themselves in a moderated manner specific energy efficiency targets over several years. Details of this approach are described on the website of the network initiative, which now includes nearly 400 networks. In the 2022 monitoring report, results of 212 networks are reported which by then had finished the networking activity. The 2,191 companies participating in the 212 networks evaluated reported a total of 9,070 implemented energy efficiency measures. In 8,328 of these, the energy savings were quantifiable, while the remaining were mainly organizational measures, such as training courses and information campaigns. These 8,328 quantifiable energy-saving measures result in total annual savings of 6,743 GWh of final energy, 8,452 GWh of primary energy (only the non-renewable portion is considered) and 2,451 kt of CO₂. The 212 networks investigated achieved their average network target of 33.4 GWh/a, as reported in the monitoring, by 95% (previous year: 98%). At the measure level lighting (27%) were implemented most frequently. These are followed at a great distance by measures in the areas of process technology (15%), compressed air (7%), motors and drives (7%), heating and hot water (7%) and other measures (6%).



Of the measures implemented, 49% related to the replacement of existing technology, while 37% represented optimization. 76% of the measures related to electricity as an energy source and 17% to natural gas. The technology with the largest median savings per measure turned out to be cogeneration, followed by heat recovery/waste heat recovery, industry-specific processes and process heat. Across the measure categories the largest savings come from process technology, process heat, other measures, heat recovery/waste heat recovery, and industry-specific processes. This example shows that, despite the high share of motor and motor applications in industrial energy demand, they still represent a low share in savings, even in a highly specialized policy measure such as the Learning Networks for Energy Efficiency.

Greece

“Antonis Tritsis AT03” Programme.

Interventions and actions to improve energy management and use of renewable energy in water and wastewater management infrastructure.

Antonis Tritsis Programme is managed by the Ministry of Internal affairs and is aimed at municipal water and wastewater utilities. The total budget of the 12 in total foreseen actions amounts to 2.5 bn € (funding from National Resources and the European Investment Bank).

Action AT03 is the most relevant to the project as it involves replacing old pumps and inverters for more energy efficient operation and use of RES. More specifically in the context of AT03, it is planned to finance projects related to the following actions:

1. Interventions and actions to improve energy efficiency, energy saving in energy-intensive water and wastewater infrastructures such as replacement of equipment in pumping stations, boreholes, water and wastewater treatment facilities, buildings, etc. Replacement of existing pumps with new high energy efficiency ones. Installation of frequency converters (inverters).
2. Utilization of Renewable Energy Sources (RES) (PV on the roofs of buildings, in parking areas, on the roof of closed tanks, geothermal, etc.) and intelligent energy distribution-storage-consumption systems (the utilization of RES and the management of energy are aimed at energy autonomy).
3. Supply and installation of intelligent energy management systems in existing sewage and drinking water networks, and treatment facilities. Indicative actions are the installation of energy consumption meters in energy-intensive infrastructures/equipment and their correlation with quantitative and qualitative parameters. Installation of analogue water level sensors for water reservoirs, control-monitoring, and energy management systems facilities/infrastructure

The total budget for the AT03 Call for Proposals is 150 mln €.

There have been 139 proposals for funding exceeding the total budget by about 200 mln €. The budget of the selected 53 projects will amount to 145 mln €.

Action AT01 of the same programme is also linked to water and wastewater infrastructure and focuses solely on the aging pipework network. More specifically in the construction of new external networks and upgrading internal drinking water distribution networks through the replacement of aging pipelines, creating zones and loops.

Together the two programmes will deliver a significant upgrade to both electromechanical equipment (AT03) and pipe network (AT01) of local water companies and municipalities.

Netherlands

The Netherlands is and remains ambitious and objectively at the forefront of the energy transition, introducing advanced policy measures targeting EU-MORE related measures for (industry) companies.

An important (new) development within the Dutch legislative framework is the requirement (as of end of 2023) for large companies to analyse all motor driven systems larger than 15 kW. This happens as part of



the mandatory energy audit which is implemented nationally (refer to the 'onderzoeksplicht' and 'informatieplicht') and overlaps with the mandatory energy audits for large companies required by the EED Art.7/8 every 4 years.

This specific inclusion of motor driven systems in the mandatory energy audit is an important development that could be the first step towards accelerated uptake and implementation of specific policy measures targeted at the replacement of old- and inefficient electric motors.

In regard to this review, three measures were found that stipulate the replacement of electric motors for energy efficiency improvements: 1. the Energie-investeringsaftrek (EIA), 2. the Versnelde klimaatinvesteringen industrie (VEKI), and 3. the Milieu-investeringsaftrek (MIA) & Willekeurige afschrijving milieu-investeringen (VAMIL). Each identifying and targeting the replacement of electric motors in processes through various intervention types and are described in detail.

However, in each of the identified measures the replacement of electric motors is part of wider policy and technical interventions providing blanket EE improvements to companies or the industry sector.

The Dutch 'Energy List' provides detailed specification for eligible (technical) measures which, in relation to EU-MORE, includes IE3, IE4 and IE5 electric motors for use in (industry) company processes.

Portugal

The Energy Efficiency Promotion Plan (PPEC) consists of an incentive mechanism that aims to promote actions to improve efficiency in electricity consumption. To this end, suppliers, network operators and entities that promote and defend the interests of electricity consumers in Portugal propose measures (tangible and intangible) that go through a selection process managed by ERSE (Regulatory Entity). These actions are aimed at electricity consumers in the various market segments, such as Industry and Agriculture, Commerce and Services, and Residential. The selected actions are funded through a tariff surcharge included in the energy bill (Global Use of the System). The PPEC had its first edition in 2007 and it is now in its 7th edition.

Measures relating to electric motors were approved in the 4th edition (2011/2012), 5th edition (2013/2014) and 6th edition (2017/2018).

In the 6th edition, a measure to promote the installation of High Efficiency Motors (HEMs), within the 0,75kW to 400kW power range, in the manufacturing, agricultural and fisheries sectors as a replacement for low efficiency motors (motors of efficiency class below IE1) was approved. The objective was to replace these inefficient motors with IE3 or IE4 motors.

A financial incentive of 51,1% of the average new motor price (including installation costs) was given. The measure also foreseen a rapid assessment of the use profile and load of the motor to ensure a correct dimensioning of the replacement motor. The measure had a budget of 896 767€ for the replacement of 420 motors. The estimated electricity savings generated by the measure were of 115 GWh with a corresponding reduction of GHG of 43 thousand tCO₂eq.



5. Discussion

This section discusses main observations on electric motor-related policies, as there are:

- Mandatory standards for electric motors
- Subsidy-based policies for electric motors
- Non-subsidy-based policies
- Generic energy efficiency programmes for industry versus motor-specific policies
- Impacts of motor-related policies
- Missing aspects in electric motor-related policies

5.1 Mandatory standards for electric motors

Regulation on mandatory standards and labels for electric motors under eco-design and labelling policies²³ has been a central European instrument to address new motors. While new motors are not the focus of the EU-MORE project, standards and labels for motors provide the (minimum) potential for electricity savings, when old motors are replaced.

Efficiency requirements for low voltage motors are derived from the [Commission Regulation \(EU\) 2019/1781](#) and the amending [Regulation \(EU\) 2021/341](#) which extend the scope of energy efficient motors covering the output power range from 0.12 kW up to 1000 kW and setting for the first time energy efficiency requirements for the variable speed drives (VSD).

In the last two years, the standards were increasingly tightened further:

Step 1 (Starting 1 July 2021)

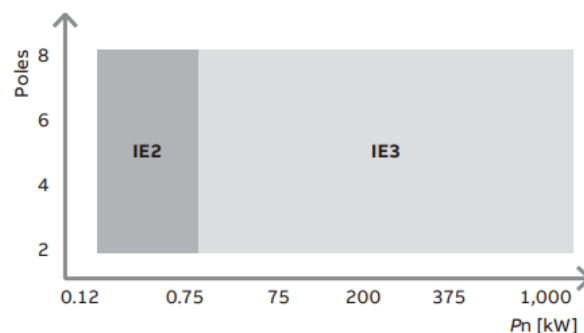


Figure 8: Regulation for electric motors under EU Eco-design requirements (since July 2021)

The first step in 2021 broadened the range of motors concerned. The coverage with standards concerns induction electric motors without brushes, commutators, slip rings or electrical connection to the rotor, rated for operation on a 50 Hz, 60 Hz or 50/60 Hz sinusoidal voltage, that:

- have 2, 4, 6 or 8 poles;
- have a rated voltage above 50 V and up to and including 1000 V;
- have a rated power output from 0.12 up to and including 1000 kW
- are rated on the basis of continuous duty operation (means capable of continuous operation at rated power with a temperature rise within the specified temperature class) and
- are rated for direct-on-line operation.

Three-phase motors with a rated output between 0.75kW and equal to or below 1000kW had to reach the IE3 level of motor efficiency standards by July 2021 (see Figure 8). The regulation also sets requirements

²³ <https://www.iea-4e.org/ems/news/ie4-motors-are-required-in-the-eu/>

on the efficiency of variable speed drives. Variable speed drives have two levels of efficiency (IE1 and IE2) and the regulation requires all drives in scope to reach the IE2 level.



Figure 9: Regulation for electric motors under EU Eco-design requirements (since July 2023)

Step 2 (Starting 01.07.2023) (additions to Step 1)

2, 4 and 6 pole single speed motors from 75 kW up to 200 kW had to reach the IE4 efficiency class (Figure 9).

The Regulation also sets information requirements for electric motors and variable speed drives in scope. This includes the provision of energy efficiency values at different load points, enabling easier optimisation of energy use in motor systems.

The EU Commission estimated that under the former regulation more efficient motors were expected to bring 57 TWh of annual energy savings in the EU by 2020. Taking into account the overall effect of the revised regulation, the annual savings are expected to increase to 110 TWh (9500 ktoe) by 2030.

5.2 Subsidy-based policies for electric motors

The overwhelming number of measures discussed in Chapter 0 are related in a broad sense to subsidy-based policies. Taking all categories together, which in one way or another represent subsidies: financial measures and loans, as well as their combinations, fiscal measures and market-based instruments such as energy saving obligations (see Figure 3) 42 out of 61 (69%) are related to subsidy-based policies. This shows that energy efficiency policies related to electric motors are targeting largely the financial barriers. While these factors hold significance, obstacles in implementation, such as complex interactions with industrial processes, are impeding the adoption of cost-effective measures within the industry. The recent surge in electricity prices, driven by escalating gas prices, significantly influences wholesale electricity prices and has been particularly pronounced in 2022. Despite observing a decline in electricity prices in 2023, they still hover around an average that is roughly double the pre-Ukraine crisis levels. It remains uncertain whether they will swiftly return to those lower levels, as a potential resurgence in gas prices could lead to another increase in the near term. In the medium term, there are certainly factors at work which tend to decrease the prices (notably reforms in the marginal pricing of electricity and increasing penetration of renewables in the power mix). However there are also strong factors active leading to increases in electricity prices (such as increasing demand from heat pumps, electric cars, hydrogen production and direct electrification of process). This will lead to further strain on electricity prices.

Hence, it can be expected that the economics of motor-related measures is already becoming more interesting and will further improve. The non-economic barriers to motor-related measure thus will require additional focus.

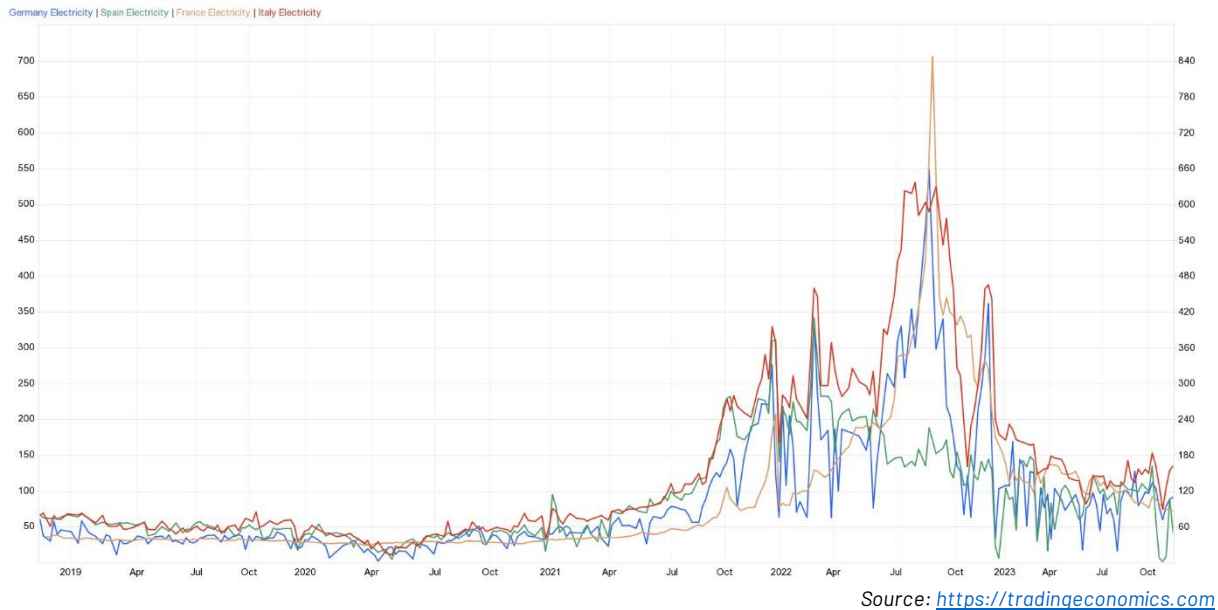


Figure 10: Whole sale electricity prices in four European countries Germany, France, Italy, Spain

5.3 Non-subsidy-based policies

Non-subsidy-based policies related to electric motors only represent one third of all policies. They are linked to:

- Mandatory standards
- Mandatory information (such as audits or motor labelling)
- Informational measures
- Learning Networks for Energy Efficiency

Barriers overcome by non-subsidy-based policies related to electric motors include informational and behavioral barriers to electric motor replacement. Mandatory information policies, such as energy audits obligations, are one example of such policies. These policies aim to provide information to consumers about the benefits of electric motors and to encourage them to replace their old, inefficient motors with newer, more efficient models. Learning Networks for Energy Efficiency is another example of a non-subsidy-based policy that aims to overcome informational barriers by providing training and support to businesses and individuals on how to improve energy efficiency.

The success of these measures in overcoming barriers to electric motor replacement varies depending on the specific policy and context. However, the effectiveness of mandatory information policies is less clear, as they may not be sufficient to overcome all of the barriers to electric motor replacement, such as upfront costs and lack of awareness about the benefits of electric motors.

5.4 Generic energy efficiency programmes for industry versus motor-specific policies

Frequently motor-specific policies are integrated into general industrial programmes on energy, as can be derived from the following examples and the in-depth analysis presented in Annex III: Policy Reviews Collection.

Example where electric motors are not specifically addressed in industrial energy efficiency programmes:



- The Learning Networks for Energy Efficiency in industry address all industrial technology equally. Correspondingly, low hanging fruits such as industrial lighting first attract the attention of the networks, while electric motors and their applications represent a correspondingly low share.

Examples where general programmes on energy efficiency in industry include motor-specific components.

- The “Federal Funding for Energy and Resource Efficiency in the Economy” programme in Germany aims to increase energy efficiency in the industry. The purpose of module 1 is to support the replacement or acquisition of high-efficiency units for industrial and commercial applications on the company premises in cross-sectional technologies.
- The Energy Efficiency Promotion Plan (PPEC) programme in Portugal, containing a measure to promote the installation of high efficiency motors (IE3 or IE4).

While there are arguments to consider policies and measures in the context of all industrial energy efficiency policies, there are **important arguments to advocate motor-specific measures which address all or many aspects of motor-specific barriers in industry in common** and in focus, given the fact that electric motors and their applications represent about 70% of industrial electricity demand in Europe.

5.5 Policy instruments promoting systems approaches to motor replacement

Quite a few of the investigated countries have developed specific policy instruments to address systems approaches to motor replacement. Examples include:

- The Netherlands: An important (new) development within the Dutch legislative framework is the requirement (as of end of 2023) for large companies to analyse all motor driven systems larger than 15 kW. This happens as part of the mandatory energy audit which is implemented nationally (refer to the ‘onderzoekplicht’ and ‘informatieplicht’) and overlaps with the mandatory energy audits for large companies required by the EED Art.7/8 every 4 years. This specific inclusion of motor driven systems in the mandatory energy audit is an important development that could be the first step towards accelerated uptake and implementation of specific policy measures targeted at the replacement of old- and inefficient electric motors.
- Germany: In the “Federal Funding for Energy and Resource Efficiency in the Economy”, which has different modules, the purpose of module 1 is to support the replacement or acquisition of high-efficiency units for industrial and commercial applications on the company premises in cross-sectional technologies. This module is component-oriented with a detailed list of technologies. Motor systems aspects are partly reflected in the detailed technology lists. Module 4 (Energy- and resource-related optimisation of facilities and processes) complements with a systemic approach: Funding is provided for investment measures for the energy and resource-oriented optimisation of industrial and commercial facilities and processes that contribute to increasing energy or resource efficiency. The funding is open to all technologies and can also include the measures listed under modules 1.

CEMEP addresses the systems perspective in their policy paper "[A system approach to maximise energy savings potential in electric drive systems](#)". Their key take-aways are:

- Only increasing the efficiency level of individual components (e.g. motor or VSD) does not generate significant energy savings.
- A system approach must be implemented to enable efficiency, when components become a system optimising the energy consumption of the application.
- Key measures should be mandated to start saving energy, such as using Life Cycle Cost assessment; expert cooperation & knowledge creation; and highlighting non-energy benefits (e.g. lower carbon footprint).

CEMEP points to the fact that in recent years standards were developed to assess the energy efficiency of components and systems, progressing from the individual component to the entire electric drive



system. Notably, this is the case of the Standard IEC 61800-9 Electric Drive System, which describes how to calculate the energy efficiency of a complete Electric Drive System. Based on the development of these Standards, CEMEP advocates policies addressing in particular the following organisational and technical measures (CEMEP 2023), which are best addressed in connection with audits on motor systems, notably:

- the use of Life Cycle Cost assessments to highlight the advantages of energy saving measures in motor systems.
- the creation of knowledge using IEC- and ISO-standards across the value chain to reduce the energy demand of electric drive systems.



6. Conclusion

The imperative need for EU member states to prioritize the introduction of policy measures targeting old and inefficient electric motors used in the industrial and service sectors cannot be overstated and becomes ever more apparent from this review with little to no policies found that are targeting motor replacement directly. Instead, blanket EE related measures cross cutting multiple sector are found to be the main measures addressing motor inefficiency related energy consumption. As per the introduction section, the electricity consumption of motors in the industrial sector remains a significant contributor to energy consumption and carbon emissions across the EU with over an estimated half of Europe's electricity consumption in the industry sector consumed by motors. Introduction of adequate measures to support their timely replacement therefore plays a pivotal role in driving the energy saving targets of the member states and, as emphasised by this review, remain under considered by all countries.

Aligning with the long-term goals set in the NECPs, EU member states are committed to achieving substantial reductions in greenhouse gas emissions by 2030, with the ambition to transition to a cleaner more efficient energy system. These reports outline the strategic roadmap towards the ambitious targets set by the EU, and under the EED, specifically relating to Articles 7/8 (and 11 audits), MS are obligated to implement policies that promote energy efficiency and the use of renewable energy sources to achieve the (annual) energy consumption targets set. However, what is apparent from the first revision of the NECPs and the underlying accompanying annual energy reports, is that many MS struggle to achieve the saving targets set.

Introducing policy measures which focus on, and promote the need for, early motor replacement the MS have a major, and still often untapped, opportunity to significantly contribute toward achieving the saving targets set. Furthermore, the introduction of focused policies can foster innovation and economic growth, by incentivizing the adoption of efficient technologies in parallel to motor replacements such as digitization of the motor system, introduction of variable speed drives (VSDs), energy class standards, improvement of recycling, and further development of a robust market for energy-efficient motors which is shown to be underappreciated.

Also economic benefits of early motor replacement should not be understated, as they align with reduced energy costs for industries, increased competitiveness in global markets, and job creation in the manufacturing and maintenance sectors which are all potential outcomes of adequate integration of motor replacement policies. Similarly, roll-out of supportive trainings raising the overall competence of motor operators and energy experts, often auditors, who lack the required knowledge for proper assessment of the motor system, and fails to recognise the inherent energy savings potential.

In essence, the adoption of policies targeting old and inefficient electric motors in industry represents an untapped and major opportunity for member states. Allowing them to address environmental concerns, stimulate economic growth, and bolster their energy security, all in alignment with the long-term targets laid out in their NECPs and the obligations stipulated in the EED. The time to act is now, and by doing so, EU member states can take a significant step towards a more sustainable and prosperous future for all, while fulfilling their energy saving obligations.

7. Annex I: Policy Review Collection Template

EU-MORE



EUropean MOtor
REnovation initiative

Collection Template

of past and existing policy options for the
acceleration of electric motor renovation

COUNTRY

Main Author(s) (Organization)



List of Acronyms

Acronym	Text
	Please include any acronyms used in this Collection Template



COUNTRY

General suggestions and recommendations filling in this template:

- Consider the [National Energy and Climate Plans \(NECP\)](#) as a good first starting point
- Have a look at the [ODYSSEE-MURE](#) database for a first policy overview before diving into the government websites
- Also consider the [IEA policy database](#)
- **Contact (national) policy experts for verification and additional inputs, rather than asking them to fill out the policy review for you.**
- **Use this activity as a good opportunity for general stakeholder outreach for EU-MORE, draw attention to the [website](#) and explore the option to discuss upcoming developments by creating a dedicated section on the [forum](#) (and sign up!)**

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

... add text here ...

Suggested format/structure:

- Introduction to the national policy framework including the implementing authorities (name and typical responsibilities)
- Description of the general direction / course of action taken by the country (NECP)
- Overview of major national programmes related to Energy Efficiency
- Highlight EU-MORE related and/or relevant policy developments in the past, present, or expected in the (near) future.
- (If available) list the related National goals/targets set on Energy Efficiency improvements to which the related motor replacement measures aim to contribute

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

... add text here ...

Would you say the countries actions in this field are:

- Leading the pack as a frontrunner, with significantly large measures already implemented and/or under consideration that go beyond the typical standard
- Lagging, little to no action taken at all
- Industry standard, slow mover, why?
- Please specify (no need to be scientific, can be based on gut-feel personal judgement / perspective)



Measure 1: [TITLE]

Overview	
Short Description	[Brief summary of the policy measure related to motor replacement](2-3 lines max)
Responsible Authority	[(national) authority responsible for implementation](text)
Status	[Ongoing / Proposed (definitive) / Proposed (early-stage) / Completed](pick one)
Issue Date	[Month, Year](date of announcement)
Start Date	[Month, Year](confirmed/expected)
Ending Date	[Month, Year](confirmed/expected)
Duration	[# Months](confirmed/expected)
Reference:	[Link to main resource](official government publication/announcement/website with information)

Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

... add text here ...

Include:

- *The (specific) scope of the targeted sector (Municipalities, SME's, Large Companies, certain industry sector, ...)*
- *Set conditions / requirements / criteria for participation in the scheme (company size, expected energy reduction, cost of intervention, return on investment years, funding percentages)*
- *a description of the eligible actions related to motor renovation.*
- *(Where possible) the specific type of motors addressed (like year of construction / Efficiency class IE1; IE2; IE3; IE4 or IE5 / power (kW) / # of operating hours per year)*



	Characteristics
Budget	[Total amount in EUR](total budgeted/actual amount in EUR) <ul style="list-style-type: none"> ○ Include any relevant details on the budget distribution. If possible, try to include budgets specific to motor renovation (like range of funding/budget available per beneficiary)
Financing of the measure	[How is the measure funded](i.e. through national funds, ESCOs, trade-in-schemes, tax incentive, other...)
Policy focusses	[Product / service](Indication if the policy support package targets/focuses on product ('physical') interventions or service ('soft') interventions)
Intervention Type	[short keyword that best captures the intervention](equipment upgrade, capacity building, awareness raising, mandatory replacement, ...)
Main Barriers Addressed	[Brief description of the main barriers addressed by the measure e.g. high initial cost, lack of information, general financial viability, return on investment, ease of regulation, emission reduction, waste reduction, ...]
Key Driver(s)	[what "forced" the implementation of the measure](a court ruling, a national law, EU Directive, other?)
Replicability	[high / medium / low](a simple personal 'gut feeling' assessment of the potential for replication or transfer to other countries; are there any specific local conditions)
EU Inclusion	[Yes/No, + short description](Included in NECP? EED? Other EU wide policy directives?)
Related Characteristics	[open text](feel free to include any additional thoughts on the Key Characteristics not captured in the above)

Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

... add text here ...

	Impacts
Case level impact	[High (>20%) / Medium (5-20%) / Low (<5%) / Unknown](indicative value based on the expected total % reduction in energy consumption through measure introduction at the case level)
Policy level impact	[High (>0.5%) / Medium (0.1-0.5%) / Low (<0.1%)](indicative value based on the expected total % reduction in energy consumption through measure introduction at the industry/sector level)
Size	[Number of electric motors impacted by the action; where possible disaggregated by efficiency level, power range]
Energy	[Estimation of overall Energy / GHG savings through the measure](in MWh or tCO ₂) Where available specify the estimation specific to motors
Impact evaluation	[Short, bulleted list of the main (expected) results and/or key achievements of the measure implementation](see detailed impacts description section above)

(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

... add text here...

Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

... add text here...

This is a good opportunity to reach out and ask the national stakeholder or responsible authorities directly for their inputs, for example through a short interview with stakeholders asking them to provide their views on current or future specifications, opportunities, or limitations regarding policy development.

Typical barriers for implementation:

- *(National) monitoring platform needed.*
- *Involvement of too many stakeholders*
- *Legal, regulation, certification issues*
- *Too complex, too little benefits observed.*
- *General cost of implementation*
- *Timeline unrealistic*

	Lessons Learnt
Key takeaways	[List of key takeaways/learnings](summarized list)
Recommendations	[for the specific improvement of existing National and/or EU policies](please specify)
Linked measures	[list of affiliated measures](follow-up interventions, finalized, discontinued, or planned measures associated with the action)
Reference(s)	[weblink(s)](weblink for further reading e.g. reports, studies, publications, policy evaluations, ...)
Other	[Key associated contacts, organizations, ministries, responsible authorities]
Thoughts, comments, considerations ...	[Links to successful cases, case studies, success stories, further research, or any other relevant reports]

Measure 2: [TITLE]

Copy and paste section (1.1) and all subsections to include additional measures

Table 10: National Policy Measure Overview - COUNTRY

#	Measure Title	Short Description	Type of Measure	Start Year	End Year	Duration	Target Groups	Source link / Reference	Case Level Impact of the measure
1									
2									
3									
...									
...									



8. Annex II: Summary Table of Policy Measures

Country	Measure Title	Measure Acronym	Category	Sub-Category	Start Year	End Year	Target Group 1	Target Group 2	Reference	Case Level Impact	Policy Level Impact	Policy Focus	Replicability	EU Inclusion	NECP	EED Art. 7/8	Key Driver
Austria	Umweltförderung im Inland (UFI)	UFI	Financial - Subsidies		1993	-	Industry - All	Services	Link	High	High	Product	High	Yes	Yes		
Austria	OekoBusiness Wien/Vienna	OBVV	Information/Trainings	Financial - Subsidies	1998	Ongoing	Industry - All	Services	Link	High	High	Service	High	Yes	Yes		
Austria	Energy Audits	EA	Mandatory Information	2015	2019	Industry - Large Companies			Link	High	Both	High	Yes	Yes	Yes	EED	
Austria	Energy management systems in small and medium enterprises	EMS-SME	Financial - Subsidies		2018	2025	Industry - SMEs		Link	Low	Medium	Both	Medium	Yes	Yes		
Austria	klimaaktiv Energy Efficient Enterprises	kaEEE	Information/Trainings		2005	2030	Industry - All	Services	Link	High	High	Service	High	No	No		
Belgium	Tax deduction for energy saving investments by companies	TD-ESIC	Fiscal		1993	Ongoing	Industry - All		Link	Low	Medium	Product	High	Yes	Yes		
Belgium	Wallonia - Voluntary agreements with industry	VVAI	Voluntary Agreements		2003	Ongoing	Industry - All		Link	High	High	Product	High	Yes	Yes	Yes	EED
Belgium	Flanders - Voluntary agreements with industry	FVAI	Voluntary Agreements		2003	Ongoing	Industry - All		Link	High	High	Product	High	Yes	Yes	Yes	EED
Belgium	Brussels - Compulsory energy audits for large buildings and large companies	BEA-LBLC	Mandatory Information	2012	Ongoing	Industry - Large Companies	Buildings - All		Link	High	Medium	Product	High	Yes	Yes	Yes	EED
Bulgaria	Innovations and Competitiveness	IAC	Financial - Subsidies & Loans	Information/Trainings	2014	Ongoing	Industry - SMEs		Link	Medium	Medium	Product	High	Yes			
Bulgaria	Energy Efficiency and Renewable Sources Fund	EERF	Financial - Subsidies & Loans	Information/Trainings	2006	Ongoing	Industry - All	Municipalities	Link	Medium	Medium	Both	High	Yes	Yes		
Croatia	ENU-17: Increasing energy efficiency and use of RES in manufacturing industries	ENU-17	Financial - Subsidies		2017	2030	Industry - SMEs		NECP			Both	High	Yes	Yes		
Croatia	ENU-1: Energy efficiency obligation system for suppliers	ENU-1	Mandatory Standards		2019	2030	All Sectors		NECP		High	Both	High	Yes	Yes	Yes	EED
Croatia	Introduction of efficient electric motors	IEEM	Information/Trainings		2011	2016	Industry - All		NEEAP		High	Product	High	No	No	No	
Cyprus	Grant Scheme for conducting energy audits in SMEs	GSEA-SME	Financial - Subsidies		2019	Until end of budget	Industry - SMEs		Link	Low	Low	Service	High	Yes	Yes		
Cyprus	Business4Climate	B4C	Voluntary Agreements		2018	Unknown	Industry - SMEs		Link	Low	Low	Service	High	Yes	Yes		
Cyprus	Supporting scheme for promoting energy efficiency investments in Small and Medium Enterprises (SMEs)	SSEI-SME	Financial - Subsidies		2022	~2030	Industry - SMEs		Link	Low	Low	Both	High	Yes	Yes		
Czech Republic	Operational Program Technologies and Application for Competitiveness	OP TAC	Financial - Subsidies		2021	2027	Industry - All	Services	Link	Medium	High	Both	Medium	Yes			
Denmark	Mandatory energy audit in large enterprises	MEALE	Mandatory Information	2012	Ongoing	Industry - Large Companies			Link	High	Medium	Service	High	Yes	Yes	Yes	EED
Denmark	Renewable energy for production processes	REPP	Financial - Subsidies		2013	2021 (?)	Industry - All		Link	High	High	Product	High	Yes		Yes	EED
Denmark	Increase in energy tax rates on business as part of Green Tax Reform – phase 1	IETR-GTR1	Fiscal		2021	2030	Industry - All	Services	Link	High	High	Product	High	Yes	Yes		EED
Denmark	Competitive subsidy scheme related to private enterprises	CSSRPE	Financial - Subsidies		2021	2029	Industry - All	Services	Link	High	Medium	Product	High	Yes			EED
Estonia	Grant support for resource efficiency in the enterprises	GSREE	Financial - Subsidies		January 2017	Dec. 23	Industry - All		Link	High	High	Both	High	No	No	No	
Finland	Energy Efficiency Agreement for Industries	EAI	Voluntary Agreements		1997	2025	Industry - All		Link		High	Product	High	Yes	Yes	Yes	EED
France	White Certificates Scheme	WCS	Market-based Instruments	2006	Ongoing	Industry - All			Link	High	High	Product	High	Yes			
Germany	Federal Funding for Energy and Resource Efficiency in the Economy – Module 1	FFEREE M1	Financial - Subsidies		2019	2023	Industry - All	Municipalities	Link	High	High	Product	High	Yes	Yes	Yes	EED



Germany	Federal Funding for Energy and Resource Efficiency in the Economy – Module 4	FFEREE M4	Financial - Subsidies		2019	2023	Industry - All	Municipalities	Link	High	High	Product	High	Yes	Yes		EED
Germany	Federal Funding for Energy and Resource Efficiency in the Economy – Funding competition	FFEREE M-FC	Financial - Subsidies		2019	2023	Industry - All	Municipalities	Link	Medium	Medium	Product	High	Yes	Yes	Yes	EED
Germany	KfW Energy Efficiency Programme - Production Plants/Processes	KfW-EPPPP	Financial – Loans		2015	-	Industry - All		Link	High	Medium	Product	Medium	No			EED
Germany	Energy-efficient and climate-friendly production processes	ECP	Financial - Subsidies		2013	2017	Industry - All		Link	Medium		Both	High	No			
Germany	STEP up! - Utilizing electricity efficiency potentials	STEP	Financial - Subsidies		2016	2019	All Sectors		Link	Low	Low	Both	Medium	No			
Germany	PIUS Advice and Invest	PAI	Financial - Subsidies		2017	n/a	Industry - SMEs		Link	Medium		Service	Medium	Yes			
Greece	“Antonis Tritsis AT03”	AT-AT03	Financial - Subsidies		2020	2023	Buildings - Public		Link	High	High	Product	High	Yes			
Greece	“Green transition SMEs”	GT-SMEs	Financial - Subsidies		2023	-	Industry - SMEs		Link	High	High	Both	High	Yes			
Greece	“Energy efficiency obligation scheme”	EEOS	Mandatory Standards		2017	2030	Industry - Large Companies		Link	High		Both	High	Yes	Yes		EED
Hungary	Corporate income tax incentive to trigger energy efficiency Investments	CITITEE	Fiscal		2017; amended 2022	Ongoing	Industry - All		Link	Medium	Low	Product	High	Yes	Yes	Yes	EED
Hungary	Requirement for large energy consuming enterprises to install sub-metering devices	RLECEIS MD	Mandatory Standards	Mandatory Information	2020	Ongoing	Energy Intensive Industry		Link	Low	Low	Product	Medium	Yes			
Hungary	Operational Programmes for Environment and Energy Efficiency 2021-2027	OP EEE 2021-2027	Financial - Subsidies		2014	2027	All Sectors		Link	Medium	High	Both	Low	Yes			
Ireland	EXEED Certified Programme	ECP	Financial - Subsidies		2021	2023	All Sectors		Link	Medium	High	Product	High	Yes	Yes		
Ireland	Energy Efficiency Obligation Scheme (EEOS)	EEOS	Market-based Instruments	2021	2030	Energy Intensive Industry											
Italy	White certificates (PS)	WCPS	Market-based Instruments	2004	-	Industry - All		Link	Medium	Medium	Product	Medium	Yes	Yes			
Latvia	Efficient use of energy resources and transfer to RES in manufacturing industry	EU-EMI 2014-2020	Financial - Subsidies		2017	Dec. 2023	Industry - All		Link	High	High	Product	High	Yes	Yes	Yes	EED
Latvia	Improving energy efficiency and promoting the use of RES in industry	EU-EE-RES 2021-2027	Financial - Subsidies		Sept. 2022	December, 2029	Industry - All		Link	High	High	Product	High	Yes	Yes	Yes	
Latvia	Loans and green bonds to improve the energy efficiency of businesses	LGB-EEB	Financial – Loans		2018	-	Industry - All		Link		Medium	Product	Medium	Yes	Yes		
Lithuania	Increase energy efficiency in industrial enterprises (private sector)	IEE-IP	Financial - Subsidies		2022	2029	Industry - All		Link	Medium	High	Product	Low	No			
Lithuania	Agreements with energy companies on energy savings	ACES	Mandatory Standards	Voluntary Agreements	2017	-	Industry - Large Companies		Link	Low	Low	Both	Medium	Yes	Yes		Energy Efficiency Action Plan
Luxembourg	Voluntary Agreements (“Accord Volontaire”)	VA	Voluntary Agreements		1996	December, 2023	Industry - All		Link	Low	Low	Service	High	Yes	Yes		
Malta	Aid Investment Scheme for Businesses	AISB	Financial - Subsidies		2020	2023	Industry - All	Services	Link			Product	High	No	No		
Netherlands	Energie-investeringsaftrek (EIA)	EIA	Fiscal		1997	Ongoing	Industry - All	Services	Link	High	High	Product	High	Yes	Yes		
Netherlands	Versnelde klimaatinvesteringen industrie (VEKI)	VEKI	Financial - Subsidies		2019	Ongoing	Industry - All		Link	High	Medium	Product	High	Yes	Yes		
Netherlands	Milieu-investeringsaftrek (MIA) & Willekeurige afschrijving milieu-investeringen (VAMIL)	MIA-VAMIL	Fiscal		1991	Ongoing	Industry - All	Services	Link	High	Medium	Product	High	Yes	Yes	No	
Poland	System of White Certificates	SWC	Market-based Instruments	2013		All Sectors		Link	High	High	Product	High	Yes	Yes	Yes		EED
Portugal	SGCIE - Management System for Intensive Energy Consumers	SGCIE	Mandatory Information	April, 2008	Ongoing	Energy Intensive Industry		Link	High	High	Product	High	Yes	Yes	Yes		EED
Portugal	Plano de Promoção da Eficiência no Consumo de Energia (PPEC) / Energy Efficiency Promotion Plan	PPEC	Financial - Subsidies				All Sectors		Link	High	High	Both		Yes	Yes		
Portugal	Energy Efficiency Fund (EEF)	EEF	Financial - Subsidies				Industry - All		Link			Product	Medium				



Romania	EIB loans for energy efficiency projects	EB-EE	Financial – Loans		2020	Ongoing	Industry - SMEs		Link			Both	High				
Slovakia	Slovak Sustainable Energy Financing Facility (SLOVSEFF III)	SSEFF III	Financial - Subsidies & Loans	2014	2020	All Sectors			Link			Product	Low	Yes	Yes		
Slovenia	Financial incentive for increasing the efficiency and use of RES in industry (same for SMEs)	FIERI	Financial - Subsidies		2017	2030	Industry - SMEs		Link	Low	Low	Product		Yes	Yes	Yes	EED
Slovenia	Financial incentives for efficient electricity consumption	FIIEEC	Financial - Subsidies		2008	2030	Industry - All		Link	High	High	Product		Yes	Yes	Yes	EED
Slovenia	Energy efficiency obligation scheme	EEOS	Mandatory Standards		2010 (2015)	2030	All Sectors		Link	High	High	Both		Yes	Yes	Yes	
EEDSpain	Ecodesign requirements for energy-using products	ERP	Mandatory Standards		2007	Ongoing	All Sectors		Link	High	Medium	Product	High	Yes	Yes	No	
Sweden	PFE – Programme for energy efficiency	PFE	Voluntary Agreements		2004	2015	Industry - Energy Intensive Companies		Link	High	High	Product	High	No	No		
Sweden	Energikartläggningsscheckar (SEAP)	SEAP	Financial - Subsidies		2010	2014	Industry - SMEs		Link	Medium	Low	Product	High	No	No		National Law
Sweden	Energy Step	ES	Financial - Subsidies		2018	2020	Industry - Large Companies	Mining/Manufacturing	Link	Low	Low	Product	High				



9. Annex III: Policy Reviews Collection



Austria

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

DI Konstantin Kulterer,
DI Deyan Dimov
(Austrian Energy Agency)



List of Acronyms

Acronym	Description	English
AWS	Austria Wirtschaftsservice Gesellschaft	Austrian Economic Service
BMK	Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie	Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology
CHP		Combined Heat and Power
EEffG	Bundes-Energieeffizienzgesetz	Federal Energy Efficiency Act
KPC	Kommunalkredit Public Consulting	Municipal loan Public Consulting
UFI	Umweltförderung Inland	National Subsidy Programme for Environmental Measures
EMS	Energiemanagementsystem	Energy Management System
SME		Small and Medium Enterprises
UMS	Umweltmanagementsystem	Environmental Management System
WKO	Wirtschaftskammer Österreich	Austrian Economic Chamber



9.1 Austria

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

"The main energy policy making is taking place at the federal level in a number of government ministries and institutions. The Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology is the main government institution responsible for energy matters at the federal level.

This Ministry is also responsible for transport, energy R&D and environmental protection, including climate action and emissions from combustion. The Federal Ministry of Finance is responsible for setting energy taxes.

At the regional level, the governments of the nine federal provinces have responsibility for policymaking, setting subsidy levels, and implementing regulatory control of energy companies.

The E-Control Commission is the federal regulator for electricity and gas in Austria. The E-Control GmbH is a government-owned company providing advice on regulation to the commission. The energy institute for Austrian businesses was initiated by the Austrian chamber of commerce and established in 2008.

Two official bodies – the National Climate Protection Committee (Nationales Klimaschutzkomitee, NKK) and the National Climate Protection Advisory Board (Nationaler Klimaschutzbeirat, NKB) – accompany the implementation of the Austrian Climate Change Act on a continuous basis."²⁴

"The Austrian Energy Agency was established by the federal government and states to promote clean energy use in Austria. Besides the Austrian Energy Agency, which acts as a national energy agency, regional institutions performing the tasks of an energy agency exist in all Austrian federal provinces. This corresponds to the important role the federal provinces play in energy policy. In some federal provinces these institutions are incorporated into the administration, in others energy agencies have been formed as legal bodies.

The most important and innovative nation-wide campaign is klimaaktiv, which is the Austrian government's climate change information and grant programme. The programme is overseen by the Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, and managed by the Austrian Energy Agency. The aim of the programme is to support energy efficiency and increased use of renewables in all sectors of the economy, through direct grant support and accompanying measures, such as information and advice.

In 2007, the Austrian government funded the Climate and Energy Fund (Klima und Energiefonds – KLIEN), which has since its inception delivered clearly visible impetuses for the Austrian Climate Policy and the restructuring of the Austrian Energy System. The Climate and Energy Fund supports R&D in renewable energy and energy efficiency as well as market demonstration and deployment."²⁵

Furthermore, the two entities Public Sector Credit Consulting (Kommunalkredit Public Consulting, KPC) and Austria Economic Service (Austria Wirtschaftsservice Gesellschaft, AWS) are responsible for the processing of funding/subsidies to companies, see details below.

Description of the general direction / course of action taken by the country.

In accordance with "Fit for 55" initiative, Austria aims to reduce carbon emissions by 49 % compared to 2005 levels by 2030 for sectors outside of Emission Trading System.

²⁴ Energy efficiency trends and policies in Austria, Austrian Energy Agency 2021, page 13, 14

²⁵ Energy efficiency trends and policies in Austria, Austrian Energy Agency 2021, page 14



In the government agreement for the years 2020 to 2024, the federal government has already set the year 2040 as the deadline for achieving climate neutrality. By 2030, the target is to achieve a production of 100% renewable electricity and 5 terawatt hours (TWh) of renewable gas.²⁶

Overview of major national programmes related to energy efficiency.

In Austria there are at least four major instruments to increase the energy efficiency in companies in the production and service sector.

"Large companies must in accordance with § 9 EEffG either (1) carry out an external energy audit every four years, or (2) implement a management system (Energy Management System, Environmental Management System or EMS or UMS equivalent, intra-nationally recognized management system). Persons who carry out these energy audits must meet certain qualification standards. In addition, external auditors must be listed in a public register.

For small and medium sized enterprises (SMEs) there are the federal support programmes in Austria: each province of the nine provinces of Austria has its own support programme. These programs subsidize consulting services for SMEs related to energy and other environmental aspects within different programs. Topics include energy efficiency, mobility management, waste, resource efficiency, greenhouse gas emissions.

The Environmental Support Programme ("Umweltförderung im Inland, UFI") is one of the most important subsidies for companies with the emphasis on climate protection, energy saving, renewable energies, and prevention of air pollution. The basis of this subsidy is regulated in the federal law "Umweltförderungsgesetz". The UFI incentive scheme is financed from the budget of the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK). The KPC is entrusted as a settlement agency with the practical development of support programmes. Since 1993, KPC has managed the environmental support schemes of the Federal Government. Until the end of 2022, the funding under the UFI amounted to approx. € 150.000 million per year. The subsidy programmes provide grants of up to 30% of the investment costs. Multiple grants by public (e.g. by the EU or by provincial governments) are also possible within the maximum limit of the EU. There are grants for energy-saving and efficiency measures, improving thermal insulation, combined heat and power (CHP), district heating and heat from renewable energies.

One of several Austrian klimaaktiv programmes within the Austrian Climate Strategy is the national programme for energy efficiency in companies, which started in 2005 under the management of the Austrian Energy Agency.²⁷

Related policy developments in the past, present, or (near) future

The most important policies/programmes are subsidies in the field of energy efficiency investments, within the "Umweltförderung Inland". Here, motor replacement and certain motor optimisation measures can be subsidised.

In 2011/2012 "Energy-efficient drives" programme subsidised the replacement of electric motors and the installation of frequency converters with a flat rate per kW. The programme was not continued.

Within the klimaaktiv programme audit guides for pumps, fans were published around 2010, including information on motor replacement and high efficient motors. For these audit guides trainings for consultants were and are still organized.

In December 2023 potential energy savings by the replacement of electric motors and other saving measures (as insulation of pipes, introduction of building automation systems, hydraulic optimisation of heating systems) in Austria were discussed, including a potential subsidy programme for these purposes.

²⁶ www.oesterreich.gv.at/themen/bauen_wohnen_und_umwelt/klimaschutz/1/Seite.1000310.htm

²⁷ Energy efficiency trends and policies in Austria, Austrian Energy Agency 2021, page 18,19



Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

In principle, energy efficiency measures also in the electricity sector, where Austria has a high share of renewables, are promoted by the BMK.

Energy consultancy, energy auditing, awareness raising, and investment subsidies are in place, but, for all these instruments no specific motor replacement programme exists. One exception are the specific motor replacement tips within the klimaaktiv pumps and fan system audit guides. Within this programme awards are given for measures in the optimisation of such systems.

Within EU-MORE project the programme on energy efficient drives will be analysed.

9.1.1 Measure 1: Umweltförderung im Inland (UFI)

	Overview
Short Description	UFI has been an important promotion instrument at the federal level for Austrian companies investing in environmental and climate protection measures since 1993. Measures for the efficient use of energy in commercial and industrial production processes as well as in existing buildings and heat recovery systems with predominantly operational use are promoted.
Responsible Authority	Kommunal Kredit Public Consulting (KPC)
Status	Ongoing
Issue Date	
Start Date	1993
Ending Date	Ongoing
Duration	
Reference:	https://www.umweltfoerderung.at/

9.1.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

All companies except private individuals are eligible to funding with UFI program.

In 2011/2012 the program “Energy efficient drive systems” was directly directed to the replacement of motors and to fund their replacement. Submissions were able between February of 2011 up to end of December of 2012. The funding flat rate was per kW²⁸:

- IE3 drives with a rated power < 7.5 kW: 15 Euro/kW
- IE3 drives with a rated power ≥ 7.5 kW: 10 Euro/kW
- Installation of a frequency converter for existing drives 20 EUR/kW

²⁸ Kommunalkredit Public Consulting GmbH (2012): Förderungsprogramm „Energieeffiziente Antriebe in Betrieben“



*An additional grant of 300 Euro was available for a minimum of eight hours of external energy consulting. An additional system bonus was possible if the project was implemented in a building with excellent energy performance.

The target was the change of old electric drive systems from 0,75 kW up to 375 kW. Also, the retrofitting of variable speed drive systems independent from the efficiency class of the drive system was a part of the funding program. Funding conditions were:

- The new drive systems should be IE3 according to Commission Regulation (EC) No 640/2009 of 22 July 2009 with regard to eco-design requirements for electric motors.
- The used drive systems should have CE marking.
- The electric nominal power of the retrofitted drive systems should be minimum 30 kW.

In total during the period 2011-2012, 40 projects were considered in this period, from which 27 were approved and granted.

Furthermore, the UFI-Framework on energy savings in companies, though not explicitly targeting at motor replacement, has funding opportunities available within the framework of the support programs.

Mainly there are three subprograms of relevance for electric motors. They are called "Energy-saving Measures in Enterprises" (in German: Betriebliche Energiesparmaßnahmen), "Air Conditioning and Cooling" (in German: Klimatisierung und Kühlung) or "Energy Centers for internal heat and cold supply" (in German: Energiezentralen zur innerbetrieblichen Wärme- und Kältebereitstellung). In all these funding areas, measures related to motors can potentially be included as part of the projects.

The following saving measures are eligible for subsidies for these three programmes:

1. "Energy-saving measures in enterprises"²⁹
 - a. Efficiency improvements in industrial processes and systems that significantly differ technologically and ecologically from existing installations.
 - b. Heat recovery from refrigeration systems (cooling and deep-freezing systems, process cooling systems), and ventilation systems (utilization of heat from exhaust air to heat indoor air) with heat exchanger capacity over 100 kW or a nominal air flow rate of more than 50,000 m³/h in recirculating air systems.
 - c. Heat recovery or utilization of previously unused heat streams (e.g., compressed air compressors, industrial processes, waste heat from wastewater), as well as heat pumps for utilizing low-temperature waste heat.
 - d. Heating optimization in existing buildings (retrofitting of storage systems, variable speed control, efficient pumps, heating distribution systems, control technology) resulting in a minimum of 10% energy savings.
 - e. Optimization of fossil-based process heat generators (if conversion to renewable energy sources is not possible).
2. "Air conditioning and cooling"³⁰
 - a. Systems for climatisation of office buildings and process cooling (absorption and adsorption heat systems working with renewable energy or industrial waste heat, free cooling systems)
 - b. Systems for industrial process cooling with refrigerants with GWP < 150.
3. "Energy centers for internal heat and cold supply" Three from five criteria should be completed:³¹
 - a. Construction of a renewable heat generation system or a climate-friendly refrigeration system (heat pump, biomass boiler, connection to district heating, climate-friendly refrigeration systems, use of waste heat, solar thermal energy).
 - b. Installation of a heat recovery or free-cooling system.

²⁹ <https://www.umweltfoerderung.at/betriebe/energiesparmassnahmen/unterkategorie-anlagen-und-prozessoptimierung>

³⁰ <https://www.umweltfoerderung.at/betriebe/klimatisierung-und-kuehlung/kaelte>

³¹ https://www.umweltfoerderung.at/fileadmin/user_upload/umweltfoerderung/betriebe/Energiezentralen/UFI_Standardfall_Infoblatt_ENERZEN.pdf



- c. Construction or expansion of internal primary distribution networks.
- d. Optimization of energy supply/distribution (e.g. heating optimization in existing buildings, higher-level measurement, control, and regulation technology using state-of-the-art technology, optimized storage systems including storage and load management, anergy network, 3- or 4-wire network).
- e. Measures for sector coupling (e.g. integration of own photovoltaic systems for the operation of heat or cold generators, provision of systems for the control energy market).

In the period between 2018-2022 a total of 371 renovation projects with motor-relevance were approved and granted. This period was analysed within a subcontract for EU-MORE project.

	Characteristics																				
Budget	<ul style="list-style-type: none"> • Budget for the total program, incl. renewable energy in 2022: 151 Mio. EUR <ul style="list-style-type: none"> ○ Funding rate max. 30% (for SMEs up to 35%) ○ Evaluation for 2022³²: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Category</th> <th>Nr. of projects</th> <th>Environmentally relevant investment [EUR]</th> <th>Funding value [EUR]</th> </tr> </thead> <tbody> <tr> <td>Efficient energy use of energy</td> <td>2.041</td> <td>315.716.405</td> <td>51.990.435</td> </tr> <tr> <td>Renewable energy</td> <td>1.970</td> <td>388.083.115</td> <td>83.031.085</td> </tr> <tr> <td>Others</td> <td>53</td> <td>68.474.883</td> <td>16.486.006</td> </tr> <tr> <td>Total</td> <td>4.064</td> <td>772.274.403</td> <td>150.507.526</td> </tr> </tbody> </table> 	Category	Nr. of projects	Environmentally relevant investment [EUR]	Funding value [EUR]	Efficient energy use of energy	2.041	315.716.405	51.990.435	Renewable energy	1.970	388.083.115	83.031.085	Others	53	68.474.883	16.486.006	Total	4.064	772.274.403	150.507.526
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Others	53	68.474.883	16.486.006																		
Total	4.064	772.274.403	150.507.526																		
Financing of the measure	National fund																				
Policy focus	Physical intervention																				
Intervention Type	equipment upgrade																				
Main Barriers Addressed	initial costs, return on investment, emission reduction																				
Key Driver(s)	Unknown																				
Replicability	High																				
EU Inclusion	Included in NECP																				
Related Characteristics																					

9.1.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

³² <https://www.bmk.gv.at/dam/jcr:8ea7566f-f34a-4822-88e7-4afa89741d1b/UFG-Jahresbericht-2022.pdf>



Projects 2022 in the relevant areas (general)³³

	Number of projects	Environmentally relevant investment EUR	Funding Value EUR	CO2 reduction in t per year	CO2 reduction in useful life	Energy from Renewables MWh/a	Energy-savings MWh/a
Energy-saving Measures in Enterprises	247	103 668 541	21 174 249	49 641	496 408	0	185 094
Energy Centers for internal heat and cold supply	8	9 356 636	1 819 285	4 463	66 945	3 464	15 144
Air Conditioning and Cooling	118	35 842 751	5 240 338	14 290	142 895	8 777	39 082

For electric motors KPC conducted a more detailed analysis under a subcontract for EU-MORE:

The programme "Energy efficient drive systems" as part of UFI achieved the following results for the period 2011-2012³⁴:

- 27 motor projects granted
- 1.938 tCO₂/a carbon savings for all projects
- 1.306.334 € investment costs for all projects
 - from which 119.076 € were granted
- 67,4 €/CO₂ funding efficiency (under the assumption of 10 years life span of the project)
- 5.337 MWh energy savings
- 891 kWel implemented motor optimization
- 5.589 kWel implemented speed control optimization

The three programmes (Energy-saving measures in enterprises, air conditioning and cooling and energy centers) for the period 2018-2022 achieved the following results:

There were a total number of 2.490 projects funded, see following table. In the course of analysis, the motor relevant projects were reduced according to different criteria down to 371.

Part of motors-system optimisation	Number of projects with motor-relevance
Motors	22
Drive-Chain	3
Transmission	2
Frequency Converters	20
Compressors	1
Fans	3
Compressed Air	161
Optimisation of heating systems, incl. e.g. circulation pumps	73
Pumps	86
Total	371

³³ <https://www.bmk.gv.at/dam/jcr:8ea7566f-f34a-4822-88e7-4afa89741d1b/UFG-Jahresbericht-2022.pdf>

³⁴ Results of subcontract between KPC and AEA within the EU-MORE project



Number of projects 2018-2022	Environmentally related investments [EUR]	Funding value [EUR]	Funding EU value [EUR]	CO ₂ -savings [t/a]	Energy (electricity) savings*** [kWh/a]
Total for 3 Programmes 2.490*	716.940.812	101.657.340	14.296.375	373.583	36.501.530
Total with motor relevance 371**	56.804.362	10.237.594	1.764.134	31.060	46.756.717

* Number of projects in the the subprogrammes of relevance (efficient energy use, air conditioning and cooling, energy centers)

**Reduction to projects which, due to their measures, project name and project size, may contain relevant measures on motor systems. Also only electricity-saving projects were classified as relevant.

***The increase in electricity savings results from the summation of all projects: many projects show an increase in their electricity use instead of savings, since these projects replace other energy sources with electricity.

From the 371 potential projects, a total number of 22 projects included detailed information on electric motor-replacement. These projects achieved the following results:

- 22 motor projects granted
- 4.893 tCO₂/a carbon savings for all projects
- 7.387.709 € investment costs for all motor relevant projects
 - from which 1.751.000 € were granted
- 35,8 €/CO₂ funding efficiency (under the assumption of 10 years life span of the project)
- 18.537 MWh energy savings
- 5.600 kWel implemented motor optimization

Impacts	
Case level impact	High
Policy level impact	High
Size	<p>For the period 2011-2012 for energy efficient drives programme:³⁵</p> <p>No information about motor efficiency classes were found.</p> <p>For the period 2018-2022 for these selected projects where information was available:</p> <p>number of new motors: 281 overall*</p> <p>divided in IE classes:</p> <ul style="list-style-type: none"> ○ IE3: 15 motors ○ IE4: 31 motors ○ IE5: 2 motors <p>divided in power range:</p> <ul style="list-style-type: none"> ○ 0-10 kW: 29 motors

³⁵ Results of subcontract between KPC and AEA within the EU-MORE project



	<ul style="list-style-type: none"> ○ 10-100 kW: 51 motors ○ 100-1000 kW: 8 motors ○ 1000-2000 kW: 1 motor <p>*information about number of motors in efficiency classes or in power range is uncompleted</p>
Energy	<p>Evaluation for the whole funding program in 2022 in category "Efficient energy use", including all projects, not only motor-systems³⁶:</p> <ul style="list-style-type: none"> ○ 92.353 tCO₂/a saved. ○ 337.559 MWh/a
Impact evaluation	

9.1.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors

<ul style="list-style-type: none"> • Very successful, long lasting and well-known subsidy programme • Long lasting effort to optimise application process (online) • Current funding offer includes measures on electric motor driven systems, though not specifically mentioned as stand-alone measure. • Compared to the total number of funding projects, a low share of projects with measures specifically addressed to optimisations of electric motors but: • Frequent replacement of entire component groups with integrated motors (e.g. pumps, compressors, etc.) • No funding requirement for mapping the technical details of system components, as savings effects are calculated over the entire system. • Potential to explicitly mention drive systems in programme description. <p>Efficient Drives Program (2011-2012)</p> <ul style="list-style-type: none"> • Low demand for explicit subsidies compared to total applications in other programmes, however, for energy-saving projects whose energy savings were not exclusively due to motor replacement, funding applications could be submitted under the programme "Operational Energy Saving Measures". • Higher refusal rate compared to whole subsidy programme. • Discontinuation or non-renewal of the funding offer due to: <ul style="list-style-type: none"> ○ The low number of funding applications did not justify a flat-rate funding, which should above all optimise the submission process for applicants and the funding agency and make it more attractive (a similar programme for LED-optimisation is still operational) ○ Still existing funding opportunities under the funding offer "Operational Energy Saving Measures" (therefore this kind of measures are still eligible for funding) <p>UFI Energy saving measures (efficient energy use) in companies³⁷</p>

Lessons Learnt

³⁶ <https://www.bmk.gv.at/dam/jcr:8ea7566f-f34a-4822-88e7-4afa89741d1b/UFG-Jahresbericht-2022.pdf>

³⁷ Results of subcontract between KPC and AEA within the EU-MORE project



Key takeaways	See above
Recommendations	Potential to explicitly mention drive systems in programme description.
Linked measures	In Austria, several programmes on consultancy for energy efficiency in companies are available on regional basis. Recommended measures can be subsidised within this programme.
Reference(s)	<p>https://www.umweltfoerderung.at/foerderinstrumente/betriebliche-umweltfoerderung-im-inland</p> <p>https://www.umweltfoerderung.at/betriebe/energiesparmassnahmen/unterkategorie-anlagen-und-prozessoptimierung</p> <p>Annual Evaluation Report: Umweltinvestitionen des Bundes, Klima und Umweltschutzmaßnahmen 2022, BMK, Vienna, 2023: https://www.bmk.gv.at/dam/jcr:8ea7566f-f34a-4822-88e7-4afa89741d1b/UFG-Jahresbericht-2022.pdf</p> <p>Results of subcontract with EU-MORE project</p>
Other	Kommunalkredit Public Consulting GmbH Türkenstraße 9 1090 Wien T +43 1/316 31-DW F: DW 104 umwelt@kommunalkredit.at
Thoughts, comments, considerations ...	

9.1.2 Measure 2: OekoBusiness Wien/Vienna

	Overview
Short Description	OekoBusiness Wien is the city's environmental service programme for companies with a business location in Vienna. Within the framework of OekoBusiness Wien, companies receive a co-financed environmental service package.
Responsible Authority	City of Vienna
Status	Ongoing
Issue Date	
Start Date	1998
Ending Date	Ongoing
Duration	25 years
Reference:	https://www.wien.gv.at/umweltschutz/oekobusiness/

9.1.2.1 Main Description

OekoBusiness Vienna is part of the SMART CITY VIENNA framework, which is the city's long-term and holistic strategy to meet the challenges of the 21st century. The aim is to ensure the best quality of life for all of Vienna's citizens and to save resources through comprehensive innovations. An important part of this aim is for companies in the city to do business in an environmentally sustainable way.

The purpose of OekoBusiness Vienna is to help companies generate *green and clean* profits through environmental management practices that benefit both the environment and the companies, ensuring financial rewards and high quality for each company.

OekoBusiness Wien is the city's environmental service programme for business companies located in Vienna. Within the framework of OekoBusiness Wien, companies receive a co-financed environmental service package. The amount of co-financing varies depending on the advisory service provided.

There are three steps to becoming an OekoBusiness company:

"OekoBusiness Wien funds certain consultancy services to encourage businesses to take action to reduce their environmental impact. In individual meetings consultants develop solutions tailored to the needs of each business in three stages:

- Stage 1: Consultants working within OekoBusiness Wien network conduct an environmental check-up together with the company to find savings potentials and detect environmental weak points in the operation.
- Stage 2: On this basis, the company management can decide to participate in the programme and select a suitable consultancy module.
- Stage 3: Supported by tailored consultancy services and expert input, the company develops its environmental project(s) and starts implementation already during the first year of participation. An independent commission assesses the progress made and takes a decision about the award. All measures taken are documented in OekoBusiness Wien database."³⁸

Consultants must fulfil certain criteria and must be listed (OekoBusiness Wien – BeraterInnenpools).

³⁸ <https://www.wien.gv.at/english/environment/protection/eco/consultancy.html>



A lot of documented measures include motor renovation in the form of compressed air, chiller, pump, and fan systems optimisation, including change of equipment.

The programme is a co-financing 60 EUR per consulting hour, with maximum rates.

The most important and relevant programmes include:

- First Check, incl. checking of energy bill: supported are 8 h, with a maximum co-financing of 480 EUR.
- ECOPROFIT (Ökoprofit): for companies in Vienna above 30 employees, esp. above 50 employees. Co-financed are: 6 whole-day workshops, 40 hours consultancy (max. 4.400 EUR)

The focus of ECOPROFIT is on water, residual waste, hazardous waste, solvent emissions, electricity, natural gas and heating and process heat. The companies learn how to develop and implement environmental measures and reduce operating costs at the same time.

Most of the motor-relevant measures were reported in this programme. Examples included replacement of compressors, of fans including motors and similar optimisation measures in all fields.

- ECOBONUS (Ökobonus): target group-companies below 50 employees, with higher energy intensity,

The aim is to develop and implement appropriate environmentally friendly measures in the companies and thus also to reduce operating costs.

The report template is to be used by listed consultants and measures must be presented for potential award. Co-financed with max. 1.800 EUR.

- Efficiency (Effizienz): The aim of the advisory service is to reach energy efficiency as well as changes in behaviour and optimisations in the process. Co-financed with max. 1.200 EUR (20 hours).

Contents of the consultation are:

Recording of all relevant energy variables and their costs, Evaluation of the potential for change and savings from a feasibility point of view, divided into measures that can be implemented immediately and those that can be implemented in the medium to long term, and Summary assessment and evaluation of measures taken³⁹

	Characteristics
Budget	Annual total Budget is not published. Depending on the programme 800 to 4.400 EUR are available per company per year.
Financing of the measure	Public authorities, interest groups and companies all work together on OekoBusiness Vienna to implement preventive and integrative environmental protection policies and actions that also benefit businesses' bottom line. Public subsidies are granted for consultancy and training, and capital investments are made by the private sector, in some cases with support from additional public sources.
Policy focus	Service intervention: Consultancy and moderated workshops
Intervention Type	Consultancy and capacity building (Workshops)

³⁹ MA 22 - 1569/2021 - OekoBusiness Wien - Kofinanzierungsrichtlinien 2021-2024



Main Barriers Addressed	<p>“OekoBusiness Vienna aims to:⁴⁰</p> <ul style="list-style-type: none"> • Reduce adverse environmental impacts of economic activity through integrated environmental protection strategies • Improve the competitive position of Viennese businesses through more efficient use of resources (making full use of innovative potentials and cost saving opportunities), sustaining employment over the medium term • Strengthen the advisory component in the relationship between the city administration and private sector enterprises • Contribute to the sustainable development of the City of Vienna • Support the exchange of information, nationally and internationally, with city administrations and enterprises running similar programmes • Extend and support environmental protection efforts both nationally and internationally • Contribute to de-coupling economic growth from resource consumption and environmental damage”
Key Driver(s)	See above
Replicability	<p>High: “An important advantage of OekoBusiness Vienna is its universal applicability, which allows the programme as a whole, or individual aspects of the programme, to be implemented in other regions and countries. In 2004, five Austrian provinces (Lower Austria, Salzburg, Styria, Vorarlberg and Upper Austria) began cooperating with OekoBusiness Vienna by using the database. Now all nine Austrian provinces offer environmental consulting services to businesses and cooperate in further development with OekoBusiness Vienna. The European Union has provided €674,000 in support for various joint projects over the last 15 years. These funds were awarded within the framework of the INTERREG IIIA „Vienna-Győr” project, which focuses on energy efficiency and exchange of training between the Hungarian city of Győr and Vienna. Other environmentally conscious cities such as Athens, the capital of Greece, and Chennai (Madras), India’s fourth-largest city, are developing OekoBusiness programmes of their own modelled on Vienna’s programme.</p> <p>UN Habitat has included OekoBusiness Vienna in its Best Practices Database, which lists the best sustainability projects worldwide. Likewise, the European Commission regards the environmental service package of the City of Vienna as an example of best practices.”⁴¹</p>
EU Inclusion	<p>Only general comment on energy consultancy in NECP</p> <p>For subsidies general is relevant: 200.000 EUR de minimis (but in this case not very relevant, as the financing is quite low, max. 4.000 EUR)(Verordnung(EU)Nr. 1407/2013 der Kommission)</p>
Related Characteristics	

9.1.2.2 Impacts

Description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

⁴⁰ <https://www.wien.gv.at/english/environment/protection/eco/philosophy.html>

⁴¹ <https://www.wien.gv.at/english/environment/protection/eco/philosophy.html>



"The effort to integrate environmental policies and measures in economic activities throughout Vienna is backed by an evaluation report by the Austrian Institute for Industrial Ecology. About 98% of participants in OekoBusiness Vienna rated the programme as „excellent“ or „good“.

Businesses responded very positively to some of the programme's strong points, including consultancy services, the incentive to make changes, the raising of environmental awareness, the opportunity for a systematic analysis of a business's current situation, and the enhanced company image as a result of winning an award. The innovative impact of the measures proposed was also greatly appreciated by the participating businesses. The high-quality consultancy services provided by OekoBusiness Vienna have spawned a wide variety of new policies and measures. A look at the results clearly shows that the environment is the real beneficiary of OekoBusiness Vienna."⁴²

From 1998 to 2021, the OekoBusiness Wien companies have collectively achieved the following savings:⁴³

- 170.7 MEUR operating expenses saved
- 792,000 t carbon dioxide emissions avoided; for 2021: 4596,22 t CO2 total energy (not only electricity!)
- 3.3 million m3 drinking water consumption reduced.
- 2.6 TWh final energy savings; for 2021: 21.4 GWh electricity
- 225.8 km total transport mileage reduced
- 127,836 t solid waste output reduced

	Impacts
Case level impact	See above
Policy level impact	High
Size	Not available
Energy	
Impact evaluation	

9.1.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

Very successful, long lasting local programme, here are some success factors:

- Low barrier for first contact (8 h consultancy), high share of subsidy
- Reporting of measures public database (for external reporting)
- Evaluation of whole programme important for continuing financing, now done annually; publication of evaluation report
- Standardised templates for reports can increase the quality of the audits/ consultancy activities and outputs.

⁴² <https://www.wien.gv.at/english/environment/protection/eco/benefits.html>

⁴³ <https://www.wien.gv.at/umweltschutz/oekobusiness/erreichtes.html>



- Support of the implementation of measures/activities is important (done in another programme in Austria)
- Different modules to address SMEs: e.g. OekoBonus is a good module for smaller SMEs to start with environmental activities, OEKOWIN is a module to involve larger companies, Eco-label Tourism (Umweltzeichen Tourismus) is focusing on tourism sector.
- Particularly important is the evaluation of the modules of the programme (once a year).
- Awarding of companies for good environmental practises is important.
- Publish good practises and activities of companies on the internet.

Potential improvements in discussion are establishing an energy service center, a one-stop shop for companies and households, targeting resource efficiency and circular economy.

In general important for communication to SMEs are short formats, tailored formats, energy check and at the same time also subsidy advice.

	Lessons Learnt
Key takeaways	
Recommendations	See above
Linked measures	
Reference(s)	
Other:	
Thoughts, comments, considerations	Measure Database (German): https://unternehmen.oekobusiness.wien.at/massnahmen/#top
Contact Persons:	Stadt Wien – Umweltschutz Dr. Thomas Hruschka, DI Bertram Häupler Telefon: +43 1 4000-73573 Fax: +43 1 4000-73573 E-Mail: office@oekobusiness.wien.at

9.1.3 Measure 3: Energy Audits

	Overview
Short Description	Large companies have to conduct energy audits or implement a management system. Energy Audits for large companies according Energy Efficiency Directive
Responsible Authority	BMK/E-Control
Status	Ongoing
Issue Date	2014: Bundes-Energieeffizienzgesetz – EEffG, StF: BGBl. I Nr. 72/2014 (was renewed in June 2023)
Start Date	2015
Ending Date	2019



Duration	4 years
Reference:	www.monitoringstelle.at

9.1.3.1 Main Description

Description of the policy measure and how it relates specifically to EU MOREs topic of electric motors

Large companies have to either conduct an external energy audit in accordance with § 17 and § 18 of the National Energyefficiency Law (Bundes-Energieeffizienzgesetz – EEffG (2014)). This law was revised in Jun 2023, this information is based on the version of 2014.

at regular intervals, at least every four years or implement:

- A certified energy management system in accordance with EN 16001 or ISO 50001 or equivalent successor standards, or
- A certified environmental management system in accordance with ISO 14000 or any subsequent equivalent standard, or in accordance with Article 13 of Regulation (EC) No 1221/2009 allowing voluntary participation by organisations in a Community eco-management and audit scheme, or
- A nationally recognised management system equivalent to an energy management or environmental management system, which shall also include a regular internal or external energy audit in accordance with § 17 and § 18.

The introduction of the management system shall be documented and maintained. Energy audits have to fulfil certain criteria § 18 plus Annex. The audits must cover three main energy consumption areas: 1) buildings, 2) industrial processes and 3) transport, provided that each of these accounts for at least 10% of the total energy consumption of the entire company.

In the Annex for the energy audits in industry, it is stipulated that data collection and analysis must include (among other things) the following, relevant in this context:

- Manufacturing processes (technical data on product and product quality, current operating conditions concerning set points), and
- Associated utility processes (e.g. steam, hot water, compressed air, electrical drives (motors), heat recovery systems, pumps, fans and ventilation systems, lighting, IT infrastructure).

The recommendations for action shall address, among others not that relevant for this project, at least the following issues:

- Measures to reduce or recover energy losses;
- Replacement, modification or upgrading of equipment.⁴⁴

Obligated companies must register with the National Energy Efficiency Monitoring Agency via an online platform. A list of the obligated companies is published on the website of the National Energy Efficiency Monitoring Agency and updated annually. Companies that have carried out the audit must at least provide a summary of the energy audit on the online reporting platform and enter data on energy consumption and potential energy savings in an online form.

Energy auditors had to fulfil certain criteria specified in § 17. Regarding the qualification of the auditors, Austria has introduced a rating system to assess energy service providers separately in each of the three main energy consumption areas (buildings, processes, transport). The rating system takes into account both professional experience and training.⁴⁵

They are listed on: <https://www.monitoringstelle.at/monitoring/energiedienstleister/energieberater>

⁴⁴ Bundes-Energieeffizienzgesetz – EEffG, StF: BGBl. I Nr. 72/2014

⁴⁵ www.monitoringstelle.at (last access: 30.3.2023)



For training, courses in the area of motor systems are valid.

The national energy efficiency monitoring body checks whether the audit report complies with the requirements of the EEffG. There are no monitoring activities for the measures identified in the energy audits, but there are several subsidy programmes at national and regional level to promote the implementation of energy measures.

	Characteristics
Budget	Not available.
Financing of the measure	Audits have to be paid by company
Policy focus	Mandatory energy audits for big companies
Intervention Type	Mandatory Service
Main Barriers Addressed	
Key Driver(s)	Implementation of Energy Efficiency Directive
Replicability	High
EU Inclusion	Implementation of European Energy Efficiency Directive
Related Characteristics	

9.1.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

In 2020, 2,072 companies were registered as obligated large companies according to § 9 EEffG, regardless of any group connections. The personal services sector (e.g. laundry or hairdressing chains) and associations accounted for the majority of obligated large companies with 679 registered companies. The manufacturing sector came in second with 524 enterprises.

In total, energy audits were carried out for 1,910 companies. The manufacturing sector has the highest share in the total energy consumption with 29%, followed by energy supply with 26%.

The majority of the energy consumption examined in the energy audits is attributable to the processes sector. The main reason for this is that 25 % of the large companies subject to the obligation come from the manufacturing sector (industrial sector). The energy consumption of industrial companies is proportionally higher than that of service companies.

If the energy consumption of the energy audits of each obligated company is added up, this results in an Austria-wide annual energy consumption of 192,538.9 GWh or 693,140.1 TJ for large companies. Compared to the Austrian energy balance (Statistik Austria, 2019a), energy audits reach 47.6% of gross domestic consumption in 2019 (1,453,874 TJ).

64% of all reported energy audits show an energy savings potential in the company of between 1-10%.⁴⁶

⁴⁶ Klima- und Energieziele: Monitoringreport gemäß §§ 7 und 30 Bundes-Energieeffizienzgesetz, Berichtsjahr 2021, BMK,2021



	Impacts
Case level impact	High
Policy level impact	High/Unknown
Size	Unknown
Energy	
Impact evaluation	As per above

9.1.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors.

The main source of this chapter is DEESME, Nationale Programme für Energieeffizienz in KMU Unterstützung für die Umsetzung von Artikel 8 EED in Österreich:

While energy audits and energy management systems help companies identify potential energy efficiency measures, a practical challenge is that the recommended measures are not always implemented.

Common barriers that prevent companies from introducing energy audits or energy management systems and implementing measures include lack of knowledge about the benefits and available support schemes, and fear of hidden costs.

Member States providing concise information can reduce the importance of such barriers by increasing awareness and knowledge in companies.

An important lever to increase the implementation rate could be a stronger link between the measures proposed in the audits and the corresponding funding programmes that could be used for implementation.

Auditors should be encouraged to provide appropriate funding opportunities for the identified measures and also include links to available tools for further cost estimation (several are available on the klimaaktiv website) or to best practice examples of companies that have successfully implemented similar solutions.

For this purpose, the existing best practice examples on the website of the national energy efficiency monitoring body could be enriched with examples from industry, e.g. by adding experience reports from business owners.

In Austria, according to Article 17(4) of the EEffG the energy auditor is responsible for reporting on the energy audit. Furthermore, the National Energy Efficiency Monitoring Agency provides a detailed guideline for the submission process in the corporate service portal (Unternehmensserviceportal, USP) and a Word template for the audit report to facilitate the reporting process.



Thus, the effort for the companies in the submission is already quite low. However, Austria could expand the scope of specific audit information to be submitted. For example, the query of the identified measures together with the expected savings can provide useful information on the potentials that certain technologies may have for the national energy efficiency targets. In combination with the implemented measures from the last audit period, the implementation rate can be tracked, providing valuable insights, e.g. on the need for additional support programmes or general improvements to the audit or reporting process.⁴⁷

Personal opinion (10 years of random checks of audit reports): A lot of time is needed by consultants for the analysis of energy consumption. This should be automated: most important energy consuming equipment should be automatically monitored by the companies, data for energy management should be available before starting the audit in a standardised manner. Furthermore, there should be up-to date inventory lists of most important electric motors with age and efficiency class, available.

Lessons Learnt	
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	www.monitoringstelle.at Monitoringstelle Energieeffizienz, Österreichische Energieagentur: Marktentwicklungen von Energieeffizienz-maßnahmen, Energieaudits und anderen Energiedienstleistungen gemäß § 24 Abs. 2 Z 8 EEffG Berichtsjahr 2017 BGBl. I Nr. 72/2014: Bundesgesetz über die Steigerung der Energieeffizienz bei Unternehmen und dem Bund (Bundes-Energieeffizienzgesetz - EEffG)
Other	
Thoughts, comments, considerations ...	

9.1.4 Measure 4: Energy management systems in small and medium enterprises

Overview	
Short Description	Integration of an energy management systems in small and medium enterprises.
Responsible Authority	Ministry of Climate Action and Energy (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie)
Status	Ongoing

⁴⁷ DEESME, Nationale Programme für Energieeffizienz in KMU Unterstützung für die Umsetzung von Artikel 8 EED in Österreich; <https://www.deesme.eu/>; <https://www.deesme.eu/knowledge-hub/>



Issue Date	
Start Date	mid 2018
Ending Date	30.06.2025
Duration	84 months (expected)
Reference:	https://www.aws.at/fileadmin/user_upload/Content.Node/media/richtlinien/ab_2022_05_aws_EnMS_Richtlinie.pdf

9.1.4.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

<p>Providing financial support for the implementation of energy management systems in businesses, including funding for the installation of measurement technologies for electricity consumption, power, mass flow rate, compressed air volume, and training costs for integrating the energy management systems.⁴⁸</p> <p>When introducing an energy management system, the energy condition of the company is initially subjected to a comprehensive inventory (initial review or actual analysis of the energy situation). This includes topics such as reviewing energy data, identifying significant energy consumers, and analyzing energy costs. Based on this inventory, significant energy-saving potentials are identified and concrete proposals for energy-saving measures are developed.</p> <p>Eligible costs for funding include external consulting costs for the development, preparation, documentation, and external certification of an energy management system. The funding application must include a proposal from the external consultant. Additionally, all material and immaterial investment costs related to the implementation of an energy management system, such as energy monitoring software, are eligible for funding. Stationary measuring equipment that can measure at least one of the following parameters is also eligible: current, voltage, electrical power, temperature, heat and/or cold quantity, volume flow (liquid, gaseous), illuminance, and compressed air quantity. The measuring equipment must be directly related to the energy management system and provide it with the necessary data.</p>
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	Characteristics
Budget	<ul style="list-style-type: none"> • 5.000.000 EUR (total budgeted) <ul style="list-style-type: none"> ○ Up to 50.000 EUR for grants ○ If available range of funding/budget per beneficiary
Financing of the measure	
Policy focus	Focus is energy. Small enterprises (not obliged to energy management and energy audits) should establish an energy management system.
Intervention Type	External consulting for introduction of energy management system, training, investments in measuring equipment.

⁴⁸ https://www.aws.at/fileadmin/user_upload/Content.Node/media/richtlinien/ab_2022_05_aws_EnMS_Richtlinie.pdf



Main Barriers Addressed	SME are not obliged to energy management systems, energy costs are small part from the company expenses. The funding program addresses barriers such as low awareness and importance of energy costs in relation to revenue, lack of evaluation of the risks associated with fossil-based energy supply, and absence of legal requirements for implementing energy management in SMEs. Key factors such as legal regulations, energy prices, EU Taxonomy Regulation (green investments/companies), and customer demands for energy management could act as important drivers. ⁴⁹
Key Driver(s)	energy saving measures
Replicability	medium
EU Inclusion	Yes, in NECP
Related Characteristics	

9.1.4.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

In total, there have been around 130 projects completed, averaging around 40 projects per year. Typical project volume ranges from 15.000 to 30.000 EUR, with the main cost factors being consulting, training and certification. Hardware costs are a minor component of the total project costs.

No information about the saved CO₂ or any relevant energy savings was published yet, evaluation is in planning phase (information: spring 2023).⁵⁰

	Impacts
Case level impact	Low
Policy level impact	Medium
Size	no projects related to electric motors were submitted as of 2022
Energy	No information was found
Impact evaluation	

⁴⁹ Interview with Dipl.-Ing. Dr. Wilhelm Hantsch-Linhart

⁵⁰ Interview with Dipl.-Ing. Dr. Wilhelm Hantsch-Linhart



9.1.4.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors.

The energy management program for SMEs has achieved several positive outcomes. The project has been successful and is viewed as uncomplicated due to its digital application process, with information on approval provided within two weeks. The start rate is disbursed promptly to make the program attractive to small businesses, without requiring bank guarantees. However, the effort required for all businesses and projects is equal, making it relatively cumbersome for smaller projects.⁵¹

Promotions are made through the Austrian Economic Chamber (Wirtschaftskammer Österreich, WKÖ) and BMK, and the program is scheduled to be evaluated in 2023.

It could be useful to promote the programme in sector specific information campaigns/workshops.

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> • The program has been successful in promoting energy management systems in businesses. • The digital application process is simple and efficient, with a response time of two weeks • However, the application process can be equally time-consuming for small and large projects. • It can be difficult to recover funds if a project is not completed.
Recommendations	It could be useful to promote the programme in sector specific information campaigns/workshops.
Linked measures	
Reference(s)	Description of the program: https://www.aws.at/fileadmin/user_upload/-Downloads/Sonstiges/Einfuehrung_eines_EnMS.pdf
Other	AWS as funding organisation. Contact person: Dipl.-Ing. Dr. Wilhelm Hantsch-Linhart
Thoughts, comments, considerations ...	The "Meisterfrost" frozen food production introduced an energy management system. The system was set up with the help of the funding for the two locations in Sinnersdorf and the third in Rohrbach an der Lafnitz at the beginning of 2020. It is now possible to track in detail when, where and how much energy is consumed or generated. The system enables the company to systematically build energy know-how in their operations, and provides detailed insights into when and how much energy is consumed or generated. The system also includes energy monitoring and automation to ensure efficient use of self-produced eco-energy. The electricity comes primarily from six photovoltaic systems and a small hydroelectric power plant with a total capacity of 600 kW. Two larger photovoltaic systems currently feed electricity into the public grid, with the aim of achieving carbon-neutral cooling of all products. ⁵²

⁵¹ Interview with Dipl.-Ing. Dr. Wilhelm Hantsch-Linhart

⁵² https://energieinstitut.net/sites/default/files/enms_meisterfrost.pdf



9.1.5 Klimaaktiv Energy Efficient Enterprises

	Overview
Short Description	The funding program "klimaaktiv Energy Efficient Enterprises" supports industrial and commercial enterprises in optimizing their energy efficiency
Responsible Authority	Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie)
Status	Ongoing
Issue Date	2005
Start Date	2005
Ending Date	
Duration	15 years
Reference:	https://www.klimaaktiv.at/energiesparen/energieeffiziente_betriebe.html

9.1.5.1 Main Description

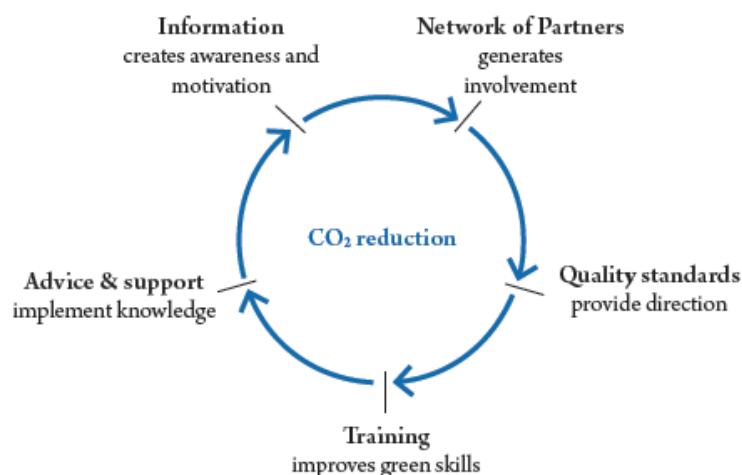
A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes.

The program "klimaaktiv Energy Efficient Enterprises" supports industrial and commercial enterprises in optimizing their energy efficiency

- Training and webinars for businesses and energy consultants
- Information and contacts for subsidized business consultations
- Guidelines, fact sheets and assessment tools on operational energy efficiency measures
- Posters and videos to raise awareness among employees
- Networking and exchange for implementing energy efficiency measures

klimaaktiv works on five levels:

klimaaktiv has developed a fine-tuned activity cycle. The five spheres of influence in the transition cycle initiate a positive feedback process and support all players in tackling the energy transition.



In more detail, in order to find companies interested in reducing energy costs, a wide range of marketing activities is set within klimaaktiv:

“Cooperation: The klimaaktiv management cooperates with market-partners for specific technologies, e.g. compressed air, variable speed drives, pumps, fans, lighting systems, steam systems and waste heat to answer the need of companies for very detailed and professional support. Information, Awards: Information on these advanced technologies are spread via newsletters and trainings. Until April 2015, more than 550 consultants have been trained in using tools for energy audits and about 200 companies have been awarded by the Minister of Environment for implementing energy efficiency measures.

Energy Audit Guides: The technological approach of the programme has been dedicated to motor driven systems so far: Since 2008 specific PR-materials, tools, and a training concept for consultants for different technologies were developed: compressed air, pumps, fans, steam, cooling systems, lighting, and waste heat. In 2015 the programme emphasises on the different possibilities to meter energy and calculate energy savings. For all technologies the most relevant saving measures are described for a very quick on-site evaluation. For the evaluation of all measures, the necessary data to be collected are stipulated, and rough economic and technical criteria are developed to decide if and how a specific technology component should be improved. Furthermore, a standard report is developed. Consultants and energy managers are trained with this tool and check their company or customers and provide their results to AEA.

Sector specific information and benchmarking: Sector specific information is developed within the branch concepts. So far five concepts have been published. For these concepts information on energy consumption and other relevant indicators are surveyed and energy performance indicators are developed. This information forms also the basis for the „Benchmarking simple“ tool which comprises at the moment 11 branches with 52 sub-categories.”⁵³

	Characteristics
Budget	300.000 – 500.000 EUR, annually
Financing of the measure	National funds
Policy focus	The program aims to promote energy efficiency in industrial and production companies, as well as energy-intensive service sectors, and has recently included renewable energy as a topic. The primary audience consists of energy managers and auditors, who are supported by energy audit guidelines. The program covers various topics that are relevant to motor operations.
Intervention Type	As part of the program audit guides for various systems including pump, fan, chiller, and compressed air and machine tools were developed. These guides contain methods for calculating energy savings and data collection sheets, and also provide information on motor replacement. As part of the program various trainings with technology providers to teach these methods were organised. The pump training (2022) and fan training (2023) have utilized the EMSA motor systems tool for accurate motor replacement calculations. Additionally, the program has published purchasing recommendations for electric motors, pumps, and compressed air systems, and developed fact sheets and posters for each technology to educate both managers and ground-level operators on these issues.
Main Barriers Addressed	Lack of information: Businesses may not be aware of the potential benefits of energy efficiency measures or may not have access to the information they need to make informed decisions. The program provides trainings and advices to help businesses

⁵³ Energy efficiency trends and policies in Austria, Austrian Energy Agency 2021, page 19

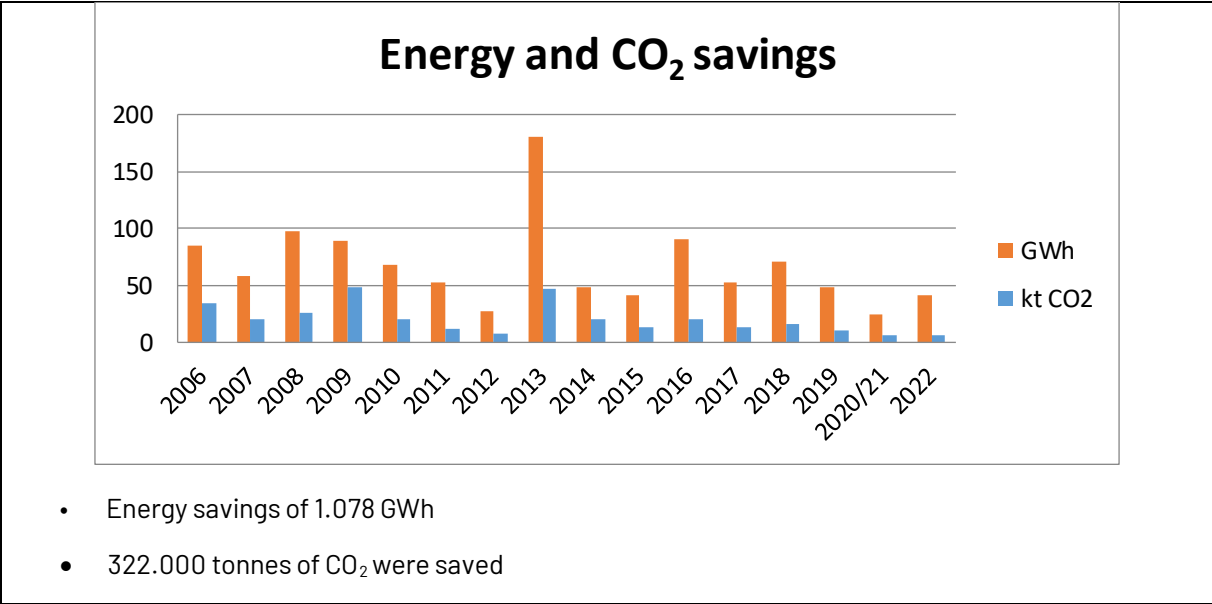


	<p>understand the options available to them and the benefits of investing in energy efficiency.</p> <p>Emission reduction: The program provides guidance and support to help businesses reduce their emissions and improve their environmental performance.</p>
Key Driver(s)	The klimaaktiv Energy Efficiency Enterprises program in Austria was not implemented due to a single driver, but rather a combination of factors and initiatives at the national, EU, and international levels.
Replicability	high
EU Inclusion	Not in NECP
Related Characteristics	

9.1.5.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

<p>There are several good examples of best practices in the motor system field that can be found online. These examples include:</p> <ul style="list-style-type: none"> • 25 examples of good practices involving the replacement of compressed air systems or the installation of frequency converters on motor systems to optimize performance • 15 good practice examples involving the optimization of the operating hours of compressed air systems. • 6 good practice examples involving the optimization of the performance of pump systems, when frequency converter was introduced for variable speed control • 8 good practice examples involving the optimization of the operating hours or the introduction of frequency converter for motors in refrigeration systems • 13 good practice examples involving optimization of the operating hours or the introduction of frequency converter for motors in ventilation and air conditioning systems <p>The number of participants, which successfully completed the training programs(2008-2022):</p> <ul style="list-style-type: none"> • 279 – compressed air systems training • 289 – pump systems training • 222 – ventilation and air conditioning training • 161 – steam generation systems training • 22 – driving systems training • 11 – machine tools training <p>Since the beginning of the program up to 2018 according to the summary of the good practice examples following results have been achieved:</p>
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	Impacts
Case level impact	High
Policy level impact	High
Size	
Energy	1.078 GWh (as of 2022) 322.000 t CO ₂ (as of 2022)
Impact evaluation	to raise awareness

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

Based on various good practice examples, data on individual measures taken by companies were collected and evaluated.

9.1.5.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure’s implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

The main success factors of the overall klimaaktiv programme are the multilevel governance and close cooperation with the national and regional support systems and governments.
For the energy-efficient business programme specifically, crucial success factors are “time”, “quality”, and “public image”. In order to establish high quality contents for the programme and to set up partner



networks, a long-term duration is essential. Initially, the klimaaktiv programme was scheduled for the period 2004–2012. This first term was then prolonged for a further eight years (2013–2020) with a third extension already being planned for 2021–2030. A long-running programme offers sufficient resources to develop the contents and the partner networks continuously. The awareness of the brand "klimaaktiv" is already quite high in Austria as 36% of Austrian citizens know klimaaktiv. Companies see an advantage in cooperating with the programme, and in using the klimaaktiv logo and their energy efficiency success stories for public relation activities.

The programme has been evaluated three times from external organisations until now. The main findings of the evaluation for the efficient business programme were:

- klimaaktiv is an outstanding example of an integrative climate protection programme which highlights relevant and measurable effects like awareness raising, knowledge transfer, and CO₂ savings
- it is very well known throughout Austria
- it has an effective overall operational management

Relevant areas for improvement for the business programme were identified and implemented consequently:

- consolidated cooperation with financial support programmes
- strengthened cooperation with regions and other climate protection programmes
- up-scaling of existing cooperation with partners

	Lessons Learnt
Key takeaways	<p>The success of the klimaaktiv programme is due to its multilevel governance and close cooperation with national and regional support systems and governments.</p> <p>For the energy-efficient business programme, "time", "quality", and "public image" are crucial success factors. A long-term duration is essential for establishing high-quality contents and partner networks.</p> <p>The awareness of the brand "klimaaktiv" is high in Austria, and companies see advantages in cooperating with the programme and using the klimaaktiv logo and their energy efficiency success stories for public relation activities.</p> <p>The klimaaktiv programme has been evaluated twice, and the findings show that it is an outstanding example of an integrative climate protection programme with relevant and measurable effects like awareness raising, knowledge transfer, and CO₂ savings.</p>
Recommendations	
Linked measures	
Reference(s)	<p>Official website of the programm</p> <p>Source: https://www.klimaaktiv.at/energiesparen/energieeffiziente_betriebe.html</p>
Other	<p>Program management</p> <p>Austrian Energy Agency</p> <p>Mag. Petra Lackner</p>
Thoughts, comments, considerations ...	<p>https://www.klimaaktiv.at/energiesparen/energieeffiziente_betriebe/good_practice.html</p>





EU-MORE



**EUropean MOtor
REnovation initiative**



Belgium

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Erik Faassen (IEECP)

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List of Acronyms

Acronym	Text
NEEAP	National Energy Efficiency Action Plan
VEA	Flemish Energy Administration
VEKA	Vlaams Energie- & Klimaatagentschap



9.2 Belgium

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Belgium can be split in the Federal State and the Communities, and the Regions.⁵⁴

There are three Regions. The names of the three regional institutions are borrowed from the name of the territory they represent. So, we refer to (from north to south) the Flemish Region, the Brussels-Capital Region, and the Walloon Region.

The Regions have legislative and executive organs: these are known as the Regional Parliament and the Regional Government. Regions have powers in fields that are connected with their region or territory in the widest meaning of the term.

The Flemish Region, the Brussels-Capital Region and the Walloon Region have powers relating to the economy, employment, agriculture, water policy, housing, public works, energy, transport (except Belgian Railways), the environment, town and country planning, nature conservation, credit, foreign trade, supervision of the provinces, communes, and intercommunal utility companies.

Snapshot introduction on the related national situation, taken from [the Belgium NECP - Part A \(2019\)](#):

“Energy

Energy intensity has been on a downward trend since 1990, reflecting the decoupling of economic growth and primary energy consumption.

In terms of the market share of total final consumption, petroleum products remain the principal source of energy (43%), followed by natural gas (27%) and electricity (20%).

The residential and tertiary sectors are the main consumers of final energy (40% in 2017), followed by industry (30%) and transport (30%)

Industry

Although the importance of the industrial sector (particularly heavy industry) in the economy has declined since the 1960s, it remains a relatively large component of Belgium's economic activity (accounting for almost 15% of GDP).

The principal contributing factors to industrial GHG emissions covered by the EU Emissions Trading System (EU ETS) are energy transformation (mainly attributable to electricity and heat production, but also oil refining), industrial processes (notably the chemical, mineral products and metal industries), and energy combustion in manufacturing industries (steel, chemicals, food and beverage production, cement).

In 2015, non-ETS industrial GHG emissions accounted for 24% of all industrial emissions from energy combustion and industrial processes. These included nitrous oxide (N₂O), fluorinated gases (F-gases) and carbon dioxide (CO₂).”

Measures that were included in the NECP which have some relevance to EU-MORE are specific to

WALLONIA with the specific measures in the non-ETS industrial sector stating:

“Continued improvement of energy efficiency in this sector through various types of technical measures, including decarbonisation of energy carriers and improved flexibility of energy demand. In the longer term, widespread fuel switching to decarbonised electricity and renewable heat (thermal solar, heat pumps and geothermal energy, or biomass combustion) must be pursued.”

Other statements applying to all three regions:

“Implementation of a framework to reduce indirect emissions:

⁵⁴ https://www.belgium.be/en/about_belgium/government/regions

Implementation of measures to reduce direct and indirect GHG emissions. This involves cross-cutting measures, such as the development of the circular economy and the promotion of urban agriculture."

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The 4 policy measures that have the most relevance to the EU-MORE project are included in this review (1 for each region + 1 encompassing all through the federal government).

Federal Government Measure 1 -> Tax deduction for energy saving investments by companies.

WALLONIA Measure 2 -> Voluntary agreements with industry

FLANDERS Measure 3 -> Voluntary agreements in energy intensive industry

BRUSSELS Measure 4 -> Compulsory energy audits for large buildings and large companies

There are however a range of additional measures that are worth mentioning here:

- Brussels - Impose a plan for reduction of energy consumption on major consumers ("PLAGE": Local Action Plan for Energy Management)
- Flanders - Energy efficiency criteria in environmental permits (overlap with voluntary agreements)
- Subsidies for energy saving investments in industry (excluding buildings)
- Energy efficiency information actions for industry
- Aids to businesses for the protection of the environment and the durable use of energy ("Aide UDE")
- Reduced rate loan mechanism ("Wallonie Entreprendre")

There is no specific mentioning of measures targeting electric motors used in industry, only for transportation in the NECP of Belgium. There are, however, as is prevalent in the large number of related measures targeting industry energy efficiency and consumption reductions, found in this review an adequate level of pressure and commitment to move to a more sustainable situation.

9.2.1 Measure 1: Tax deduction for energy saving investments by companies.

	Overview
Short Description	Tax advantage for companies when they invest in energy savings, at a percentage tax deduction level that has varied in time.
Responsible Authority	Federal Government
Status	Ongoing
Issue Date	1992
Start Date	1993
Ending Date	Ongoing
Duration	>30 years
Reference:	

9.2.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

Since the 1970s, companies have been enjoying a tax advantage when they invest in energy savings, at a percentage tax deduction level that has varied in time. For 2004, the tax deduction was of 13,5% for energy saving investments by companies (instead of 3,5% for standard investments). Since the year 2009 the deduction level has been raised to 15,5% for energy saving investments, while standard investments no longer benefit from a tax deduction.

The investments eligible for tax deductions must concern more rational use of energy, improvement of industrial processes with regard to energy or the recovery of energy in industry. They must fall into one of the 25 categories described in Annex II of the Royal Decree/CIR92.

Sinds 1st january 2016, the tax deduction's rate for investment is 8%.

The tax deduction's rate for investment for fixed assets that strives to promote R&D for new advanced product and technologies with no effect on Environment or aiming to minimize negative effects on Environment is 13.5% for 2021 revenues. But for fixed assets acquired between 01/01/2018 & 31/12/2022, it is 25% (covid 19 support measure). Theses % can be applied for investments with positive impact on Environment if they are implemented within the period of time.

Source: [Odyssee-MURE](#)

	Characteristics
Budget	N/A
Financing of the measure	Tax Exemption
Policy focusses	Physical (investments)
Intervention Type	Tax Benefit
Main Barriers Addressed	Return On Investment (ROI)
Key Driver(s)	Financial
Replicability	High
EU Inclusion	Yes included in the NECP
Related Characteristics	

9.2.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Since the tax benefit measure does not target motors specifically no direct impact estimation relating to the replacement of electric motors can be given.

An ex-ante impact of 1000 kt CO2 emission reduction in 2020 was estimated by ECONOTEC & VITO (2015).

Source: [Odyssee-MURE](#)

	Impacts
Case level impact	Low
Policy level impact	Medium

Size	Measure does not relate to electric motors directly - no impact figures on the size or number of motor replacements were found.
Energy	
Impact evaluation	

(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

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9.2.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

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Lessons Learnt	
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.2.2 Measure 2: Wallonia - Voluntary agreements with industry

Overview	
Short Description	Commitment of enterprises (by sector) for reducing energy consumption and greenhouse gas emissions
Responsible Authority	
Status	Ongoing
Issue Date	2002 (original measure)
Start Date	2004
Ending Date	2020 (continued)
Duration	
Reference:	4th National Energy Efficiency Action Plan (NEEAP)

9.2.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The measure consists in a voluntary commitment of enterprises (by sector) for reducing energy consumption and greenhouse gas emissions (as defined in the Kyoto Protocol). The industrial sectors (chemical, paper, iron and steel, glass, cement, etc.) take on commitments with regard to energy performance, while the sector concerned benefits in return from various financial and administrative advantages on the part of the Walloon Region.

Branch agreements 2003-2013

The first agreements covered the period 2003-2013. 16 sectors, 173 enterprises and 203 production sites were affected, representing over 90% of the Walloon industrial consumption. Each sector committed itself to achieve quantified energy efficiency and CO2 efficiency targets by the end of the agreement period.

According to the monitoring of the agreements, energy efficiency of the Walloon industry has improved by 16.5% and CO2 emissions have been reduced by 19.3%, in relative terms, which exceeded expectations.

Branch agreements 2014-2020

In 2014 the process has been renewed and new agreements, so-called 2nd generation agreements, have been signed for the period 2014-2020.

The general principle remains the same (i.e. improving the energy efficiency of industries and reducing their CO2 emissions) but the approach was enriched by refined methodological tools and new commitments. The new formula opens the possibility of using renewable energy sources on industrial sites. It also allows companies to use energy/CO2 life cycle analysis for their flagship product or to conduct a carbon footprint on their site.

The government decree of 15 June 2017 introduces subsidies for energy efficiency investments by SMEs.

2020-> The related agreement has since then been renewed and remains in effect

	Characteristics
Budget	N/A
Financing of the measure	N/A
Policy focusses	Product / Physical energy savings
Intervention Type	Voluntary agreement Energy Saving
Main Barriers Addressed	<ul style="list-style-type: none"> • Ease of regulation • Voluntary Participation
Key Driver(s)	
Replicability	High
EU Inclusion	Yes, proposed agreements by the companies are in line with the EED Art. 7/8 and the measure is stated in the Belgian NECP
Related Characteristics	

9.2.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The following is the impact evaluation published in the fourth National Energy Efficiency Action Plan (ETS and non ETS sites):

Final energy Savings(GWh)	2010	2015	2016	2020
1st and 2nd generation agreements outside ETS	1 090	1 478	1 504	932
1st and 2nd generation agreements ETS	4 630	6 299	6 444	3 973
SMEs	0	0	0	40
Total	5 720	7 778	7 948	4 944

Source: [Odyssee-MURE](#)

The above presented achieved energy savings through the voluntary agreements encompass far wider spread interventions than electric motor renovation/replacement in industry initiatives alone. For this reason these figures have little to no relevance for the EU-MORE project.

Impacts	
Case level impact	High
Policy level impact	High
Size	Blanket measure (not targeting motors perse), no specific information relating to motors available
Energy	As per the above; 4944 GWh
Impact evaluation	

(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

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9.2.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

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Lessons Learnt	
Key takeaways	
Recommendations	
Linked measures	

Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.2.3 Measure 3: Flanders - Voluntary agreements with industry

	Overview
Short Description	Companies undertake to carry out an energy audit and draw up an energy plan to improve energy efficiency.
Responsible Authority	
Status	Ongoing
Issue Date	2002 (original measure)
Start Date	2015 (2nd phase)
Ending Date	Ongoing (Originally until 2020 though extended since)
Duration	9 years (and more, with many follow-up/updates)
Reference:	Vlaams Energie- & Klimaatagentschap (VEKA) 4th National Energy Efficiency Action Plan (NEEAP) Flemish Energy Administration (VEA)

9.2.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

This is a measure of the Region of Flanders. In a first step, it had two components, covering the period 2003–2013: the Audit covenant and the Benchmark covenant. In 2014, as a third component new ‘energy policy agreements’ were signed for the period 2015–2020 (‘Energiebeleidsovereenkomsten 2015–2020’). The measure is since extended until 2025.

First the period 2014 (issue date) 2015–2020 (effective) is described, the 2003–2013 period can be found afterward:

Energy policy agreement 2015–2020 (Energiebeleidsovereenkomst 2015–2020)

This agreement is the successor of the audit covenant and the benchmarking covenant. It concerns both ETS and non-ETS energy intensive companies (primary energy consumption > 0, PJ). After discussion in the Flemish Parliament, the case was notified to the European Commission in the framework of the state aid regulations. The agreements for ETS and non-ETS companies were approved by the Flemish government on 4 April 2014 and entered into force on 1 January 2015. By mid-2016 338 establishments had joined the agreement, which represents over 90% of the industrial energy consumption.

The companies joining the agreement commit themselves:

- to have an energy Audit carried out every 4 years;
- to set up an energy Plan on the basis of the energy audit, containing an analysis of the specific energy consumption of the establishment and identifying the profitable measures (those with an IRR after taxes of 14%) for reducing the specific energy consumption;
- to carry out all profitable investments of it;
- To annually report on the measures taken, studies and recalculations of the potential of profitable measures;

- To annually report on the energy consumption, the CO₂-eq emissions and their evolutions.

In counterpart, the Flemish Region commits itself not to impose other specific Flemish measures (such as an energy or CO₂-tax, going beyond European obligations) to the companies fulfilling their obligations. It will also simplify the administrative burden of companies by not requiring any additional reporting on energy.

The companies joining the agreement are considered as automatically satisfying all the obligations on energy plans of the government Energy Decree of 19 November 2010.

Period 2003–2013

1. Audit covenant (annual primary energy consumption > 0,5 PJ)

The companies involved undertake to carry out an energy audit and draw up an energy plan to improve energy efficiency. In the first phase, (not later than 4 years after acceptance of the energy plan), they must implement all cost-effective measures with an IRR of at least 15% after tax. In the second phase, not later than 4 years after the acceptance of the updated energy plan, companies must implement energy efficiency measures with an IRR of at least 13.5%.

The Flemish Authority offers a number of benefits in return:

- exempts the companies involved from specific measures and rules intended to improve energy efficiency which are replaced by the covenant;
- Does not impose any specific energy tax and does everything to ensure that businesses are exempted from a Federal energy tax;
- European Directive 2003/96/EC provides for full or partial exemption from the Community minimum rate of energy taxation for covenant companies if it can be shown that the achievable energy saving is equivalent. The companies involved are thus fully or partially exempt from a number of excise duties;
- Target-group companies that do not sign or implement the covenant lose the right to the degressive application of the Federal electricity contribution;
- Undertakes to provide additional aid to promote energy efficiency, targeted initially at businesses who have signed up to the audit covenant;
- from the 2009 tax year, companies that have signed an energy policy agreement with the Flemish Authority are fully exempted from property tax on new equipment and machinery.

2. Benchmarking covenant (annual primary energy consumption 0,1 – 0,5 PJ)

The companies involved are bound under a benchmarking covenant to achieve and maintain the world benchmark performance in terms of energy efficiency up to 2012. A business undertakes to be inspected once every four years by a consultant to check to what extent the specific energy consumption of its process installations achieves world benchmark levels and also to produce an energy plan aimed at achieving that goal.

The covenant stipulates that a business must take all cost-effective measures (with an IRR after tax of at least 15%) as quickly as possible, but not later than by 2005, or at least take the decision to implement them rapidly by the end of 2005. If this was not enough to achieve the benchmark, less cost-effective measures (with an IRR after tax of at least 6%) must also have been implemented by 2007. If these measures do not achieve the benchmark by the end of 2008, the company must then have reached that level or have achieved an acceptable approximation of it, with an equivalent result in the area of energy efficiency, by not later than 2012.

This might involve the use of flexible instruments, such as joint implementation, a clean development mechanism and emissions trading.

	Characteristics
Budget	N/A
Financing of the measure	N/A

Policy focusses	Product / Physical energy savings
Intervention Type	Voluntary agreement Energy Saving
Main Barriers Addressed	<ul style="list-style-type: none"> • Ease of regulation • Voluntary Participation
Key Driver(s)	Government Decree Energy Planning of 2010 (amongst others and a related tendency to move towards more sustainability).
Replicability	High
EU Inclusion	Yes, proposed agreements by the companies are in line with the EED Art. 7/8 and the measure is stated in the Belgian NECP
Related Characteristics	<p>There is also the energy efficiency criteria in environmental permits measure in effect in the Flanders area which has a large overlap with the required energy audits stated above as well as the mandatory Energy Audits for large companies required by the EED article 7/8.</p> <p>link</p>

9.2.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The savings achieved compared with the year 2007, as in the framework of EU directive 2006/32. For non-Emission Trading Sites (ETS), they are those published in the fourth National Energy Efficiency Action Plan. For the total, they are based on figures obtained from the Flemish Energy Administration (VEA).

(GWh)	2015	2016	2020	Source
Non ETS	2197	2378	2541	4th Flemish NEEAP, p. 9
ETS	6851	7617	10030	
Total	9048	9995	12571	VEA + own calculations

Source: [ODYSSEE-MURE](#)

The above presented achieved energy savings through the voluntary agreements encompass far wider spread interventions than electric motor renovation/replacement in industry initiatives alone. For this reason these figures have little to no relevance for the EU-MORE project.

Impacts	
Case level impact	High
Policy level impact	High
Size	Difficult to estimate due to
Energy	As per the above; 12571 GWh NO specific figures are available related to motors

Impact evaluation	
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(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

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9.2.3.3 *Lessons Learnt*

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

The success of the voluntary agreements measure indicated the willingness of the private sector to move when presented with the right incentives.

Lessons Learnt	
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.2.4 Measure 4: Brussels - Compulsory energy audits for large buildings and large companies

Overview	
Short Description	Energy audits for large buildings and large companies
Responsible Authority	Local Authority
Status	Ongoing
Issue Date	2011
Start Date	2012
Ending Date	Ongoing
Duration	>12 years
Reference:	4th National Energy Efficiency Action Plan (NEEAP)

9.2.4.1 *Main Description*

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The energy audit is mandatory for large companies; and large energy consumer facilities when applying for environmental permits.

The audit must be performed by an accredited auditor, who will determine in collaboration with the operator of the building a list of measures to be included in an action plan together with a timetable for their implementation.

Licensees are required to implement the measures of the energy audit that are profitable in less than 5 years to achieve the energy saving and greenhouse gases emission reduction objectives identified by the audit.

Besides, Article 8.4 of Directive 2012/27/EU requires that energy audits be carried out for all companies that are not SMEs and this every 4 years. This article has been transposed within the COBRACE (Brussels Code of Air, Climate and Energy Management). Companies subject to the obligation to carry out an audit under the legislation on environmental permits are exempted. 1613 large firms are affected by Article 8§4.

Source: [Odyssee-MURE](#)

	Characteristics
Budget	N/A
Financing of the measure	Companies pay for the audits and measures themselves
Policy focusses	Physical
Intervention Type	Mandatory Energy Audit
Main Barriers Addressed	Lack of information
Key Driver(s)	Local Authority Decree 2006 EC EED Article 7/8
Replicability	High
EU Inclusion	Yes - NECP amongst others. Also direct link to EED Article 7/8
Related Characteristics	

9.2.4.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The following is the impact evaluation published in the fourth National Energy Efficiency Action Plan:

Final energy savings in 2015: 42 GWh

Final energy savings in 2016: 53 GWh

The energy audits do not specifically target the replacement of Electric Motors however though these will be included in the recommended energy saving measures by the Auditor. No specific impact information on the effectiveness of motor renovation can be given.

Source: [Odyssee-MURE](#)

	Impacts
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Case level impact	High (gut feeling)
Policy level impact	Medium
Size	As of January 2017, 266 audits have been introduced since the publication of the decree of 15 December 2011 relating to the energy audit for energy-intensive establishments. It is estimated that about 70 audits are handled annually. No specific information is available on the number of motors replaced.
Energy	See above. Figures do not relate to motors.
Impact evaluation	

(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

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EU-MORE



EUropean MOtor
REnovation initiative



Bulgaria

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Deyan Dimov (Austrian Energy Agency)

List of Acronyms

Acronym	Bulgarian	English
EERSF	Фонд "Енергийна ефективност и възобновяеми източници	Energy Efficiency and Renewable Sources Fund
ERDF	Европейски фонд за регионално развитие	European Regional Development Fund
OPIC	Оперативна програма "Иновации и конкурентоспособност"	Operational Programme "Innovations and Competitiveness"
SEDA	Агенция за устойчиво енергийно развитие	Sustainable Energy Development Agency



9.3 Bulgaria

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

In Bulgaria there are several authorities responsible for overseeing and implementing various aspects of the policy framework:

- Ministry of Energy: main governing body responsible for formulating and implementing energy policies in Bulgaria.
- Sustainable Energy Development Agency (SEDA): implements state policies on energy efficiency and promotes renewable energy production and consumption.
- Energy Efficiency and Renewable Sources Fund (EERSF): acts as a lending institution, credit guarantee facility, and consulting company, supporting energy efficiency projects through technical assistance, financing, and guarantees.

The National Energy Efficiency Action Plan of Bulgaria sets out the country's targets for energy savings in the year 2020. The plan includes the following indicative targets⁵⁵:

- Energy savings in final energy consumption: 716 ktoe/a
- Energy savings in primary energy consumption: 1,590 ktoe/a, with 169 ktoe/a specifically in the energy transformation, transmission, and distribution sectors.

To achieve these targets, Bulgaria relies on the implementation of strong energy efficiency policies and the optimal use of additional funds from various sources, including:

- European funds and programs
- Obligated persons (based on the energy efficiency obligation scheme for energy traders)
- Local sources
- State budget

The successful implementation of these targets will result in a reduction of primary energy consumption in 2020 from 18,460 ktoe (as projected in the reference scenario) to 16,870 ktoe. Furthermore, Bulgaria aims to achieve a 41% reduction in primary energy intensity by 2020 compared to the intensity levels recorded in 2005.

In accordance with the Energy Efficiency Act and Directive 2006/32/EC on energy end-use and energy services, Bulgaria has adopted a national indicative energy savings target of at least 9% of the average final energy consumption for the period 2001-2005. This target covers a nine-year period and has been supported by the development and implementation of the First (2008-2010) and Second (2011-2013) three-year action plans focused on improving energy efficiency in end-use energy.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

Energy policy of the Republic of Bulgaria is fully consistent with the main objectives of energy policy of the European Union energy security, competitiveness and sustainable development. The Energy Strategy of the Republic of Bulgaria by 2020 is assumed that "energy efficiency is the highest priority in the energy policy of the country". On this basis, ambitious targets are set for improving energy efficiency⁵⁶.

⁵⁵ <https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-bulgaria.pdf>

⁵⁶ <https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-bulgaria.pdf>

9.3.1 Measure 1: Innovations and Competitiveness

	Overview
Short Description	Operational Programme "Innovations and Competitiveness" (OPIC) is the main program in Bulgaria that provides support to businesses through the European Structural and Investment Funds (ESIF) for the period 2014-2020. Its measures aim to foster innovation, entrepreneurship, and the growth of small and medium-sized enterprises, while promoting energy and resource efficiency in businesses to create sustainable competitive advantages.
Responsible Authority	Ministry of Innovations and Growth
Status	Ongoing
Issue Date	
Start Date	2014
Ending Date	
Duration	
Reference:	https://www.eufunds.bg/bg/opic

9.3.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The Operational Programme "**Innovations and Competitiveness**" 2014-2020 (OPIC) is the main programmatic document at the national level outlining the support for Bulgarian businesses from the European Structural and Investment Funds for the period 2014-2020. OPIC is aimed at addressing the needs, overcoming challenges, and harnessing the opportunities for development in the Bulgarian economy. The measures outlined in the program aim to contribute comprehensively to the creation of sustainable, long-term competitive advantages for Bulgarian enterprises and to accelerate the transition to a knowledge-based economy. The support is focused on innovation development, entrepreneurship, capacity growth of small and medium-sized enterprises (SMEs), and the energy and resource efficiency of enterprises⁵⁷.

One of the project selection procedures of OPIC is **the "Rebuilding SMEs by improving energy efficiency" - BG16RFOP002-6.002**. The following text describes the criteria for selecting a project.

Eligible candidates:

- Micro, small, or medium-sized enterprises registered under the Commercial Act or the Cooperative Act.
- Candidates who have concluded financial years in 2018, 2019, and 2020.
- Candidates should engage in their primary economic activity in sector C "Processing Industry" according to the Classification of Economic Activities (CEA-2008).

⁵⁷ <https://www.eufunds.bg/bg/opic/node/553>

The list of eligible categories of materials and equipment includes **possible expenditures for the acquisition of** machinery, facilities, equipment, systems representing durable assets, and materials. To be eligible for funding, candidates must meet certain requirements such as:

- Investments in energy production systems can be funded, provided that the energy produced is solely for self-consumption.
- Materials and equipment
- For all investments in materials and equipment from the List of eligible categories of materials and equipment, beneficiaries are required to annually provide energy consumption data for a period of three years after project completion.

In this regard, candidates can:

- Fund the acquisition of a new energy monitoring system using funds from the current procedure, including such expenses in the project.
- Fund the upgrade of an existing energy monitoring system to cover the energy consumption of the materials and equipment acquired through the project, using funds from the current procedure, including such expenses in the project.
- Not allocate funding for either of the two aforementioned options and ensure the possibility of submitting energy consumption data for the materials and equipment acquired through the project using their own resources.
- BDS EN ISO 50001(Energy Management Systems)/EN ISO 50001 standard - up to BGN 9,000.00.

It is permissible to purchase technology/equipment through this procedure. When choosing technology/equipment from the List, candidates may include auxiliary materials and equipment necessary for their assembly and/or commissioning as functional units.

These **equipment groups** are established based on the following criteria:

- New energy-efficient systems and equipment available on the Bulgarian market.
- New energy-efficient systems and equipment based on Best Available Techniques (BAT).
- Operational characteristics compliant with national standards and regulations.
- Compliance with European and/or Bulgarian standards (e.g., DIN, ISO, CE marking, etc.).

List of eligible materials and equipment⁵⁸:

1. Climate chambers with highly efficient heat/cold/moisture regeneration - Criteria
 - Standard for energy efficiency of electric motors: IE3 or IE4
 - Indoor air quality compatible with VDI 6022 hygiene guidelines
 - BDS EN 14825:2019: Energy efficiency class for heat pumps A+++, which corresponds to the following Seasonal Coefficient of Performance (SCOP):
 - SCOP at high temperature (+40°C) ≥ 3.75
 - SCOP at low temperature (-15°C) ≥ 4.38
 - SCOP of the refrigeration cycle ≥ 3.80
 - SCOP_{net} of the entire system ≥ 5.00
 - Monitoring requirement
 - Minimum measurement points include:
 - Power meter for each climate chamber
 - Temperature measurement of the four airflows: exhaust, supply, ambient, and exhaust air.
2. Pumps - Criteria:
 - Standard for energy efficiency of the motor: IE3 or IE4
 - Minimum Energy Efficiency Index (MEI) ≥ 0.70

⁵⁸ <https://opic.bg/news/uo-na-opik-obyavyava-za-obshchestveno-obszhdane-protsedura-za-podbor-na-proekti-bg16rfop002-6002-vzstanovyavane-na-mssp-chrez-podobryavane-na-energiynata-efektivnost> (conditions for application - appendix 18)

- Minimum Efficiency Index(IEE) for circulation pumps ≤ 0.20
 - Built-in electronic control
 - Monitoring requirement
 - Minimum measurement points include: Power meter for each pump or group of pumps with a common power supply line and total installed electrical power above 15 kW.
3. Compressors for compressed air – Criteria:
- Energy efficiency standard for the main motor with nominal power $2 \div 18$ kW: \geq IE3
 - Energy efficiency standard for the main motor with nominal power $19 \div 75$ kW: \geq IE4
 - Operating pressure: $7.5 \div 13$ bar
 - Piston compressors:
 - Up to 10 bar: $7.3 \div 10.3$ kW/m³/min
 - $10 \div 15$ bar: $8.7 \div 13.0$ kW/m³/min
 - Rotary compressors:
 - Up to 7.5 bar:
 - $2 \div 18$ kW: $6.2 \div 8.2$ kW/m³/min
 - $19 \div 75$ kW: $5.4 \div 6.3$ kW/m³/min
 - $7.5 \div 10$ bar:
 - $2 \div 18$ kW: $7.3 \div 10.3$ kW/m³/min
 - $19 \div 75$ kW: $6.4 \div 7.2$ kW/m³/min
 - $10 \div 13$ bar:
 - $2 \div 18$ kW: $8.7 \div 13.0$ kW/m³/min
 - $19 \div 75$ kW: $7.8 \div 8.8$ kW/m³/min
 - Monitoring requirement:
 - Minimum measurement points include: Power meter for each new compressor.
4. Systems for Motor Speed Control with Frequency Converters/Inverters and Soft Starters - Criteria
- Maximum motor power not exceeding 300 kVA
 - Built-in communication capabilities
 - Built-in EMC(Electromagnetic Compatibility)filter
 - Requirement for monitoring
 - The minimum measurement points include: Power meter for each frequency converter/soft starter or a group of frequency converters/soft starters with a common power supply line and a total electrical power exceeding 15 kW
- * There are 19 more different categories which do not consider any motor measures.

		Characteristics								
Budget	<ul style="list-style-type: none"> • The budget for OPIC program deviates from year to year. The whole budget from 2014 up to 2022 was BGN 3.250 Mio. (€ 1.662 Mio.). Projects are financed around 87% through EU fund and 13% through national fund⁵⁹ 									
		2014	2015	2016	2017	2018	2019	2020	2021	2022
	Budget in Mio. [BGN]	331	400	299	337	434	315	673	271	190
	Budget in Mio. [EUR]	169	204	153	172	221	161	343	138	97

⁵⁹ <https://2020.eufunds.bg/bg/5/0/OPProfile>



	<ul style="list-style-type: none"> Total budget for the project procedure “Rebuilding SMEs by improving energy efficiency” - BG16RFOP002-6.002 is BGN 136 Mio. (€ 70 Mio.)⁶⁰ <ul style="list-style-type: none"> Project size: minimum BGN 25.000 (€ 12.800) and maximum BGN 150.000 (€ 76.850) Funding rate: max. 50%
Financing of the measure	European and national funds
Policy focus	Physical intervention
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost, return on investment, emission reduction
Key Driver(s)	
Replicability	High
EU Inclusion	Yes
Related Characteristics	

9.3.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

A total of 842 projects were submitted, out of which 795 contracts were approved. Out of these approved contracts, 127 projects have been completed while 668 projects are still ongoing⁶¹.

The total value of all the projects is BGN 159 Mio. with 50% funding.

The program is still ongoing and no evaluation for the saved energy or saved CO₂ emissions was found.

	Impacts
Case level impact	Medium
Policy level impact	Medium
Size	No information

⁶⁰ <https://opik.bg/news/uo-na-opik-obyavyava-za-obshchestveno-obszhdane-protsedura-za-podbor-na-proekti-bg16rfop002-6002-vzstanovyavane-na-mps-chrez-podobryavane-na-energiynata-efektivnost>

⁶¹ <https://2020.eufunds.bg/en/5/0/Project/Search?Prior=CxCZITJVNbv90GjGBpwKw%3D%3D&Proc=YGXVoOcFbUYDyum8Dg4UHW%3D%3D&showRes=True>

Energy	No information
Impact evaluation	

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

No information

9.3.1.3 *Lessons Learnt*

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

no information

	Lessons Learnt
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	https://opic.bg/news/uo-na-opik-obyavyava-za-obshchestveno-obszhdane-protsedura-za-podbor-na-proekti-bg16rfop002-6002-vzstanovyavane-na-msp-chrez-podobryavane-na-energiynata-efektivnost https://eumis2020.government.bg/bg/s/Procedure/Info/11f75244-8bb7-48c8-8525-073b27955aba https://2020.eufunds.bg/bg/5/0/OPPProfile http://ope.moew.government.bg/bg/notice/noticedetail/from/noticecurrent/id/86/typeld/1
Other	
Thoughts, comments, considerations ...	

9.3.2 Measure 2: Energy Efficiency and Renewable Sources Fund

	Overview
Short Description	Energy Efficiency and Renewable Sources Fund (EERSF) as an entity that combines the functions of a lending institution, a credit guarantee facility, and a consulting company. It offers support to Bulgarian enterprises, municipalities, and private individuals by providing technical assistance for the development of energy efficiency investment projects. EERSF assists in securing financing or co-financing and can act as a guarantor for other financial institutions.
Responsible Authority	Government of Bulgaria (Ministry of Economy and Energy)
Status	Ongoing
Issue Date	2004
Start Date	2006
Ending Date	Ongoing
Duration	
Reference:	https://www.bgeef.com/en/

9.3.2.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

Eligible candidates⁶² for funding are:

- Municipalities
- Corporate Clients
- Private individuals

Application process⁶³:

1. Detailed Energy Audit

A necessary condition for a successful application with the EERSF is the presence of a detailed energy audit allowing for an energy analysis and choice of energy saving measures.

2. The Project Cycle

- Project identification (Project Developer)
- Initial project screening (when necessary, EERSF/external consultancy company)
- Completion of Initial Project Proposal (IPP) (Project Developer)
- Submission of IPP and accompanying documents to EERSF (Project Developer)
- Assistance in IPP and accompanying documents completion and improvement (EERSF)
- Project appraisal and assessment (EERSF)
- Formal decision for approval of EERS financing
- Completion of negotiations for financing and disbursement of funds

Principal Eligibility Criteria Error! Bookmark not defined. .

⁶² <https://www.bgeef.com/en/energy-efficiency-measures/>

⁶³ <https://www.bgeef.com/en/application-procedure/application-process/>

All energy efficiency projects approved and supported by the EERSF should meet the following eligibility criteria:

- The project should involve the application of well-proven technology;
- The project cost should range between BGN 30 000 and BGN 3 000 000 although exceptions are possible if strongly justified;
- The equity contribution of the Project Developer should be at least 10%;
- The repayment period is up to 10 years.

The **financial resources** of the Fund can be used to finance in the following six types of investment⁶⁴:

1. Investments in improved energy efficiency (EE) in industrial processes, including but not limited to:
 - Purchase of equipment, machinery, and tools;
 - Installation of the purchased equipment; and
 - Training of staff in the proper use of the equipment and new technologies.
2. Rehabilitation of buildings in all sectors. The rehabilitation should be directed towards improving EE, including but not limited to:
 - Improvements to mechanical heating ventilation and air-conditioning;
 - Others
3. Improvements to heat sources and distribution systems,
4. Rehabilitation of municipal facilities, e.g., street lighting.
5. Other energy end-use applications, including but not limited to:
 - Energy management control systems;
 - Power factor correction measures;
 - Air compressors; and
 - Others
6. Demand-side off-grid renewable energy generation:

Characteristics	
Budget	Year
	2005-2008
	2013
	2014
	<ul style="list-style-type: none"> ○ The project cost should range between BGN 30 000 and BGN 3 000 000 although exceptions are possible if strongly justified
Financing of the measure	Global Environment Fund (GEF), the Government of Bulgaria, the Government of Austria, European Bank for Reconstruction and Development (EBRD), Kozloduy International Decommissioning Support Fund (KIDSF) and from the Bulgarian private sector ⁶⁵
Policy focus	Soft and physical interventions
Intervention Type	Equipment upgrade

⁶⁴ <https://econoler.com/wp-content/uploads/2021/01/Bulgarie2021.pdf>

⁶⁵ http://citynvest.eu/sites/default/files/library-documents/Model%2019_Energy%20Efficiency%20and%20Renewable%20Sources%20Fund%20-EERSF_final.pdf

Main Barriers Addressed	High initial cost, return on investment, ease of regulation and emission reduction
Key Driver(s)	Energy Efficiency Act (EEA) in 2004 was a key driver
Replicability	High
EU Inclusion	Yes, it is a part of the NECP of Bulgaria
Related Characteristics	

Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

From its initial launch in mid-2006 to the end of 2020, EERSF granted energy efficiency loans of a total of 212 projects, representing a combined project investment exceeding USD 57.7 million. Additionally, during this time period, the Fund provided partial credit guarantees or portfolio guarantees to 33 projects, with a total project investment valued at USD 14.7 million.

By the end of 2014, the energy efficiency investments supported by EERSF had achieved a total energy savings of 95,4 MWh/year and a reduction of 75 kt/year of CO₂eq emissions⁶⁶.

By the end of 2020, the energy efficiency investments supported by EERSF had resulted in a significant impact, with a total energy savings of 129,160 MWh/year and a reduction of 93,052 kt/year of CO₂eq emissions⁶⁷.

	Impacts
Case level impact	Medium
Policy level impact	Medium
Size	212 projects
Energy	Energy savings of 129,160 MWh/year and a reduction of 93,052 kt/year of CO ₂ eq emissions
Impact evaluation	The achievements of EERSF showcase the effectiveness of its concept and the value it brings to the energy efficiency sector. Despite facing financial constraints, the fund has been able to deliver tangible results, demonstrating the demand and necessity for innovative approaches in promoting energy efficiency. The positive outcomes achieved by EERSF provide valuable insights and inspiration for other regions and countries seeking to develop similar initiatives and implement sustainable business models to drive energy efficiency advancements ^{Error! Bookmark not defined.} .

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

No information

⁶⁶ http://citynvest.eu/sites/default/files/library-documents/Model%2019_Energy%20Efficiency%20and%20Renewable%20Sources%20Fund%20-EERSF_final.pdf

⁶⁷ <https://econoler.com/wp-content/uploads/2021/01/Bulgarie2021.pdf>

9.3.2.2 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure’s implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

EERSF did not fulfil the initial expectations of funders regarding its role in the energy efficiency financing market in Bulgaria, as indicated by a World Bank midterm review. EERSF demonstrated its success by identifying an alternative market niche, focusing on providing loans and guarantees to public-sector EE projects and actively supporting project preparation. EERSF initially assumed that commercial banks would require partial credit guarantees as a condition for entering the EE finance sector. However, the Bulgarian finance community did not perceive such guarantees as necessary for financing EE projects. Instead, public-sector borrowers had a strong repayment track record, and corporate sector loans were provided based on balance sheets and previous lending experience. Consequently, significant effort was required to persuade banks in Bulgaria to engage in purchasing partial credit guarantees through extensive sales efforts conducted by the Fund⁶⁸.

Lessons Learnt	
Key takeaways	The following principles have been identified as critical to EERSF’s success ^{Error! B} ookmark not defined. : <ol style="list-style-type: none"> 1. Flexible funding operations 2. Rely on ESCOs’ support to develop the market 3. Market transformation 4. Identifying of unaddressed niches
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

⁶⁸ <https://econoler.com/wp-content/uploads/2021/01/Bulgarie2021.pdf>

EU-MORE



EUropean MOtor
REnovation initiative



Croatia

Review of past and existing policy options for the
acceleration of electric motor renovation

EU-MORE

Authors:

Ivana Rogulj (IEECP)



List of Acronyms

Acronym	Text
NECP	Integrated national energy and climate plan
SMIV	Measurement and verification information system
MESD	Ministry of Economy and Sustainable Development
RES	Renewable energy sources
OPCC	Operational Program for Competitiveness and Cohesion
ETS	Emission Trading Scheme



9.4 Croatia

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

In Croatia, Ministry of Economy and Sustainable Development is the governing body for energy efficiency, with the management units for energy and climate. Besides other ministries with specific overviews, important actor is The Environmental Protection and Energy Efficiency Fund, managing the related funding.

Energy efficiency legislative framework in Croatia has an umbrella Energy Efficiency Law (OG 127/14, 116/18, 25/20, 41/21).⁶⁹ The Law regulates the area of efficient energy use, adoption of plans at the local, regional (regional) and national level to improve energy efficiency and their implementation, energy efficiency measures, energy efficiency obligations, obligations of the energy regulatory body, transmission system operator, distribution system operator and energy market operators in connection with the transmission, i.e. transport and distribution of energy, obligations of energy distributors, energy and/or water suppliers, and especially energy service activity, determination of energy savings and consumer rights in the application of energy efficiency measures.

Related planning includes *National action plan for energy efficiency for the period from 2022-2024*⁷⁰, based on the provisions of Article 8 of the EE Law. Mentioned legislation is aligned with the objectives in the framework deriving from the Governance of the Energy Union and Climate Action Regulation (*Integrated national energy and climate plan - NECP*).⁷¹ With the relevance for energy efficiency in the industrial sector, regulation also includes relevant documents describing obligation on energy audits deriving from Article 8 of the (2018) Energy Efficiency Directive (now Article 11).

Final energy consumption in Croatia in 2021 was 292.2 PJ, with a trend towards 274.2 (6.55 Mtoe) in 2030. Around 15% of yearly final energy consumption comes from industry sector. Annual energy savings goal from 2021 to 2030 aligned with the Article 8 of the new Energy Efficiency Directive will be around 93.1 ktoe. NECP includes 18 energy efficiency measures, of which Energy efficiency obligation system for suppliers and 7 other measures are linked to EED Article 8 savings.

Energy efficiency measures that could include EU- MORE relevant actions are

- ENU-1: Energy efficiency obligation system for suppliers
- ENU-10: Energy management system in the business (service & production) sector (*might be relevant*)
- ENU -17: Increasing energy efficiency and use of RES in manufacturing industries

Precise information on which actions are eligible for ENU-1 for industry are available in the Ordinance on the system for monitoring, measuring and verification of savings (OG 98/2021)⁷² and includes:

42.	Cogeneration
43.	Heat recuperation
44.	Efficient compressed air systems: use of efficient compressors or efficient use of compressors
45.	Energy-efficient electric motors and speed control
46.	Energy-efficient pump systems in industrial processes

⁶⁹ [Zakon o izmjenama i dopunama Zakona o energetskej učinkovitosti \(nn.hr\)](#)

⁷⁰ [NAPEnU_2022-2024..pdf \(gov.hr\)](#)

⁷¹ [CROATIA_ DRAFT UPDATED NECP 2021 2030 \(2\)_0.pdf \(europa.eu\)](#)

⁷² [Pravilnik o sustavu za praćenje, mjerenje i verifikaciju ušteda energije \(nn.hr\)](#)

47.	Energy-efficient ventilation systems in industrial systems
48.	Energy management system (eg. energy consumption monitoring, ISO, EMS) and consumption optimisation

The typical interventions related to electric motors replacement in industry are available from the Measurement and Verification (M&V) regulation, and they include:

- a. Measures to replace existing electric motors with new and more efficient ones (most often includes the installation of energy converters). The calculation of savings is based on the difference in the efficiency of the electric motor before and after the measure. If there is a change in the power and load factor of the electric motor in order to increase the efficiency, they also affect the overall energy savings.
- b. Installation of energy converters on existing electric motors.
- c. Changing the size of the electric motor. The above is carried out in cases where the existing electric motors are oversized and due to consumption optimization, the power of the electric motor is reduced.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

As described above, there are several measures that could be linked to efficiency of motors. Most relevant are *Increasing energy efficiency and use of RES in manufacturing industries* and EEOS. Data on savings refer to the total EEOS or the total increase of energy efficiency measure.

9.4.1 Measure 1: ENU-17 Increasing energy efficiency and use of RES in manufacturing industries

Overview	
Short Description	Achieving energy savings through increasing the energy efficiency in manufacturing industries and reducing the share of conventional (fossil) fuels in total energy consumption by introducing renewable energy sources in the industry production sector
Responsible Authority	MESD - National Coordination Body for Energy Efficiency
Status	Ongoing
Issue Date	2017
Start Date	2017
Ending Date	2030
Duration	13+ years
Reference:	Fourth National Energy Efficiency Action Plan CROATIA_ DRAFT UPDATED NECP 2021 2030

9.4.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes:

This measure started in 2017 with the Fourth National Energy efficiency Action Plan and the energy efficiency part included:

Implementation of measures to increase energy efficiency in the industrial production, including energy audits for small and medium enterprises and project design.

Additionally: the implementation of measures focused on industrial companies that are not eligible applicants for co-financing of energy efficiency measures and renewable energy sources from ERDF funds will be encouraged. The mentioned activities are complementary to the activities of the measure, but they differ in the source of financing. The effects will be added to the savings achieved through the measure and will be delineated through SMIV effects depending on the sources of financing (OPCC and ETS).

Also, the introduction of the system will be encouraged by the co-financing through the FZOEU energy management in accordance with the HRN EN standard ISO50001. This activity provides support for the assessment of energy saving potential in companies and ensures continuous monitoring of energy consumption and identification of opportunities for savings.

In the new NECP, the measure is continued with the following description: in the past period, €60 million was secured from the ESI Funds, based on the OPCC. The absorption of funds was excellent, which proves that industrial plants in the Republic of Croatia have significant potential for improving energy efficiency, reducing energy consumption and reducing the share of conventional (fossil) fuels in total energy consumption by introducing renewable energy sources. The aim of this measure is to ensure the continuation of co-financing of the implementation of such measures in manufacturing industries through grants and financial instruments:

- All available funding sources that can be used to ensure co-financing of energy efficiency measures and RES in industry will be identified, taking into account both 209 national and EU sources of financing (ESI Funds, Modernisation Fund, Recovery Fund, etc.)
- For each identified funding source, eligible projects will be identified, and the financing mechanism and method of its implementation will be elaborated in detail (elaboration will be made by programming documents as well as in the National Energy Efficiency Action Plan, which will be developed during 2021).
- These programmes shall be provided in the manner set out in the relevant documents

	Characteristics
Budget	In the period until 2019 the available funding included 30.184.396,00 kn = 4 million EUR Until end of period: 60 million EUR For the new period: Not possible to determine until detailed analyses have been carried out.
Financing of the measure	NRRP (61 million EUR are provided) and ESI funds.
Policy focusses	Both product and services
Intervention Type	all
Main Barriers Addressed	Not identified
Key Driver(s)	National legislation
Replicability	High
EU Inclusion	NECP
Related Characteristics	

9.4.1.2 Impacts



Detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Reducing the energy consumption of businesses in the industrial sector.
No further detailed impact information could be drafted as the replacement of motors is a small part of the broad set of activities included in the measure.

A total of 10,32 ktoe (0,43 PJ) savings are reported for the measure as a whole.

	Impacts
Case level impact	Not easy to evaluate because of the broad set of activities included in the measure.
Policy level impact	Not easy to evaluate because of the broad set of activities included in the measure.
Size	Not defined
Energy	10,32 ktoe (0,43 PJ) – no specific savings for electric motors
Impact evaluation	Reducing the energy consumption of businesses in the industrial sector.

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

The methodology depends on the included actions, for the motors replacement is as follows:

Calculation of final energy savings (Article 7)

For savings in the event of a change in the power of the installed electric motor, unit energy savings are calculated according to the following formula:

$$UFES = \left(\frac{P_{init} \times LF_{init}}{\eta_{init}} - \frac{P_{new} \times LF_{new}}{\eta_{new}} \right) \times h$$

If the power of the old engine is equal to the power of the efficient engine, the savings are determined according to the formula:

$$UFES = \left(\frac{1}{\eta_{init}} - \frac{1}{\eta_{new}} \right) \times P_{new} \times LF_{new} \times h$$

Total energy savings are:

$$ES = \sum_{i=1}^n UFES_i$$

UFES [kWh/motor/a]	Unit final energy savings
P _{init} [kW]	Mechanical power of old motor
P _{new} [kW]	Mechanical power of efficient motor
LF _{init} [%]	Load factor of old motor

LF_{new} [%]	Load factor of efficient motor
η_{init} [%]	Efficiency of old motor
η_{new} [%]	Efficiency of efficient motor
h [h/a]	Working hours/year

Calculation of greenhouse gas savings

$$E_{CO_2} = FES \times e / 1000$$

ECO2 [t CO ₂ /a]	Greenhouse gas savings
FES [kWh/a]	Total final energy savings
e [kg CO ₂ /kWh]	Emission factor

9.4.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Subsidy schemes are deemed as necessary to proceed with energy saving interventions at a large scale.

Lessons Learnt	
Key takeaways	Subsidy schemes are deemed as necessary in order to proceed with energy saving interventions at a large scale
Recommendations	n.a.
Linked measures	Measure continued to the new NECP period.
Reference(s)	CROATIA_DRAFT UPDATED NECP 2021 2030
Other	MESD
Thoughts, comments, considerations ...	

9.4.2 Measure 2: ENU-1 Energy Efficiency Obligation System for Suppliers

Overview	
Short Description	Energy Efficiency Obligation System for Suppliers as described in the EED Art8
Responsible Authority	MESD - National Coordination Body for Energy Efficiency
Status	Ongoing
Issue Date	2019
Start Date	2019
Ending Date	2030

Duration	11y
Reference:	CROATIA_ DRAFT UPDATED NECP 2021 2030

9.4.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes:

The Energy Efficiency Obligation System was established by the Energy Efficiency Act (OG 127/14, 116/18, 25/20), and its functioning is further defined by the Ordinance on the Energy Efficiency Obligation System (OG 41/19). With the entry into force of the Energy Efficiency Act (OG 41/21), the Ordinance on the system of energy efficiency obligations (OG 41/19) ceases to be valid and the elements of the system of energy savings obligations and the manner of its implementation are transferred to the Ordinance on the system for monitoring, measuring and verifying energy savings (OG 98/21, 30/22). Obligated entities of the energy efficiency obligation system are supplied by energy suppliers. The system has been operational since 2019, when it was entered by suppliers that have delivered more than 300 GWh of energy to the market during 2017. In 2020, the suppliers who delivered more than 100 GWh of energy to the market in 2018 enter the system of obligations, and from 2021 onwards all those suppliers who supplied more than 50 GWh of energy to the market during the previous year. From 2021 to 2030, the goal is to achieve cumulative energy savings in final consumption by achieving new annual savings every year. According to Directive 2018/2002 amending Directive 2012/27/EU on energy efficiency, the system is set up in such a way that savings of 0.8% of annual final consumption are to be achieved each year. According to the agreed amendments to the 2023 Energy Efficiency Directive, these targets change and are as follows: in the period from 2021 to 2023, the goal is to achieve savings of 0.8%, from 2024 to 2025 1.3%, from 2026 to 2027 1.5% and from 2027 to 2030 1.9% of annual final energy consumption. This raises the national target of the Republic of Croatia from the previous 125.3 PJ (2,993.7 kten) to 180.6 PJ (4,313.6 kten). According to the Energy Efficiency Act, the objective is to achieve 70% of the savings referred to in Article 8 (7.) of the Energy Efficiency Directive through the energy efficiency obligation scheme. In view of the new objective, it is necessary to carry out detailed analyses and, if necessary, determine a new distribution of the objective between alternative policy measures and the obligation system and prescribe it through amendments to the Act.

	Characteristics
Budget	Cannot be evaluated.
Financing of the measure	Energy Efficiency Obligation Scheme payer funds
Policy focusses	Product / service
Intervention Type	Multiple interventions
Main Barriers Addressed	Not available
Key Driver(s)	EU Directive
Replicability	High
EU Inclusion	Yes, NECP
Related Characteristics	

9.4.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Reduction of final energy consumption and consequent reduction of CO2 emissions: estimated savings in 2030 27.3 PJ (652.5 ktoe); estimated reduction in CO2 emissions in 2030 1,532.9 ktCO2e;



cumulative energy savings in the period 2021-2030 126.4 PJ (3,019.5 ktoe); cumulative reduction in CO2 emissions in 2021-2030 7,093.9ktCO2e

	Impacts
Case level impact	Not available
Policy level impact	High (>0.5%)
Size	Not available
Energy	Reduction of final energy consumption and consequent reduction of CO2 emissions: estimated savings in 2030 27.3 PJ (652.5 ktoe); estimated reduction in CO2 emissions in 2030 1,532.9 ktCO2e; cumulative energy savings in the period 2021-2030 126.4 PJ (3,019.5 ktoe); cumulative reduction in CO2 emissions in 2021-2030 7,093.9ktCO2e No specific target for motors.
Impact evaluation	It is a key Article 8 Energy efficiency measure

(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

As for Measure no1.

9.4.2.3 Lessons Learnt

	Lessons Learnt
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	NECP
Other	
Thoughts, comments, considerations ...	

9.4.3 Measure 3: Introduction of efficient electric motors

	Overview
Short Description	Introduction refers to the installation of electric motors with high efficiency and the introduction of Variable Speed Drives (VSD) where it is useful.
Responsible Authority	Center for Energy Investments (<i>this agency is not implementing EE policy anymore</i>)
Status	Past
Issue Date	2011
Start Date	2011
Ending Date	2016
Duration	5y
Reference:	3rd National Energy Efficiency plan

9.4.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

This is an old measure put here for the purpose of introduction to the existing framework.

It is a result of an assumption that up to 90% of electricity consumption in the industry falls on pumps, fans, other electric motors where it is possible to apply the mentioned measures. Economic savings are less than technical savings, but high enough to make the measure economically feasible. It is necessary to encourage companies to complete programs of replacement and improvement of electric drives, rather than interventional solutions to individual cases. Developed standard energy audits provide an assessment of the expediency and potential of applying this measure, after which financing is facilitated, assuming developed financial models.

The largest part of electricity consumption in industry falls on electric drives – up to 90%. This area offers great potential savings, but no systematic measures or programs were undertaken. Introduction of efficient electric drives refers to the installation VSD where it is useful, as in processes where the flow of the working substance continuously changes. Depending on the engine power, this the measure can achieve technical energy savings of over 16%, and financial savings of more than 10%. This measure also provides achieving energy savings at the expense of proper use of individual elements of the already existing electric motor drive, as well as the electric motor of the drive as a whole. A reduction in installed power would have a positive effect on the stability of EES operation, as well as the reduction of user and distributor operating costs for electricity.

	Characteristics
Budget	n.a.
Financing of the measure	National Energy Efficiency Fund and private funding
Policy focusses	Product
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost and lack of financing at that point
Key Driver(s)	National legislation
Replicability	Later included in a larger industrial policy measure described below, high replicability
EU Inclusion	The measure started pre- accession
Related Characteristics	

9.4.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Expected energy savings in 2016 = 630 TJ (174 GWh)
 Expected effect on energy savings for 2020 = 760 TJ (210 GWh)

	Impacts
Case level impact	n.a.
Policy level impact	High (>0.5%)
Size	
Energy	Expected energy savings in 2016 = 630 TJ (174 GWh) Expected effect on energy savings for 2020 = 760 TJ (210 GWh)
Impact evaluation	-

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Deemed/ estimated savings.

EU-MORE



Cyprus

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Nikos Ntaras (CRES)

List of Acronyms

Acronym	Text
SME	Small Medium Enterprises
EIT	European Institute of Innovation and Technology

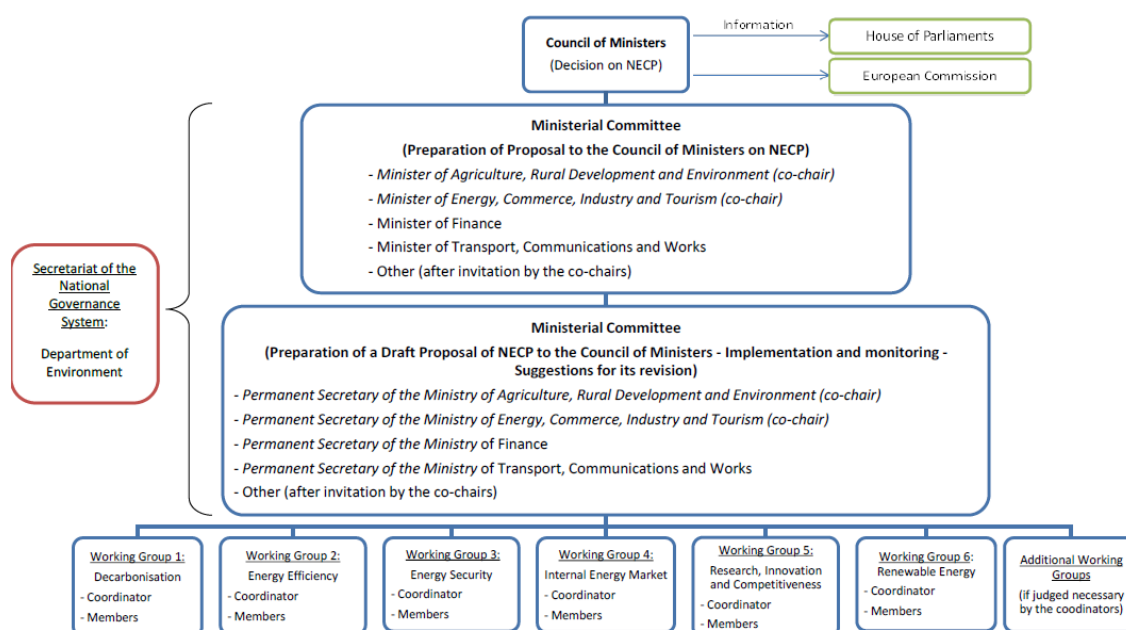


9.5 Cyprus

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The institution responsible for energy issues in Cyprus is the Ministry of Energy, Commerce, and Industry, while climate change is the responsibility of the Ministry of Agriculture, Rural Development and Environment and in particular the Department of Environment. The Ministry of Energy, Commerce and Industry is also responsible authority for the preparation of the National Energy and Climate Plan, with almost all the personnel within the Department of Energy contributing to the above effort.

For the purposes of achieving the 2030 and long-term objectives and targets of the Energy Union in line with the 2015 Paris Agreement a new structure for climate and energy governance has been approved by the Council of Ministers. The "National Governance System for Climate and Energy" is a Ministerial Committee, consisting of the Minister of Agriculture, Rural Development and Environment, the Minister of Energy, Commerce and Industry, the Minister of Finance and the Minister of Transport, Communications and Works. This committee must propose the National Energy and Climate Plan (NECP) to the Council of Ministers which takes the final decision. The proposal of the NECP is prepared by the Technical Committee, which consists of the Permanent Secretaries of the same Ministries. The Technical Committee also monitors the implementation of the NECP and makes proposals for its revisions when necessary. The Technical Committee is consulted by the following seven Expert Working Groups: Decarbonisation, Energy Efficiency, Energy Security, Internal Energy Market, Research, Innovation and Competitiveness, Renewable Energy and Transport. Transport is an additional working group created due to the significant contribution of the sector to the national emissions. Each Working Group has a coordinator. All working groups with the exception of decarbonisation are the responsibility of the Ministry of Energy, Commerce and Industry; decarbonisation is the responsibility of the Department of Environment (Ministry of Agriculture, Rural Development and Environment). The secretariat of the National Governance System for Climate and Energy is held by the Department of Environment. The structure of the National Governance System for Climate and Energy can be seen in the figure below.



Structure of the National Governance System for Climate and Energy

The strategic documents relevant to the climate and energy policy are the following:

- a) National strategy and action plan for the adaptation to climate change; adopted in May 2017 by the Council of Ministers (decision no. 82.555)
- b) National Action Plan for the improvement of air quality in Cyprus; adopted in May 2018
- c) EU Council conclusions of 13/12/2019 on climate neutrality by 2050

The national plan elaborates on the five dimensions of the Energy Union, i.e. decarbonisation (which is broken down into two distinct sections: greenhouse gas emissions and renewable energy sources), energy efficiency, security of energy supply, internal energy market, and research, innovation and competitiveness.

Cyprus' cumulative savings target of Article 7 of the EED is estimated to be 243.04 ktoe for the period 2021 to 2030 (NECP 2020). Cyprus plans to achieve these energy savings through a combination of an energy savings obligation scheme and several alternative policy measures. In the EEO scheme electricity and transport fuel suppliers are obligated to trigger energy savings actions at final customer level. The objective is to achieve 100 ktoe of cumulative savings for the period 2021-2030 under Article 7 of the EED (COM 2020)3. The wide range of alternative measures for the period 2021-2030 are listed in the box below (only the measures related to energy efficiency in the industry are listed below and the most relevant measures to EU-MORE):

- Energy efficiency obligation scheme for energy distributors
- Energy Fund of Funds providing soft loans for energy efficiency
- Individual energy efficiency interventions and energy efficiency retrofits in governmental buildings
- Support schemes/incentives for promoting energy efficiency in households, enterprises and wider public
- Promotion of energy efficiency in SME, through voluntary agreements
- Energy efficiency in water sector

Business 4 Climate

A financial support scheme is currently in development that was planned for implementation for 2020 to 2022, to encourage business to take measures towards their reduction of greenhouse gas emissions. The scheme started as an initiative, "Business4Climate" through which the Cyprus Employers and Industrialists Federation, the Cyprus University of Technology and the Department of Environment of the Ministry of Agriculture, Rural Development and Environment, aimed to commit businesses to more actively involved in climate action by reducing their greenhouse gas (GHG) emissions by 8% until 2030 through a voluntary commitment. Currently there are 64 signatories.

Legislation

Cyprus had set a list of policies and measures in order to achieve the national energy efficiency obligations by 2020. The major measures currently implemented and ongoing are:

- Legislation for energy efficiency (incl. energy efficiency in public sector, energy efficiency in metering and billing, transformation, transmission and distribution, energy audits).
- Legislation for regulating the market for energy auditing in buildings, industries and transport and the operation of Energy Service Companies (ESCOs).
- Legislation for energy labelling and market surveillance.
- Legislations for setting up an energy efficiency obligation scheme for energy companies.

Financial incentives and other measures

- €48.27m have been secured by the European and Structural Funds 2014-2020 for grant schemes and projects for energy efficiency investments in private and public buildings. €8.7m will be allocated for improving the energy efficiency for buildings used by SMEs, €18.4m energy retrofits in households, €20m for improving the energy efficiency in central government public buildings and €1.17m for pilot projects of combined heat and power generation in public and semi-public buildings. Projects under this package may be extended up until 2023.
- Grant Scheme for conducting energy audits in SMEs.

- Decision for the establishment of a new energy efficiency revolving fund /soft loan Financing Instrument to promote investments in the fields of Energy Efficiency and Renewable Energy Sources, targeting small and medium-sized enterprises, public bodies and households.
- Establishment of an energy efficiency network with voluntary agreements with businesses.
- Financing measures for energy efficiency investments in existing hotels.
- Financing measures in agriculture.
- Targeted measures in transportation and Integrated Fleet Management Systems.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

There is not specific programme related to electric motors but projects related to energy efficiency such as financing energy efficiency related projects in SME, Hotels and Agriculture. Also the programme Bussiness4Climate to encourage businesses to the actions towards reducing their carbon footprint.

Industrial activity in Cyprus has been steadily declining. This has led to a drop in final energy consumption of the industrial sector. The fall in energy use has been accelerated by substantial energy efficiency improvements across the sector and mainly in the cement industry.

9.5.1 Measure 1: Grant Scheme for conducting energy audits in SMEs

	Overview
Short Description	Part of the wider NECP measure "Supporting Schemes operated by the RES and Energy Efficiency National Fund for promoting energy efficiency investments in Residential and Public sector and energy audits in SMEs. "
Responsible Authority	Management Committee of RES and Energy Efficiency National Fund.
Status	Ongoing
Issue Date	2019
Start Date	2019
Ending Date	Until end of available budget
Duration	
Reference:	https://www.fundingprogrammesportal.gov.cy/en/call/promotion-of-energy-audits-in-small-and-medium-enterprises/

9.5.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The Plan aims to promote the implementation of energy audits in the areas where they carry out their economic activity and in which energy is consumed (buildings, industrial facilities and processes, agricultural facilities and transport) by SMEs that are registered and operate in areas under the control of Republic of Cyprus. The measure aims to carry out an energy audit in as many SMEs as possible.

The SMEs in which an energy audit will be carried out are expected to receive detailed knowledge of their energy profile. They will also be informed about the prioritization and planning of cost-effective energy saving measures that they will be able to implement, based on the recommendations that the energy auditor will propose in his report. It is expected that the **SMEs that will carry out an energy audit** utilizing the provisions of this plan, will proceed to implement the energy saving investments proposed by the energy audit, utilizing other financial **tools and/or private funds and/or licensed Energy Service Providers (hereinafter “PEY”)**.

The Scheme exclusively covers part of the expenditure for carrying out an energy audit, provided that it is carried out by an Energy Auditor (hereinafter “EU”) registered in the respective register in accordance with KDP184/2012.⁵ The EU register is posted on the website of the Energy Service of the Ministry of Energy, of Trade and Industry (hereinafter “YEED”)(www.energy.gov.cy). The Scheme does not cover investments with retroactive effect.

	Characteristics
Budget	Total Call budget: 200,000€ The rate of public funding will be 30% of the cost of the energy audit . The maximum amount for each SME can be up to €2,000 .
Financing of the measure	The policy measure concerns the various subsidy/financing schemes that will be operated the next years by the Management Committee of the RES and Energy Efficiency National Fund (national funds).
Policy focus	Service
Intervention Type	Energy Audits
Main Barriers Addressed	<ul style="list-style-type: none"> • Lack of information • General financial viability
Key Driver(s)	NECP targets for Energy Saving
Replicability	High
EU Inclusion	Yes, Included in NECP
Related Characteristics	

9.5.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

The direct impact of the Energy Audits alone is not available.

The Grant Scheme for conducting energy audits in SMEs is part of the wider NECP measure “Supporting Schemes operated by the RES and Energy Efficiency National Fund for promoting energy efficiency investments in Residential and Public sector and energy audits in SMEs.”. The NECP foresees for this measure **37,28 ktoe** energy savings for the period 2021-2030. The total budget foreseen amounts to 190 mln €.

	Impacts
Case level impact	Low

Policy level impact	Low
Size	N/A
Energy	N/A
Impact evaluation	See above section

9.5.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

No specific information on the lessons learnt were found for this measure.
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	Lessons Learnt
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.5.2 Measure 2: Business4Climate

	Overview
Short Description	Promotion of energy Efficiency in enterprises, through voluntary agreements under the "Business 4 climate" initiative.
Responsible Authority	Department of the Environment of the Ministry of Agriculture, Rural Development and Environment in collaboration with Cyprus Employers and Industrialist Federation
Status	Ongoing
Issue Date	September 2018
Start Date	September 2018
Ending Date	Not available
Duration	Not available
Reference:	https://www.oeb.org.cy/en/drasis/business4climate/ https://www.cea.org.cy/en/epichirisis-enonoun-dynamis-gia-tin-exikonomisi-energias-ke-ti-miosi-ekpobon-aerion-tou-thermokipiou/

9.5.2.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

Business4Climate is an innovative idea developed in 2017-2018 by Cyprus Employers and Industrialist Federation, in collaboration with the Cyprus University of Technology (scientific advisor) and the Department of Environment of the Ministry of Agriculture, Rural Development and Environment. Climate4Climate initiative was developed as a pilot project (funded by the RIS Climate-KIC through the European Institute of Innovation and Technology (EIT)) to demonstrate how Cypriot enterprises can voluntarily commit and take action against climate change. Enterprises (other than those involved in the ETS) participating in the project have to sign of a voluntary declaration, to reduce greenhouse gas emissions by more than 8% by 2030. Up to date the declaration has been signed by 64 enterprises. It is foreseen that the implementation of the energy efficiency measures will start in 2020. It was decided that incentives are required for participating the enterprises in the project and step up their emissions reduction efforts by 2030. For mobilizing the enterprises, supporting schemes are under preparation from the Department of Environment of the Ministry of Agriculture, Rural Development and Environment, utilizing national funds. Enterprise that will manage to reduce their emissions, will receive as a reward, for each tCO₂eq. reduced in a specific year, the Carbon Market Price in that specific year. The NECP foresees that the total Investment cost taking into account private contribution, will amount to 37mln € until 2030.

Participating companies will develop and implement an action plan until 2030 in order to reduce their energy and natural resources consumption. Actions may include improvement of energy efficiency in buildings, use of renewable energy sources, energy saving and responsible waste management. By managing their resources in a more efficient and sustainable way, a company reduces their operating costs as well and thus becoming a more competitive one. Simultaneously, the participating companies become members of the Energy Efficiency Network for Businesses.

Eligible interventions foreseen among other: "Energy Saving Measures related to the production processes - Replacement of lamps, replacement of refrigerators, Heat-recovery systems, Insulation of hot-water pipes, efficient appliances, **Efficient electric motors/variable speed drives**, amongst others.

	Characteristics
Budget	37mln € until 2030 (foreseen in NECP)
Financing of the measure	The <u>pilot project</u> has been funded by the RIS Climate-KIC through the European Institute of Innovation and Technology (EIT). The aforementioned 37mln € are expected to be secured by supporting schemes are under preparation from the Department of Environment of the Ministry of Agriculture, Rural Development and Environment, utilizing national funds.
Policy focus	Mainly service ('soft') interventions
Intervention Type	improvements in energy efficiency, use of renewable energy sources, energy saving and responsible waste management. Eligible interventions foreseen among other: "Energy Saving Measures related to the production processes - Replacement of lamps, replacement of refrigerators, Heat-recovery systems, Insulation of hot-water pipes, efficient appliances, Efficient electric motors/variable speed drives , etc
Main Barriers Addressed	Lack of other relevant capacity building measures regarding energy efficiency in SMEs
Key Driver(s)	NECP targets
Replicability	high
EU Inclusion	Yes, included in NECP

Related Characteristics	
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9.5.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Expected cumulative end-use energy savings of the measure (2020-2030): 15,20 ktoe No further information on the impact of the measure was found.

	Impacts
Case level impact	Low
Policy level impact	Low
Size	
Energy	
Impact evaluation	See above

(If available) Description of the method used for calculating the final energy - and/or cost- savings achieved by the measure and specific to that of electric motor replacement.

Not available

9.5.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

No specific information on the lessons learnt were found for this measure

	Lessons Learnt
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.5.3 Measure 3: Supporting scheme for promoting energy efficiency investments in Small and Medium Enterprises (SMEs)

Overview	
Short Description	Supporting scheme for promoting energy efficiency investments in Small and Medium Enterprises (SMEs) through European Structural and Investment Funds
Responsible Authority	Ministry of Energy, Commerce and Industry
Status	Ongoing
Issue Date	June 2022
Start Date	Call for proposals opened in June 2022
Ending Date	Call open for proposals until end of 2023
Duration	Programming period 2021-2027
Reference:	https://www.industry.gov.cy/assets/modules/wnp/articles/202306/51/docs/1odigos.pdf https://www.industry.gov.cy/en/funding-schemes/64/51/?ctype=ar

9.5.3.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The funding scheme aims to promote energy saving investments in buildings and facilities, owned and/or used from SMEs and non-profit organisations.

The main objective of the Scheme is to achieve a reduction in the consumption of primary energy on average by at least 30 %.

The total budget for the scheme amounts to 40mIn € (public spending) and is financed by the Recovery and Resilience Mechanism of the European Union. The funding rate for the beneficiaries amounts to 40%. For the majority of the beneficiaries (SMEs) the maximum public spending per project will be 100,000€.

The Scheme is also included in the NECP as one of the measures related to energy saving in Cyprus (Measure #8 – “Supporting scheme for promoting energy efficiency investments in Small and Medium Enterprises (SMEs) through European Structural and Investment Funds (Programming Period 2021-2027).

Eligible interventions include energy saving actions for the building envelope, installation of RES, cogeneration units and (most importantly for EU-MORE) replacement of old motors by new and efficient ones.

According to the NECP, the expected cumulative end-use energy savings for the period 2021-2030 amount to 8,45 ktoe.

Characteristics	
Budget	The total budget for the scheme amounts to 40mIn € (public spending) and is financed by the Recovery and Resilience Mechanism of the European Union. The funding rate for the beneficiaries amounts to 40%. For the majority of the beneficiaries (SMEs) the maximum public spending per project will be 100,000€.
Financing of the measure	Subsidy scheme
Policy focus	Product and service

Intervention Type	Energy saving measures for SME buildings (envelope energy saving measures), RES installations, replacement of old motors by new and efficient ones, cogeneration units etc
Main Barriers Addressed	High initial cost
Key Driver(s)	NECP targets
Replicability	high
EU Inclusion	Yes, NECP targets
Related Characteristics	

9.5.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

According to the NECP, the expected cumulative end-use energy savings for the period 2021-2030 amount to 8,45 ktoe (for all eligible interventions)

	Impacts
Case level impact	Low
Policy level impact	Low
Size	
Energy	
Impact evaluation	

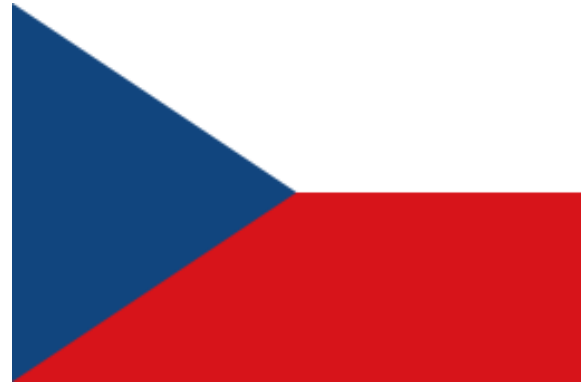
9.5.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

No further information on the measure was found during the review.

	Lessons Learnt
Key takeaways	Similar subsidy schemes are deemed essential in order to proceed with energy saving interventions at a large scale
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

EU-MORE



Czech Republic

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

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List of Acronyms

Acronym	Text
API	Business and Innovation Agency
ERDF	European Regional Development Fund
MIT	Ministry of Industry and Trade
OP TAC	Operational Program Technologies and Application for Competitiveness



9.6 Czech Republic

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Taken directly from [CZ NECP\(2019\)](#):

1.1.1.1 Political context

"The Czech Republic is a stable democratic State, a member of the UN, OECD, EU and NATO and other international organisations. The Czech Republic has a directly elected President and a bicameral Parliament, which consists of the Senate and the Chamber of Deputies.

As part of self-government, the Czech Republic is divided into 14 self-governing regions, 76 districts and more than 6 200 self-governing municipalities. Municipalities and regions are managed by elected assemblies. Regions are headed by governors, statutory cities by statutory mayors and cities and municipalities by mayors (starosta). Prague has a special status, being simultaneously a region, statutory city and the capital."

(...)

3.1.1.5 Industry sector

"In order to reduce greenhouse gas emissions in the industry sector, it is crucial to implement cross-cutting measures based on EU legislation. In addition to the EU ETS, especially integrated pollution prevention and control, in accordance with Act No 76/2002, on integrated prevention, has a major contribution to reducing emissions. Emissions of fluorinated gases are regulated by Act No 73/2012, on ozone-depleting substances and on fluorinated greenhouse gases, and Implementing Decree No 257/2012, on the prevention of emissions of ozone-depleting substances and on fluorinated greenhouse gases, which transpose the relevant EU regulations.

The achievement of climate and energy goals in the area of manufacturing industry, which includes, for example, the steel, chemical, ceramic, cement, glass, paper, brick and lime industries, is a separate and very complex issue. These industries have a particularly significant potential in this regard and this fact should be considered in the framework of creating national strategies and policies. It is mainly due to the specific needs of this sector and the great variety of technologies used and developed in it that this sector is not dealt with in detail in the submitted material. The prerequisite is the rapid development of an independent industrial policy of the Czech Republic for the period 2021–2030 with a view to 2050, which will address the sector in a comprehensive way, i.e. including maximising support (including state support) in developing and applying all technologies contributing to climate and energy goals, physical and price affordability of energy, maximum protection of competitiveness, etc. In this respect, the 'National Economic Strategy 2030' is being prepared, which includes also the National Investment Plan."

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

One measure relating to the EU MORE objective was identified and verified through the CZ Ministry, SVN and ENVIROS, namely the **Operational Program Technologies and Application for Competitiveness (OP TAC)** prepared as part of the funding available through the *European Regional Development Fund (ERDF)*

No other related policy measures were found relating to replacement of electric motors in processes.

9.6.1 Measure 1: Operational Program Technologies and Application for Competitiveness 2021-2027



Overview	
Short Description	The OP TAC was prepared for the operational programme of the ERDF financial mechanism; providing investment aid for increasing the energy efficiency of technological and production processes in industry and on improving the energy performance of buildings intended for business.
Responsible Authority	The managing authority of Operational Program Technologies and Application for Competitiveness (OP TAC) is the Ministry of Industry and Trade (MIT)(Ministerstvo Průmyslu a Obchodu) ⁷³ . The Business and Innovation Agency (API) acts as the intermediate body. ⁷⁴
Status	Ongoing
Issue Date	2021
Start Date	2022
Ending Date	2027
Duration	60 months (5 Years)
Reference:	https://www.agentura-api.org/cs/op-tak/ https://www.mpo.cz/en/

9.6.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes.

The specific objective 4.1 Energy efficiency measures aims to provide investment support to increase energy efficiency in the business sector (industry and services) and to improve energy performance of buildings intended for business.

- increasing energy efficiency of production and technological processes;
- improving the energy performance of buildings (building envelope, technical equipment);
- reconstruction and replacement of energy production equipment for own consumption;
- reconstruction of electricity, gas and heat distribution;
- recovery of waste energy in production processes;
- construction of buildings in high (passive) energy standard;
- implementation of monitoring, automation and energy management features in buildings;
- energy management.

From geographical point of view, the programme supports improvements in the energy performance of the industry sector in all regions of the Czech Republic, excluding the capital City of Prague.

The support may have a form of a grant or a financial instrument. The latter is intended to be provided to small projects with shorter payback periods.

The lifetime savings in the case of the implementation of investment measures exceeds the length of the commitment period (10 years for industrial technologies; 12–30 years for buildings) while for the energy management is considered for 2 years.

The operational programme consists of 5 priorities that are further divided into specific objectives, each of which has defined supported activities. The target group is SMEs, and specific activities are suitable for large enterprises. Newly, it is also possible to support the categories of enterprises marked as mid-cap or small mid-cap companies.

The 5 defined priorities are:

1. Research and Development and Innovation and their Digital Transformation
2. Growth and Competitiveness of SME's

⁷³ <https://www.mpo.cz/en/>

⁷⁴ <https://www.agentura-api.org/cs/op-tak/>

3. Digital Infrastructure
4. Low Carbon Economy
5. More Efficient Use of Resources

Priority #4 is most related to the EU MORE project and defines 3 subgoals:

- 4.1 Promoting Energy efficiency and reducing greenhouse gas emissions
- 4.2 Promoting Renewable Energy
- 4.3 Developing Smart Energy Systems and storage

The activities under SC 4.1 are most related to EU MORE objectives.

Priority access 4 is allocated 17,2% (0,5)bn EUR of the programs funding

One of the obligatory annexes to the subsidy application is an energy assessment / energy performance certificate for the project carried out by a certified energy specialist. The overall energy savings under the programme will be calculated based on the ex-post evaluations that verify each implemented project (individual measure).

	Characteristics
Budget	<p>A total of EUR 3.2 billion, equivalent to approximately CZK 81.5 billion, has been prepared for this operational programme from the ERDF.</p> <p>EUR 0.5, (17,2%) of that total funding is allocated to priority action 4. Low Carbon Economies, for which the measures relating to EU MORE are part of subgoal 4.1. Promoting energy efficiency and reducing greenhouse gas emissions.</p> <p>In the previous period 44.5% of the funds⁷⁵ were part of increasing energy efficiency of production and technological processes, subgoal 4.1. The CZ ministry estimates of those funds 10% to be used on motor improvements., meaning an estimated:</p> <p>EUR 22,25 million was spent on EU-MORE related motor improvements or an approximate 5% from the 0.5 bn EUR under priority action 4. (estimated and verified by the CZ ministry directly).</p>
Financing of the measure	Co-financing of projects with support from the OP TAC
Policy focusses	Measure overall - Both , for the activities under SC4.1 Promoting Energy Efficiency and Reducing Greenhouse Gas Emissions Primarily Physical .
Intervention Type	Promotion of Energy Efficiency in Businesses
Main Barriers Addressed	High initial cost, financial viability of projects
Key Driver(s)	<p>Article 7/8 EED</p> <p>The need to reduce the Czech Republic's final energy consumption and to meet the obligation of new energy savings under Article 7 of Directive 2012/27/EU of the European Parliament and of the Council, as well as the need to contribute to the fulfilment of the targets in relation to the renovation and construction of buildings under Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings.</p>
Replicability	Medium - blanket measure that relies on the ERDF funding
EU Inclusion	Yes - the OP TAC is the flagship program implemented in the CZ supporting Czech entrepreneurs meet the energy efficiency requirements set.

⁷⁵ Verified by the CZ Ministry

Related Characteristics	This is a very broad blanket measure which covers much more than Electric Motors.
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9.6.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Each project is subject to a substantive evaluation process of proposed individual energy saving measures. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. Project execution and energy savings are verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and an ex-post random on-the-spot check of a randomly selected sample of projects.

The ex-ante and ex-post energy evaluation of individual measures and calculation of savings are carried out by independent certified energy specialists. The processing of the documents in question, the accuracy of the calculations and the declared savings are subject to control by the State Energy Inspectorate and by the provider of financial support when checking the aid application.

Verification of achieved energy savings according to the criteria of Article 7 and Annex V of the Directive is carried out by the relevant department of the Ministry of Industry and Trade responsible for the implementation of the energy efficiency improvement policy.

Expected impact figures of the OP TAC program are:

Cumulative total savings for 2030: 8.8 PJ
 Public budgets: k€ 400,000.0 from 2022 to 2027
 Investments: k€ 1,012,658.0 from 2022 to 2027

	Impacts																																			
Case level impact	Medium																																			
Policy level impact	High																																			
Size	Unknown – however in theory all electric motor replacements are potentially supported through this funding measure in varying degrees. In 2022: EUR 22,25 million was spent on EU-MORE related motor improvements or an approximate 5% of the 0.5 bn EUR available for priority action 4 ⁷⁶ .																																			
Energy	Cumulative annual savings: <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Year:</th> <th>2021</th> <th>2022</th> <th>2023</th> <th>2024</th> <th>2025</th> <th>2026</th> <th>2027</th> <th>2028</th> <th>2029</th> <th>2030</th> <th>2020</th> </tr> </thead> <tbody> <tr> <td>PJ:</td> <td>0</td> <td>0.21</td> <td>0.419</td> <td>0.629</td> <td>0.838</td> <td>1.048</td> <td>1.257</td> <td>1.467</td> <td>1.467</td> <td>1.467</td> <td>-</td> </tr> </tbody> </table> Total: 8.8 PJ												Year:	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020	PJ:	0	0.21	0.419	0.629	0.838	1.048	1.257	1.467	1.467	1.467	-
Year:	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020																									
PJ:	0	0.21	0.419	0.629	0.838	1.048	1.257	1.467	1.467	1.467	-																									

⁷⁶ Estimated figure received from CZ Ministry of Industry and Trade

Impact evaluation	<ul style="list-style-type: none"> Reducing the energy intensity / improving the energy efficiency of production and technological processes Modernisation of traction substations and traction power supply system
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Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

See impacts section above.

9.6.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

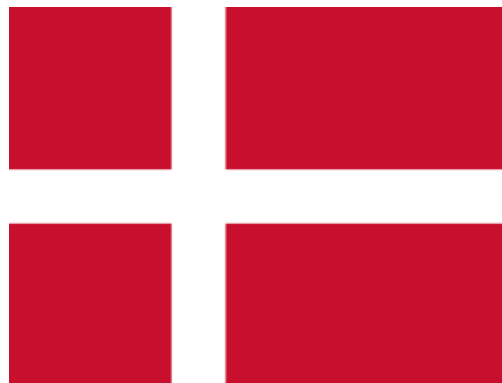
This is the fourth iteration of the flagship programme in the CZ which has led to the definition of the following 5 priority axes for the subsequent program to address the main barriers.

PA 1 Promotion of research and development for innovation
PA 2 Development of entrepreneurship and competitiveness of small and medium-sized enterprises
PA 3 Efficient energy management, development of energy infrastructure and renewable energy sources, support for the introduction of new technologies in the management of energy and secondary raw materials
PA 4 Development of high-speed Internet access networks and information and communications technologies
PA 5 Technical assistance

The budget and name of related previous programs were OPIE, OPEI, and OPEIC with allocated budgets:
OPIE (2004-2006): 0,26 bn EUR
OPEI (2007-2013): 3,67 bn EUR
OPEIC (2014-2020): 4,3 bn EUR
OP TAC (2021-2027): 3,2 bn EUR (not-final)

Lessons Learnt	
Key takeaways	<ul style="list-style-type: none"> Clear Communication and Guidance Streamlined Application Process Target Support for SMEs
Recommendations	
Linked measures	ERDF funded programs: OPIE (2004-2006): 0,26 bn EUR OPEI (2007-2013): 3,67 bn EUR OPEIC (2014-2020): 4,3 bn EUR OP TAC (2021-2027): 3,2 bn EUR (not-final)
Reference(s)	https://www.agentura-api.org/cs/op-tak/ https://www.mzp.cz/C1257458002F0DC7/cz/statni_politika_zivotniho_prostredi/SFILE/SPZP-2030_4AK_EN-20220525.pdf

	https://sustainabledevelopment.un.org/content/documents/15717Czech_Republic.pdf https://energy.ec.europa.eu/system/files/2020-03/cs_final_necp_main_en_0.pdf
Other	
Thoughts, comments, considerations ...	



Denmark

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Shima Ebrahimigharehbaghi (IEECP)

9.7 Denmark

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Denmark is at the forefront of the energy transition and has established itself as a leader in renewable energy. The country has set ambitious targets, aiming to reduce greenhouse gas emissions by 70% from 1990 levels by 2030 and have renewables account for at least 50% of total energy consumption by the same year.

Denmark has committed to achieving net-zero emissions by 2050 and has plans to phase out all coal-fired power plants by 2030. The government has also set targets for renewable energy, aiming for 100% coverage of electricity and 55% of overall consumption from renewables by 2030. Additionally, the goal is for 90% of district heating to come from non-fossil sources by 2030, and the sale of petrol and diesel cars is set to end by the same year.

With its impressive wind energy infrastructure, Denmark leads the world in wind power utilization. The country has the highest share of wind energy in both total primary energy consumption and electricity in the world (22.49%). Denmark's flexible domestic power system and extensive interconnection capabilities have allowed for successful integration of variable renewable energy, ensuring a reliable and secure electrical grid.⁷⁷

Denmark's utilization of combined heat and power plants with heat storage capacity, along with the increasing deployment of wind power, presents significant potential for efficient integration of heat and electricity systems, further supporting the country's transition to sustainable energy sources.

The Danish Ministry of Climate, Energy, and Utilities takes on the responsibility for national and international endeavours in combating climate change, aiming to achieve the Danish government's ambitious target of reducing greenhouse gas emissions by 70 percent by 2030. They lead the promotion of world-class utility and energy services, supporting sustainable growth and ensuring a clear pathway towards an efficient and effective energy supply system for Denmark. With visionary green leadership, they strive for a sustainable future⁷⁸.

In line with their efforts, Denmark submitted its draft National Energy and Climate Plan (NECP) to the European Commission on 21 December 2018. The preparation of the draft NECP involved a dedicated project group consisting of the Danish Ministry of Energy, Utilities, and Climate, as well as the Danish Energy Agency. While the Ministry of Energy, Utilities, and Climate held the overarching responsibility for developing the draft plan, the Danish Energy Agency took charge of modelling and scenario development. This collaborative effort aimed to outline a comprehensive plan for Denmark's energy and climate goals in the NECP⁷⁹.

Denmark has implemented new measures to enhance energy efficiency. They have replaced the Energy Savings Obligation scheme with competitive subsidy schemes for private enterprises and buildings. From 2021 to 2030, Denmark aims to fulfil energy saving obligations through alternative policies. This includes a competitive subsidy scheme for private enterprises, with an annual budget of DKK 300 million, and a similar scheme for buildings, with an annual budget of DKK 200 million. These measures encourage energy savings and support sustainable practices in various sectors.

Efficiency in existing buildings is also a priority. Denmark plans to improve building efficiency through building code requirements and information campaigns. These initiatives aim to promote technological opportunities and financial measures available to building owners. By encouraging renovations and providing financial aid based on energy savings, Denmark seeks to maximize the potential for energy efficiency in private buildings.

⁷⁷ <https://www.iea.org/countries/denmark>

⁷⁸ <https://www.devex.com/organizations/ministry-of-climate-energy-and-utilities-denmark-141050#:~:text=The%20Danish%20Ministry%20of%20Climate,by%2070%20percent%20by%202030.>

⁷⁹ https://energy.ec.europa.eu/topics/energy-strategy/national-energy-and-climate-plans_en

Additionally, Denmark is focusing on replacing oil burners with heat pumps in areas without access to district heating or the gas grid. They have allocated DKK 20 million annually for a subsidy scheme to support this transition. By promoting the use of heat pumps, Denmark aims to reduce reliance on fossil fuels and promote cleaner and more sustainable heating solutions. These initiatives contribute to Denmark's overall goal of achieving energy savings and transitioning towards a greener energy future.⁸⁰

The Danish regulations require large enterprises to conduct mandatory energy audits every four years, covering their total energy consumption, including processes, buildings, and transport. These audits can be fulfilled by either performing a standalone energy audit or implementing a certified energy management system or certified environmental management system that includes an energy audit component.

Consumer information and training initiatives in Denmark aim to promote energy-efficient solutions, behaviour, and purchasing among end-users. The Danish Energy Agency develops action plans for information campaigns targeting homeowners, the public sector, and commercial enterprises, with a focus on improving energy efficiency in buildings and providing access to energy renovation information. The agency's website, sparenergi.dk, serves as a central platform for communication and resources on energy efficiency for private households and businesses. The Knowledge Centre for Energy Savings in Buildings provides advice and training for craftsmen, industry organizations, and educational institutions to enhance energy efficiency knowledge and skills. Denmark improves energy efficiency in electricity infrastructure with dynamic line rating and System Integrity Protection Schemes. In the gas sector, optimized component choices and continuous optimization maintain efficiency in the gas network.⁸¹

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

Although Denmark is at the forefront of the energy transition implementing major energy policies with ambitious targets no specific measures relating to the accelerated replacement of electric motors in Industry are implemented.

9.7.1 Measure 1: Mandatory energy audit in large enterprises

Overview	
Short Description	Large companies are required to conduct energy audits every four years under the EU's EE directive. In Denmark, companies with over 250 employees or a turnover of at least 50 million euros must comply. Reporting the audit results to the Danish Energy Agency is mandatory, but implementation of energy-saving recommendations is not required. The measure does not specify the inefficient electric motor system replacement. However, the potential impacts of the energy audits might be the replacement of such an inefficient motor system.
Responsible Authority	The Danish Energy Agency
Status	Ongoing
Issue Date	2013
Start Date	OCT 2012 by EED (confirmed/expected)
Ending Date	In Force
Duration	unknown
Reference:	https://ens.dk/en/our-responsibilities/energy-savings/energy-audits-large-enterprises

⁸⁰ https://climate-laws.org/document/denmarks-integrated-national-energy-and-climate-plan_9ed8

⁸¹ <https://ens.dk/en/our-responsibilities/energy-savings/energy-audits-large-enterprises>

9.7.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

Regarding energy audits and management systems (EED Article 8), the Danish Government has presented a Bill to the Danish Parliament that includes the general rules for implementing mandatory energy audits. Large enterprises are obligated to conduct energy audits every four years or maintain a certified energy or environmental management system that includes an energy audit. The Act also empowers the Minister for Climate, Energy, and Building to establish detailed requirements for energy audits and qualification standards for auditors. The scope of the audits will vary depending on the complexity of the enterprise's processes.

The Act applies to large enterprises in all sectors, including transport activities. Large enterprises are defined as those with at least 250 employees and an annual turnover exceeding EUR 50 million or an annual balance sheet over EUR 43 million. The Danish Energy Agency is responsible for drafting an executive order to implement the Act and establish minimum criteria for energy audits. Enterprises with a certified energy management system may be exempt from the audit requirement if it meets the minimum criteria outlined in Annex VI of the Directive.

Currently, there is no definitive list of covered enterprises, but the Minister will disseminate information to obligated enterprises through various channels. Accredited auditors will verify the quality of certified management systems, ensuring compliance with international standards. Denmark's accreditation scheme for energy audit consultants and certification scheme for building energy auditors ensure the qualification requirements are upheld. The Act does not currently cover small and medium-sized enterprises (SMEs), but Denmark has separate initiatives, such as the "Energy Management Light" guide, to promote energy efficiency and audits specifically tailored to SMEs. Additionally, the "RE for production processes" scheme supports enterprises in converting production processes to renewable energy and district heating, with grants available for energy efficiency measures.

The Danish Energy Agency has various information and advice initiatives aimed at both SMEs and households to raise awareness and promote the benefits of energy audits. These efforts contribute to Denmark's energy saving goals and make it more economically attractive for enterprises to conduct audits and implement energy-saving measures.⁸²

	Characteristics
Budget	N/A
Financing of the measure	The measure is defined at national level. No information is provided on how it will be supported financially.
Policy focusses	Soft intervention – mandatory energy audits for large enterprises
Intervention Type	Mandatory information – energy management obligations – energy audits
Main Barriers Addressed	Energy auditing programs are designed to tackle barriers associated with energy consumption, with a particular focus on motor systems that serve as substantial energy consumers. The primary objective is to carry out a thorough evaluation of the critical operational elements within these systems, systematically analyzing their performance and identifying areas with potential for energy enhancement. At the core of these programs lies the principle that audited companies should exhibit

⁸² https://energy.ec.europa.eu/system/files/2014-11/2014_neeap_en_denmark_0.pdf

	a dedication to implementing cost-effective energy-saving measures based on the opportunities identified during the audits.
Key Driver(s)	Compliance with European Union Directives (Article 8 of the EED) and national policy objectives, which prioritize energy efficiency, carbon reduction, and sustainable development
Replicability	High
EU Inclusion	Yes, In April 2014, the Danish Parliament enacted comprehensive regulations and guidelines, proposed by the Danish government, to enforce the requirement outlined in Article 8 of the Energy Efficiency Directive (EED). This specific requirement focuses on mandatory energy audits. The passage of these regulations exemplifies Denmark's commitment to implementing and adhering to the provisions set forth in Article 8 of the EED.
Related Characteristics	The targeted end uses or types include other process heat, process heat and electricity generation, lighting, process cooling, space heating, electric motors and drives, electric processes, office equipment, and servers.

9.7.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

There are no requirements to actually implement the suggestions from the Energy audit. Denmark has carried out an ex-ante analysis on the economic consequences for the enterprises. The analysis states that the administrative burdens for the enterprises will be approximately 44,3 million D.kr. annually.

As mentioned, implementing the energy-saving improvements recommended in the energy audit is entirely optional and not mandatory. This aspect may explain why the immediate impact on energy savings is not readily accessible at the moment.⁸³

In 2020 and 2021, almost 2,100 and 1,100 companies were required to carry out mandatory energy audits, respectively.^{84,85}

The energy saving potential differs across various energy use types. A comparison was made among the three main energy use categories: industry, buildings, and transport. The analysis revealed that the highest absolute energy saving potential was found in energy consumption related to industrial processes and the buildings sector. Industrial energy use encompasses various aspects such as the application of heat in manufacturing, boiler fuel, electricity consumption for operating industrial motors and machinery, heating and lighting of manufacturing areas, and other types of energy used directly to support the manufacturing process.⁸⁶

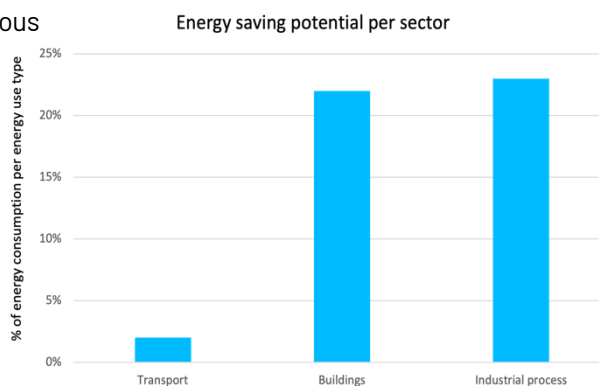


Figure 11: Energy saving potential per sector.

⁸³ <https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf>

⁸⁴ <https://kefm.dk/Media/637898535646182290/Energi%20og%20forsyningspolitisk%20redeg%C3%B8relse.pdf>

⁸⁵ <https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf>

⁸⁶ https://energy.ec.europa.eu/system/files/2018-10/final_report_-_development_of_guidelines_and_recommendations_on_the_impl_0.pdf

In general, the audit data indicates that there is a potential for energy savings of approximately 14% in relation to the total energy consumption.

Companies that exhibit lower energy consumption levels tend to identify a number of energy-saving opportunities relative to their consumption level. One plausible explanation for this phenomenon is that these companies often assign lower priority to energy efficiency improvements or may have limited awareness of potential initiatives, as opposed to companies with higher energy consumption levels. The latter, driven by the higher proportion of energy costs in their overall expenses, are more motivated to seek and implement energy-saving measures.

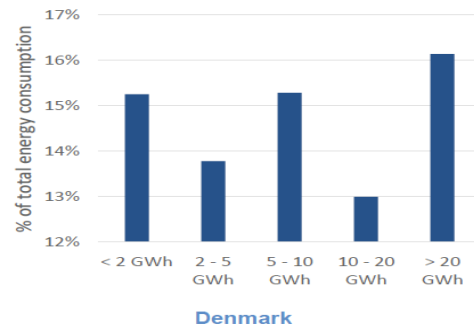


Figure 12: Identified energy savings potential by annual energy consumption level

In summary, the smallest enterprises incur the highest saving opportunities they identify. Figure 13 illustrates this point by showing that Danish companies consuming less than 2 GWh of energy annually would need to implement nearly all identified energy improvements to recoup the audit expenses within the first year.⁸⁷

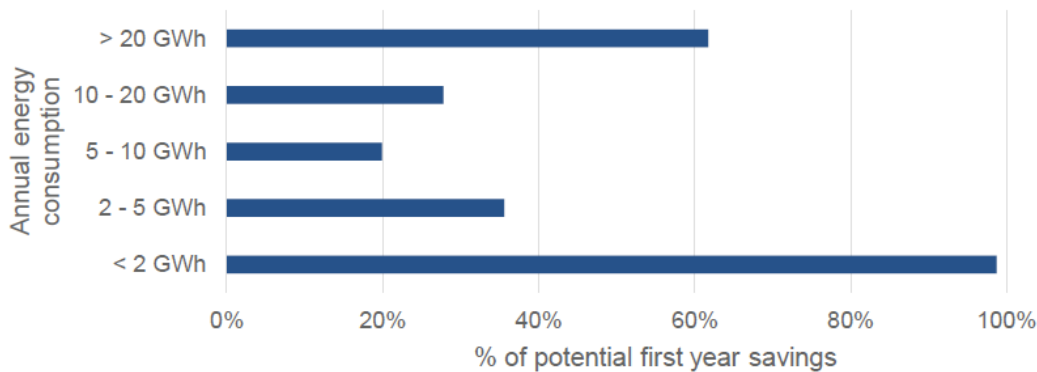
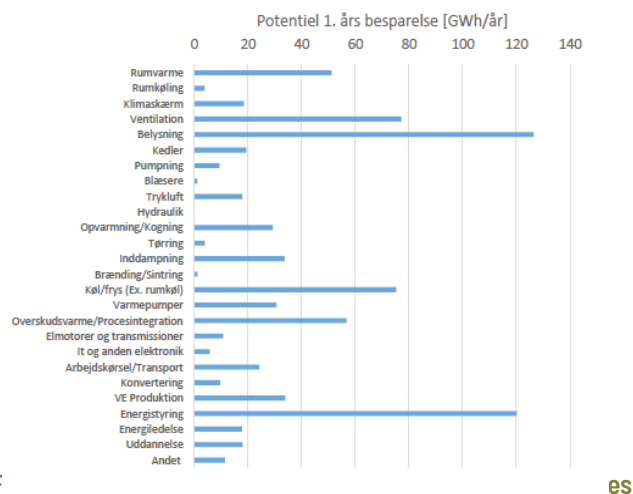


Figure 13: Cost of energy audit compared to potential 1st year savings

The areas with the greatest opportunities for energy savings and efficiency improvements are primarily in lighting and energy management technologies. These sectors offer significant potential for reducing energy consumption and optimizing energy usage.

Additionally, there are substantial opportunities for energy savings in ventilation and cooling systems. By implementing more efficient and optimized ventilation and cooling solutions, businesses and industries can further reduce their energy usage and overall environmental impact.



⁸⁷ https://www.ca-eed.eu/ia_document/analysis-of-danish-energy-audits-denmark/

Furthermore, electric motors and transmissions also hold significant energy-saving potential, accounting for almost 15 GWh/year. By adopting more efficient electric motor systems and optimizing transmission mechanisms, businesses can make substantial strides in conserving energy and enhancing their overall sustainability efforts.

	Impacts
Case level impact	High
Policy level impact	Medium
Size	Not available
Energy saving	15 GWh/year
Impact evaluation	<ul style="list-style-type: none"> - In 2020 and 2021, almost 2,100 and 1,100 companies were required to carry out mandatory energy audits, respectively. - The highest absolute energy saving potential was found in energy consumption related to industrial processes and the buildings sector.

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

N/A

9.7.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Denmark's energy efficiency policy employs three types of instruments:

- Normative: These are rules and regulations, such as "Obligatory Energy Audits for Large Energy Users."
- Informative: Guidelines and advice, like the initiative "Spareenergi.dk," provide information to promote energy efficiency.
- Economic: Economic instruments include subsidies, tax deductions, and programs like the "Energy Efficiency Obligation Scheme" and the "Voluntary Agreement Scheme for Energy Intensive Industry."

In Denmark, a study revealed interesting findings regarding the cost-benefit of energy audits for different types of companies. Surprisingly, larger companies and those with low energy consumption face the most difficulty in achieving a balanced cost-benefit ratio for energy audits.

The analysis of Danish energy audits showed that for companies with an annual energy consumption of less than 2 GWh, the cost of the energy audit is almost equal to the potential first-year savings. However, for companies with an annual energy consumption between 5-10 GWh, the cost is only 20% of the savings. On the other hand, the most energy-consuming companies, with an annual consumption exceeding 20 GWh, experience elevated relative costs (60%) compared to the potential first-year savings.

The study suggests that this phenomenon could be attributed to several factors, including complex energy structures, challenging business operations, and a pre-existing focus on energy-saving projects in these larger companies. As a result, implementing energy-saving measures in these cases may involve more complexity and yield fewer low-hanging fruit opportunities compared to smaller energy-consuming companies.

In Denmark, sampling in energy audits is permitted, but there are no specific guidelines. The auditor has the responsibility of determining a representative and proportional sample. A sampling or multi-site approach is generally allowed, as long as the audit is proportionate and representative. The qualified auditor has the discretion to decide which locations should be considered to ensure representativeness and proportionality. The same applies to clustering companies. The process of selecting locations within the sampling must be documented and justified, just as it should be for clustering.

	Lessons Learnt
Key takeaways	A key takeaway from Denmark's success in energy efficiency is that a combination of various instruments pursuing the same objective yields the most significant impact in reducing energy consumption.
Recommendations	The current definition of energy audits for large enterprises does not adequately address the energy-saving potential of electric motor systems, often resulting in impractical or inefficient recommendations. Given that electric motor systems are significant energy consumers, energy audits should focus specifically on these systems to conduct a thorough analysis of their operational characteristics and identify opportunities for enhanced energy efficiency. Companies undergoing audits should be required to commit to implementing cost-effective energy-saving measures identified during the process.
Linked measures	https://ens.dk/ansvarsomraader/energibesparelser/virksomheder/energisynd-i-store-virksomheder
Reference(s)	https://www.ca-eed.eu/ia_document/analysis-of-danish-energy-audits-denmark/ https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf https://kefm.dk/Media/637898535646182290/Energi%20og%20forsyningspolitisk%20redeg%C3%B8relse.pdf https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf https://energy.ec.europa.eu/system/files/2018-10/final_report_-_development_of_guidelines_and_recommendations_on_the_impl_0.pdf https://energy.ec.europa.eu/system/files/2014-11/2014_neeap_en_denmark_0.pdf
Other Thoughts, comments, considerations ...	

9.7.2 Measure 2: Renewable energy for production processes

	Overview
Short Description	In 2012, the Danish Parliament made a political agreement that mandated renewable energy to constitute 35% of the final energy consumption by 2020. However, due to the prevailing tax policies favouring fossil fuels, they remained more affordable than

	renewables, discouraging the transition. To incentivize the industry to adopt renewable energy in their production processes, a subsidy scheme was introduced.
Responsible Authority	The minister for climate, energy, and buildings, The Danish energy agency
Status	Ongoing
Issue Date	2012
Start Date	2013
Ending Date	2021(?)
Duration	8 years
Reference:	https://www.retsinformation.dk/eli/ta/2013/607

9.7.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The subsidy scheme aims to close the price gap between renewable and fossil fuels by offering support to industries willing to switch to renewable energy sources or district heating. This support can be utilized in three ways:

Replacing Fossil Fuels with Renewable Energy: Businesses can receive investment aid to implement projects that replace fossil fuels with renewable energy in their production processes. While all forms of renewable energy are eligible, most projects are expected to focus on biomass, such as converting from coal to wood chips. Companies that choose to receive investment support from this scheme must forgo subsidies for clean electricity production from sources like wind turbines.

Replacing Fossil Fuels with District Heating: The scheme also facilitates businesses that replace fossil fuels with district heating for their processes. For instance, a horticulture company could abandon its individual coal-fired plants and connect to district heating. This transition presents an opportunity for businesses to optimize their energy-consuming processes with the new energy system.

Energy-Efficiency Measures: The third aspect of the scheme provides support for energy efficiency improvements directly associated with the conversion to renewable energy or district heating. By offering investment aid for energy-efficient equipment, the scheme aims to ensure that projects achieve maximum energy efficiency and a reasonable repayment time for businesses.

The overall goal of this investment scheme is to promote the adoption of renewable energy and increase energy efficiency in industrial production processes, moving closer to the target of 35% renewable energy in Denmark's final energy consumption by 2020.

The Act on subsidies for the promotion of renewable energy in companies' production processes aims to provide state subsidies to encourage the energy-efficient use of renewable energy sources in companies' manufacturing processes. The eligible renewable energy sources include biomass, solar, wind, and biogas. The Minister for Climate, Energy, and Buildings has the authority to define the specific criteria for these renewable energy sources. The law covers grants for projects that replace fossil fuels with renewable energy sources or district heating, as well as energy efficiency improvements related to these projects. To be eligible for grants, companies must be registered under the VAT Act and located in Denmark.

The Danish Energy Agency is responsible for administering and granting these subsidies in accordance with the state aid rules of the EUF treaty. The Act also establishes procedures for submitting applications, documentation, and oversight of the subsidy implementation. If companies fail to meet the conditions or provide incorrect information, the Danish Energy Agency may decide to lapse or partially lapse the grants and require repayment.

The Act allows for complaints about decisions made under its provisions to be addressed by the Energy Complaints Board. The law prescribes punishments, including fines, for providing false information or obstructing inspections. The Act became effective on July 1, 2013, and does not apply to the Faroe Islands and Greenland.

	Characteristics
Budget	<p>EUR 500 million</p> <p>As part of the 2012 energy policy agreement, a substantial fund of DKK 3.75 billion (equivalent to EUR 500 million) was created to facilitate the transition of industries towards renewable energy sources. The primary aim of this fund was to provide financial assistance to businesses interested in converting their production processes from traditional fossil fuels (such as coal, oil, and gas) to more sustainable options like biomass, solar, wind, or district heating.</p> <p>Since August 2013, businesses have been eligible to receive investment subsidies from this fund, enabling them to undertake the necessary changes in their operations and embrace renewable energy solutions. The subsidy not only supports the adoption of renewable sources but also extends its benefits to encompass investments in energy-efficient measures. This approach seeks to promote greener practices within industries, driving the overall shift towards a more sustainable and environmentally responsible energy landscape.</p>
Financing of the measure	National funds
Policy focusses	Physical intervention
Intervention Type	<ul style="list-style-type: none"> Financial - Subsidies - Subsidies for energy audits/training/benchmarking activities Financial - Subsidies - Subsidies for investments in efficient/renewable heating technologies
Main Barriers Addressed	High initial cost, general financial viability
Key Driver(s)	a national law and EU Directive
Replicability	High
EU Inclusion	Yes, promoting the use of renewable energy sources
Related Characteristics	

9.7.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The implementation of the "Renewables for industry" initiative is projected to have a significant positive impact on the environment, leading to a reduction of approximately 1 million tonnes of CO₂ per year starting from 2020 and beyond. The anticipated effects of this scheme in 2020 have been carefully calculated, and they include:

Reduction in fossil energy consumption: An estimated decrease of about 16 PJ (petajoules) per year, signifying a substantial shift away from traditional fossil fuels towards more sustainable energy sources.

Increase in the share of renewables: The initiative is expected to boost the utilization of renewable energy sources, resulting in an approximate increase of 1.1% in their overall contribution to the energy mix.

Reduction in CO₂ emissions: Compared to the emissions recorded in 1990, the initiative is projected to achieve a reduction of about 1.5% in CO₂ emissions. This reduction is equivalent to an impressive 1 million tonnes of CO₂e (CO₂ equivalent) per year.

Overall, these calculated effects highlight the positive strides being made towards curbing greenhouse gas emissions and fostering a greener and more sustainable energy landscape by promoting the adoption of renewable energy solutions within industries.^{88, 89}

	Impacts
Case level impact	High
Policy level impact	High (>0.5%) → 1.1%
Size	No information
Energy	See impacts section above. No specific impact estimation to motors is available.
Impact evaluation	See above

a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

N/A

9.7.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Cost of Subsidies: the potential costs of renewable subsidies and the strain they may put on the national economy. While renewable energy is essential for combating climate change, policymakers need to ensure that the financial burden of subsidies is manageable and sustainable over the long term.

Retail Price Impact: subsidies are often paid by end-users, which can lead to an increase in retail electricity prices. It's crucial to strike a balance between supporting renewable energy and mitigating the impact on consumers' electricity bills.

Wholesale Price Impacts: the effect of a large-scale deployment of renewable energy on wholesale prices. The variability of wind and solar power may affect the traditional energy market dynamics, and this should be factored into energy planning and pricing models.

⁸⁸ https://commission.europa.eu/system/files/2023-07/DENMARK%20_%20DRAFT%20UPDATED%20NECP%202021%202030%20%287%29.pdf

⁸⁹ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1083>

Grid Investments: invest in grid expansion and upgrades to accommodate the integration of renewable energy sources, especially for offshore wind projects. A robust transmission system is vital to ensure smooth power flow and reliability.

Regulatory Stability: To provide certainty and attract investments in the renewable energy sector, the Danish government should strive to maintain stable and predictable regulatory regimes. Frequent changes to subsidy programs and regulations can deter potential investors and disrupt market growth.

Consumer Awareness: Educating consumers about the trade-off's and benefits of transitioning to renewable energy is essential.

	Lessons Learnt
Key takeaways	See above
Recommendations	See above
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.7.3 Increase in energy tax rates on business as part of Green Tax Reform – phase 1

	Overview
Short Description	The 'Green tax reform' adopts a two-phase approach to drive a just and green transformation. In the first phase, it focuses on ambitious greenhouse gas (GHG) tax reform to incentivize emissions reduction in the most affected companies. This will accelerate the transition towards sustainability. The second phase aims to implement a uniform carbon tax across all sectors to ensure emissions reductions are achieved comprehensively.
Responsible Authority	the Danish Ministry of Finance
Status	Ongoing
Issue Date	2020
Start Date	2021
Ending Date	2030
Duration	108
Reference:	https://fm.dk/nyheder/nyhedsarkiv/2020/december/bred-aftale-om-groen-skattereform-baner-vej-for-groen-omstilling-i-erhvervslivet/ https://fm.dk/media/18517/aftale-om-groen-skattereform_a.pdf

9.7.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

Denmark, as a green pioneer country, has set an ambitious climate goal to reduce greenhouse gas emissions by 70% by 2030 compared to 1990. To ensure a stable framework for this long-term green transition, the government and other parties have reached an agreement on various measures.

The agreement introduces a new and ambitious CO2 tax, which will give companies the incentive and time to enhance energy efficiency and adapt to predictable framework conditions. To support companies most affected by the CO2 tax and encourage them to transition, a substantial amount of funding will be allocated until 2030. This will help minimize the risk of emissions moving abroad and safeguard Danish jobs.

The agreement is expected to lead to significant carbon reductions: 4.3 million tonnes by 2030 and 1.3 million tonnes by 2025, making it the most substantial contribution towards achieving Denmark's 2030 climate targets since the Climate Law was passed.

Recognizing the importance of achieving climate goals, the agreement will be reassessed in 2023, 2026, and 2028. This periodic review will assess progress towards the 2025 target, evaluate the tax level for specific processes, and initiate adjustments if needed.

The agreement showcases Denmark's commitment to a market-driven green transition, demonstrating that a prosperous welfare society and strong business community can coexist with climate action. The elements of the agreement include a new and more uniform CO2 tax, tax reductions for specific sectors, a fund for green transition support, and measures to promote green businesses.

The financing for the agreement will come from the CO2 tax itself, as well as reserves from the North Sea Development Agreement (2017), the Green Tax Reform Agreement 2020, and proceeds from the Agreement on Enhanced Debt Recovery. Administrative costs will also be covered.

The agreement's main elements include the following:

- New and ambitious CO2 tax with special rates for mineralogical processes and restructuring of energy taxes.
- Tax reductions, including a reduction in general electricity tax and cancellation of temporary energy tax from the Energy Agreement 2018.
- A fund to support firms facing challenges in adapting, targeted support for the fishing industry and horticulture, CO2 capture and storage pool (CCS), green training and upskilling, and a reserve.
- Initiatives to promote green business, such as climate visions, climate partnerships, and bans on petrocake by 2030.
- A revisit of the agreement towards 2030, focusing on achieving the 2025 targets and addressing greenhouse gas emissions from agriculture.

Overall, the agreement represents a decisive step towards achieving Denmark's climate goals and serves as a model for other countries to emulate.

Characteristics	
Budget	<p>The individual elements in the financial plan have been rounded to increments of DKK 25 million, with the exception of administrative costs. The total sum has been rounded to an increment of DKK 100 million. The revenue implications will be incorporated into the legislative proposals when they are presented. The impact calculations are based on consistent assumptions and calculation methods outlined in the Climate Status - and Projection 2022 report.</p> <p>Specifically, the financial plan includes the elimination of the current bottom deduction from the CO2 tax as the first point. However, the implementation of the reserve has not been finalized yet. The agreement allows for future discussions to determine the tax layout beyond 2030, with additional visits scheduled for this purpose.</p>

Financing of the measure	<p>The agreement is fully funded over the period 2023-2030. The parties to the agreement agree that the agreement will be financed by the following actions, cf. Table 1:</p> <ul style="list-style-type: none"> - CO₂ tax, incl. abolition of existing bottom deductions from the CO₂ tax - Reserve from North Sea Development Agreement (2017) - Reserve from Green Tax Reform Agreement 2020 - Use of proceeds from debt agreement - Remaining funding <p>This section outlines the various sources of funding for the green tax reform and investment plan. Between 2025 and 2030, the Reserve from the North Sea Development Agreement (2017) will contribute 1,050 DKK million. Furthermore, the Reserve from the Green Tax Reform Agreement 2020 is set to provide 1,175 DKK million from 2024 to 2030. Additionally, proceeds from the agreement on enhanced debt recovery will contribute 1,625 DKK million from 2023 to 2030. Moreover, there will be a reduction in the investment envelope, incurring a cost of 800 DKK million in 2023.</p>
Policy focusses	physical intervention
Intervention Type	Fiscal policy
Main Barriers Addressed	emission reduction
Key Driver(s)	a court ruling, a national law, EU Directive
Replicability	high
EU Inclusion	Yes
Related Characteristics	

9.7.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Carbon emission impact											
<p>The agreement is anticipated to result in remarkable reductions in carbon emissions, aiming for 4.3 million tonnes by 2030 and 1.3 million tonnes by 2025. This achievement marks the most substantial step towards Denmark's 2030 climate targets since the implementation of the Climate Law.</p> <p>Table appears to represent "Cumulative annual savings" for the years 2020 to 2030, with data presented in two columns: "PJ" and "kt CO₂."</p>											
Table 11: Cumulative annual savings											
Year:	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020
PJ:	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2	0.2	0.4	-
kt CO ₂ :	14.3	14.3	14.3	14.3	14.3	4.8	4.8	4.8	4.8	9.6	-
Notes:											

PJ: This column represents the cumulative annual savings measured in "PJ." PJ stands for "PetaJoules".
 kt CO2: This column represents the cumulative annual savings measured in "kilotons of CO2."

Economic impact

Table presents an overview of the overall economic impact in DKK million for the years 2023 to 2030. The table shows various measures and their financial implications as part of a green tax reform and investment plan. Here's a breakdown and interpretation of the table:

- CO₂ Tax: This column represents the revenue or cost generated from implementing a CO₂ tax. The values show that in 2023 and 2024, there will be a cost of -25 DKK million, but starting from 2025, there will be revenue generated due to the CO₂ tax. In 2030, the estimated revenue is 1,125 DKK million, contributing to a cumulative total of 5,575 DKK million from 2023 to 2030.
- Reorganisation of the Space Heating Tax: This column represents the financial impact of reorganizing the space heating tax. From 2025 to 2029, there will be costs incurred, resulting in a cumulative total cost of -975 DKK million from 2025 to 2030.
- Reduction of the General Electricity Tax: This column shows the reduction in the general electricity tax, which will lead to savings of -100 DKK million in 2025 and -225 DKK million in 2026. This trend continues, and the cumulative savings amount to -900 DKK million by 2030.
- Cancellation of Temporary Energy Tax: This column represents the financial impact of canceling the temporary energy tax. There will be significant savings in this regard, amounting to -4,175 DKK million from 2023 to 2030.
- Green Investment Window Reserve: The table indicates that a Green Investment Window Reserve will be established, with a total value of -1,000 DKK million.
- Other Measures: This section includes various measures with their respective financial implications. For instance, there is a Reserve for Tax Exemption of Biogas, Reserve, Investments in Green Transition, and more.
- Financing: This section details the sources of financing for the green tax reform and investment plan. The Reserve from North Sea Development Agreement (2017) contributes 1,050 DKK million from 2025 to 2030. The Reserve from Green Tax Reform Agreement 2020 will contribute 1,175 DKK million from 2024 to 2030. Proceeds from the agreement on enhanced debt recovery will add 1,625 DKK million from 2023 to 2030. Additionally, there will be a downgrading of the investment envelope, resulting in a cost of 800 DKK million in 2023.
- Green Space: This column shows the funds allocated to green projects, starting from 2022 with 875 DKK million and increasing in the following years, with a peak in 2026 at 825 DKK million. The cumulative total for the green space amounts to 3,875 DKK million from 2023 to 2030.
- Total: The final column shows the total overall economic impact, indicating that there is no net financial gain or loss for the years 2023 to 2030, with a total of 4,300 DKK million.

The table provides a comprehensive view of the financial implications of various green tax reform measures and investments, aiming to support the transition to a greener economy in Denmark.

Table 12: Economic impacts of the agreement

2022 level / prices, DKK million	2023	2024	2025	2026	2027	2028	2029	2030	2023-2030	CO ₂ , 2030 (2025)
CO ₂ tax ¹	-25	-25	600	775	950	1.050	1.125	1.125	5.575	2,5 (1,2)
Reorganisation of the space heating tax			-125	-125	-150	-175	-200	-200	-975	0,1 (0,1)
Reduction of the general electricity tax						-100	-225	-575	-900	
Cancellation of temporary energy tax	-1.250	-1.025	-900	-800	-225				-4.175	

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

N/A

9.7.3.3 *Lessons Learnt*

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Denmark's green tax reform demonstrates the country's commitment to combating climate change. It has implemented a carbon tax, and now plans to raise carbon taxes for companies within its borders. The reform aims to reduce greenhouse gas emissions significantly and contribute to Denmark's emission reduction goals. The transition will come with costs, impacting households and industries, but the government intends to ease the burden on vulnerable households. Heavy industries are encouraged to decarbonize through subsidies and lower carbon taxes. The reform showcases Denmark's leadership in carbon pricing measures alongside other Nordic countries.

Denmark's recent green tax reform proves that raising carbon taxes is achievable, showcasing the country's leadership in climate mitigation. Their policies include a carbon tax, initiated in 1992, and participation in the EU Emission Trading System. The new reform increases carbon taxes for companies in Denmark, aiming to substantially reduce greenhouse gas emissions and support emission reduction targets. However, implementing these changes will incur costs, impacting both households and industries. The government plans to alleviate the burden on households, especially the vulnerable, by redirecting revenue from higher carbon taxes. Furthermore, heavy industries are encouraged to transition to cleaner technologies through subsidies and reduced carbon taxes. Denmark's approach sets an ambitious example for effective decarbonization, despite potential challenges in the heavy industry sector and concerns about carbon leakage.

Improvement:

Denmark's green tax reform stands as a remarkable example of successful climate action, demonstrating that raising carbon taxes can lead to positive outcomes. As a long-standing leader in climate mitigation, Denmark has already made significant progress in reducing its territorial emissions, thanks to the widespread adoption of wind power and bioenergy.

The country's climate policy arsenal includes a carbon tax, introduced back in 1992, currently set at €24/tCO₂ and applicable to transport and non-district heating activities, which collectively account for 35% of greenhouse gas emissions. Additionally, Denmark actively participates in the EU Emission Trading System (EU ETS), covering power generation and manufacturing industries responsible for 26% of emissions. These industries must either purchase carbon permits at €98 per tCO₂ or receive free allowances, favouring major emitters in oil refining, cement, bricks, and glass production. Moreover, road transport is subjected to various fuel excise taxes, effectively resulting in an impactful carbon price of €197.7 per tCO₂.

While Denmark's efforts in pricing carbon emissions surpass the average OECD/G20 country, they still trail behind other leading nations such as other Nordic countries, Switzerland, and France. This realization prompted Denmark to take bolder action, leading to a political agreement in June 2022, envisioning a substantial increase in carbon taxes paid by domestic companies. For firms outside the EU ETS, the carbon tax will rise from €24 per tCO₂ to €100 by 2030, making it one of the highest levels globally, comparable to Sweden, Liechtenstein, and Switzerland.

The green tax reform estimates a reduction of 4.3 million tCO₂ in Denmark's greenhouse gas emissions, a significant step towards their emission reduction goals. Nevertheless, the government

acknowledges the need for further measures, and a second phase of the reform is anticipated later, targeting emissions from agriculture.

While the transition to a greener economy promises numerous benefits, it also comes with costs. Investments relying on fossil fuels might see reduced economic returns and could become stranded assets. This necessitates significant investments in clean technologies, such as wind, solar, hydropower, hydrogen, and carbon capture and storage (CCS). Though the cost of these technologies has been declining, estimating the overall expense of climate mitigation remains challenging.

The green tax reform, being mindful of potential impacts on households, intends to alleviate the additional burden of higher carbon taxes by redirecting revenue to support vulnerable households. One such measure is a tax break on electricity, particularly benefiting low-income families.

The heavy industry sector plays a crucial role in global emissions, emphasizing the importance of their decarbonization efforts. In Denmark, the non-metallic mineral products sector contributes over 25% of carbon emissions from the total Danish industry, including prominent companies like Aalborg Portland. This sector, which currently enjoys exemptions from carbon taxation, will be subject to a carbon tax of €16.5 per tCO₂ in 2030 under the green tax reform. Encouraging investments in new technologies, such as Carbon, Capture and Storage (CCS), will enable rapid decarbonization.

Some criticize offering lower carbon taxes and subsidies to heavy industries, fearing it may hinder innovation. However, empirical evidence suggests that economic incentives, like higher energy prices, drive innovation and foster technological advancements, even in challenging industries. Denmark plans to review the carbon tax on non-metallic mineral processes, opening the opportunity to stimulate further innovation in this sector.

Denmark's Green Tax Reform exemplifies a well-structured and ambitious approach to cost-effective decarbonization. The country leads by example alongside other Nordic nations, setting a commendable standard for carbon pricing measures. Nevertheless, continuous efforts and ongoing evaluation will be necessary to achieve their emission reduction goals and combat climate change effectively.

Lessons Learnt	
Key takeaways	<ul style="list-style-type: none"> - The main takeaway message from Denmark's green tax reform is that ambitious climate action is possible through well-designed carbon pricing policies. - By increasing carbon taxes on companies and offering incentives for clean technologies, Denmark aims to substantially reduce greenhouse gas emissions. - it emphasizes the importance of decarbonizing heavy industries and stimulating innovation through economic incentives.
Recommendations	<ul style="list-style-type: none"> - Strengthen Carbon Pricing: Denmark has shown that carbon pricing can be an effective tool in reducing greenhouse gas emissions. To further enhance its impact, the government should consider gradually increasing carbon taxes beyond 2030. This would provide stronger economic incentives for industries to transition to cleaner technologies and reduce their carbon footprint. - Foster Innovation: While the green tax reform encourages industries to invest in clean technologies, the government should continue to support research and development in renewable energy and low-carbon solutions. Providing additional incentives, grants, and funding for innovative projects can accelerate technological advancements and ensure Denmark remains at the forefront of climate-friendly technologies. - Prioritize Green Infrastructure: To facilitate the energy transition, Denmark should prioritize the development of green infrastructure, such as renewable energy installations and electric vehicle charging networks. Investments in sustainable infrastructure will create jobs, stimulate economic growth, and help reduce emissions in the long term. - Engage in International Cooperation: Climate change is a global challenge that requires collective efforts. Denmark should actively engage in international

	<p>cooperation, sharing its successful carbon pricing strategies and collaborating with other countries to promote climate action. By showcasing its achievements, Denmark can inspire and encourage other nations to adopt similar policies.</p> <ul style="list-style-type: none"> - Address Equity and Social Impact: As carbon taxes may increase costs for some households, the government should continue to focus on equity by directing a portion of the carbon tax revenue to support vulnerable communities. Targeted measures, such as tax breaks on essential utilities like electricity, can help alleviate the burden on low-income families during the transition. - Continuously Evaluate and Adjust: Climate policies need continuous evaluation to assess their effectiveness and identify potential areas for improvement. Denmark should regularly review the impacts of the green tax reform, gathering data on emission reductions, economic outcomes, and social implications. Based on these evaluations, the government can make necessary adjustments to optimize the policy's impact. - Promote International Collaboration on Carbon Border Adjustments: As Denmark takes ambitious climate action, it should work with other countries to promote a coordinated approach to carbon border adjustments. This will help prevent carbon leakage and ensure that industries face similar carbon pricing regardless of their location, fostering fair competition and encouraging global climate action.
Linked measures	The government plans to initiate a second stage of the green tax reform soon, with a specific focus on addressing significant emissions arising from the agricultural sector.
Reference(s)	https://www.regeringen.dk/media/11468/aftaletekst-groen-skattereform.pdf https://kefm.dk/Media/6/B/Udspil%20til%20gr%C3%B8n%20skattereform.pdf https://www.cepweb.org/denmarks-green-tax-reform-g20-countries-should-take-notice/ https://www.oecd.org/env/cc/2956442.pdf https://commission.europa.eu/projects/green-tax-reform-emission-taxes-industries_en https://www.skm.dk/aktuelt/groen-vaekst/politiske-aftaler-for-den-groenne-omstilling/ https://www.elibrary.imf.org/view/journals/001/2020/235/article-A001-en.xml https://kefm.dk/Media/6/B/Udspil%20til%20gr%C3%B8n%20skattereform.pdf https://www.regeringen.dk/media/11211/groen-skattereform.pdf
Other	
Thoughts, comments, considerations ...	

9.7.4 Measure 4: Competitive subsidy scheme related to private enterprises

Overview	
Short Description	The scheme is aimed at achieving energy savings in businesses and is open to end user energy savings projects as regards all types of energy in most of the private sectors in Denmark and most types of activities in Denmark. Road transportation, shipping, and savings in the IT sector are exempt.
Responsible Authority	The Danish energy agency, Central Government
Status	Ongoing
Issue Date	29/12/2020
Start Date	2021

Ending Date	2029
Duration	96
Reference:	https://www.retsinformation.dk/eli/lta/2020/2303

9.7.4.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes.

The executive order pertains to grants for energy savings and energy efficiency improvements in commercial enterprises in Denmark. Here is a summary of the key points:

Scope and Definitions. The order applies to subsidies granted to companies for projects aimed at achieving energy savings and energy efficiency improvements in final energy consumption, including reducing the use of fossil fuels.

Eligible Costs and Aid Intensity. The eligible costs include additional investment costs directly related to achieving higher energy efficiency levels in the project.

Subsidies may vary depending on the size of the company, with a maximum subsidy of up to 30% for large companies, 40% for medium-sized companies, and 50% for small businesses.

The total subsidy per energy-saving project should not exceed DKK 15 million.

Chapter 3: Conditions for Grants and Commitments

Eligibility for grants is subject to meeting specific conditions, including not having received illegal subsidies before, not being in crisis, and starting work on the project after obtaining a commitment for subsidies.

The energy-saving measures should not have been completed or received subsidies from other sources, and they must have a payback period between 2 to 10 years.

Application for Grant. Companies can apply for subsidies in two phases, submitting applications digitally via the application portal. Applications are prioritized based on bid prices calculated during the first phase. Energy-saving measures can only be included in one application per application round.

Decision on Commitment to Grant. The Danish Energy Agency assesses applications to approve commitments for grants within the allocated budget. The most expensive project that reaches the indicative commitment framework sets the final cut-off price and can receive full subsidies if funds are available.

Payment of Subsidies. Subsidies are paid to NemKonto, a Danish government payment system. Payment is contingent on the successful completion of the project and the provision of relevant documentation.

Control and Disclosure Obligations. The Danish Energy Agency has the authority to conduct inspections and access information to verify compliance with the grant commitments.

Lapse and Repayment of Subsidy. Commitments for grants may be voided if projects are not completed as specified or if the terms of the undertaking are not fulfilled.

If subsidies have been paid but conditions are not met, they may be demanded to be repaid.

Access to Appeal and Penalty. The Danish Energy Agency's decisions can be appealed to the Energy Complaints Board within four weeks. Penalties may be imposed for providing incorrect or misleading information during the application process.⁹⁰

⁹⁰ <https://www.retsinformation.dk/eli/lta/2020/2303>

	Characteristics
Budget	The program sets aside approximately 4 billion DKK from 2020 to 2029, with the highest annual funding being available during the initial years of the period. The program follows a competitive bidding approach as a subsidy scheme. Subsidies are awarded based on the bids submitted for the cost per saved kWh in each project. Projects with the lowest cost per saved kWh are granted subsidies first, followed by the second lowest, and so on. The primary goal of the scheme is to promote energy savings in commercial enterprises, and it is open to end user energy saving projects across various energy types in most of the private sector in Denmark. However, road transportation, shipping, and energy savings in the IT sector are not eligible for subsidies under this scheme.
Financing of the measure	National funds
Policy focusses	Physical intervention
Intervention Type	Financial - Subsidies - Subsidies for investments in efficient/renewable heating technologies
Main Barriers Addressed	High initial cost, general financial viability, emission reduction
Key Driver(s)	National law, EU Directive
Replicability	high
EU Inclusion	Yes
Related Characteristics	

9.7.4.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Throughout 2022, five application rounds were conducted, with all received applications set to be finalized by the year's end. Table reveals that nearly 1100 phase 1 applications were submitted, seeking funding of approximately DKK 436 million. Among them, 740 applications were received during phase 2, aiming for funding of around DKK 248 million.

During the same year, a total of 562 commitments were made, amounting to approximately DKK 224 million. If these approved projects are successfully implemented as scheduled, they are projected to yield annual energy savings of approximately 495 GWh and reduce carbon dioxide emissions by roughly 138,202 tons each year.

Table 13: Key figures for the implementation in 2022

		2021	2022
Funds in the phase 1	million DKK	588,0	350,0
Number of applications phase 1	Pcs.	1.104	1088
Amount applied for phase 1	million DKK	344,74	435,8
Number of applications phase 2	Pcs.	768	740

Amount applied for phase 2	million DKK	214,04	247,7
Number of commitments	Pcs.	513	562
Amount of commitment	million DKK	165,47	224,1
Pledged annual energy savings	GWh	406,8	495,7
Commitment-made lifetime energy savings	GWh	3.541,4	4.490,1
Pledged annual CO2 reductions	tonnes of CO2	84.505	138.202
Commitment-given lifetime CO2 displacement	tonnes of CO2	769.232	1.330.948

Regarding realized projects, payment requests are continuously processed as projects are completed. As of March 23, 2023, approximately DKK 46 million has been paid out for 298 completed energy-saving projects. Table provides an overview of payments made, including the number of payouts, the corresponding amounts, annual energy savings, lifetime energy savings, and annual CO2 reductions for projects realized in 2020, 2021, and 2022.

Table 14: Overview of payments in the Business Pool by commitment date

		2020	2021	2022
Number of payouts*	Pcs.	48	184	66
Amount paid	million DKK	16,16	25,09	5,37
Annual energy saving, projects realised	GWh	47,8	59,0	10,63
Lifetime energy saving, realized projects	GWh	409,29	520,50	97,93
Annual CO2 reduction, realized projects	tonnes of CO2	8.771,5	8.942,1	2.601,3
CO2 reduction over lifetime, realized projects	tonnes of CO2	77.048,9	82.329,3	24.609,9

*Calculated as of 23-03-2023

The following section provides a brief overview of the applicant demographics concerning the commitments made in 2022.

Company Size:

Table presents the distribution of commitments based on company size. Large companies lead the way with the highest number of projects undertaken, contributing to the majority of expected energy savings.

Table 15: breakdown of company sizes by cases receiving commitments 2022

Company size	Number of commitments	Annual energy savings [GWh]
Small	190	72,51
Between	115	77,55
Big	256	346,06
AMOUNT	562	495,76

Figure 15 illustrates the distribution of grant amounts and energy savings across different action categories³. It becomes evident that initiatives falling under the categories of "Replacement of supply systems," "Replacement of lighting and HVAC," and "Conversion/ optimization of both supply plants and

process plants" yield the most substantial energy savings and, consequently, receive the highest level of support. On the other hand, the action categories "Replacement or conversion/optimization of process plants" and "Rebuilding/optimization of supply plants" occupy a smaller portion when considering only the numbers. This suggests that these types of measures often encompass projects that lead to significant energy savings.

For instance, when replacing supply systems, some projects may involve the substitution of older oil or gas boilers with heat pumps for space heating.

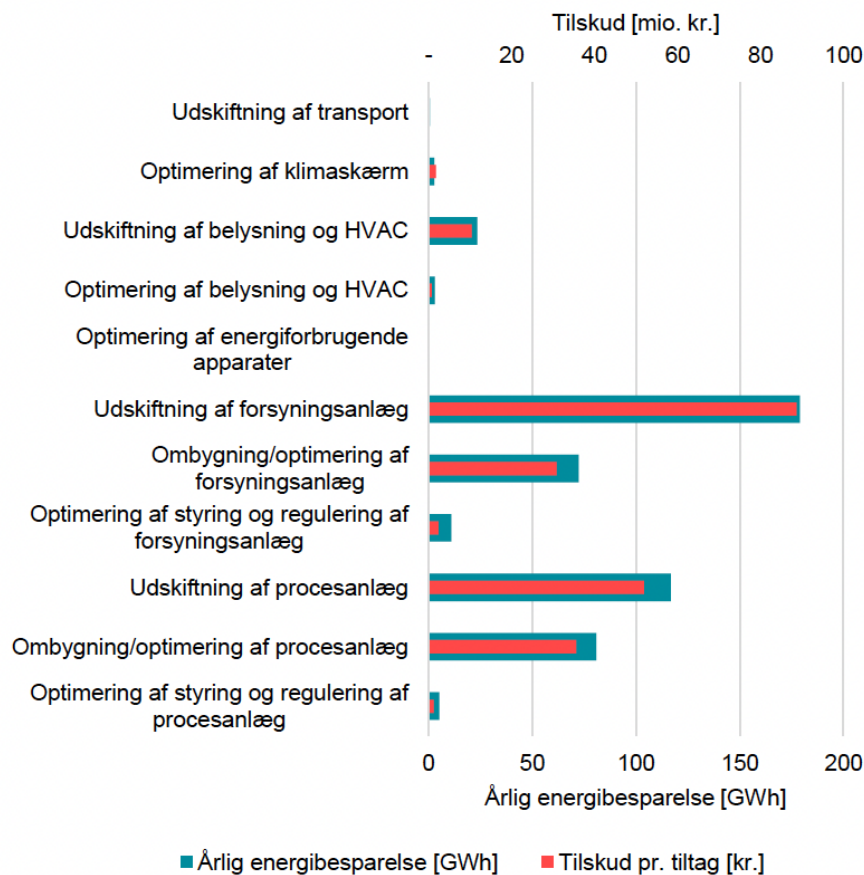
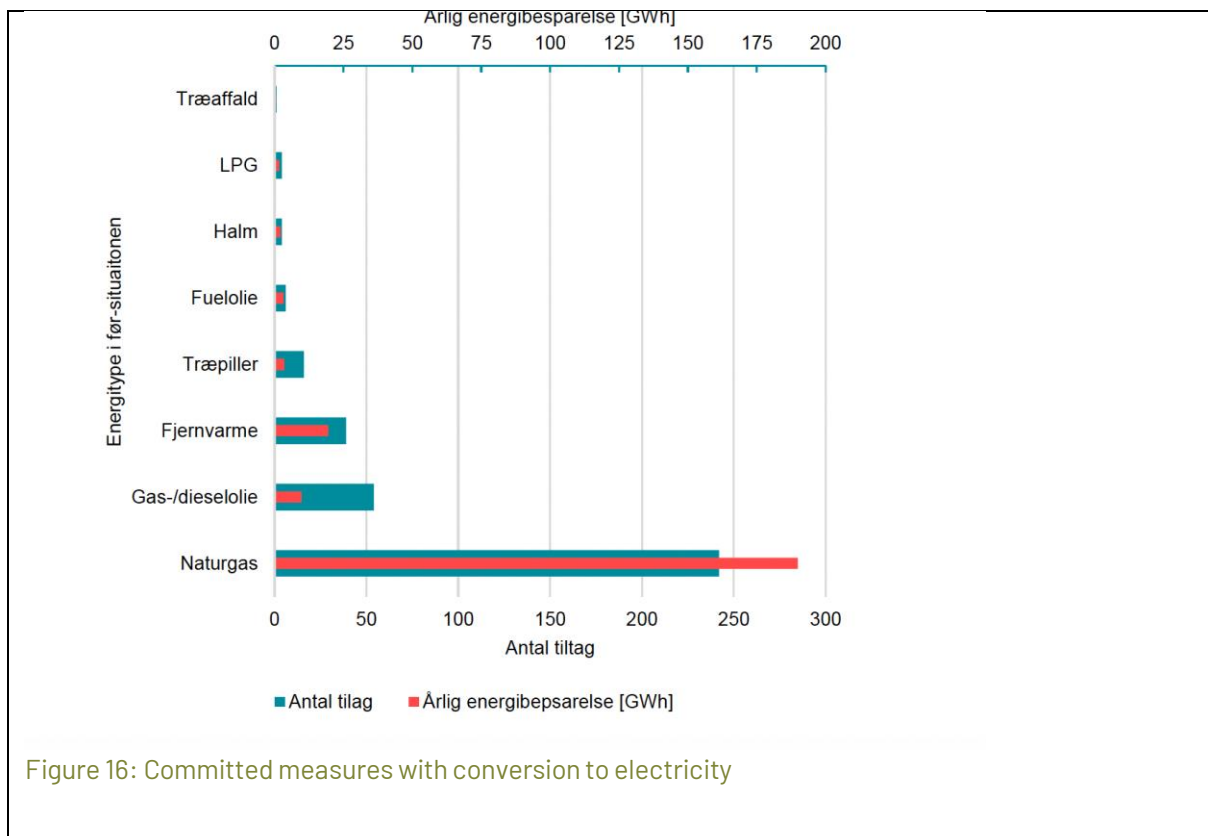


Figure 15: Applications committed by action categories

Electrification plays a significant role in the commitments made, accounting for nearly 50% of all projects. These initiatives result in an annual energy saving of approximately 230 GWh, constituting around 46% of the total pledged annual energy savings. Additionally, they contribute to an impressive reduction of approximately 76,000 tonnes of CO₂ emissions each year.

When converting to electricity, natural gas and gas/diesel fuel are the most common energy sources. The distribution of energy savings achieved through this conversion, based on the respective energy types in the pre-situation, is illustrated in Figure 16.

Furthermore, roughly 30% of the approved applications involve projects related to heat pump installations. This suggests that a majority of the electrification projects funded by Erhvervspuljen involve converting to heat pumps.



	Impacts
Case level impact	High
Policy level impact	Medium
Size	N/A
Energy	See section above. There are no specific figures available directly relating to the replacement of electric motors/EU-MORE
Impact evaluation	See above.

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

N/A

9.7.4.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

-

	Lessons Learnt
Key takeaways	-
Recommendations	-
Linked measures	-
Reference(s)	https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-denmark.pdf https://www.lovtidende.dk/api/pdf/233421 https://ens.dk/ansvarsomraader/energibesparelser/virksomheder/erhvervstilskud-til-energieffektiviseringer https://ens.dk/sites/ens.dk/files/Energibesparelser/Virksomheder/erhvervspuljen_-_statusrapport_2022.pdf
Other	-
Thoughts, comments, considerations ...	-

EU-MORE



**EUropean M0tor
REnovation initiative**



Estonia

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Ivan Sangiorgio (IEECP)



List of Acronyms

Acronym	Description	English
MKM	Majandus- ja Kommunikatsiooniministeerium	Ministry of Economic Affairs and Communications
ENMAK	Energiamajanduse Arengukava Aastani	Estonian Energy Policy Development Plan
NECP	-	National Energy and Climate Plan
EMTAK	Eesti Majanduse Tegevusalade Klassifikaator	Estonian Classification of Economic Activities



9.8 Estonia

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The Estonian Ministry of Economic Affairs and Communications elaborates and implements national policies and development plans in the energy sector. The Ministry of the Environment The Energy Sector Development Plan (ENMAK, 2017)⁹¹ outlined Estonia's energy sector's vision with the aim to ensure affordable and accessible energy supply for consumers, aligning with the European Union's long-term energy and climate goals. In the ENMAK, it is stated that by 2030 the national primary energy consumption will be decreased by 10% and the energy intensity of Estonian economy more than halved (from 5.6 to 2 MWh/k€ GDP) with respect to 2012 values. The ENMAK emphasizes enhancing energy efficiency in the building and transport sectors rather than focusing on industry. This approach is justified by the trend observed in the Estonian economy over the past decade, where there has been a shift towards services. Consequently, the industrial sector lags in terms of final energy consumption with a share of 16%, while residential and transport sectors account for nearly two-thirds of the consumption⁹². A year later, in the National Energy and Climate Plan⁹³ (NECP, 2018), formulated to fulfill the requirements outlined in Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, the Estonian government reformulates the targets to be achieved by 2030 in terms of reduction of primary energy and final energy consumption, respectively of 2.7 and 4.2 % from 2017 values. The new measures listed in the NECP focused once again on the building and transport sectors, in particular concerning residential heating and cooling, reduction of the transport demand and better organization of the mobility system. The same focus on building renovation and district heating enhancement is found in the 2021-2027 Strategic Plan⁹⁴, which plans to allocate 3.37 billion euros from European Union cohesion policy subsidies. One of the targets for the subsidies is the enhancement of resource utilization efficiency in companies, which comprehends the improvement of energy efficiency and renovation of non-efficient appliances such as electric motors⁹⁵.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

No specific measures targeted to the enhancement of the energy efficiency in the industrial sector have been declared, since the focus is put on buildings renovation and district heating for the residential sector. Energy efficiency in industries is somehow accounted with measures supporting the efficient use of resources in companies. Estonia is thus lagging in the enhancement of industrial energy efficiency and is definitely not a frontrunner in the field of electric motors renovation. This is partially motivated by the minor share of the industrial sector in the national final energy consumption, compared to the residential and transport ones.

⁹¹ <https://www.mkm.ee/en/energy-sector-and-mineral-resources/energy-economy/energy-sector-development-plan>

⁹² https://iea.blob.core.windows.net/assets/21965e0d-c9a9-4617-b1ad-5b4539d91ad7/Estonia_2019_Review.pdf

⁹³ https://energy.ec.europa.eu/system/files/2019-03/ec_courtesy_translation_ee_necp_0.pdf

⁹⁴ <https://www.iea.org/policies/13883-2021-27-strategic-plan-energy-efficiency-of-residential-buildings>

⁹⁵ <https://www.rtk.ee/rohelisem-eesti#majandus-ja-kommunikatsiooniministeerium>

9.8.1 Measure 1: Grant support for resource efficiency in enterprises

Overview	
Short Description	Grant (up to 200.000 € for small projects) aimed at increasing resource productivity in companies through the introduction of innovative technologies and solutions.
Responsible Authority	Estonian Ministry of the Environment
Status	Ongoing
Issue Date	January 2017
Start Date	January 2017
Ending Date	December 2023
Duration	21 months
Reference:	- https://www.riigiteataja.ee/akt/103082018003 - https://ringmajandus.envir.ee/sites/default/files/2022-08/10.08_L%C3%B5pparuanne_Ressursit%C3%B5hususe%20meetme%20tulemuslikkuse%20ja%20m%C3%B5ju%20hindamine.pdf -

9.8.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

<p>The grant support is based on the national Regulation 30/07/2018 No.27, resulting from the article 14 of the Structural Support Act 2014–2020.</p> <p>The grant is targeted to small and medium enterprises in the mining and manufacturing sectors⁹⁶ and provides up to 200.000 € to cover the costs for small projects promoting the best possible resource-efficient technology, supporting resource management systems and IT applications. The grant also allowed, until August 2018, the financing of large projects with a maximum support of 2 million €.</p> <p>Among the eligible activities there is the acquisition and/or replacement of equipment with innovative and resource-saving ones.</p> <p>For energy efficiency projects, the maximum rate of support for a large enterprise is 45%, for a medium-sized enterprise 55% and for a small enterprise 65% of the eligible costs, but not more than 50% of the project costs. Eligible costs are investment costs in tangible and intangible assets, setup costs related to investments, costs of trainings of the support recipient's personnel.</p> <p>The applicants must be in possess of an energy audit not older than 2 years, able to certify the attainable energy savings.</p>
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Characteristics	
Budget	111 million € (up to 200 thousand € per project)
Financing of the measure	European Union Regional Development Fund
Policy focusses	[Product / service] (Indication if the policy support package targets/focuses on product ('physical') interventions or service ('soft') interventions)

⁹⁶ EMTAK (Classification of Estonian economic activities) section B/subsections 05–09 and section C/subsections 10–33 except for subsection 12

Intervention Type	Equipment upgrade
Main Barriers Addressed	High investment cost
Key Driver(s)	National Law on structural support for the period 2014–2020
Replicability	High
EU Inclusion	No
Related Characteristics	No focus is given to electric motor renovation, but the among the promoted measure's activities there is the acquisition and/or replacement of equipment with innovative and resource-saving ones.

9.8.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Until February 2022 a total number of 138 companies received grant support, surpassing the target of 135 set for 2022. The resource productivity in 2019 was 0.54 €/kg against 0.44 €/kg of 2012 (+18.5%). The impact of the measure until December 2021 was of 214 GWh of overall energy saving⁹⁷. No disaggregated data is available concerning the type of implemented projects or GHG emissions savings.

	Impacts
Case level impact	-
Policy level impact	High
Size	Unknown
Energy	214 GWh (overall)
Impact evaluation	The measure achieved the targets in terms of resource productivity increase and supported companies, for the activity 4.3.1: " <i>Investment in the best possible resource-efficient technology; supporting resource management systems and supporting IT applications</i> " in the eligible companies before the ending date.

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

-

9.8.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

⁹⁷ <https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-estonia.pdf>

A total number of 30 interviews were conducted with beneficiaries, representatives of professional associations and representatives of the implementing agency. The interviews allowed to receive feedbacks about the criticalities and areas of concern related to the measure's activities. The following barriers were reported:

- The conditions to apply to the grant support are unclear and/or too complicated. Additional instructional materials and preliminary counselling should be provided. In order to increase the attractiveness of the measure, it is recommended to prepare additional guidance materials (in addition to the existing one) for each application round. Companies also need confirmation and information about the duration and openness of the measure, which gives companies the confidence to invest money more narrowly in conducting resource audits and, in the long term, make investment plans to increase resource efficiency.
- Insufficient time for requests and resource audits puts entrepreneurs in an unequal situation. In order to ensure equal opportunities for all companies when applying for subsidies, the application rounds should announce the opening at least 9 months in advance.
- Finding self-financing can be problematic for companies. It is more difficult for small and microenterprises to find the required financial means to fulfil the self-financing necessary for the implementation of projects, compared to large enterprises with a large turnover and financial buffer. It is thus necessary to increase state guarantees and/or guarantees for companies with less financial capacity.
- The metrics developed to assess performance are inadequate. It is thus necessary to update the resource productivity evaluation metric.

	Lessons Learnt
Key takeaways	The measure was found to be successful and permitted to achieve the targets of supported companies and increase in resource productivity. The measure is cross-sectoral and not focused on attainable energy savings or GHG emissions reduction, but rather on general resource utilization efficiency. It thus comprehends energy efficiency and motor renovation as eligible activities, however no disaggregated data of the measure's impact in this regard is available yet.
Recommendations	<ul style="list-style-type: none"> - Increase the support in the grant application procedure - Ensure enough time for the companies to prepare requests and resource audits - Increase the financial support to small and microenterprises - Update and improve the evaluation metric for the achieved savings
Linked measures	-
References	<ul style="list-style-type: none"> - https://www.riigiteataja.ee/akt/103082018003 - https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-estonia.pdf - https://ringmajandus.envir.ee/et/ettevotete-ressursitohususe-meede - https://ringmajandus.envir.ee/sites/default/files/2022-08/10.08_L%C3%B5pparuanne_Ressursit%C3%B5hususe%20meetme%20tulemuslikkuse%20ja%20m%C3%B5ju%20hindamine.pdf
Other	<ul style="list-style-type: none"> - Inge Roos, Department of Energy Technology, Tallinn University of Technology (TalTech), E-mail: inge.roos@tech.ee (author of the Odysee-Mure report: https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-estonia.pdf) - marika.lillemets@envir.ee, Advisor to the Department of Environmental Management, Subject: audits and investments
Thoughts, comments, considerations ...	Despite the understandable inclination to implement general energy efficiency policy measures, no specific policy measures related to the renovation of electric motors in industries could be identified in Estonia. This is significant considering the relatively low final energy consumption of the industrial sector in Estonia. Therefore, it is crucial to enhance the level of detail in policy measures to address motor renovation in this sector.

EU-MORE



**EUropean M0tor
REnovation initiative**



Finland

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Ivan Sangiorgio (IEECP)

List of Acronyms

Acronym	Text
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
ESM	Energy Saving Measure
NCES	National Climate and Energy Strategy



9.9 Finland

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

In the NECP⁹⁸, the Ministry of Economic Affairs and Employment of Finland outlines the national targets and policy measures to achieve the EU's 2030 energy and climate targets. Three main objectives are outlined in the NECP: the achievement of carbon neutrality by 2035; to be the first fossil-free welfare society; to strengthen the carbon sinks and stocks in the medium and long term.

The NECP is primarily based on Finland's National Climate and Energy Strategy (NCES)⁹⁹, which outlines the actions necessary to fulfil the European Union's climate commitments for 2030 and achieve the targets set in the Climate Change Act. These targets include reducing greenhouse gas emissions by 60% by 2030 and attaining carbon neutrality by 2035. Projections indicate that Finland's share of renewable energy will surpass the minimum target outlined in the EU's Fit for 55 Package by 2030.

The Strategy places a strong emphasis on the green transition and reducing dependence on Russian fossil energy, which has gained significant attention since spring 2022. Regarding heat production, the strategy prioritizes the promotion of non-combustion-based heating methods. The electrification of the energy system and the integration of systems are crucial aspects, particularly for sectors where emission reduction is challenging. Additionally, the strategy includes a national hydrogen strategy that aims to foster the hydrogen economy, advance electrofuels, and establish specific targets for hydrogen electrolysis capacity.

The NCES presents the new policies that will be promoted by the country related to energy efficiency. The energy efficiency agreements¹⁰⁰ will continue beyond the current period of 2017-2025, ensuring that incentives are in place for contract companies and municipalities to save energy and promote energy efficiency. Energy audits will be supported to maintain their effectiveness in achieving energy savings and improving efficiency. Adequate resources will be allocated to regulate and provide energy advice, ensuring that consumers receive independent and up-to-date information on energy savings, efficiency, renewable energy solutions, and consumer flexibility opportunities. From 2023 onwards, regional energy advisory services will be funded as part of an energy work program. The energy efficiency requirements for new and renovated buildings will be assessed and potentially updated by 2023. The implementation of the Smart Readiness Indicator for buildings will be considered after a dedicated feasibility study. Grants will continue to be provided for initiatives targeting energy efficiency in residential buildings and smart energy consumption.

No particular focus is put on policy measures targeted to motor renovation or replacement. In the NECP, however, the increase in energy efficiency of machinery is mentioned as a potential action to reduce CO₂ emissions.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The enhancement of energy efficiency in the industrial sector is a primary focus of Finland's policy actions, reflected by the effort put in the Energy Efficiency Agreements firstly established in 1997.

⁹⁸ https://energy.ec.europa.eu/system/files/2020-01/fi_final_necp_main_en_0.pdf

⁹⁹

https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164323/TEM_2022_55.pdf?sequence=4&isAllowed=y

¹⁰⁰ See 1.1

The replacement of electric motors is not a field directly addressed by Finland’s policy measures, even though it is potentially an Energy Saving Measure (ESM) eligible for aid through the industrial Agreements.

It is worthy to mention the lack of publicly available disaggregated statistics about the different ESM technologies implemented under the Agreements, which do not permit to assess the relevance of motor renovation within the policy measure.

9.9.1 Measure 1: Energy Efficiency Agreement for Industries

Overview	
Short Description	Voluntary energy efficiency agreement targeted to large, medium and small enterprises in the industrial sector. Three agreement periods have been issued: 1997-2007, 2008-2016, 2017-2025.
Responsible Authority	Energy Authority (under the Ministry of Economic Affairs and Employment) Motiva (subcontracted by the Energy Authority with administrative, promotional and monitoring roles)
Status	Ongoing
Issue Date	1997
Start Date	1997
Ending Date	2025
Duration	28 years
Reference:	https://energiatehokkuussopimukset2008-2016.fi/etusivu https://energiatehokkuussopimukset2017-2025.fi/en/ https://www.motiva.fi/en/solutions/energy_efficiency_agreements

9.9.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The Energy Agreement Scheme is Finland’s major measure for fulfilling EED Art 7 requirements and it also supports the implementation of the EPBD Directive. The current 2017-2025 agreement period, issued in 2016, extends the 2008-2016 period.

The Ministry of Economic Affairs and Employment oversees the Energy Authority, which is accountable for planning, advancing, and executing the energy efficiency agreements.

To handle the execution, communication, reporting, and monitoring of these agreements, the Energy Authority has enlisted the services of Motiva Ltd, a government-owned company¹⁰¹. The measure is targeted to industrial companies of any size, which enter the agreement by signing an Accession Document related to their sector’s Action Plan, such as Energy Intensive Industry, Food and Drink, Chemical, Technology, Motor Trades and Repair¹⁰². A company can join the agreement even without a branch-specific Action Plan, relying on the General Action Plan for Industry or Services.

By the end of March every year, the participants are required to submit a report regarding their energy usage from the previous year, as well as any ESM taken to improve efficiency and the implementation of other activities outlined in the Action Plan.

¹⁰¹ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1108>

¹⁰² <https://energiatehokkuussopimukset2017-2025.fi/en/agreements/>

Companies that have joined the Energy Efficiency Agreements have the opportunity to be granted with an aid up to 20% of the project costs (25% in the case an ESCO is used). The total cost of the project must be of at least 10.000 €, without any upper bound excepts for specific cases (heat recovery with heat output > 10MW, heat pumps over 1 MW, lighting and building insulation projects).

Financial support is provided also to companies implementing a project with new technologies, mainly first demonstration plants¹⁰³, and to companies willing to perform an energy audit (50% financing for SMEs that have joined the Agreements and 40% for all the others).

The Energy Agreements therefore are not a direct form of grant support but promote the collaboration between companies and the Energy Authority and define specific regulations for energy savings monitoring and reporting.

Electric motor renovation and/or replacement actions are not specifically addressed by the measure but are for sure eligible for granting by companies of any size that have joined the Agreements. For companies without an Agreement these actions would be eligible for support only in the case of the adoption of completely new motor technologies.

	Characteristics
Budget	About 1 million euros per year (for the operation costs of the agreements scheme only) 23 million euros of financial support for the medium-sized industrial sector by the government in the period 2017-2021, 13 for energy intensive industries
Financing of the measure	National funds
Policy focusses	Product intervention
Intervention Type	Equipment upgrade (excluded: heat recovery with heat output > 10MW, heat pumps over 1 MW, lighting projects and building insulation)
Main Barriers Addressed	High initial cost, lack of information
Key Driver(s)	EED art.7
Replicability	High (the measure has been replicated three times)
EU Inclusion	Yes, included in the NECP
Related Characteristics	The financial aid to the companies is not a direct result of the participation to the Agreements; the Agreements are mainly an instrument to foster the collaboration between the Government and companies and to stimulate the monitoring and reporting of energy savings.

9.9.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The 2008-2016 edition of the measure resulted in high impact in terms of energy savings and CO₂ emissions reduction. A total number of 667 companies (about 5000 production sites) were involved, leading to 21200 ESMs implemented. The industrial sector was responsible for the 68% of the achieved annual cumulative energy savings, equal to 15.9 TWh/year (electricity+heat). The annual reduction of CO₂ emissions was of 4.7 million tonnes.

¹⁰³ <https://tem.fi/en/projects-eligible-for-aid>

Between 2017 and 2021, about 19000 ESMs were reported by companies with cumulative annual energy savings of 20.3 TWh/year, equal to 2.9% of Finland's total energy consumption in 2020.

The current edition of the Agreements has been already recognized as a success ensuring their extension after 2025, as stated in the NCES.

	Impacts
Case level impact	-
Policy level impact	High
Size	No disaggregated data available regarding each ESM technology adopted. Across all the sectors, in 2017-2021 period 18824 ESMs were implemented, with 1.007 billion € of energy efficiency private investments. 728 companies are involved in the measure.
Energy	2008-2016: cumulative annual energy savings of 10.81 TWh/year (industrial sector) 2017-2021: cumulative annual energy savings of 6.3 TWh/year in the period 2017-2021 (energy intensive industry + medium-sized industry);
Impact evaluation	2008-2016 (energy + industry + service sectors): <ul style="list-style-type: none"> - 495 million EUR of annual cost savings - 4.5 million ton CO₂ of annual emission reduction - 11050 total ESMs implemented 2017-2021 (energy intensive industry + medium-sized industry): <ul style="list-style-type: none"> - 286 million EUR of annual cost savings 2017-2021 (all sectors): <ul style="list-style-type: none"> - 2.3 million tonnes CO₂ of annual emission reduction

EU-MORE



**EUropean MOtor
REnovation initiative**



France

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors :

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List of Acronyms

Acronym	Text
CEE	French white certificates scheme (Certificats d'Economies d'Energie)
SNBC	National Low-Carbon Strategy (Strategy (stratégie nationale bas-carbone)
MEP	Multiannual Energy Plan (programmation pluriannuelle de l'énergie)
LTECV	<i>Law on Energy Transition for Green Growth</i>
PNIEC	<i>Integrated National Energy and Climate Plan (NECP)</i>



9.10 France

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The following is taken directly from the executive summary (p.4) of the 2019 NECP of France:¹⁰⁴

"The integrated national energy and climate plan for France is based on two documents adopted at national level on the governance and programming of matters relating to energy and climate.

- *The Multiannual Energy Plan (programmation pluriannuelle de l'énergie, MEP), which establishes the priorities for government action in the field of energy for the next 10 years, divided into two five-year periods. It covers all energy types and all of the cornerstones of energy policy (managing energy demand, promoting renewable energies, safeguarding security of supply, controlling energy costs, developing networks in a balanced manner, etc.), and makes it possible to forge a coherent and integrated vision of the role of energy in French society and desirable future trends in this respect.*
- *The National Low-Carbon Strategy (stratégie nationale bas-carbone, SNBC), which is France's roadmap for climate change mitigation. This provides guidelines to enable the transition to a low-carbon economy across all sectors. It specifies France's short-term and medium-term greenhouse gas (GHG) emissions reduction targets (carbon budgets) and aims to achieve carbon neutrality, i.e. net zero emissions, by 2050.*

The MEP and the SNBC are closely linked: the energy scenario in the MEP is identical to that in the SNBC for the period covered by the former. The MEP covers the first 10 years of the SNBC as regards energy consumption and the energy mix. The MEP adopts an operational approach to this 10-year period in terms of government action to decarbonise energy. Compliance with the projections of the SNBC for the period until 2050 represents one possible trajectory for achieving France's climate targets. The SNBC covers all greenhouse gases, some of which are not covered by the MEP.

The scope of the MEP is restricted to metropolitan France, whereas the SNBC also covers the overseas departments. As a result, the parts of these documents incorporated into the Integrated National Energy and Climate Plan (PNIEC) may vary slightly in terms of scope.

The Law on Energy Transition for Green Growth (LTECV) of 17 August 2015 sets out the principles underpinning the process for drafting these two documents. The SNBC and the first three carbon budgets were adopted by decree (Decree No 2015-1491 of 18 November 2015). The MEP for the period 2016-2023 was also adopted by decree (Decree No 2016-1442 of 27 October 2016). The MEP and the SNBC are linked in terms of compatibility: the LTECV provides for the MEP to be compatible with the SNBC and the GHG emissions reduction targets set in the carbon budgets.

The LTECV states that these two documents should be revised every five years, with the exception of the first revision, which was initially planned for the end of 2018 for the MEP and mid-2019 for the SNBC. A full revision cycle for the MEP and the SNBC therefore started in 2017 and continued throughout 2018. A draft revised version of the SNBC was published in December 2018 (hereinafter the 'draft SNBC 2'). Prior to its adoption by decree, the draft underwent a process of statutory consultation (involving the Environmental Authority, the High Council for Climate, the Corsican Assembly, the overseas authorities, the National Council for Standards Assessment, the Regulatory Impact Mission of the Secretariat General of the Government and the public). A draft version of the MEP for the period 2019-2028 (hereinafter the 'draft MEP 2') was published in January 2019. Prior to its adoption by decree, the draft underwent a process of statutory consultation involving the energy committees.

¹⁰⁴ https://energy.ec.europa.eu/system/files/2022-08/fr_final_necp_main_en.pdf

The current draft integrated national energy and climate plan for France incorporates sections from the draft SNBC 2 and the draft MEP 2, and follows the general framework outlined in Annex I to the Regulation on the governance of the Energy Union. The SNBC 2 and the MEP 2 were drafted for the purpose of ensuring that France can comply with the energy and climate targets imposed on it by the EU. The following table contains the EU targets that apply to France and the figures forecast for 2030 under a scenario that assumes the implementation of France's energy and climate strategy.

	Target	Timeline	Forecast
Final energy consumption	National target of -20% compared to 2012 EU target of -32.5% compared to trend-based scenario	2030	120.9 Mtoe or -32.6% compared to PRIMES 2007
Primary energy consumption	No national target EU target of -32.5% compared to trend-based scenario	2030	202.2 Mtoe or -24.6% compared to PRIMES 2007
Share of renewable energy in gross final energy consumption	National target of 33% EU target of 32%	2030	41 Mtoe or 33%
Renewable and recovered heat and cold in district heating	+1% per year up to 60%	2030	+0.9% per year up to 65%
Increase in the rate of renewable and recovered heat	+1.3% per year	2030	Between +1.2% and +1.8% per year
GHG emissions except for land use, land-use change and forestry (LULUCF) and except for sectors covered by the European carbon market (EU ETS)	-37% compared to 2005	2030	-42%
Land use, land-use change and forestry (LULUCF)	Emissions do not exceed removals in relation to the reference period of 2005–2009 ¹	2021–2025 and 2026–2030	Overall compliance with no-debit rule

The trajectory corresponding to these targets differs slightly from that presented in the draft MEP and SNBC published in early 2019; in particular, it is slightly more ambitious in terms of energy efficiency in the buildings and industry sectors, and includes recently implemented or planned measures (application of the Law on Energy and Climate adopted on 8 November 2019 regarding the renovation of 'thermal sieves' (buildings that lose a large amount of heat), freezing of the carbon component, etc.). The target for renewable energies was also increased to 33% of final energy consumption, compared to 32% in the initial draft. The measures explicitly outlined in the final version of the MEP and therefore in the integrated national energy and climate plan will not be sufficient to achieve all the relevant targets by 2030, in particular with regard to a reduction in final energy consumption, meaning that additional measures must be taken. The gradual increases in the carbon component of taxation were suspended in November 2018, meaning that new measures are also required to achieve outcomes equivalent to those anticipated for this component. These measures may be tabled by the governance bodies that have recently been set up (Ecological Defence Council, High Council for Climate, Citizens' Climate Convention). As an indication of the amount of work that remains to be done, it has been estimated that the following outcomes would be achieved by 2030 if action were limited solely to the measures set out in the MEP:

- a reduction of 39.5% in GHG emissions (with reference to 1990), compared to a target of 40% stipulated by law, and an expected outcome of 43.2% for the trajectory that serves as a basis for the MEP and the SNBC;

- a reduction of 17% in final energy consumption (with reference to 2012), compared to a target of 20% stipulated by law, and an expected outcome of 20% for the trajectory that serves as a basis for the MEP and the SNBC;
- a reduction of 36% in primary fossil fuel consumption (with reference to 2012), compared to a target of 40% stipulated by law, and an expected result of 41% for the trajectory that serves as a basis for the MEP and the SNBC;
- an increase of 33% in renewable energy consumption, in line with the target stipulated by law and the trajectory that serves as a basis for the MEP and the SNBC.”

Page 23:

“Current energy and climate policies and measures relating to the five dimensions of the Energy Union”

(...)

Industry

France’s policy on reducing GHG emissions in the industrial sector mainly involves capping emissions from the industrial installations that emit the most GHGs via the EU’s emissions quota trading system, improving energy efficiency (by means of green loans for SMEs and industrial intermediate-sized enterprises, grants from the Agency for the Environment and Energy Management (ADEME) for research into energy efficiency in industry and reductions in the public electricity grid usage tariff for companies that consume a lot of energy and that introduce an energy efficiency policy) and recovering waste heat (with mandatory cost/benefit analyses for new installations that generate waste heat with a view to determining whether this heat could be used in a district heating or cooling network).¹⁰⁵

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

France’s White Certificates Scheme includes several action types related to electric motors, including one about high efficiency motors (IE4 class) up to 1 MW. These larger motors can be eligible as a specific action, requiring an energy audit before approval.

No other related measures were found in this policy review.

9.10.1 Measure 1: White Certificates Scheme [Certificats d’Economies d’Energie – CEE]

	Overview
Short Description	The catalogue of the scheme includes several action types related to electric motors, including one about high efficiency motors (IE4 class) up to 1 MW. However, the way this action is counted does not differentiate whether this would be an early replacement or not. Larger motors can be eligible as a specific action, requiring an energy audit.
Responsible Authority	Ministry in charge of energy (Ministry of Ecological Transition)
Status	Ongoing
Issue Date	2005
Start Date	July 2006
Ending Date	No ending date

¹⁰⁵ [France 2019 final NECP](#)

Duration	17 years until now (and to be continued)
Reference:	https://www.ecologie.gouv.fr/operations-standardisees-deconomies-energie

9.10.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The scheme has been created by the national Energy Law adopted in 2005 and started officially in July 2006. It sets mandatory energy savings targets on energy suppliers. The energy suppliers can meet their target by acquiring white certificates, either with their own programmes or buying them on the market. The most common way to get certificates is to use the catalogue of the 200+ types of standardised actions (88% of the white certificates in 2018-2021). It is also possible to get certificates from specific actions reported with energy audits (3.6%), or by funding accompanying programmes selected by the ministry through calls for programmes on topics defined by the ministry (8.4%).

The scheme covers all end-use sectors, including the industry. Until 2019, the industrial sites covered by the EU ETS were not eligible. They can now be eligible under certain conditions. It should be noted that, even if the scheme is cross-cutting, it has aimed primarily to achieve energy savings in buildings (where it is possible for end-users to cumulate incentives from white certificates with public incentives). Nevertheless, the amount of white certificates from actions in industry has increased over time.

The parties that can apply for white certificates are the obligated parties (energy suppliers), delegated parties (organisations contracted by obligated parties to meet part or all of their energy savings target) and eligible parties (local authorities, social housing body and the national housing agency). End-users cannot apply for white certificates, however they can benefit from the support offered by the obligated, delegated or eligible parties. This support is most often a financial support (e.g. grant or soft loan). It can also be a tailored technical support, but this is rare as it is more difficult for the obligated parties to demonstrate that they had a material role in the implementation of the energy efficiency actions.

The standardised actions are defined with technical specifications (e.g. minimum efficiency requirements, capacity range, installation by a professional, applicable technical standard(s) to be met). These specifications also set the data to be reported for each action. The specifications' factsheets (in French) are given below as hyperlink on the catalogue's code of each action type.

List of standardised actions related to electric motors (as of July 2023), with their code in the catalogue:

Most of these action types are about industry:

- [IND-UT-132](#): asynchronous motor of class IE4
- [IND-UT-102](#): variable speed drive on asynchronous motor
- [IND-UT-114](#): permanent magnet or reluctance synchronous motorised variable speed drive
- [IND-UT-133](#): electronic control system for an electric motor with energy recovery
- [IND-UT-136](#): motor-controlled systems

There are also two action types about services:

- [BAT-EQ-123](#): permanent magnet or reluctance synchronous motorised variable speed drive
- [BAT-TH-112](#): variable speed drive on asynchronous motor

In case of actions not covered by the catalogue, they can be submitted as specific actions. The submission file shall then include an energy audit, and the payback time shall not be less than 3 years. The methodology to document a specific action has been defined by ADEME (French agency for ecological transition).

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	Characteristics
Budget	<p>The public budget is for the administration of the scheme.</p> <p>The financial incentives are funded by the obligated parties. For the period 2018–2020, it was estimated to represent about 2 billion euros per year. It is likely to be about 4 to 5 billion euros per year in the current period (2022–2025).</p> <p>The funding used for actions related to electric motors cannot be estimated, as the incentives vary according to the action type and the obligated party.</p>
Financing of the measure	The scheme is funding by the obligated parties, energy suppliers. They recover their cost on the energy bills. So ultimately, the scheme is funded by the energy consumers (instead of taxpayers in case of public funding).
Policy focusses	Focus on ‘physical’ actions (investments in energy efficiency technologies or solutions).
Intervention Type	Financial incentives for energy efficiency actions
Main Barriers Addressed	<ul style="list-style-type: none"> Primarily the financial barriers, as the scheme makes that financial incentives are offered to end-users for implementing energy efficiency actions. The scheme also addresses the information barriers, as the obligated parties have a direct interest in making their customers and other end-users aware of the energy efficiency solutions relevant to them. Energy suppliers have direct contact with end-users, and also have large marketing and information capacities (much larger than ministries or public agencies). The catalogue of standardised actions is also a way to make end-users aware of energy efficiency solutions available on the market. The scheme might also help to develop the supply chain of energy efficiency actions: the white certificates market can help to increase the viability of business models for the actions eligible to the scheme. Obligated parties also have an interest to develop partnerships with manufacturers or installers, to optimize their programmes and reduce their costs.
Key Driver(s)	<p>The scheme was adopted in 2005, after the electricity and gas markets started to be liberalized. This made that the former agreements on energy efficiency between the national monopolies for electricity and gas and the national energy agency could not be continued. The government then decided to replace these agreements with a market-based mechanism.</p> <p>It has then become progressively the main French energy efficiency policy. Between 2006 and 2022, the equivalent annual target has been multiplied by a factor of more than 40.</p>
Replicability	High: currently 13 Member States implement an Energy Efficiency Obligation Scheme (the general type of policy instrument to which white certificates belong), whose 4 EEOS include white certificates (France, Italy, Poland and Spain).
EU Inclusion	Yes: the white certificates scheme is the single policy measure reported by France to the energy savings obligation set by the Energy Efficiency Directive (formerly Article 7 now Article 8). It is therefore included in all reporting of France to the European Commission about energy efficiency (formerly the National Energy Efficiency Action Plans and annual reports to the EED; now in the National Energy and Climate Plans, and in the National Energy and Climate Progress Reports).
Related Characteristics	

9.10.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Key results from the period 2018-2021:

17.7% of white certificates from actions done in industry

Main action in industry is not electric motor, but heat recovery on cooling units that represents 54% of white certificates achieved in industry.

The main action related to electric motor is motor-controlled systems, that represents 10 times less certificates (5.4%).

However, in terms of number of actions done in 2019-2021, the most frequent action in industry was variable speed drive on asynchronous motor, with 4 281 actions (vs. 1 294 actions of heat recovery on cooling units).

For more details, see the report on the 2018-2021 period (in French):

<https://www.ecologie.gouv.fr/sites/default/files/VF%20CEE%20Bilan%20P4vIntegrale.pdf>

Data for year 2022:

4 366 variable speed drives on asynchronous motor

1 727 motor-controlled systems

For more details, see the 2022 annual report (in French):

<https://www.ecologie.gouv.fr/sites/default/files/Bilan%20annuel%20CEE%20P5%20-%202022.pdf>

	Impacts
Case level impact	High (main French policy for energy savings)
Policy level impact	High
Size	<p>An increasing trend can be seen in the number of actions related to electric motors: 4.281 actions of variable speed drives on asynchronous motor over 2019-2021 4.366 actions of variable speed drives on asynchronous motor in 2022</p> <p>The detailed data per efficiency level and power range are not publicly available. It should be noted that for new motors, the scheme complies with the additionality principle of Article 8 (formerly Article 7) EED, meaning that only the energy savings beyond the minimum requirements set in the Ecodesign regulations are eligible. The baseline may also be updated according to the market average.</p> <p>In practice, IE2 and then IE3 motors are no longer eligible since April 2022 and September 2022, respectively. New motors up to 1 MW shall now be at least IE4.</p>
Energy	N/A for motor replacement action specifically
Impact evaluation	An ex-post evaluation of the scheme has been done in 2019. However, it did not look specifically at actions related to electric motors. As the largest amount of certificates comes from the residential sector, the conclusions from the evaluation are not necessarily relevant to the case of electric motors.

	<p>However, the trends in white certificates show that the number of certificates from actions done in industry has increased over time. The scheme has thus been effective in supporting energy efficiency actions in industry.</p> <p>The data available also show that the action types in industry that brought the largest amounts of certificates are the ones related to heat recovery. This is likely related to the additionality rules, making that heat recovery actions get 'full' savings (before/after comparison), whereas actions related to electric motors are credited for 'additional' savings only (see below about calculation methods).</p> <p>Nevertheless, actions related to electric motors represent the largest number of actions (see data above). It is then also likely that actions related to electric motors are, on average, smaller than the ones related to heat recovery (in terms of energy consumption).</p> <p>There are also accompanying programmes to promote energy management in companies. This supports the identification of cost-effective energy savings opportunities, including about electric motors.</p>
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Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

<p>Only the results from the calculation methods are publicly available (i.e. the ratio of energy savings per action type). The detailed calculation methods can be asked to the ministry or ADEME. They are likely to be similar to the calculation method about early replacement of electric motors developed by the streamSAVE project. However, with the main difference that the French scheme does not seem to differentiate the case of early replacement. Which means that the baseline used in the French scheme is either the minimum energy performance requirements set in the Ecodesign regulation for electric motors, or the market average.</p>
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9.10.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Actions related to electric motors can be addressed in catalogues of standardised actions. Which makes possible to streamline their monitoring and the crediting of the related energy savings. It is however difficult to know what shares of the actions would have been done anyway, in the absence of the scheme. Especially now, as the scheme has been in place for already 17 years, making that it is almost impossible to define a counterfactual.

As part of the monitoring process for the white certificates, it is possible to collect a minimum set of data (e.g. nominal power of the motor). However, these detailed data are not publicly available.

Obligated parties likely compile the data they collect about the actions they support (including invoices, and thereby cost data). Therefore, they also develop a detailed knowledge about energy efficiency actions. However, information and knowledge are then a key competitive advantage in the market of white certificates, making that the detailed data are not shared.

The public authorities have also developed their knowledge and skills in piloting the scheme, and especially in avoiding too strong variations in the price of white certificates. This is essential, as too strong variations can affect significantly the market players and their business models. The price should be high enough to be attractive for market players to engage in the market, but not too high, as otherwise this makes it too difficult for obligated parties to meet their target and this can have a too high impact on energy prices (as obligated parties recover their cost on energy prices).

The main principle of such a market-based mechanism is that obligated parties are free to support the action types they want, as long as these action types are eligible to the scheme. The rationale of such scheme is that it is supposed to support the most cost-effective actions, which means in this context, the actions that the obligated parties can trigger with the least efforts from their side. In practice, obligated parties estimate the ratios of certificates they can get according to their cost to get these certificates. They might also prioritize action types that are strategic to them, for example to retain or gain customers.

The public authorities can also adapt the rules to prioritize action types in line with their policy priorities. This can be done for example in the way to define the baseline for the energy savings calculations (e.g. crediting 'full' or 'additional' savings), or using bonuses that will increase the number of certificates per action, independently of the energy savings achieved, and thereby making the action types with bonuses more attractive for obligated parties.

In its current settings, the French white certificates scheme does not prioritize the early replacement of electric motors. The policy priority is to promote building renovations and the replacement of fossil fuel heating systems, and to a lesser extent car pooling (ride-sharing). The scheme also aims to tackle energy poverty and achieve a minimum share of certificates among low income households (to compensate the distributional effects due to the increase on energy prices from the obligated parties' cost recovery).

Nevertheless, the size of the scheme makes that it is clearly a driver for energy efficiency actions in industry. Moreover, the long history (started in 2006) and the visibility about its continuation make that it is a major component of the energy efficiency markets in France, well known by the market players (energy companies, end-users, manufacturers, installers, etc.).

Key takeaways	<ul style="list-style-type: none"> • Main energy efficiency policy • Actions in industry not the policy priority of the scheme, but the size of the scheme makes that it is very likely the main driver for standardised actions in industry. • Actions related to electric motors do not represent the largest share of white certificates achieved in industry, but they do represent the largest number of actions done in industry. • The specific case of ‘early replacement’ of electric motors is not yet considered in the scheme (new high efficiency motors are eligible vs. a baseline at least equivalent to the minimum requirements of the Ecodesign regulations or the market average).
Recommendations	It would be interesting to discuss whether the specific case of ‘early replacement’ of electric motors could be credited with a different baseline, to value the promotion of anticipated replacements of the least efficient motors (similarly to the recent legislation requiring the renovation of the least efficient buildings in case of lease or sale).
Linked measures	
Reference(s)	<p>(all sources below are in French)</p> <ul style="list-style-type: none"> • Official information, reports and data on the ministry’s website: https://www.ecologie.gouv.fr/politiques/certificats-economies-energie • Guide prepared by ADEME in 2020 to present the scheme to companies: https://librairie.ademe.fr/changement-climatique-et-energie/3008-certificats-d-economie-d-energie-pour-les-entreprises-9791029709876.html • Page on the scheme on the website of ATEE, professional association that gathers the market players (energy companies, ESCos, manufacturers, ...) and coordinates the technical working groups that propose new or revision of standardised actions: https://atee.fr/efficacite-energetique/club-c2e/les-certificats-deconomie-energie
Other	<p>Responsible authority: Ministry of Ecological Transition (DGEC – General Directorate on Energy and Climate)</p> <p>Supporting agency: ADEME (French agency for ecological transition)</p> <p>Other supporting body: ATEE (French association of market players, coordinating the technical working groups of the scheme)</p>
Thoughts, comments, considerations ...	



Germany

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

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List of Acronyms

Acronym	Description	English
BAFA	Bundesamt für Wirtschaft und Ausfuhrkontrolle	Federal Office for Economic Affairs and Export Control
BMWK	Bundesministerium für Wirtschaft und Klima	Federal Ministry for Economic Affairs and Climate Action
BMWi	Bundesministerium für Wirtschaft und Energie	Federal Ministry for Economic Affairs and Energy of Germany
KfW	Kreditanstalt für Wiederaufbau	Credit Institute for Reconstruction



9.11 Germany

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Germany's national policy framework includes implementing authorities such as the Federal Ministry for Economic Affairs and Climate Action (BMWK)¹⁰⁶. It is responsible for formulating and implementing policies related to economic affairs, energy, and climate action. The ministry's main tasks include promoting economic growth and employment, ensuring the competitiveness of German industry, and developing policies to address climate change. There are several other important authorities. The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV)¹⁰⁷ focuses on environmental protection and climate change. The Federal Ministry for Digital and Transport (BMDV)¹⁰⁸ deals with transportation and digital infrastructure. The Federal Network Agency (BNetzA)¹⁰⁹ regulates energy and telecommunications. The Federal Ministry of Education and Research (BMBF)¹¹⁰ is responsible for education, research, innovation, and technology. These authorities play key roles in implementing policies within their respective areas.

Germany's National Energy and Climate Plan (NECP) outlines the country's general direction and course of action for achieving its energy and climate objectives. The NECP focuses on the transition to a sustainable and low-carbon economy, with a strong emphasis on renewable energy sources, energy efficiency, and greenhouse gas (GHG) emissions reduction. Germany recognizes the importance of energy efficiency in reducing energy consumption and improving overall sustainability. The NECP includes measures to enhance energy efficiency in buildings, industry, transportation, and other sectors. This involves implementing energy-efficient technologies, promoting energy-saving practices, and establishing energy performance standards. The NECP emphasizes the need for sectoral integration and cross-sectoral cooperation to achieve synergies and optimize energy systems. This involves coordinating efforts between energy, transportation, industry, and other sectors to facilitate a holistic approach towards sustainable energy transformation.¹¹¹

Several national programs support energy efficiency initiatives in Germany's industry:

- The "KfW Energy Efficiency Programme for Production Plants/Processes" is a German national program that provides low-interest loans to commercial enterprises for implementing energy efficiency measures in their production facilities and processes. The program is ongoing and is available for companies of any size and is open to companies and individual entrepreneurs in the commercial sector who are majority privately owned, as well as freelancers. The program requires all investment measures to achieve energy savings of at least 10%¹¹².
- The "Federal Funding for Energy and Resource Efficiency in the Economy" is another German national program that aims to increase energy efficiency in the industry. The program receives over 10,000 applications per year and consists of different modules. The purpose of module 1 is to support the replacement or acquisition of high-efficiency units for industrial and commercial applications on the company premises in cross-sectional technologies. The program is ongoing and has been successful in supporting smaller projects with a very high

¹⁰⁶ <https://www.bmwk.de/Navigation/DE/Home/home.html>

¹⁰⁷ <https://www.bmuv.de/>

¹⁰⁸ <https://bmdv.bund.de/DE/Home/home.html>

¹⁰⁹ https://www.bundesnetzagentur.de/cln_111/DE/Home/home_node.html

¹¹⁰ https://www.bmbf.de/bmbf/de/home/home_node.html

¹¹¹ https://www.bmwk.de/Redaktion/EN/Downloads/E/draft-of-the-integrated-national-energy-and-climate-plan.pdf?__blob=publicationFile&v=1

¹¹² <https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/F%C3%B6rderprodukte/EE-Produktion-292/>

attractiveness for applicants¹¹³. Module 4 (Energy- and resource-related optimisation of facilities and processes) complements with a systemic approach: Funding is provided for investment measures for the energy and resource-oriented optimisation of industrial and commercial facilities and processes that contribute to increasing energy or resource efficiency. The funding is open to all technologies and can also include the measures listed under modules 1.

- The “Energy-efficient and climate-friendly production processes” programme, which is designed to improve energy efficiency in production processes. It supports companies in investing in the most energy-efficient and environmentally friendly solutions in the design of their production processes¹¹⁴.
- The “STEP up! - Utilizing electricity efficiency potentials” programme aims to increase the efficiency of electricity use by promoting the use of energy-efficient technologies and practices. It provides funding for projects that reduce energy consumption and greenhouse gas emissions by improving the energy efficiency¹¹⁵. The programme was running from 2016-2019.
- The “PIUS Advice and Invest” programme subsidises investment projects by SMEs which increase resource efficiency and reduce CO2 emissions through process and/or organisational changes. SMEs in production, commerce and the service sector are supported with consulting in their efforts to cut their resource consumption and reduce emissions of harmful substances through ¹¹⁶.

According to “Regulation on Securing Energy Supply through Medium-Term Effective Measures (EnSimiMaV) (Verordnung zur Sicherung der Energieversorgung über mittelfristig wirksame Maßnahmen) companies are required to promptly implement identified and economically feasible energy efficiency measures within 18 months. The feasibility is determined based on an economic viability assessment as outlined in DIN EN 17463 ¹¹⁷.

Germany has set a goal to save 500 TWh of energy by 2030 thanks to measures set out in the new energy efficiency law¹¹⁸. The new EU ecodesign measures for electric motors and variable speed drives enter into force on 1 July 2021, aimed at improving the energy efficiency of these products across the EU. Applicable to AC induction motors (such as those that can be found in washing machines, air conditioners, or heat pumps and are also commonly used in many types of industrial applications), the new rules update the previous regulation from 2009. The new regulation has a significantly broader scope, covering motors with a power range from 0.12 kW up to 1000 kW (relative to the previous 0.75 – 375 kW). The energy efficiency requirements have also been reinforced, reflecting technological progress and market evolution in the past decade¹¹⁹. Both policy and regulatory reforms can help Germany achieve a cost-efficient, equitable and sustainable pathway to meeting its highly ambitious energy transition goals.

¹¹³ <https://www.bmwk.de/Redaktion/EN/Pressemitteilungen/2022/12/20221205-measures-under-the-eww-funding-programme-can-now-commence-ahead-of-schedule.html> and https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz_und_Prozesswaerme/energieeffizienz_und_prozesswaerme_node.html (Module 1)

¹¹⁴ <https://www.iea.org/policies/872-support-of-energy-efficient-and-climate-friendly-production-processes>

¹¹⁵ https://www.bmwk.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/pilotprogramm-stromeinsparungen-im-rahmen-wettbewerblicher-ausschreibungen-stromeffizienzpotentiale-nutzen-step-up.pdf?__blob=publicationFile&v=8

¹¹⁶ <https://www.energieeffizienz-hessen.de/investitionsfoerderung/pius-invest.html>

¹¹⁷ <https://www.gesetze-im-internet.de/ensimimav/BJNR153000022.html>

¹¹⁸ <https://www.euractiv.com/section/energy/news/germany-moves-ahead-with-energy-efficiency-law-amid-ongoing-eu-talks/>

¹¹⁹ https://commission.europa.eu/news/new-eu-rules-boost-energy-efficiency-electric-motors-2021-06-30_en

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

Germany has been actively promoting the replacement of old electric motors in various industrial sectors. This includes motors used for pumps, ventilators, and other related components. The country has implemented measures to increase energy efficiency in the industry. By encouraging the adoption of more efficient electric motors, Germany aims to enhance energy performance in the industrial sector. These measures align with the country's commitment to sustainable practices and reducing energy consumption.

9.11.1 Measure 1: Federal Funding for Energy and Resource Efficiency in the Economy – Module 1

	Overview
Short Description	This funding program supports investment measures that lead to a reduction in energy and/or resource demand and carbon dioxide emissions. Eligible investments include the replacement or acquisition of high-efficiency units such as electric motors, pumps, ventilators, and related components such as variable-frequency drive.
Responsible Authority	Federal Office for Economic Affairs and Export Control (BAFA) or Credit Institute for Reconstruction (KfW) ¹²⁰
Status	Ongoing
Issue Date	2018 (individual modules were combined in one funding program)
Start Date	2019
Ending Date	2023 (expected; still running as of Oct. 2023)
Duration	
Reference:	https://www.bafa.de/DE/Energie/Energieeffizienz/-Energieeffizienz_und_Prozesswaerme/energieeffizienz_und_prozesswaerme_node.html

9.11.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

"Federal Funding for Energy and Resource Efficiency in the Economy" (EEW) is the central government program of BMWK to increase energy efficiency in the industry. It receives over 10,000 applications per year. The funding program consists of different modules. The purpose of module 1 is to support the replacement or acquisition of high-efficiency units for industrial and commercial applications on the company premises in the following cross-sectional technologies:

- **High efficient electric motors and drives** consisting of an efficient electric motor and a control system (variable-speed drives) as a standard product for stationary use, which have to fulfil the following requirements:
 - Electric motors 0.12 to 0.75 kW = efficiency class IE4
 - Electric motors 0.75 to 1000 kW = at least efficiency class IE5
 - Electric motors >1000 kW = minimum efficiency of 96.8%
 - Electric motors up to 1000 kW not subject to legal requirements = at least efficiency class IE5
- **Pumps** with electrical drive - high efficient centrifugal and dry rotor pumps, wet rotor circulation pumps, frequency converter for pumps with variable flow rate.

¹²⁰ The program offers funding through either a direct grant from BAFA or a repayment allowance ("Tilgungszuschuss") combined with a loan from KfW.

	<ul style="list-style-type: none"> ○ Pumps must be driven by a high efficient electric motor, see above criteria ● Fans – high efficient fans that use an electric motor to drive a rotating impeller, frequency converters for demand-dependent control of the fan speed, heat exchangers. <ul style="list-style-type: none"> ○ Equipped with a motor of efficiency class IE4 or higher ● Compressed air generators - with speed or without speed control if the compressor operates with low switching frequency and low idle time. ● Frequency converters for demand-dependent regulation of the speed of electric motors and drives. <p>Eligible to apply with a place of business or branch in Germany are private companies, municipal companies, self-employed individuals and contractors. ¹²¹</p>
Characteristics	
Budget	No information was found about the whole budget of the program <ul style="list-style-type: none"> ○ Max. 200.000 EUR per beneficiary (for module 1 – cross-cutting technologies) ○ The funding rate is 30 % of eligible costs, and for small and medium-sized enterprises is 40 %.
Financing of the measure	financed by the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK)
Policy focus	Focus of physical interventions
Intervention Type	Equipment upgrade
Main Barriers Addressed	Emission reduction, efficiency optimization
Key Driver(s)	Energy efficiency directive (EED) (probably)
Replicability	High
EU Inclusion	Yes, it is a part of NECP as measure M02 ¹²²
Related Characteristics	Assumed lifetime for ESMs: On average 7.8 years, individual lifetime depends on the measure [electrical drives 8 years, compressed air 8 years, systemic solutions 8 years, pumps 8 years]

9.11.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

<p>According to the evaluation report for the years 2019, 2020 and 2021¹²³:</p> <ul style="list-style-type: none"> ● Average subsidy amount per motor in 2021: 9.649 € ● Electrical savings in total per year (for all systems in module 1): <ul style="list-style-type: none"> ○ 63 GWh in 2019 ○ 72 GWh in 2020 ○ 78 GWh in 2021 ● Estimated electrical savings in motor systems per year: <ul style="list-style-type: none"> ○ 2.973 MWh in 2019 ○ 4.831 MWh in 2020 ○ 5.815 MWh in 2021

¹²¹ [https://www.kfw.de/PDF/Download-Center/F%C3%B6rderprogramme-\(Inlandsf%C3%B6rderung\)/PDF-Dokumente/6000004386_M_295_Anlage_TMA_Modul1.pdf](https://www.kfw.de/PDF/Download-Center/F%C3%B6rderprogramme-(Inlandsf%C3%B6rderung)/PDF-Dokumente/6000004386_M_295_Anlage_TMA_Modul1.pdf)

¹²² "Notification of Member States' measures and methodologies to implement Article 7 of Directive 2012/27/EU", in the 2019 draft of the NECP

¹²³ https://www.plattform-i40.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/bundesfoerderung-fuer-energieeffizienz-in-der-wirtschaft.pdf?__blob=publicationFile&v=6

- Achieved GHG emission reductions (for all systems in module 1):
 - 61.122 t CO₂ in 2019
 - 62.959 t CO₂ in 2020
 - 61.655 t CO₂ in 2021
- Estimated reduction of energy costs (for all systems in module 1):
 - 17,3 Mio. € in 2019
 - 18,9 Mio. € in 2020
 - 20,4 Mio. € in 2021
- Achieved funding efficiency:
 - 50 €/t CO₂ was the target
 - 124 €/t CO₂ was achieved

	Impacts
Case level impact	High
Policy level impact	High
Size	Module 1 (cross-cutting technologies): 831 motors for 2019 525 motors for 2020 333 motors for 2021
Energy	Module 1 (cross-cutting technologies): 61.122 t CO ₂ in 2019 62.959 t CO ₂ in 2020 61.655 t CO ₂ in 2021
Impact evaluation	The target of saving 160.000 t CO ₂ in total by 2023 was already achieved in 2021 with 185.000 t CO ₂ saved, The target of 20.000 funding measures in total by 2023 was already achieved in 2021 with 22.102 funding approvals.

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement.

The calculation of electrical savings is done using a statistical method. To further validate the values, the number of systems, nominal power, operating hours, and any existing speed control were used to determine the power consumption after implementation of the savings measure and compared to the statistical savings value. Percentages of savings up to an average of 35% per technology cluster were accepted as plausible.

9.11.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

Module 1 is the most widely supported module in the "Federal Funding for Energy and Resource Efficiency in the Economy". The module is designed for applicants with smaller projects and has a very high attractiveness for applicants. In 2021, a total of 8.870 projects were supported with around 76 million euros in funding, leading to about 249 million euros in investment. The majority of the applications were submitted online, with only a small percentage submitted through KfW as a repayment bonus / allowance alongside a credit application. The reason for the low credit application may be due to the fact that the program is intended for smaller projects. The program's online application process and ease of access contribute to its success. The credit application process, on the other hand, requires collateral and is therefore more complicated. The need for a credit option should be assessed on a case-by-case basis, depending on the practical needs of the applicant¹²⁴.

Lessons Learnt	
Key takeaways	<ul style="list-style-type: none"> ○ Electric motor systems were direct affected by this measure ○ The target regarding the number of support measures has already been reached prematurely. ○ The target for CO2 savings has already been achieved in 2021. ○ The current funding efficiency of support is worse than the target.
Recommendations	
Linked measures	
Reference(s)	<p>2021, BMWK, Querschnittstechnologien – Merkblatt, Link: https://www.bafa.de/SharedDocs/Downloads/DE/Energie/-eew_merkblatt_2022.pdf?__blob=publicationFile&v=2</p> <p>2023, Fraunhofer, Evaluation der Bundesförderung für Energieeffizienz in der Wirtschaft, Link: https://www.plattform-i40.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/bundesfoerderung-fuer-energieeffizienz-in-der-wirtschaft.pdf?__blob=publicationFile&v=6</p> <p>"Credit Institute for Reconstruction" (KfW), Link: https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/F%C3%B6rderprodukte/Energieeffizienz-und-Prozessw%C3%A4rme-aus-Erneuerbaren-Energien-(295)/</p>
Other	
Thoughts, comments, considerations ...	

¹²⁴ https://www.plattform-i40.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/bundesfoerderung-fuer-energieeffizienz-in-der-wirtschaft.pdf?__blob=publicationFile&v=6

9.11.2 Measure 2: Federal Funding for Energy and Resource Efficiency in the Economy – Module 4

	Overview
Short Description	Module 4, part of the funding program "Federal Funding for Energy and Resource Efficiency in the Economy" supports investment measures for energy-efficient optimization of systems and processes in industrial and commercial companies. The aim is to increase energy efficiency, reduce the consumption of fossil fuels, and enhance the competitiveness of the funded enterprises.
Responsible Authority	Federal Office for Economic Affairs and Export Control (BAFA) or Credit Institute for Reconstruction (KfW) ¹²⁵
Status	Ongoing
Issue Date	2018 (individual modules were combined in one funding program)
Start Date	2019
Ending Date	2023 (expected)
Duration	48 months (expected)
Reference:	https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz_und_Prozesswaerme/Modul4_Energiebezogene_Optimierung/modul4_energiebezogene_optimierung_node.html

9.11.2.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

Module 4 of the funding program is specifically designed to be technology-neutral, allowing all efficiency measures that contribute to the energy-related optimization of systems and processes in companies to be eligible for funding. However, it is required to submit an energy-saving concept during the application process.

Targeted enterprises for funding include both small and medium-sized enterprises (SMEs) and large companies, including private and municipal entities, freelance professionals utilizing a predominantly business location, and contractors implementing eligible measures for qualifying companies.

The funding program offers two options: a grant variant and a repayment subsidy alongside a loan. The BMWK considers these funding options to cater to the diverse financing needs of businesses. The technical minimum requirements are the same for both variants. The maximum funding amount is 10 million euros, with a funding rate of up to 30% of eligible investment costs (40% for SMEs). Under the loan variant, projects can be financed up to 25 million euros of eligible investment costs.¹²⁶

¹²⁵ The program offers funding through either a direct grant from BAFA or a repayment allowance ("Tilgungszuschuss") combined with a loan from KfW.

¹²⁶ https://www.plattform-i40.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/bundesfoerderung-fuer-energieeffizienz-in-der-wirtschaft.pdf?__blob=publicationFile&v=6

Eligible measures for funding include¹²⁷:

- Process optimizations or changes for energy and resource savings.
- Utilization of process waste heat, such as capturing and using it in heating networks or generating electricity.
- Increasing energy and/or resource efficiency in heating, cooling, and ventilation systems used in manufacturing.
- Efficient provision of process heat or cooling, including optimized storage.
- Avoiding energy and/or resource losses in production processes.
- Shifting from fossil fuels to renewable energy sources.
- Electrification of processes.

	Characteristics
Budget	No information was found about the whole budget of the program <ul style="list-style-type: none"> ○ A maximum amount of €500 per tonne of CO2 saved annually (for medium-sized enterprises (ME): max. €900, small enterprises (SE): max. €1,200) as outlined in the energy-saving concept. ○ The funding rate is 30 % of eligible costs, and for small and medium-sized enterprises is 40 %¹²⁸.
Financing of the measure	financed by the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK)
Policy focus	Focus of physical interventions
Intervention Type	Equipment upgrade
Main Barriers Addressed	emission reduction, efficiency optimization
Key Driver(s)	Energy efficiency directive (EED)(probably)
Replicability	High
EU Inclusion	Yes, it is a part of NECP
Related Characteristics	

9.11.2.2 Impacts

¹²⁷https://www.bafa.de/SharedDocs/Downloads/DE/Energie/eew_modul_4_oap_merkblatt_2023.pdf?__blob=publicationFile&v=3

¹²⁸https://www.bafa.de/SharedDocs/Downloads/DE/Energie/eew_modul_4_oap_merkblatt_2023.pdf?__blob=publicationFile&v=3

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

- Achieved final energy savings (for all systems in module 4):
 - 2.007 GWh/a in 2019
 - 1.786 GWh/a in 2020
 - 3.801 GWh/a in 2021
- Achieved GHG emission reductions (for all systems in module 4):
 - 677.113 t CO₂ in 2019
 - 519.271 t CO₂ in 2020
 - 1.016.128 t CO₂ in 2021
- Estimated reduction of energy costs (for all systems in module 4):
 - 299,1 Mio. € in 2019
 - 142,5 Mio. € in 2020
 - 238,7 Mio. € in 2021
- Achieved funding efficiency:
 - 23 €/t CO₂ was the target
 - 32,78 €/t CO₂ was achieved (2019-2021)

	Impacts
Case level impact	high
Policy level impact	high
Size	Electric drive systems (motors, pumps, fans, HVAC systems) represents around 36% from all the funded projects
Energy	<ul style="list-style-type: none"> • 7.594 GWh (2019-2021) • 2.212.512 t CO₂ (2019-2021)
Impact evaluation	

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement.

not found

9.11.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

In the 2021 funding cycle of Module 4, a total of 2.116 projects were supported, with approximately 337 Mio. € in funding allocated, triggering over 2.064 Mio. € in investments. The number of funding cases increased by 70% compared to the 2020, with a corresponding 85% increase in funding volume. SMEs represented 75% of the funded cases, while private companies dominated the funding landscape. The focus was on process and plant optimization, with a notable rise in funding for waste heat utilization. The program achieved significant energy savings, resulting in an annual reduction of 1 Mio. t CO₂ and cost savings of around 240 Mio. €.

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> • Increased funding and participation. • SMEs play a major role. • Focus on process optimization and waste heat utilization. • Significant energy and cost savings achieved. • Program effectiveness and positive evaluation.
Recommendations	
Linked measures	
Reference(s)	<p>2021, BMWK, Querschnittstechn. - Merkblatt Modul 4 Link: https://www.bafa.de/SharedDocs/Downloads/-/DE/Energie/eew_modul_4_oap_merkblatt_2023.pdf?__blob=publicationFile&v=3</p> <p>2023, Fraunhofer, Evaluation der Bundesförderung für Energieeffizienz in der Wirtschaft, Link: https://www.plattform-i40.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/bundesfoerderung-fuer-energieeffizienz-in-der-wirtschaft.pdf?__blob=publicationFile&v=6</p>
Other	
Thoughts, comments, considerations ...	

9.11.3 Measure 3: Federal Funding for Energy and Resource Efficiency in the Economy – Funding competition

Overview	
Short Description	The funding competition is explicitly technology-, actor-, and sector-neutral. This means that regardless of the technology, actor, or sector, all efficiency measures that contribute to the energy-related optimization of facilities and processes can be supported
Responsible Authority	Federal Office for Economic Affairs and Export Control (BAFA) or Credit Institute for Reconstruction (KfW) ¹²⁹
Status	Ongoing
Issue Date	2018 (individual modules were combined in one funding program)
Start Date	2019
Ending Date	2023 (expected)
Duration	48 months (expected)
Reference:	https://www.wettbewerb-energieeffizienz.de/WENEFF/Navigation/DE/Foerderwettbewerb/Rahmenbedingungen/rahmenbedingungen.html https://www.wettbewerb-energieeffizienz.de/WENEFF/Redaktion/DE/PDF-Anlagen/richtlinie-bmwk-weneff-08-05-2023.pdf?__blob=publicationFile&v=9

9.11.3.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The funding competition is explicitly open to all technologies, actors, and sectors. This means that any efficiency measures contributing to the energy-related optimization of facilities and processes can be supported, regardless of their specific characteristics. The funding competition is designed similarly to Module 4 in terms of its target groups and objectives. The main differences lie in the funding procedure, which can be either competitive or through application, and in the maximum funding limit or possible funding rate.

The funding is carried out through a competitive process, where companies submit their applications on specific deadlines for each competition round. Any applications submitted after the deadline will be considered in the following round. The applications are ranked based on their funding efficiency (CO2 emissions reduction per year achieved per funding euro) and then approved, taking into account the available funds.

With the promotion competition and its systemic approach, savings of approximately 0,7 million tonnes of CO2 or three terawatt-hours of final energy are intended to be achieved by 2023.

Characteristics

¹²⁹ The program offers funding through either a direct grant from BAFA or a repayment allowance (“Tilgungszuschuss”) combined with a loan from KfW.

Budget	Projects with a maximum budget of 5 million euros can be funded with a support rate of up to 50% of eligible costs. The funding is provided as a non-repayable grant.
Financing of the measure	Financed by the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK)
Policy focus	Focus of physical interventions
Intervention Type	Equipment upgrade
Main Barriers Addressed	emission reduction, efficiency optimization
Key Driver(s)	Energy efficiency directive (EED)(probably)
Replicability	high
EU Inclusion	Yes, it is a part of NECP
Related Characteristics	

9.11.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

<p>According to the evaluation report for the years 2019, 2020 and 2021¹³⁰:</p> <ul style="list-style-type: none"> • Funding overview: <ul style="list-style-type: none"> ○ 26 funding approvals; 14,1 Mio. € funding support <i>in 2019</i> ○ 39 funding approvals; 43,5 Mio. € funding support <i>in 2020</i> ○ 23 funding approvals; 23,7 Mio. € funding support <i>in 2021</i> • Achieved final energy savings (for all systems): <ul style="list-style-type: none"> ○ 230.515 MWh/a <i>in 2019</i> ○ 411.064 MWh/a <i>in 2020</i> ○ 638.327 MWh/a <i>in 2021</i> • Achieved GHG emission reductions (for all systems): <ul style="list-style-type: none"> ○ 59.896 t CO₂ <i>in 2019</i> ○ 187.202 t CO₂ <i>in 2020</i> ○ 103.485 t CO₂ <i>in 2021</i> • Estimated reduction of energy costs (for all systems): <ul style="list-style-type: none"> ○ 11,1 Mio. € <i>in 2019</i> ○ 22,1 Mio. € <i>in 2020</i> ○ -3,3 Mio. € <i>in 2021</i> • Achieved funding efficiency: <ul style="list-style-type: none"> ○ 29,86 €/t CO₂ <i>was achieved (2019–2021)</i>

Impacts

¹³⁰ https://www.plattform-i40.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/bundesfoerderung-fuer-energieeffizienz-in-der-wirtschaft.pdf?__blob=publicationFile&v=6

Case level impact	Medium
Policy level impact	Medium
Size	
Energy	<ul style="list-style-type: none"> • 1.280 GWh(2019-2021) • 350.583 t CO₂(2019-2021)
Impact evaluation	

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

not found

9.11.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

<p>The majority of funded companies are large companies. Most of the cases come from the glass and, ceramics, stone and earth processing sector, and the wholesale trade. The projects are expected to achieve energy savings of about 638 GWh per year and a reduction of approximately 103 thousand tonnes of CO₂-equivalent per year. There was an increase in electricity consumption due to the measures, which reduced primary energy savings and greenhouse gas emissions. 45% of the projects did not apply for the maximum funding rate (50% of eligible costs) likely for competitive reasons.</p>

Lessons Learnt	
Key takeaways	<ul style="list-style-type: none"> ○ The measure reaches SMEs, although large corporations remain the major of funded entities ○ Diversification among technology fields is crucial
Recommendations	Positive feedback from recipients, who express satisfaction with the administrative process and plan to recommend the competition in the future.
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.11.4 Measure 4: KfW Energy Efficiency Programme - Production Plants/Processes

	Overview
Short Description	The KfW Energy Efficiency Programme provides low-interest loans to support energy efficiency measures in the area of production facilities/processes of commercial enterprises
Responsible Authority	Credit Institute for Reconstruction (KfW)
Status	ongoing
Issue Date	not found
Start Date	01.07.2015
Ending Date	not found
Duration	not found
Reference:	https://www.kfw.de/inlandsfoerderung/Companies/Energy-and-the-environment/

9.11.4.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The KfW Energy Efficiency Program for Production Plants and Processes (KfW 292/293) supports commercial enterprises in implementing energy efficiency measures with low-interest loans. Investments in production plants, process technology, cross-sectional technologies, heat recovery and utilization of waste heat, as well as combined heat and power plants, are eligible for funding. All investments must meet certain minimum energy efficiency requirements.¹³¹

The funding program is available for companies of any size. The program is available for companies and individual entrepreneurs in the commercial sector who are majority privately owned, as well as freelancers. These eligible parties must either be located in Germany or have foreign branches, subsidiaries, establishments, or offices in Germany. In addition, companies that provide services for a third party within the framework of a contracting agreement are also eligible.

All investment measures that achieve energy savings of at least 10% are eligible for funding, including:

- Machinery/equipment/process technology
- Compressed air/vacuum/extraction technology
- Electrical drives/pumps
- Measurement, control, and automation technology
- Information and communication technology
- Etc.

¹³¹ <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Effizienzprogramm-f%C3%BCr-die-F%C3%B6rderjahre-2017-und-2018.pdf>

	Characteristics
Budget	<ul style="list-style-type: none"> ○ The maximum funding per project is 25 million EUR ○ Up to 100% of eligible costs can be financed. ○ The credit limit can be exceeded if the project has special eligibility for funding.
Financing of the measure	national fund
Policy focus	physical intervention
Intervention Type	equipment upgrade
Main Barriers Addressed	high initial cost, energy efficiency
Key Driver(s)	EU Energy Efficiency Directive 2012/27/EU (EED)
Replicability	medium
EU Inclusion	No
Related Characteristics	

9.11.4.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The investments funded in 2017 and 2018 have resulted in total greenhouse gas reductions of 543.000 tCO_{2e}, including 151.000 tCO_{2e} from projects supported abroad¹³². The investments funded in 2015 and 2016 have resulted in total greenhouse gas reductions of 475.000 tCO_{2e}, including 62.000 tonnes CO_{2e} from projects supported abroad¹³³.

	Impacts
Case level impact	high
Policy level impact	medium
Size	no information was found
Energy	For the years 2015, 2016, 2017, 2018 a total of 1.018.000 tCO _{2e} according to evaluation reports
Impact evaluation	

¹³² <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Effizienzprogramm-f%C3%BCr-die-F%C3%B6rderjahre-2017-und-2018.pdf>

¹³³ <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Energieeffizienzprogramm-Produktionsanlagen-und-prozesse-F%C3%B6rderjahrg%C3%A4nge-2015-und-2016.pdf>

(If available) Description of the method used for calculating the final energy - and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

not found

9.11.4.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

Key results from the evaluation of the programs for the years of 2015, 2016, 2017 and 2018^{134,135} are as following:

- The programme supported 2.103 energy efficiency projects with a lending volume of €6.2 billion in the years 2015, 2016, 2017 and 2018.
- Supported projects resulted in final energy savings of 2.4 TWh in the years 2015, 2016, 2017 and 2018.
- The investments led to energy cost savings of around €219 million in the years 2015, 2016, 2017 and 2018.
- The investments also resulted in an annual reduction of greenhouse gas emissions of 1.018.000 tCO_{2e}.

Lessons Learnt	
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	<p>2019, KfW, Evaluation KfW Energy Efficiency Programme – Production Facilities and Processes for the years 2017 und 2018 Source: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Effizienzprogramm-f%C3%BCr-die-F%C3%B6rderjahre-2017-und-2018.pdf</p> <p>2017, KfW, Evaluation KfW Energy Efficiency Programme – Production Facilities and Processes for the years 2015 und 2016 Source: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Energieeffizienzprogramm-Produktionsanlagen-und-prozesse-F%C3%B6rderjahrg%C3%A4nge-2015-und-2016.pdf</p>
Other	

¹³⁴ <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Effizienzprogramm-f%C3%BCr-die-F%C3%B6rderjahre-2017-und-2018.pdf>

¹³⁵ <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Evaluation-KfW-Energieeffizienzprogramm-Produktionsanlagen-und-prozesse-F%C3%B6rderjahrg%C3%A4nge-2015-und-2016.pdf>

Thoughts, comments, considerations ...	
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9.11.5 Measure 5: Energy-efficient and climate-friendly production processes

	Overview
Short Description	This program promoted measures to improve energy efficiency and reduce greenhouse gas emissions in industry, which may include the use of efficient electric motors.
Responsible Authority	Federal Ministry of Economics and Energy (BMWi); implementation: Project Management Agency Karlsruhe
Status	Completed.
Issue Date	7 April 2014 (amendment from 12 December 2013)
Start Date	12, 2013
Ending Date	12, 2017
Duration	48 months. Applications could be submitted continuously; evaluation happened four times a year
Reference:	https://www.bmwk.de/Redaktion/DE/Artikel/Industrie/klimaschonende-produktionsprozesse.html ; https://www.bmwk.de/Redaktion/DE/Downloads/P-R/richtlinie-foerderung-klimaschonende-produktion.pdf?__blob=publicationFile&v=1

9.11.5.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The program had the **aim** to support the industry in implementing energy-efficient and climate-friendly production processes. The government wanted to provide incentives to support investments to increase energy efficiency in industrial production processes. "Production processes" within the meaning of these guidelines are industry-specific processes for the direct production of a (material) company product.

The funding program **targeted**:

- Companies in the manufacturing sector with their registered office or branch in Germany (with the exception of energy supply) and
- Contractors who carry out an eligible measure under a contracting agreement at an eligible company.

Funding was **available for investment measures to increase energy efficiency** in commercial and industrial production processes, in particular:

- Production process and production method conversions to energy-efficient technologies,
- Measures for the efficient use of energy from production processes or plants in the company, and
- Other energy optimization of production processes.

The program underlines that measures should correspond to the “state of the art in environmentally friendly technology”(available on the market) or “go beyond this for the specific application, by applying known and already tested and technologies in a new context”. The program does not state specific measures, such as the replacement of motors.

The **funding volume** is up to 20% of the investment costs directly related to environmental protection. The maximum amount is 1.5 million euros.

The following **funding requirements** must be fulfilled:

- Additional investment costs of at least 50.000 euros;
- Specific final energy savings for the same production output measured against the average consumption of the last three years of the plant/process under consideration of at least 5 percent; and
- At least 100 kg CO₂ savings per year in relation to 100 euros additional investment costs.

In addition, the companies need to have evidence of energy and CO₂ savings and the improvement of energy efficiency by an independent energy advisor or by an by energy officer, if company is certified according to DIN EN ISO 50001 or EMAS is certified.

The projects to be funded are selected in a competition held four times a year. Projects may be funded by means of grants in accordance with the present guideline¹³⁶, the Law on the Establishment of a Special Fund "Energy and Climate Fund" (EKFG) and the Administrative Regulations on Sections 23, 44 of the Federal Budget Code (BHO) as amended from time to time. Applications can be submitted through a portal¹³⁷.

	Characteristics
Budget	Overall budget not defined; maximum 1.5 million euros per beneficiary
Financing of the measure	Special fund: “Energy and Climate Fund”
Policy focus	Increase of energy efficiency in production processes
Intervention Type	Project funding
Main Barriers Addressed	Market failure because positive externalities of energy-efficient production processes with regard to climate protection are not taken into account by the individual actors in their investment decisions

¹³⁶ https://www.bmwk.de/Redaktion/DE/Downloads/P-R/richtlinie-foerderung-klimaschonende-produktion.pdf?__blob=publicationFile&v=1

¹³⁷

<https://foerderportal.bund.de/easyonline/nutzungsbedingungen.jsf;jsessionid=8104B26D27E3A9AD57A B1C6D652005E5?redirectFrom=/easyonline/easyOnline.jsf>

Key Driver(s)	Energy reduction as key pillar of the energy concept of the government; enable international competitiveness and innovativeness; measures to reduce energy use and costs
Replicability	High (replicability to other companies and branches was a selection criteria)
EU Inclusion	No; reference is only made to the national energy strategy
Related Characteristics	Selection criteria for the funding were specific final energy savings per year, CO2 reduction through the measurements, the improvement of energy efficiency and the innovation and replication potential, existence of an energy management system.

9.11.5.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

The duration of the project was four years in which period about 87 projects have been funded. Online and also the Project Management Agency Karlsruhe could not provide any information on the overall impact of the funding programme. Given that funded project had to achieve at least 100 kg CO₂ savings per year, it can be assumed that the investments led to reduction of 8.700 kg of CO₂ per year.

	Impacts
Case level impact	Medium
Policy level impact	n/a
Size	n/a
Energy	Given that funded project had to achieve at least 100 kg CO ₂ savings per year, it can be assumed that the investments led to reduction of 8.700 kg of CO ₂ per year.
Impact evaluation	87 projects have been implemented that improved the energy efficiency of production processes

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

not found

9.11.5.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

The missing evaluation of the program makes it hard to assess the final impact. The extension of the funding period suggests that there was an interest from the side of the industry to apply for the program.

	Lessons Learnt
Key takeaways	Funding programme could initiative the realisation of project that increased the energy efficiency in production processes.
Recommendations	Impact evaluation of such programmes is crucial to assess the effectiveness of such programs. The responsible implementation authority should be responsible for the data collection and assessment.
Linked measures	n/a
Reference(s)	n/a
Other	
Thoughts, comments, considerations ...	n/a

9.11.6 Measure 6: STEP up! - Utilizing electricity efficiency potentials

	Overview
Short Description	This program supported projects to increase electricity efficiency in all sectors, which may include the use of efficient electric motors.
Responsible Authority	Federal Ministry of Economics and Energy (BMWi)
Status	Completed.
Issue Date	25 May 2016
Start Date	May, 2016
Ending Date	2019 (pilot phase 2016-2019)
Duration	24 months. There were two funding periods per year.

Reference:	https://www.bundesanzeiger.de/pub/publication/jklwmm2Mkb13bVQye13/content/jklwmm2Mkb13bVQye13/BAnz%20AT%2031.05.2016%20B2.pdf?inline https://www.bmwk.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/pilotprogramm-stromeinsparungen-im-rahmen-wettbewerblicher-ausschreibungen-stromeffizienzpotentiale-nutzen-step-up.pdf?__blob=publicationFile&v=8
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9.11.6.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The pilot program "Electricity savings in the context of competitive tenders: Exploiting Electricity Efficiency Potentials"(STEP up!) was running two years. The aim was to introduce a competitive model as a new way of promoting energy efficiency in a way that is open to all sectors, technologies and actors in the field of energy efficiency.

The evaluation report refers to the energy end-use efficiency and energy services, as well the energy efficiency directives as drivers that brought the topic on the agenda in Europe and Germany. The further development of these "competitive tenders" took shape in the course of the development of the National Action Plan for Energy Efficiency (NAPE) in 2014.

Eligible applicants were:

- Commercial enterprises, including economically active municipal enterprises, with a permanent establishment or branch in Germany,
- Contractors who carry out eligible measures under a contracting agreement at eligible companies.

The program **funded investment measures to save electricity** at the site of Germany:

- Renewal investments and early replacement investments
 - Replacement and substitution of existing technology with high-efficiency technology
 - Replacement of inefficient electricity-consuming components, systemic optimizations, implementation of new developments
- Additional investments:
 - Supplementation of existing systems by new acquisition
 - additional high-efficiency technologies

Eligible were additional investment costs, costs that led to an improvement of efficiency, and investments side costs, such as for planning or installation.

The tender rounds included each open and closed tenders – open rounds were for sector- and technology open projects and closed ones for specific sectors, target groups, technologies or themes. Single projects but also collections of projects could be funded in so called open tenders.

Funding volume was between 20,000–250,000 euros for small projects and between 250,000–1,500,000 euros for large projects. The funding intensity was up to 30% of the eligible costs.

Funding criteria were that:

- The payback period of each (partial) measure must be more than three years in relation to the electricity costs saved without subsidies.

- The funding amount applied for in the competition must not exceed the funding quota of a maximum of 30% for the additional investment costs of the measures is not exceeded.
- The cost-benefit threshold must not exceed €0.10/kWh.

Project with the greatest savings effect per requested funding euro were funded.

	Characteristics
Budget	300 million euro; maximum funding of 1.5 million euro / project
Financing of the measure	n/a
Policy focus	Energy saving, energy efficiency
Intervention Type	Pilot funding program
Main Barriers Addressed	n/a
Key Driver(s)	The evaluation report stated the reduction of energy costs and the regular proof of the implementation of energy efficiency measure were main drivers for the project implementation.
Replicability	Medium. Can be replicated. Focus of the closed tenders could be targeted to electric motors.
EU Inclusion	EU framework mentioned in the evaluation report, but no direct link.
Related Characteristics	n/a

9.11.6.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

Overall, 89 project have been funded.

The cost-benefit ratio of the subsidized projects ranges from 0.5 to 10.0 ct/kWh and, at an average of 4.8 ct/kWh, is well below the maximum permissible value of 10 ct/kWh.

The **electricity consumption could be declined by 1.142.097 MWh**. In total, around 113 GWh of electricity per year and around 1.1 TWh of electricity over the service life will be saved.

The electricity savings and the CO₂ intensity of the saved electricity result in total savings of **58 kt per year, or over 586 kt CO₂ eq** over the useful lives of the projects.

In total, the subsidized electricity efficiency measures lead to a reduction in electricity costs of just under 13 million euros per year.

The evaluation report¹³⁸ of the program states that the quantitative savings and climate protection targets of STEP up! were missed. As main reasons were given the low demand and therefore the low number of funding cases. The economic policy objectives, such as reducing energy costs or dismantling obstacles to efficiency measures among grant recipients, were achieved.

	Impacts
Case level impact	Low
Policy level impact	Low
Size	Low; as it could be identified: 2 out of 89 projects, but indirect measures might have been missed.
Energy	1.142.097 MWh, 58.144 tCO ₂
Impact evaluation	Savings are far behind the expectation; e.g. estimated were 400.000 t CO ₂ eq to over 800.000 t CO ₂ eq in comparison to 58.144 t CO ₂ .

(If available) Description of the method used for calculating the final energy - and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

The saving were calculated based on data from the funding data bank and calculation by Ifeu and Prognos, who did the funding evaluation.

9.11.6.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

In contrast to previous funding measures, this program has a competitive element to stimulate a high level of dynamism. Most projects had been submitted as individual projects in open tender rounds. The applications sharply increased in 2018-2019, in comparison to lower number of applicants in 2016-2017¹³⁹. Thus, it seems that the program had to be first known and that there was a wider interest of applicants from different sectors. Almost half of the funded companies were SMEs.

¹³⁸ Ifeu and Prognos, 2019. Ex post-Analyse des Pilotprogramms STEP up!

https://www.bmwk.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/pilotprogramm-stromeinsparungen-im-rahmen-wettbewerblicher-ausschreibungen-stromeffizienzpotentiale-nutzen-step-up.pdf?__blob=publicationFile&v=8

¹³⁹ Ifeu and Prognos, 2019. Ex post-Analyse des Pilotprogramms STEP up!

https://www.bmwk.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/pilotprogramm-stromeinsparungen-im-rahmen-wettbewerblicher-ausschreibungen-stromeffizienzpotentiale-nutzen-step-up.pdf?__blob=publicationFile&v=8

Overall, 89 project have been funded with a funding volume of 28.8 million euros, among which were also two drives, or motor projects. Closed tenders specifically for electric motors could potentially increase the number of applications; though this funding program saw a higher attendance in the open tender rounds.

From the interviews and case studies in the evaluation phase¹⁸, it became clear that especially the effort of the application in connection with the competitive procedure (and thus an uncertainty of results for the applicant) in relation to the achievable funding amount (funding rate) is a particular challenge for the interested applicants. Adaptation to the pilot program could not be implemented in that regard, but changes were already made to the guidelines during the pilot phase: The main changes were the reduction of the minimum project size and the extension of the guidelines to include electricity and heat projects.

Further challenges were: the timeline of the program implementation, required support services for the applicants and activities to raise awareness of the program; the fix funding rounds; three month tender period and the complex funding structure with open and closed tenders. Furthermore, small companies saw the competitive character as barrier.

	Lessons Learnt
Key takeaways	Open tenders were more prominent. Applicant number was still low. Barriers must be overcome to make programs more attractive and application easier. The expected impacts in terms of emission reductions and energy savings could not be met.
Recommendations	Design funding programs flexible to address barriers of applicants from one funding round to the next.
Linked measures	Evaluation report: https://www.bmwk.de/Redaktion/DE/Evaluationen/Foerdermassnahmen/pilotprogramm-stromeinsparungen-im-rahmen-wettbewerblicher-ausschreibungen-stromeffizienzpotentiale-nutzen-step-up.pdf?__blob=publicationFile&v=8
Reference(s)	It is important to understand the motivations for the attendance to a funding program. Energy efficiency is not a main investment criterion for most companies. Barriers for energy efficiency must be known and tackled in the program.
Other	
Thoughts, comments, considerations ...	

9.11.7 Measure 7: PIUS Advice and Invest

	Overview
Short Description	PIUS-Invest is a funding program for SMEs in the German federal state of Hesse that funds efficient production processes and digitization.
Responsible Authority	LEA Hessen, federal energy agency
Status	Ongoing
Issue Date	2017
Start Date	2017
Ending Date	Not defined.
Duration	n/a
Reference:	https://www.energieeffizienz-hessen.de/investitionsfoerderung/pius-invest.html https://www.energieeffizienz-hessen.de/fileadmin/user_upload/news-import/PIUS-Invest_Dokumentation-Ansicht.pdf

9.11.7.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

PIUS is a funding program for SMEs in the federal state of Hesse, Germany. The four letters stand for Production Integrated Environmental Protection. This means that entrepreneur can optimize their production processes with state support in such a way that the environment also benefits.

Fundable are projects that **target at least one of the aims**:

- Improving energy and resource efficiency in production and the building envelope
- Networking and digitization of processes to optimize resource use and avoid waste
- Production, distribution, use and storage of renewable energies
- Adaptation to climate change
- Saving raw materials and recyclables and establishing recyclable material cycles through the use of innovative manufacturing technologies

The PIUS program is **aimed at SMEs** in manufacturing, services and trade. The definition of SME is:

- Maximum 250 employees. Here, the full-time equivalent applies for part-time employees. If you employ 300 employees, but 150 of them are part-time employees with 50 percent positions, the total counts as 225 full-time positions.
- Maximum 50 million euros annual turnover
- Maximum 43 million euros annual balance sheet.

Fundable are:

- a maximum of 40 percent of the eligible costs, or a

- a maximum of 500,000 euros per project.

A 100% financing is possible with the innovation credit by the WIBank.

The principle applies that companies receive one euro of project funding per kilogram of CO₂ saved. Several project applications are possible per company.

The program follows three steps:

Step 1: Free "impulse consulting" on energy efficiency in the company.

Step 2: Subsidized Hesse "PIUS consulting". Small and medium-sized companies from the production, trade and service sectors benefit from subsidized, resource-efficient consulting that helps them reduce their consumption of energy, water, air, raw materials, consumables and supplies, and cut emissions of pollutants.

Step 3: The "PIUS-Invest" grant.

	Characteristics
Budget	Up to 500,00 euros per project; 13.000.000€ funding volume from 2017-2020.
Financing of the measure	Funds of the State of Hesse, the European Fund for Regional Development (EFRE) and the European Investment Fund (EIF)
Policy focus	Efficient production processes and digitalization
Intervention Type	PIUS Advice and PIUS Invest
Main Barriers Addressed	Application process could be easier; better visibility for the funding system; schematic process for the application process ¹⁴⁰
Key Driver(s)	Strengthens competitiveness, Consultants provide valuable support; Reduces costs, saves resources, energy and CO ₂ ; Responds to customers' sustainability requirements ¹⁴¹
Replicability	Medium
EU Inclusion	Partial funding by EU
Related Characteristics	n/a

9.11.7.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

¹⁴⁰ Expressed wishes for improvement. Source: https://www.energieeffizienz-hessen.de/fileadmin/user_upload/news-import/PIUS-Invest_Dokumentation-Ansicht.pdf

¹⁴¹ Expressed success criteria. Source: https://www.energieeffizienz-hessen.de/fileadmin/user_upload/news-import/PIUS-Invest_Dokumentation-Ansicht.pdf

CO2 saving are calculated foreach company by an advisor in the PIUS Advice step.

	Impacts
Case level impact	Medium
Policy level impact	n/a
Size	n/a
Energy	14,000 t CO ₂ saving annually in supported SMEs (status 2020) ¹⁴²
Impact evaluation	n/a

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

n/a

9.11.7.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

Unique integration of advice (PIUS Advice), investment (PIUS Invest) and innovation credit that enable a financing of up to 100%. In 2020, 34 SMEs have profited from PIUS

	Lessons Learnt
Key takeaways	Combination of advice and investment provides a valuable support to SMEs
Recommendations	Advice can overcome challenges in the application process.
Linked measures	n/a
Reference(s)	https://www.energieeffizienz-hessen.de/fileadmin/user_upload/news-import/PIUS-Invest_Dokumentation-Ansicht.pdf
Other	n/a

¹⁴² https://www.energieeffizienz-hessen.de/fileadmin/user_upload/news-import/PIUS-Invest_Dokumentation-Ansicht.pdf

Thoughts, comments, considerations ...	Successful cases: https://www.energieeffizienz-hessen.de/fileadmin/user_upload/news-import/PIUS-Invest_Dokumentation-Ansicht.pdf (none addresses electric motors)
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EU-MORE



**European M0tor
REnovation initiative**



Greece

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Center for Renewable Energy Sources and Saving (CRESS)

List of Acronyms

Acronym	Text
CRES	Centre for Renewable Energy Sources and Saving
CRM	Capacity Remuneration Mechanism
ERDF	European Regional Development Fund
ESF	European Social Fund
ETS	Emission Trading Scheme
GHG	Greenhouse Gases
IPTO	Independent Power Transmission Operator
MoEE	Ministry of Environment and Energy
PPC	Public Power Corporation



9.12 Greece

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The Ministry of Environment and Energy (MoEE) is responsible for designing and implementing energy and climate policy. The MoEE also has responsibility for tracking progress on climate targets and reporting GHG emissions to the United Nations Framework Convention on Climate Change (UNFCCC). The Ministry of Finance is responsible for taxation and fiscal policy, including energy taxation. The Ministry of Development and Investments is responsible for investment policies in the energy sector and for financing energy innovation and research through national and EU resources.

Within the MoEE, the General Secretariat for Energy and Mineral Resources is responsible for implementing energy policy in sectors including electricity, oil, gas, renewables and energy efficiency and for disseminating energy statistics. The Directorate of Energy Policies and Energy Efficiency and the Energy Inspectorate Units of the General Directorate of Inspectors and Auditors are centrally involved in energy efficiency policy development and implementation. The Centre for Renewable Energy Sources and Saving is responsible for promoting renewable energy, rational use of energy and energy conservation. The Centre for Renewable Energy Sources and Saving is a public entity, supervised by the MoEE, but with financial and administrative independence. It implements innovative projects and promotes market penetration of new energy technologies for renewables and efficiency.

The Regulatory Authority for Energy (RAE) is a financially and administratively independent authority that oversees Greek energy markets. It has a consenting opinion on the National Gas and Electricity Grid Operation Code, the Power Exchanges Code, and the Gas and Power Distribution Network Operation Code. RAE is also responsible for licensing energy market participants and overall energy market supervision. It plays a decisive role in market reforms and needs to ensure that the behaviour of the various system operators and market participants complies with EU regulations.

The Public Power Corporation S.A. (PPC) is the historic incumbent electricity company. PPC owns the largest share of installed generation capacity, including most lignite-fired generation and associated mines, and all large-scale hydro generation. The PPC is the largest electricity supplier at the wholesale and retail level. In November 2021, the Greek state reduced its ownership share in PPC from 51% to 34% (PPC, 2022).

The Independent Power Transmission Operator S.A. (IPTO) is the Greek electricity transmission system operator (TSO), responsible for the operation, maintenance and development of the electricity transmission system and cross-border interconnections.

IPTO is owned for 76% by the Greek state and 24% by the Chinese company State Grid (ADMIE Holding, 2022). The Hellenic Electricity Distribution Network Operator S.A. (HEDNO) is the Greek electricity distribution system operator (DSO). It operates, maintains and develops the electricity distribution systems in mainland Greece and in the interconnected islands, and manages the electricity markets and distribution grids of non-interconnected islands.

HEDNO is owned 51% by PPC and 49% by the Australian private company Macquarie Asset Management (HEDNO S.A., 2022).

The government's strategic aim is that the energy and climate objectives set in the context of the NECP by 2030 should contribute substantially to the necessary energy transition in the most economically competitive manner for the national economy, should ensure a sharp reduction in greenhouse gas emissions through a comprehensive and cohesive programme of measures and

policies, thus placing Greece at the core of developments in the Energy Union both for 2030 and, ultimately, for 2050. In the context of the NECP the following targets have been set for 2030:

- a) Greenhouse gas emissions reduction by more than 42% compared to emissions in 1990.
- b) A 35% share of RES in gross final energy consumption.
- c) Final energy consumption in 2030 to be lower than that recorded in 2017.

Over the years the Ministry of Environment and Energy (MoEE) has implemented a plethora of Energy Efficiency related programs that include government financial aid such as the Green Transition program. This programme includes various energy saving eligible actions such as equipment upgrade.

In the industrial sector, Greece implemented in December 2016 a requirement for large industry to either conduct an energy audit every four years or implement an energy or environmental management system in compliance with Article 8 of the EU Energy Efficiency Directive. Small to medium-sized enterprises will also have access to quality energy audits due to these policies, according to the IEA.

Energy efficiency opportunities identified and implemented within Greek industry can also contribute towards the obligations of energy suppliers and retailers under the energy efficiency obligation scheme. This represents a source of energy savings that could be exploited by parties obligated by the programme to meet legislated requirements. It is therefore of benefit to maximise the relationships among industrial energy users and energy retailers to provide mutually beneficial updates for the energy audits and obligation programme participants.

In the industrial sector, the measure for the relocation of industrial plants to industrial-business zones will be strengthened. New policy measures will support actions at an industrial-business zone level for better energy management and increased savings, such as central heat production and distribution systems, according to Greece's NECP. Furthermore, the promotion of natural gas as fuel in industries established far from the high pressure network through the transportation of liquefied natural gas is expected to be important. In the same context, the production of energy from the utilisation of waste heat and the replacement of conventional fuels with alternative ones will be promoted. Finally, special financing mechanisms will be designed to strengthen the implementation of energy efficiency improvement measures in the industrial sector through energy performance contracts, such as subsidising borrowing costs and facilitating access of energy services companies to financing.

Finally, a specific package of policy measures aimed at improving energy efficiency in the agricultural sector is currently being considered. For example, a measure to improve the energy efficiency of pumping stations, as well as new measures such as the energy upgrading of agricultural machinery and the reduction in energy consumption in greenhouses and livestock farms are being planned.

The most relevant to EU-More policy measures are subsidies related to energy efficiency investments in the industrial and public services sectors. In that context notable is the programme Antonis Tritsis which focuses on water/wastewater infrastructure and pumping equipment replacement/upgrade.

Moreover, the legislative requirement regarding Energy Efficiency Obligation Schemes is having a great impact on energy efficiency in the industrial sector. Currently, the obligated parties offset their obligations through the implementation of specific energy efficiency measures. To this direction, CRES plans to promote the replacement of old and inefficient motors in the industry by introducing new mathematical equations and offering the obligating parties, the option to offset their obligations through the replacement of such old motors.

- Improvement in Energy Efficiency through Energy Saving Companies - Expected savings 36 ktoe, 2021-2030
- Energy Upgrade of Pumping Stations Equipment - Expected savings 35 ktoe, 2021-2030
- Energy efficiency obligation schemes - Expected savings 661 ktoe, 2021-2030
- Measure M16 - Promotion of energy audits in SMEs and in households.
- Measure M17 - Financing programmes for the application of the recommendations of energy audits to obliged or non-obliged parties.
- Measure M18 - Promotion of energy management systems in SMEs.
- Measure M33 - Financing programmes for improvement in the energy efficiency of industries and processors in the context of the new programming period, including the promotion of EPCs.
- Measure M47 -Promotion of measures for modernising water supply / sewage and irrigation infrastructures, to save both water and energy.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

There are various national actions related to energy efficiency which are relevant to the EU-MORE project. The most notable is the Antonis Tritsis programme and specifically its AT03 action which is aimed at energy efficiency improvement of water pumping stations by a series of measures including replacement of old pumps, adding variable speed drivers, remote monitoring and installation of PVs.

Additionally, the energy efficiency obligation scheme could be modified to further push energy suppliers and industrial partners to improve energy efficiency through the replacement of electric motors.

9.12.1 Measure 1: “Antonis Tritsis AT03 ” Programme.

Overview	
Short Description	Interventions and actions to improve energy management and use of renewable energy in water and wastewater management infrastructure.
Responsible Authority	Ministry of Internal Affairs
Status	Submissions proposals for funding ended 31/12/2020. The project implementation is active.
Issue Date	24/07/2020
Start Date	24/07/2020
Ending Date	31/12/2023
Duration	~3 years
Reference:	https://eyde.ypes.gr/tritsis

9.12.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

Antonis Tritsis Programme is managed by the Ministry of Internal affairs and is aimed at municipal water and wastewater utilities. The total budget of the 12 in total foreseen actions amounts to 2.5 bn € (funding from National Resources and the European Investment Bank).

Action AT03 is the most relevant to the project as it involves replacing old pumps, inverters for more energy efficient operation and use of RES. More specifically in the context of AT03, it is planned to finance projects related to the following actions:

4. Interventions and actions to improve energy efficiency, energy saving in energy-intensive water and wastewater infrastructures such as replacement of equipment in pumping stations, boreholes, water and wastewater treatment facilities, buildings, etc. Replacement of existing pumps with new high energy efficiency ones. Installation of frequency converters (inverters).
5. Utilization of Renewable Energy Sources (RES) (PV on the roofs of buildings, in parking areas, on the roof of closed tanks, geothermal, etc.) and intelligent energy distribution-storage-consumption systems (the utilization of RES and the management of energy are aimed at energy autonomy).
6. Supply and installation of intelligent energy management systems in existing sewage and drinking water networks, and treatment facilities. Indicative actions are the installation of energy consumption meters in energy-intensive infrastructures/equipment and their correlation with quantitative and qualitative parameters. Installation of analogue water level sensors for water reservoirs, control-monitoring and energy management systems facilities/infrastructure

The total budget for the AT03 Call for Proposals is 150,000,000 €.

There have been 139 proposals for funding exceeding the total budget by about 200 mln €. The budget of the selected 53 projects will amount to 145 mln €.

Action AT01 of the same programme is also linked to water and wastewater infrastructure and focuses solely on the aging pipework network. More specifically in the construction of new external networks and upgrading internal drinking water distribution networks through the replacement of aging pipelines, creating zones and loops.

Together the two programmes will deliver a significant upgrade to both electromechanical equipment (AT03) and pipe network (AT01) of local water companies and municipalities.

	Characteristics
Budget	150,000,000 EUR
Financing of the measure	The projected is funded from National Funds and the European Investment Bank via the Ministry of Internal Affairs
Policy focus	The policy focuses on energy saving through water/wastewater infrastructure renewal.
Intervention Type	Equipment Upgrade
Key Driver(s)	The key driver in this case is to enhance the operation of water/wastewater networks which are in many cases old and inefficient. Moreover, the increased operational cost for the utility suppliers due to the elevated electricity prices following the Russian - Ukrainian war.
Replicability	High
EU Inclusion	Yes

9.12.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

The programme is in the implementation stage and there are not many data yet regarding its impacts. However the managing authority has issued a report¹⁴³ which suggests that the total energy savings from the implemented projects so far is in the order of 28.8 GWh/year from AT03 (equivalent to the final energy consumption of 2000 homes).

	Impacts
Case level impact	High
Policy level impact	High
Size	53 selected projects
Energy	28.8 GWh/year energy savings from the implemented projects so far.
Impact evaluation	The measure is expected to substantially improve the efficiency of operation of water/ wastewater networks.

9.12.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

- High level of participation in the programme as total requested funding from all applications exceeded the available budget.
- Simple process aimed directly to water/wastewater authorities or municipalities that managed water networks.
- From discussions with stakeholders involved in the implementation of the programme, the main barriers that would hamper the energy (and water) savings achieved from the interventions and actions described by the programme are the lack of monitoring and servicing of the newly installed equipment.
- The project is still ongoing so detailed feedback or data of are not available.

	Lessons Learnt
Key takeaways	Project aims at water/wastewater equipment renewal. Substantial energy savings potential from renewing old and inefficient pumping equipment. 150,000,000 EUR budget. High participation by municipal water and wastewater utilities. Energy savings in the order of 30 GWh/yr
Recommendations	In line with the National Actions implemented on Energy Efficiency
Linked measures	<ul style="list-style-type: none"> • Antonis Tritsis AT01 aimed at replacing old water networks.

¹⁴³ «Χρηματοδοτικά εργαλεία του ΥΠΕΣ για σχέδια ενεργειακής διαχείρισης, Ελευθέριος Παπαβασιλόπουλος Βασίλειος Σταμάτης, Ειδική Υπηρεσία Διαχείρισης και Εφαρμογής του Υπουργείου Εσωτερικών (ΕΥΔΕ ΥΠΕΣ).»

	<ul style="list-style-type: none"> Older programme named "Filodimos I" (Φιλόδημος Ι) finished in 2019.
Reference(s)	https://eyde.ypes.gr/tritsis
Other	Ministry of Internal Affairs, Municipal water and wastewater utilities
Thoughts, comments, considerations ...	Perhaps the total available budget should be increased to cover all water/wastewater utilities in Greece. Such interventions greatly contribute to the reduction of operational cost / energy saving / emissions reduction, especially considering that the during the last years, the electricity cost for the utilities operation has become unbearable. Such measures should also be preferably coupled with other interventions including the upgrade of the water supply network to minimise water (and energy) losses and the integration of smart metering and monitoring devices.

9.12.2 Measure 2: Green transition SMEs

	Overview
Short Description	The "Green Transition SME" package encourages investment projects aiming at the exploitation and development of modern technologies, the upgrading of the products and/or services produced and their activities in general, favoring actions that exploit modern technologies, infrastructures and best practices in energy upgrading and circular economy.
Responsible Authority	Ministry of Development & Investments
Status	Ongoing
Issue Date	01/2023
Start Date	03/2023
Ending Date	Until budget exhaustion
Duration	-
Reference:	https://21-27.antonistikotita.gr/prasini-metabasi-mme/ http://21-27.antonistikotita.gr/prokirixi-desmis-drason-prasini-metavasi-mme/

9.12.2.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The programme encourages SMEs to invest in projects that aim to exploit and develop modern technologies, to upgrade the products and/or services produced and their activities in general, by rewarding actions that exploit modern technologies, infrastructure and best practices in energy upgrading and circular economy.

Minimum/maximum subsidised budget: Category A: 30.000€ up to 200.000€, Category B: 200.001€ up to 1.000.000€

Total budget: €700 000 000

Until mid July 2023, more than 6500 applications were submitted with public funding 700,000,000 € leveraging total budget of 1.5 bln €

Funding rate: up to 40% (plus a bonus of 10% in case GREEN actions are included)

The public expenditure is co-financed by the European Regional Development Fund (ERDF) of the European Union and by National Participation. For reasons of greater complementarity, funding is provided using the Common Support Framework (Article 25 C(EU) 2021/1060) to finance interventions falling within the scope of ESF+.

Eligible expenditure

- Buildings, facilities and surrounding area
- **Machinery - Equipment (procurement of new and efficient manufacturing equipment)**
- **Equipment to improve energy efficiency, energy saving, circular economy, e-vehicles (GREEN)**
- Certification of Products - Services - Processes
- Packaging Design - Labeling - Branding Services
- Promotion and Promotion Expenditure
- Participation in trade fairs
- Technical Studies & Consulting Services
- Means of transport (GREEN) - Mandatory electric
- Salary costs of new employees - (new staff from 1 to 3 FTEs)
- Indirect costs

	Characteristics
Budget	Total Funding: 700.000.000€
Financing of the measure	The Public Expenditure is co-financed by the European Regional Development Fund (ERDF) of the European Union and by National Funds. For reasons of greater additionality, funding is provided using the Common Support Framework (Article 25 C(EU) 2021/1060) to finance interventions falling within the scope of ESF+.
Policy focus	Physical and Soft interventions
Intervention Type	Equipment upgrade Energy Efficiency
Main Barriers Addressed	
Key Driver(s)	Need for Innovation, Sustainable development of companies
Replicability	High
EU Inclusion	Yes
Related Characteristics	

9.12.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation. Where possible specific to electric motors

It is expected that thousands of Greek SMEs will be financed through the plan. Specific data about the program's impact is not yet available.

	Impacts
Case level impact	Medium
Policy level impact	High
Energy	Evaluation about the project's impact on energy saving will be available by end of the year 2023.
Impact evaluation	

9.12.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

<ul style="list-style-type: none"> • Despite the relatively low funding rate (40-50%) there has been an extremely high level of participation in the programme from SMEs - meaning that the expected savings seem to be quite big • Public spending is a great tool to leverage private investments regarding energy efficiency • Still quite early, we need to see if bureaucracy for the projects' implementation remains an issue

	Lessons Learnt
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.12.3 Measure 3: Energy efficiency obligation scheme

	Overview
Short Description	Energy Efficiency Obligation schemes are a mechanism that places requirements on 'Obligated Parties' (OPs) to meet quantitative energy savings targets across their customer portfolio. OPs may be retail energy sales companies, energy distributors, transport fuel distributors, and/or transport fuel retailers.
Responsible Authority	Ministry of Environment and Energy Administrator: CRES
Status	Ongoing
Issue Date	09/11/2015
Start Date	01/01/2017

Ending Date	Ongoing
Duration	
Reference:	https://ypen.gov.gr/energeia/energeiaki-exoikonomisi/metra-politikis/kathestota/ http://www.cres.gr/obs/index.html

9.12.3.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The Energy Efficiency Obligation Scheme was introduced on January 1, 2017, in accordance with Article 9(1) of Law 4342/2015 (Government Gazette, Series I, No 143, 9.11.2015). The Obligation Scheme ensures that energy distributors and/or retailers, which are defined as obligated parties operating in the Greek territory, achieved a specific cumulative final energy saving target by December 31, 2020.

Additionally, Ministerial Decision No 174063/11.4.2017 (Government Gazette, Series II, No 1242) established the Operation Regulation of the Energy Efficiency Obligation Scheme including, inter alia, the list of obligated parties, the exact allocation of the final energy saving target, the procedures required for its implementation and the measurement, control and verification system for the implemented energy efficiency measures. The Centre for Renewable Energy Sources and Saving (CRESES) has been designated as the Operator of the Calculation, Monitoring, Control and Verification of the Energy Efficiency Obligation Scheme.

The obligated parties are the suppliers of electricity, natural gas and petroleum products (excluding aviation fuels). The obligated parties in each individual year for each energy product selected to be the energy providers that account for at least 95% of the energy sold for final consumption, and have an energy market share of more than 1% of the energy sold.

The obligated parties can implement all kind of measures (whether technical or behavioral) that can lead to final energy savings. The list of indicative measures to improve energy efficiency in the residential, tertiary, transport and industrial sectors is available on the Operator's website.

The Operator has developed and implemented a Control and Verification Mechanism, which aims at the effective control and reliable verification of the actual implementation of the energy efficiency improvement measures implemented by the obligated parties. The Control and Verification Mechanism consists of a procedure of three stages. In the 1st stage, preliminary controls are carried out, in which the obligated parties have to submit separately for each energy efficiency improvement measure that has been implemented, specific documents and data to substantiate their implementation. In the 2nd stage, the Operator determines the sample for more extensive control and verification procedures, whereas in the 3rd stage the Operator will perform thorough checks of the selected sample for each measure separately. The quality standards are set by the obligated parties and are verified by the Operator.

Currently the list of available to the obligated parties measures include:

- Awareness raising campaigns
- Energy upgrade of the building envelope in buildings
- Energy efficiency measures in technical and industrial processes
- Introduction of energy management systems - Energy audits
- Promotion of fuel additives
- Energy upgrade of heating/cooling systems

Within this framework, CRES will try with the assistance of EU-MORE to add other measure(s) specifically targeting the replacement of old and inefficient electric motors.

	Characteristics
Budget	-
Financing of the measure	Through organization's own financing schemes
Policy focus	Energy Saving
Intervention Type	Equipment upgrade, capacity building, awareness raising
Main Barriers Addressed	-
Key Driver(s)	Initial law N.4342/2015, later modified by law 4843/2021 that incorporates DIRECTIVE (EU) 2018/2002, Directive 2012/27/EU
Replicability	High
EU Inclusion	YES, Directive 2012/27/EU
Related Characteristics	General programme - General energy efficiency programme Mandatory standards - Service obligations for supply distribution/transmission companies

9.12.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Annual savings target 2017-2020: 333 ktoe / Actual savings: 598 ktoe (or 6.9 GWh)
A much greater impact is expected in the next decade (2020 - 2030) due to the implementation of the Obligation Schemes in Greece.

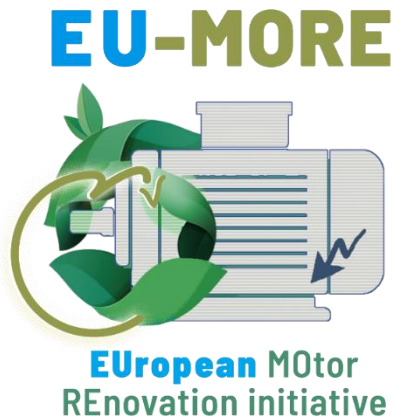
	Impacts
Case level impact	High
Policy level impact	n/a
Size	
Energy	
Impact evaluation	

9.12.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

- The Energy Efficiency Obligation Scheme is being regarded as very successful, as the actual energy savings exceeded the target by far
- One of the success factors was the very good communication and mutual agreement on the methodology for the implementation of the Scheme, by all involved parties (implementing authorities and obligated parties)
- To further increase the savings, the Scheme will allow non-direct obligated parties to participate and transfer energy savings to the direct obligated parties
- CRES is considering to use the results of the EU-MORE project to further increase the energy savings in the industry through the addition of a measure targeting directly the replacement of old and inefficient electric motors. To this direction the calculation tool/model that will be produced during the EU-MORE timeline is expected to greatly assist to the development of such calculation methodology.

	Lessons Learnt
Key takeaways	
Recommendations	
Other	



Hungary

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Erik Faassen (IEECP)

List of Acronyms

Acronym	Text
NECP	National Energy and Climate Plan
NCDS	National Clean Development Strategy
NES	National Energy Strategy
MEKH	Hungarian Energy and Public Utility Regulatory Office
SME	Small and Medium Enterprise



9.13 Hungary

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Taken directly from [IEA Executive Summary \(2022\)](#)

“The major priorities for Hungary’s climate and energy policies relate to energy security, reducing fossil fuel use and keeping energy prices affordable. This new review presents a range of recommendations to the government of Hungary to help address its key energy policy challenges, notably the low levels of energy efficiency progress (buildings, transport), high vulnerability and reliance on Russia for gas, oil and nuclear fuel, regulated energy prices which may act as a barrier to clean energy investments, as well as the need for increased resources to deliver the transition.

Hungary was among the first countries globally to turn its 2050 emissions target into a legal commitment with the adoption of the Climate Protection Law in 2020. Hungary’s medium- and long-term energy and climate policy is guided by the [National Energy and Climate Plan \(NECP\) of 2020](#) and the [National Clean Development Strategy \(NCDS\) of 2021](#).

The NCDS supports energy policy making with early or late action scenarios running up from 2030, 2040 to 2050. Reaching the 2050 target is possible, but will require developing clear policy road maps with key milestones set per sector, which will need to be monitored closely to allow early corrective actions to be taken, as needed.

Hungary’s Climate Protection Law also sets out medium-term energy targets: after 2030, increases in final energy consumption above the 2005 level need to be provided exclusively from carbon-neutral energy sources, and renewable energy sources should reach at least a 21% share of gross final energy consumption by 2030.

Hungary merged the governance responsibilities for energy and climate policies within the Ministry of Technology and Industry. Bringing the two policies under one ministry facilitates the integration of climate and energy policy planning. The creation of a dedicated Deputy State Secretary for Climate Policy reflects the growing importance of climate policy within the government.

Hungary has seen rising energy demand reaching 753 PJ in 2020. Efficiency efforts have not been able to decouple energy demand from economic growth, notably in transport and industry.

Under Hungary’s NCDS, energy efficiency needs to increase strongly. By 2030, final energy consumption should be reduced to 734 PJ, assuming early action on energy efficiency, and ultimately to around 500 PJ by 2050. However, Hungary’s NECP of 2021 has less ambitious energy efficiency targets for 2030, capping the country’s final energy consumption to 785 PJ, which is the 2005 level.

In its NECP, the Hungarian government acknowledges the importance of energy efficiency to reach climate targets and ensure energy security. However, the energy efficiency first principle is not specifically recognised, neither in the NECP nor in the National Energy Strategy (NES), which has an outlook for 2040.

The government has divided responsibilities for energy efficiency policy design, funding, implementation, and monitoring and evaluation among different government institutions and other responsible entities. Across ministries, governmental institutions and non-governmental organisations, as implementing authorities, the key challenge is often the lack of skilled professionals. To bridge this gap, the government should support the administrative realignment of energy efficiency responsibilities through, for example, the creation of a dedicated energy efficiency agency that would bundle the available technical skills and financial measures and facilitate access to energy efficiency programmes. Such an agency could work with local authorities to support them in the technically complex implementation of multi-year deep renovation projects.

Household retail prices for electricity and natural gas have long been capped in Hungary, with the objective to keep prices for households affordable and to avoid exposing households to price volatility. However, such regulated energy prices are available to all household consumers and small businesses, not only vulnerable ones, and as such hamper decarbonisation efforts, consumer choice and retail competition. The electricity and gas price regulations are planned to be reviewed, taking into account the tools published in the European Commission's Communication of 23 March 2022.

The regulatory framework needs to be revised to reach the highest possible retail market liberalisation in gas and electricity, including the elimination of administratively determined end-user prices. Protection measures should focus on vulnerable customers and less well-off households as part of social policy rather than energy policy. In July 2022, the government decided to deregulate gas and electricity retail prices for households with consumption above average levels and increase them towards market prices.

Key Recommendations:

- In line with the REPowerEU, the net zero target and Fit for 55 package, adopt increased ambitions on energy efficiency, renewables and low-carbon technologies and strengthen the 2030 greenhouse gas and sectoral emissions targets. Update the National Energy and Climate Plan and the policies and measures required.
- Place energy efficiency at the centre of energy policy making by creating a dedicated body for the implementation of efficiency policies. Design a programme to reduce energy poverty with a focus on energy efficiency and social policy measures, reducing the scope of regulated end-user prices."

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The size and scope of the Hungarian measures relating to the early replacement of electric motors remains (very) limited, with only a tax credit on energy efficiency investments that need to be approved by registered national auditors being eligible. Furthermore monitoring and verification hurdles that were encountered in the roll-out of the auditing requirement Article 7/8 EED demanded for more elaborate monitoring and verification practices at larger enterprises which directly led to the requirement to install sub-metering devices to allow auditors to monitor the efficiency of major energy consuming appliances.

No other policies relating to the replacement of electric motors in industry were found.

9.13.1 Measure 1: Corporate income tax credit for energy efficiency investments

Overview	
Short Description	The corporate income tax incentive was introduced in 2017 for the implementation and operation of new investments or refurbishments aimed at improving energy efficiency. Goal of the measure is to promote energy efficiency investments all over the business sector at large, medium, and small enterprises. In 2022 this rule was amended to include a wider geographic area.
Responsible Authority	Hungarian Energy and Public Utility Regulatory Office (MEKH)

Status	Ongoing
Issue Date	2017
Start Date	2017; amended in 2022
Ending Date	N/A
Duration	Ongoing
Reference:	Link

9.13.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The corporate income tax incentive aims to improve energy efficiency and promote energy efficiency investment across all business sectors in Hungary. The incentive scheme targets both large enterprises and small and medium-sized enterprises (SMEs).

The corporate taxpayer may enjoy tax relief when implementing an investment for energy efficiency enhancement purposes, such as the purchase of new equipment, machinery or other assets, switching to more efficient new equipment, machinery or implementing a refurbishment of existing assets or buildings. The tax return can reach up to 30% of eligible costs, but not more than the amount equivalent of €15 million at present value, which can be increased by 20% for small enterprises, and by 10% for medium-sized enterprises.

The tax relief may only be claimed on investments aimed at energy efficiency improvement. Such investments must be certified by an auditor registered at the Hungarian Energy and Public Utility Regulatory Office (MEKH). Investments to fulfil the mandatory environmental protection standards or minimum energy efficiency standards are not eligible for this incentive scheme. Taxpayers are obliged to provide data on the certified investment and the energy savings stemming from it.

The tax incentive can be used at the earliest in the tax year in which the investment became operational, and in the following five tax years. The project must be operated for at least five years. The tax incentive may only be claimed in connection with projects aimed at energy efficiency improvement. No tax credit can be applied with respect to investments aiming at fulfilling the mandatory environmental protection standards or minimum mandatory energy efficiency standards.

It is necessary for the taxpayer to obtain a certificate from an auditor registered at the Hungarian Energy and Public Utility Regulatory Authority that proves that the investment aims at improving energy efficiency by reducing energy consumption. The certificate should be based on the result of an energy audit. The taxpayer is obligated to provide data on the certified investment and the energy savings stemming from it.

	Characteristics
Budget	N/A
Financing of the measure	Tax credit
Policy focusses	Product
Intervention Type	Tax Relieve on EE investments, need to be approved by registered auditor
Main Barriers Addressed	Finance, ROI for EE investments
Key Driver(s)	EED Article 7/8
Replicability	High

EU Inclusion	Yes NECP, Art 7/8 EED
Related Characteristics	

9.13.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Limited up-to-date information is available in English. The last found verified information on the cumulative annual energy savings through the measure are:

2018 -> 0,269 PJ and 39kt CO2 savings in 2018

	Impacts
Case level impact	Medium
Policy level impact	Low
Size	Unknown
Energy	2018 -> 0,269 PJ an 29kt CO2
Impact evaluation	Improved number of investments in Energy Efficiency in industry (and beyond)

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

Direct measurement of energy savings reported to the responsible authority (MEKH) through national auditors.

9.13.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

No up-to-date information was found on the measure's effectiveness. However, similar benefits as other tax credits on energy efficiency investments can be expected.

	Lessons Learnt
Key takeaways	Increased number of Energy Efficiency investments made by businesses

Recommendations	
Linked measures	<ul style="list-style-type: none"> • Energy Efficiency Obligation Scheme • Mandatory appointment of an energy manager in enterprises with large energy consumption • Mandatory energy audit for large enterprises • Requirement for large energy consuming enterprises to install sub-metering devices
Reference(s)	N/A
Other	Hungarian Energy and Public Utility Regulatory Office (MEKH)
Thoughts, comments, considerations ...	N/A

9.13.2 Measure 2: Requirement for large energy consuming enterprises to install sub-metering devices

Overview	
Short Description	The requirement for large energy consuming enterprises to install sub-metering devices allows auditors to audit major energy consuming appliances or units at large energy consuming enterprises.
Responsible Authority	Hungarian Energy and Public Utility Regulatory Office (MEKH)
Status	Ongoing
Issue Date	2020, 16 January
Start Date	2020
Ending Date	
Duration	
Reference:	https://njt.hu/jogszabaly/2020-1-20-5Z

9.13.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

From 1 January 2020, large energy consuming enterprises that are mandated to appoint an energy manager, or enterprises that apply for the corporate income tax relief are mandated by decree to install and operate sub-meters at the following metering points:

- Electronic appliances larger than 100 kW have to be measured separately – pumps, compressors, electric engines, etc.
- Heating appliances with electronic power larger than 140 kW have to be measured separately – HVAC units, heat pumps, etc.
- factory or building units, production line with a maximum load larger than 200 kW (excluding separately measured appliances).

Exceptions to the required sub-meter installation obligation are for the equipment whose operating times do not exceed 2,000 operating hours / year on average in the three years preceding the year in question.

All the above thresholds are halved as of 2022.



	Characteristics
Budget	Not Applicable
Financing of the measure	Not Applicable
Policy focusses	Physical
Intervention Type	Mandatory monitoring/metering for audits
Main Barriers Addressed	Lack of information, lack of awareness, lack of data/measurement
Key Driver(s)	MEKH decree 1/2020; Act 57/2015 on Energy Efficiency EED 7/8
Replicability	Medium
EU Inclusion	Yes
Related Characteristics	

9.13.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The measure implementation will allow energy auditors to better implement monitoring and verification practices for large energy consuming enterprises and monitor the overall energy impact of companies. The measure implementation is directly related to the EED requiring mandatory energy audits to large enterprises. The required implementation of the sub-metering equipment allows read-out of actual energy consumption.

	Impacts
Case level impact	Low
Policy level impact	Low
Size	Limited
Energy	Very Limited
Impact evaluation	Enabler for energy consumption monitoring

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

Not Applicable

9.13.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Measure was implemented as a result of having inadequate and unreliable access to information on the energy consumption of large energy consuming equipment in industry for Auditors energy audits.

This is a direct requirement for having an adequate monitoring and verification system in place before implementing policy.

	Lessons Learnt
Key takeaways	N/A
Recommendations	N/A
Linked measures	<ul style="list-style-type: none"> • Energy Efficiency Obligation Scheme • Mandatory appointment of an energy manager in enterprises with large energy consumption • Mandatory energy audit for large enterprises • Corporate income tax credit for energy efficiency investments
Reference(s)	https://njt.hu/jogszabaly/2020-1-20-5Z
Other	MEKH
Thoughts, comments, considerations ...	

9.13.3 Measure 3: Operational Programmes for Environment and Energy Efficiency 2021-2027

	Overview
Short Description	Measures with limited relation to the EU MORE objective are EC Operational Programmes: <ol style="list-style-type: none"> 1. Environmental and Energy Efficiency OP (KEHOP(+)) 2. Economic Development and Innovation OP (GINOP(+))
Responsible Authority	Innovációs és Technológiai Minisztérium (KEHOP, KEOP) Pénzügyminisztérium - Gazdaságfejlesztési Programok Ügyfélszolgálat (GINOP, GOP)
Status	Ongoing
Issue Date	2014
Start Date	2014
Ending Date	2027
Duration	13 years
Reference:	

9.13.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

Environmental and Energy Efficiency OP (KEHOP)(KEHOP(+))

The programme aims to support sustainable growth and contribute to achieving the Europe targets for smart, sustainable and inclusive growth. It should improve flood protection, provide better waste and wastewater management services and good quality drinking water to more residents, help protect natural habitats and species, and it should improve energy efficiency and the use of renewable energy sources.

Funding priorities

The Programme will focus on five main priorities:

- Adaptation to climate change impacts
- Development of water supply, wastewater disposal and cleaning, wastewater management
- Waste management and environmental remediation related developments
- Nature protection and wildlife protection related developments
- Promoting energy and the use of renewable energy sources

Economic Development and Innovation OP (GINOP(+))

The programme aims to stimulate the economies of the less developed regions in Hungary. Its most important priorities are the competitiveness of small- and medium sized enterprises, research and innovation, and employment. The programme also aims to develop the tourism industry, enterprises' energy efficiency, and information and communication technologies. Moreover it will stimulate the use of financial instruments to cover other objectives, like increasing renewable energy production and improving the energy efficiency of households and public buildings.

Funding priorities

The Programme will focus on different main priorities:

- Increasing the competitiveness and productivity of SMEs
- Research, technological development and innovation
- Infocommunication developments
- Energy
- Employment
- Competitive labour force
- Tourism
- Financial instruments

	Characteristics
Budget	<p>KEHOP Cohesion Fund (CF): 3.131.268.934,00 € Regional Development Fund (ERDF): 305.018.340,00 €</p> <p>GINOP Funds Regional Development Fund (ERDF): 6.033.219.466,00 € European Social Fund (ESF): 1.953.991.284,00 €</p>
Financing of the measure	Directly funded through the EC Regional Development Fund (ERDF) the European Social Fund (ESF), and the Cohesion Fund (CF)

Policy focusses	Both
Intervention Type	Cross-cutting sustainability financing
Main Barriers Addressed	Cross-cutting
Key Driver(s)	EU Fund
Replicability	Low
EU Inclusion	Yes
Related Characteristics	

9.13.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

<p>Expected Impacts (KEHOP, KEOP)</p> <ul style="list-style-type: none"> • 1,100,000 residents to benefit from flood protection measures; • 340,000 additional persons served by improved water supply; • 800,000 additional persons served by improved wastewater treatment; • 60,000 tonnes/year additional solid waste recycling capacity; and • Annual decrease of greenhouse gas emissions by over 1,544,000 tonnes CO2eq. <p>Expected impacts:</p> <ul style="list-style-type: none"> • Over 300,000 unemployed people – nearly half of them under-25 years old, will benefit from job creation initiatives, with 450,000 people set to participate in training to enhance employability; • Nearly 12,500 companies - including 1,500 start-ups to receive financial/advisory support, with 8,000 more assisted to enhance their use of e-services and ICT; • Some 1,400 to benefit from improved energy and resource efficiency, while the programme will install 240 MW renewable energy production capacities; • Nearly 3,000 research jobs to be created, giving a boost to SME innovation activities and Hungarian research institutes, while improving cooperation among private and public research centres; • A million households to be linked to the new generation broadband network, with high-speed internet coverage being rolled out country-wide; and <p>Some 1.6 million visitors expected to natural and cultural heritage sites as a result of investments in sustainable tourism – helping to grow local and remote economies.</p>

	Impacts
Case level impact	Medium
Policy level impact	High
Size	Not available
Energy	No specific numbers available relating to motor replacement under the KEHOP and GINOP EC Operational Programmes
Impact evaluation	As per the above

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Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

N/A

9.13.3.3 *Lessons Learnt*

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

N/A

	Lessons Learnt
Key takeaways	
Recommendations	
Linked measures	
Reference(s)	KEHOP Hungary , GINOP Hungary
Other	EC, National Government
Thoughts, comments, considerations ...	The Operational Programmes stated here have (very) limited connection with the goals of the EU-MORE program and are only included in this review for reference

EU-MORE



**European MOtor
REnovation initiative**



Ireland

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Tomas Jezdinsky (ECI)

List of Acronyms

Acronym	Text
DECC	Department of the Environment, Climate and Communications
EXEED	Excellence in Energy Efficient Design



9.14 Ireland

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Ireland's NECP plan updated in 2023 is the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, and following the introduction, in 2022, of economy-wide carbon budgets and sectoral emissions ceilings. NECP is developed by [Department of the Environment, Climate and Communications](#). (DECC).

The plan implements the carbon budgets and sectoral emissions ceilings and sets a roadmap for taking decisive action to reduce 50% of Ireland's emissions by 2030 and reach net zero no later than 2050. This national plan sets out a total public investment of €165 billion over the period 2021 to 2030.

Main targets:

The Irish Government committed to reduce Ireland's greenhouse gas (GHG) emissions by 51% by 2030 relative to 2018 levels as legislated for in the Climate Action and Low Carbon Development (Amendment) Act 2021, and become carbon neutral by 2050.

Carbon Budget targets:

Budget Period	2021 - 2025	2026 - 2030	2031 - 2035 (provisional)
MtCO ₂ eq.	295	200	151
Average annual reduction	4.8%	8.3%	3.5%

Specific sectoral targets for industry:

- Carbon Budget 1: 30 MtCO₂eq.
- Carbon Budget 2: 24 MtCO₂eq.
- Emissions Abatement (on 2018): -35% (4 MtCO₂eq. per annum by 2030)
- Emissions up to 2021: 7.1 MtCO₂eq.

Focus is more on reducing fossil fuel and increase efficiency in industrial heating, plus on reducing embodied carbon in construction materials. Energy Efficiency measures directly linked to electrical industrial/ tertiary consumption is not a major focus in this plan.

Required Level of Decarbonisation for Industry

2018 Emissions MtCO ₂ eq.	Indicative Target for 2025 Emissions MtCO ₂ eq.	Indicative Target % Reduction for 2025	2021 Emissions MtCO ₂ eq.	% Increase (+) / Reduction (-) to date
7	6	20%	7.1	+1.4%

Thereof indirectly related also to motor replacement:

Theme	2025 KPI	2025 abatement (vs 2018) MtCO ₂ eq.	2030 KPI	2030 abatement (vs 2018) MtCO ₂ eq.	2031-2035 measures
Fossil Fuel Demand Reduction through Energy Efficiency Measures	Reduce industry fossil fuel demand through energy efficient measures in manufacturing process by 7%	0.2	Reduce industry fossil fuel demand through energy efficient measures in manufacturing process by 10%	0.2	Further reductions in industry energy demand

Energy Efficiency measures are defined under the Energy Efficiency Obligation Scheme (EEOS). The scheme started in 2014. SEAI (Sustainable Energy Authority of Ireland), see: [Sustainable Energy Authority of Ireland | SEAI](#) is the administrator of the EEOS and continued to operate in 2021 in line with previous years. Following a consultation process, the Irish Minister decided in 2020 that the scheme for 2021 would be reported in final energy. See: <https://www.gov.ie/en/consultation/ac175-public-consultation-on-the-implementation-of-the-clean-energy-package/>

Main changes:

- Ireland will use a combination of an Energy Efficiency Obligation Scheme and Alternative Measures to meet EED Article 7 targets.
- Set the metric for the obligation scheme in final energy (with a transition period to be agreed during the design phase of the scheme)

The design of the updated scheme for 2022-2030, outlining who should be obligated, the size of the target and how these targets will be delivered, will be decided following a public consultation process – at this time, the final design has not yet been published. All calculations and tools used until 2021 are under evaluation.

To this effort, SEAI have hosted numerous workshops with obligated parties, the supply chain and other interested parties, to discuss and seek feedback on the operational aspects of the EEOS redesign. The decision papers are not yet published.

The following actions are adopted to accelerate the energy efficiency measures in industry:

- Energy management systems will be mandatory for organisations who use more than 100TJ of energy per annum;
- The SEAI's Large Industry Energy Network will support organisations on adopting energy management systems, developing emissions management systems, improving energy Industry performance metrics, and adopting best practice in energy efficiency and emissions reductions;
- The SEAI's Excellence in Energy Efficient Design (EXEED) programme will support large energy users with developing exemplar energy efficiency approaches to new and existing assets, including energy efficiency design and capital support;
- Energy audits will be mandatory for organisations who use more than 10TJ of energy;
- Measures within mandatory energy audits with payback periods of less than 5 years should be implemented within 2 years of the energy audit;
- The top 15 energy users in Ireland will report energy performance and emissions data via the SEAI's Large Industry Energy Network annually, and energy performance metrics will be published;
- DECC will assess whether mandated caps on any increase in fossil fuel demand by large energy users could be put in place from 2026.

Energy Efficiency policies under EED are monitored and flanked with support (e.g. grants, training & education programmes, technical studies, etc) by the SEAI.

Under EEOS eligible measures, also replacement of old equipment like motors with new higher efficient can be supported by grants in the EEXD scheme for companies planning a major investment and planning in an energy efficient design project. It includes both the public and private sector, regardless of the project scale.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The general comments on overall GHG reduction targets per year were that these seem rather moderate and not very ambitious. As for industry the main focus of measures is on heating and reducing fossil fuel, there is no explicit programme dedicated to electric motors, hence all objectives can only be estimated as a (little) contribution to cross-cutting technologies and overall energy efficiency gains in industrial processes.

Ireland seems more of a slow mover and lagging other advanced economies and looking for more prominent issues as evidenced by other prioritised improvement targets in this country.

Likely in the following years with the increased mandatory energy audits in industry (incl training programmes & support of SMEs here), and the implementation of actions with short payback time <5 years, replacement of electric motors in processes will become more prominent and show more concrete impact beyond 2025.

9.14.1 Measure 1: EXEED Certified Programme

	Overview
Short Description	EXEED Certified Programme The EXEED programme provides grant support for energy projects that follow the EXEED certified standard for Excellence in Energy Efficient Design, which encourages innovation in design projects.
Responsible Authority	SEAI
Status	Ongoing
Issue Date	2014
Start Date	2021
Ending Date	2023
Duration	3 years, ending end of 2023, following a review process the support model for 2024 and beyond still tbd
Reference:	https://www.seai.ie/business-and-public-sector/business-grants-and-supports/exeed-certified-grant/

9.14.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

EXEED Certified grant

SEAI provide grant support for projects which are following the EXEED Certified standard for Excellence in Energy Efficient Design.

The EXEED standard encourages innovation in design projects to help future-proof the investment, by optimising energy performance, reducing operational energy costs and carbon emissions. Grant support of up to €3,000,000 per project is available.

Eligibility for EXEED

a) Projects eligible

EXEED is applicable to any sector, any organisation and any project. Projects can be of any scale or complexity, for example:

- Greenfield design - a new asset separate from any prior work
- Brownfield design - repurposing of an existing asset
- Major energy upgrade to existing asset
- Major renovation of existing assets

b) Assets eligible

EXEED applies a standardised process in energy efficient design management. Assets eligible for EXEED Certification must:

- Have a physical boundary that fully incorporates the system(s)
- Have an energy balance which includes all energy sources, energy use and energy demand
- Encompass all energy services (i.e. desired outcomes requiring energy consumption)

Grant amounts available

The scheme provides funding towards implementing the EXEED Certified process. This includes professional services and additional capital required.

Expenditure type	Large company	Medium-sized company	Small company
Pre-investment professional services to implement EXEED processes <ul style="list-style-type: none">• Design-stage processes set out in the EXEED Certified standard• Strategic input from an independent Energy Efficient Design Expert• To identify the investment opportunities which will deliver optimum energy performance	Up to 50% grant	Up to 60% grant	Up to 70% grant
Eligible expenditure to implement EXEED processes <ul style="list-style-type: none">• Incremental capital costs compared to counterfactual investment (Baseline design)• Professional services associated with implementation	Up to 30% grant	Up to 40% grant	Up to 50% grant

New equipment installed, i.e. also new efficient electric motors, under EXEED should ideally be listed under the Irish "Triple E" product register:

The Triple E Products Register is a searchable list of energy efficient products. Products on this register all meet a minimum set of stringent energy efficiency criteria and typically will be of a best-in-class efficiency standard. As such, procuring against this register will provide you with the assurance that you are purchasing a product of very high efficiency.

Triple E sets minimum criteria that products are required to meet to be listed. For products, these criteria are regularly updated, and aim to ensure that only the top 10 - 15% most energy efficient products in any technology are listed.

See: [Triple E Register for Products | Business & Public Sector | SEAI](#)

Characteristics																	
Budget	<p>There is no itemised budget for specific opportunities such as Motor renovation available publically. Related to the EXEED program specifically:</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 30%;">EXEED Spend</th> <th style="width: 15%;">2021</th> <th style="width: 15%;">2022</th> <th style="width: 15%;">2023 (YTD)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td>[Up to 19/07/2023]</td> </tr> <tr> <td>Budgeted (Planned) expenditure (€m):</td> <td>13.4 <small>(re-profiled to €4.7m in May and €3.27m in Aug 2021)</small></td> <td>9.0 <small>(re-profiled to €3m in July 2022)</small></td> <td>7.0 <small>(re-profiled to €3m in July?)</small></td> </tr> <tr> <td>Capital spend (€m)</td> <td>3.394</td> <td>1.243</td> <td>0.470</td> </tr> </tbody> </table>	EXEED Spend	2021	2022	2023 (YTD)				[Up to 19/07/2023]	Budgeted (Planned) expenditure (€m):	13.4 <small>(re-profiled to €4.7m in May and €3.27m in Aug 2021)</small>	9.0 <small>(re-profiled to €3m in July 2022)</small>	7.0 <small>(re-profiled to €3m in July?)</small>	Capital spend (€m)	3.394	1.243	0.470
EXEED Spend	2021	2022	2023 (YTD)														
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Capital spend (€m)	3.394	1.243	0.470														
Financing of the measure	national funds																
Policy focusses	Product																
Intervention Type	Equipment upgrade																
Main Barriers Addressed	Good % of high initial cost, allows faster return on investment																
Key Driver(s)	Initiative and certification standard developed by SEAI to standardise the adoption of Energy Efficient Design principles at the design stage of large energy projects.																
Replicability	High																
EU Inclusion	Yes, included in NECP; linked to ESCOs when getting energy credits under EEOS																
Related Characteristics	Not very technology specific, not explicit for electric motors																

9.14.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

On overview on the achieved impact and expenses for the EXEED program is provided below:

Grant Impact	TOTAL 2021	AVERAGE 2021	TOTAL 2022	AVERAGE 2022	TOTAL 2023	AVERAGE 2023	TOTAL 2021-2023	AVERAGE 2021-2023
Electrical EE savings (final energy)	2,541,124 kWh	121,006 kWh	143,557 kWh	134,329 kWh	1,871,371 kWh	311,895 kWh	4,556,052 kWh	126,557 kWh
Thermal EE savings (final energy)	11,679,315 kWh	555,882 kWh	15,308,003 kWh	1,517,843 kWh	7,459,647 kWh	1,243,275 kWh	34,441,165 kWh	956,699 kWh
Electric savings (% of total electric consumption)	-	23.00%	-	-11.88%	-	6.15%	-	8.47%
Thermal savings (% of total thermal consumption)	-	-0.48%	-	28.99%	-	32.01%	-	11.96%
Total annual final energy savings	14,214,639 kWh	676,888 kWh	15,451,559 kWh	1,652,172 kWh	9,331,018 kWh	1,555,170 kWh	38,997,217 kWh	1,083,256 kWh
Total annual primary savings (EERE)	23,123,251 kWh	1,101,107 kWh	16,048,893 kWh	1,865,291 kWh	11,930,468 kWh	1,988,411 kWh	51,102,612 kWh	1,415,217 kWh
Total annual cost energy savings	€ 1,000,197.21	€ 47,628.44	€ 817,264.02	€ 98,232.05	€ 456,216.71	€ 189,389.45	€ 2,473,677.94	€ 68,713.28
ETS cost savings from avoided allowance purchases	€ 3,687.34	€ 175.58	€ 38,747.25	€ 4,000.67	€ 22,162.86	€ 3,693.81	€ 64,597.35	€ 1,794.37
Total eligible expenditure	€ 6,951,776.06	€ 331,036.96	€ 5,991,886.38	€ 720,192.04	€ 4,810,994.21	€ 801,832.37	€ 17,754,657.27	€ 493,184.92
Total SEAI grant	€ 1,900,800.19	€ 90,514.29	€ 1,539,588.80	€ 183,133.51	€ 1,207,413.92	€ 201,235.65	€ 4,647,802.91	€ 129,105.64
Total eligible expenditure minus SEAI grant	€ 5,050,975.87	€ 240,522.69	€ 4,452,297.58	€ 537,058.52	€ 3,603,580.29	€ 600,596.72	€ 13,106,854.36	€ 364,079.29
Payback period (without grant)	6.92 years	6.58 years	7.00 years	8.01 years	7.09 years	8.96 years	6.99 years	7.17 years
Payback period (with grant)	5.03 years	4.83 years	5.20 years	5.83 years	5.31 years	6.28 years	5.16 years	5.25 years
SEAI cost per primary kWh saved (in-year)	€ 0.08	€ 0.11	€ 0.10	€ 0.14	€ 0.10	€ 0.15	€ 0.09	€ 0.12
Electricity-related annual tCO2 savings	1,789.26 tCO2	84.25 tCO2	-20.00 tCO2	28.67 tCO2	449.99 tCO2	75.00 tCO2	2,199.24 tCO2	61.09 tCO2
Thermal-related annual tCO2 savings	2,828.43 tCO2	134.69 tCO2	3,293.50 tCO2	323.22 tCO2	1,534.75 tCO2	259.13 tCO2	7,676.69 tCO2	213.24 tCO2
Total annual tCO2 savings	4,597.69 tCO2	218.94 tCO2	3,273.50 tCO2	351.88 tCO2	334.12 tCO2	334.12 tCO2	9,875.93 tCO2	274.33 tCO2
SEAI cost per tCO2 saved (in-year)	€ 413.43	€ 600.28	€ 470.32	€ 722.85	€ 602.28	€ 819.83	€ 470.62	€ 601.35
Lifetime	-	15 years	-	15 years	-	15 years	-	15 years
SEAI cost per primary kWh lifetime saved	€ 0.005	€ 0.007	€ 0.006	€ 0.010	€ 0.007	€ 0.010	€ 0.006	€ 0.008
SEAI cost per lifetime tCO2 saved	€ 27.56	€ 40.02	€ 31.35	€ 48.19	€ 40.15	€ 54.06	€ 31.37	€ 43.42

The EXEED stage 2 application process is perceived as time and resource intensive – often when compared with grant schemes that don't require the same level of transparency on the design process or a requirement to meet a certification standard. The EXEED process itself requires a deeper engineering and design analysis which the supply chain is struggling to adapt to and the value-add of the EXEED process is getting lost in the grant application process. This is resulting in lower quantity of applications submitted and approved and proving problematic as many of evaluations are getting delayed because clarifications are required on energy savings calculations and eligible costs or there is a lack of evidence that the EXEED process being applied correctly.

- The vast majority of both stage 1 and stage 2's are associated with major energy upgrades of existing buildings.
- The main Asset types engaging with the EXEED programme are manufacturing facilities, hotels, industrial facilities and retail facilities – the retail figure is slightly skewed by Woodies 12 x stage 2 applications.
- As per Table below, large companies are availing of the majority of the grant support. It is particularly noticeable that large companies are responsible for 76% of the stage 2 offers issued whereas they make up 50% of stage 1's. This aligns with our belief that EXEED is best positioned at large companies and Irelands largest energy users where the value-add of the engineering design process can be realised and where the time, resources and money required to implement the process effectively can be facilitated. SMEs are struggling to convert the studies at stage 1 into capital projects at stage 2.

Table 16: Successful grant applications by company size

Row Labels	EXEED Stage 1		EXEED Stage 2	
	Count of Company Size	% of total	Count of Company Size	% of total
Large	77	50%	29	76%
Medium	39	25%	6	16%
Small	38	25%	3	8%
Grand Total	154	100%	38	100%

- It is also clear from the spend review response that large companies are responsible for the majority of the energy and emissions savings from the scheme – it is felt re-positioning the scheme towards the largest energy users will help ensure greater impact from the scheme.
- The majority of stage 1 and stage 2 applications are associated with individual buildings as opposed to a wider site/group of buildings or process/value stream boundary.

Impacts																
Case level impact	<p>Actual impact numbers are unknown; estimated case level impact: Medium.</p> <p>Since re-launch in 2021, the following are the average estimated % savings for the 40 x stage 2 capital grants issued. This is at the point of offer and based on information provided at application stage.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">% savings</th> </tr> </thead> <tbody> <tr> <td>Electric savings (% of total electric consumption)</td> <td style="text-align: center;">5%</td> </tr> <tr> <td>Thermal savings (% of total thermal consumption)</td> <td style="text-align: center;">18%</td> </tr> </tbody> </table>		% savings	Electric savings (% of total electric consumption)	5%	Thermal savings (% of total thermal consumption)	18%									
	% savings															
Electric savings (% of total electric consumption)	5%															
Thermal savings (% of total thermal consumption)	18%															
Policy level impact	High – based on proposed savings for 40 x stage capital grant offers issued since 2021. Mixture of sectors including Food & drink, Pharma, Hospitality, and retail.															
Size	<p>Since the scheme re-launched in 2021, there has been one application that included a motor replacement project for proposed funding.</p> <p>See case study: MSD Carlow makes Energy Efficient Design a priority Case Studies SEAI</p>															
Energy	<p>See table below which tracks savings from scheme since re-launch in 2021. Note this does not include first phase of scheme from 2016-2019.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">2021</th> <th style="text-align: center;">2022</th> <th style="text-align: center;">2023 (YTD) [Up to 19/07/2023]</th> <th style="text-align: center;">Total savings</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Total annual tCO2 savings</td> <td style="text-align: center;">4,598</td> <td style="text-align: center;">3,274</td> <td style="text-align: center;">2,005</td> <td style="text-align: center;">9,876</td> </tr> <tr> <td style="text-align: center;">Total annual final energy savings (MWh)</td> <td style="text-align: center;">14,215</td> <td style="text-align: center;">15,452</td> <td style="text-align: center;">9,331</td> <td style="text-align: center;">38,997</td> </tr> </tbody> </table>		2021	2022	2023 (YTD) [Up to 19/07/2023]	Total savings	Total annual tCO2 savings	4,598	3,274	2,005	9,876	Total annual final energy savings (MWh)	14,215	15,452	9,331	38,997
	2021	2022	2023 (YTD) [Up to 19/07/2023]	Total savings												
Total annual tCO2 savings	4,598	3,274	2,005	9,876												
Total annual final energy savings (MWh)	14,215	15,452	9,331	38,997												
Impact evaluation	n/a															

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

There is no calculation formula nor a detailed methodology available.

If anticipated electric motor replacement a/o upgrade an existing motor with a VSD is claimed as eligible measure, the Irish SEAI will always ask for a detailed engineering report with the proper M&V savings on the entire project.

The tool “Electric Motors and Variable Speed Drives Evaluation Tool” on the SEAI website, see: [Tools & Calculators | SEAI](#) is used by companies mostly to help them work out pay back times. They do not report back to SEAI for EEOS with these calculations.

This excel tool developed by SEAI is designed to assist organisations evaluate the benefits of retrofitting a range of high efficiency motors and/or VSDs. The methodologies used in the calculation engine are based on the EMEES1 approach. The EMEES project funded by the EU whose objective was to develop harmonised evaluation methods to evaluate measures implemented to archive targets set out in the energy end-use and energy services directive is the key component of this tool.

Two calculation outputs are possible:

- Energy Savings Calculator - to provide an estimate of energy savings,
- Payback Calculator - to provide a simple payback and average payback of all measures included in the retrofit project.

Three retrofit options can be evaluated:

- a) VSDs installed on existing standard motors
- b) Motor replacement with either a High Efficiency (IE2) motor or Premium Efficiency (IE3) motor
- c) Motor replacement (with higher efficiency class) and incorporating VSD

Unfortunately, as this tool has been developed >10 years ago, the references and sources for their few indicative, „default” values are obsolete or highly questionable for current industry processes.

e.g.

- Motor efficiency only covers IE2 and IE3, but not IE4
- Operating hours depending on industry vs tertiary vary from 2.200 to max 5.000 hrs/a
- Motor load factors vary depending on application – where only a limited choice between pumps, fans, air compressors, conveyors and refrigeration is possible – from 0,42 to 0,70

9.14.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure’s implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Challenges	Solutions / Opportunities
<p>Lack of understanding and buy-in to the EXEED Process & certification.</p> <p>EED Experts still focused on equipment replacement rather than Energy Service challenge & small pool of competent EED expertise in supply chain</p>	<p>Further training and mentorship supports including development of additional guidance materials - e.g. Templates and sample EXEED documents.</p>

<p>Market predominantly see the value of EXEED in the grant rather than the process.</p> <p>Some applicants starting with projects in mind – Solar PV</p>	<p>Develop additional Case Studies – Diageo, Wyeth, Aurivo, Pfizer,, Glanbia, Kerry Ingredients, Irish Water, Ahascragh Distillery, Tyndall National Institute etc to showcase value-add of process.</p> <p>Address grant positioning and remove grant % uplifts which are making the scheme more attractive for SMEs and thus sending false message to the market.</p>
<p>Slow uptake of EXEED certification (time, effort, money & lack of awareness due to reliance on supply chain)</p>	<p>Transition from the EXEED standard to the new revision of the I.S.399:2021 standard</p> <p>I.S.399 Masterclass programme</p>
<p>Alternative “simpler” routes to capital support from likes of IDA, Enterprise Ireland and SEAI Community Energy Grant available.</p>	<p>Revamp EXEED grant offering to improve customer journey and scale up activity and delivery of high impact energy efficiency and decarbonisation projects.</p>
<p>EXEED stage 2 application process is perceived as time and resource intensive.</p>	<p>Simplify grant application and approval process where possible.</p> <p>Re-position to large industry only (increase minimum threshold) and focus on lower volume higher impact projects with greater engagement at both application and implementation stages.</p>
<p>Numerous scope changes and extension requests being requested on stage 2 approved projects due to contractors delays, lead time delays on equipment deliveries, limited shutdown windows to accommodate works and changes during the details design activity.</p>	<p>Separate out the detailed design support offering as a new application pre-stage 2 application to increase uptake and drive greater detail on project design at the point of capital support grant application.</p> <p>Remove contract deadlines completely or increase implementation period included on letters of offer.</p>

	Lessons Learnt
Key takeaways	As per the above
Recommendations	N/A
Linked measures	N/A
Reference(s)	Link to EXEED Certified Grant page Link to EXEED Certified Program page
Other	
Thoughts, comments, considerations ...	

9.14.2 Measure 2: EEOS Energy Efficiency Obligation Scheme

	Overview
Short Description	Energy Efficiency Obligation Scheme (EEOS) Credits to Obligated Parties Obligated parties have energy efficiency targets under the scheme. For every unit of energy saved through these projects, they achieve energy credits towards their targets.
Responsible Authority	SEAI
Status	Ongoing
Issue Date	2014
Start Date	2021
Ending Date	2030
Duration	Min until 2030 The design of the scheme for 2022-2030, outlining who should be obligated, the size of the target and how these targets will be delivered, will be decided following a public consultation process.
Reference:	S.I. No. 522/2022 - European Union (Energy Efficiency Obligation Scheme) Regulations 2022 (irishstatutebook.ie)

9.14.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

<p>EEOS Obligated parties have energy efficiency targets under the scheme. For every unit of energy saved through these projects, they achieve energy credits towards their targets.</p> <p>The target did rise to 700 GWh from 2018-2020. The target will be set in final energy from 2021 onwards as per the new Energy Efficiency Directive.</p> <p>Targets are allocated to each obligated party based on their share of the energy market. This is calculated in terms of sales volume to final customers. Each company's target is divided across three sectors: 75% non-residential, 20% residential and 5% energy poverty (residential).</p> <p>The obligated party will calculate the energy credits achieved in accordance with the SEAI guide on authenticating and claiming energy credits see: EEOS Guidance to authenticate & claim energy credits (seai.ie)</p> <p>Eligible measures include: Motors, drives and pumps & Replacement, VSDs and control.</p> <p>M&V Protocol report is always required to claim these credits.</p>	
	Characteristics
Budget	N/A

Financing of the measure	Through ESCOs & OP
Policy focusses	Product
Intervention Type	Equipment upgrade
Main Barriers Addressed	ease of regulation, emission reduction
Key Driver(s)	EU Directive
Replicability	High
EU Inclusion	Yes/ included in NECP and eligible under EED
Related Characteristics	

9.14.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Motor upgrades make up a very small portion of the estimated total savings. Some large projects with multiple ECMs would include motor upgrades. But there is no monitoring and data available on the impacts attributed to electrical motors specifically.

	Impacts
Case level impact	Actual value: Unknown; Estimated gut feeling impact of measure: Low
Policy level impact	Low, estimated
Size	N/A - not tracked
Energy	N/A - Not tracked, very few examples in recent years but some historic. May represent a small portion of savings achieved in larger projects with multiple ECMs. Best guess estimate is 20 GWh from all NREC projects 2014 to date, based on conservative estimate from PEP key word search.
Impact evaluation	N/A

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Estimates for cumulative savings in industry & tertiary sector together over 2021-203 through all EEOS are 25,975 GWh

9.14.2.3 Lessons Learnt



Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Motors only a part in larger non-res projects and hence not targeted by a specific measure. No real tracking of impacts, and energy savings are always included in the total EE process savings

Perception is that % savings from motor upgrades would be small in a lot of cases, which makes it difficult to justify replacement and ROI on existing motors before end-of-life.

	Lessons Learnt
Key takeaways	N/A
Recommendations	N/A
Linked measures	N/A
Reference(s)	N/A
Other	N/A
Thoughts, comments, considerations ...	N/A



Italy

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Giulia Viero (IEECP)

List of Acronyms

Acronym	Text
EU EED	European Union Energy Efficiency Directive
ESCo	Energy Service Company
GME	Gestore dei Mercati Energetici (<i>Energy Markets Manager</i>)
GSE	Gestore dei Servizi Energetici (<i>Energy Services Manager</i>)
PS	Progetto standardizzato (<i>Standardized project</i>)
TEE	Titoli efficienza energetica (<i>Energy Efficiency Certificates</i>)
TOE	Tonne of oil equivalent



9.15 Italy

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Interview on 22-06-2023 with: Ing. Marcello Salvio (Responsabile Laboratorio DUÉE-SPS-ESE: Efficienza Energetica Settori Economici) and PhD Chiara Martini (Researcher), Energy Efficiency Unit Department, Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA).

The White Certificates or Energy Efficiency Certificates (TEE), represent a form of state incentive intended for those who have carried out interventions aimed at reducing energy consumption, providing an alternative to the 65% IRPEF deductions mainly intended for the domestic sector. This form of incentive can be requested in all categories in which it is possible to carry out energy saving measures, such as:

- advanced residential;
- the industry;
- the tertiary sector / services;
- the utilities.

Based on the principles of the current Italian White Certificates ("Certificati Bianchi"), the replacement of an old motor with a new efficient one could be considered as standardised simplified measure.

However, only if the **annual energy savings for a single project are >5 TOE (ton of oil equivalent) (>58.2 MWh)¹⁴⁴**. On top of this, a detailed calculation scheme must still be filled-in with real data "ex-ante vs. ex-post".

The White Certificates are disbursed in the form of tradable securities on an energy market specially created and managed by GME (Gestore dei Mercati Energetici). The market is based on the exchanges of securities that take place between "obligatory subjects" and "voluntary subjects". In Italy, current regulations identify the "obligated subjects" in the distributors of electricity and natural gas who are required each year to achieve certain savings and primary energy objectives. These can also fulfil their obligation by purchasing white certificates issued by other subjects on the energy efficiency certificates market.

This [link](#) contains a list of all accredited energy operators (Energy Service Company (ESCO)) by the Italian Energy Services Manager, GSE.

There will be soon a new issue of the Italian White Certificates. Also, a dedicated programme for old motor renovation is at least under consideration.

Suggested format/structure:

- *Introduction to the national policy framework including the implementing authorities (name and typical responsibilities)*
- *Description of the general direction / course of action taken by the country (NECP)*
- *Overview of major national programmes related to Energy Efficiency*
- *Highlight EU-MORE related and/or relevant policy developments in the past, present, or expected in the (near) future.*
- *(If available) list the related National goals/targets set on Energy Efficiency improvements to which the related motor replacement measures aim to contribute*

¹⁴⁴ 1TOE = 10⁴ kWh. FOMIT. (2023). White Certificates. Available at: <https://www.fomit.it/certificati-bianchi-titoli-efficienza-energetica-tee/>

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The experience with energy audits for industry tracked (under EED art.8) in Dec 2019 shows that interventions on motor replacements generated about **88 GWh/year** of savings and that planned interventions, identified by means of energy audits, would be associated to a potential saving of approx. 140 GWh savings, hence showing some potential to be further exploited.

The direct savings are reported in the database as "replacement of electric motors", but there could be other motors also subsumed in other categories (e.g., compressors, conveyer belts, etc.), hence actual achievements in motors could be higher.

This confirms EU-MORE assumptions, as policies are looking into realising earlier more EE projects, motors are not always explicitly mentioned, and are part of cross-technology programmes. They are not necessary on the radar. Gap between achievement and what it is reported. And here examples.

There is monitoring in place and definition of electric motor category.

9.15.1 Measure 1: White certificates – The standardized project (PS)

Overview	
Short Description	The standardized project (Progetto standardizzato – PS) quantifies the additional energy savings reported based on a calculation algorithm and the direct measurement of a suitable representative sample of the operating parameters that characterize the project. Both in the ex-ante and ex-post configuration.
Responsible Authority	Central Government GSE Energy Suppliers The quantification must take place in compliance with a measurement program approved by the GSE, in accordance with the provisions of Annex 1, Chapter 2, of the Ministerial Decree of 11 January 2017 and subsequent amendments.
Status	Ongoing
Issue Date	2004
Start Date	2004
Ending Date	[2016]
Duration	12 years
Reference:	GSE. (2023). White certificates – Standardized Projects. Available at: Fehler! Linkreferenz ungültig. Excel (in Italian) ex-ante vs. ex-post electrical motor installation: https://www.gse.it/documenti_site/Documenti%20GSE/Servizi%20per%20te/CERTIFICATI%20BIANCHI/DOCUMENTI/3.%20INSTALLAZIONE%20MOTORI%20ELETTRICI.zip Overview of Italy's Industry Energy Efficiency measures https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1192

	<p>NECP 2021-2030, original in Italian, English version</p> <p>National NECP website (IT)</p> <p>EC's individual assessment (SWD/2020/911) in Italian or English</p>
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9.15.1.1 **Main Description**

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes.

Target: SMEs and large companies

Scope: For the preliminary analysis, the standardized project must be composed of interventions for which the repetitiveness of the operating conditions and the non-economic convenience of the measure dedicated to the single interventions have been verified.

Types of standardized interventions are listed [here](#) (in Italian).

Minimum requirements: The standardized evaluation method quantifies the additional energy savings that can be achieved through the standardized project at one or more establishments, buildings or sites, however named, for which it is demonstrable:

- the repetitiveness of the project, i.e. of the interventions that make it up, in similar contexts and under the same operating conditions;
- the non-economic convenience of the investment relating to the installation and management of meters dedicated to individual interventions, against the indicative economic value of the white certificates obtainable by virtue of the energy savings achievable from the realization of the project.

To access the mechanism:

- if the standardized project consists of several interventions, the latter must be characterized by the same duration of the useful life period (expressed in years), to be included in the same project for which the proponent submits single instance to the GSE for the request for white certificates;
- the standardized project must have generated a share of additional savings of no less than 5 TOE;
- unless otherwise indicated in the approved standardized project typologies, during the first 12 months of the monitoring period.

	Characteristics
Budget	Not available
Financing of the measure	Market incentives
Policy focusses	Focuses on product ('physical') interventions
Intervention Type	Financial incentive
Main Barriers Addressed	<p>Potential obstacles depend on the company's size (large, SME).</p> <ul style="list-style-type: none"> - Technological barriers (especially for SMES) - Knowledge barriers in relation to access to and affordability of the training in relation to such specific measures (especially for SMES) - Organizational barriers related to the internal decision-making process (especially for SMES) - Behavioural barriers for which a financial incentive for motor renovation may not be enough
Key Driver(s)	National law, linked to EU Directive
Replicability	Medium. (a simple personal 'gut feeling' assessment of the potential for replication or transfer to other countries; are there any specific local conditions)
EU Inclusion	This measure is part of the Italian NECP. Decree of December 28, 2012; Decree of 20 July 2004
Related Characteristics	

9.15.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

See next section 1.1.3

	Impacts
Case level impact	Medium (5-20%) (indicative value based on the expected total % reduction in energy consumption through measure introduction at the case level)
Policy level impact	Medium (0.1-0.5%) (indicative value based on the expected total % reduction in energy consumption through measure introduction at the industry/sector level)
Size	See table in the next section
Energy	See table in the next section
Impact evaluation	See next section 1.1.3

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

The methodology for evaluating savings is standardized: https://www.gse.it/servizi-per-te_site/efficienza-energetica_site/certificati-bianchi_site/presentare-progetti_site/Documents/Tabella%20Tipologia%20Intervento%20ps.pdf

9.15.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure’s implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Below we report the table with data from 2019(provided by ENEA). It is reported **solely for comparison** with the latest data, which is included in the second table below.

Type of intervention	Interventions carried out	Final energy saving (toe) from interventions carried out	Planned Interventions	Final energy saving (toe) from identified interventions
Compressed air	747	7.731	3.413	49.217
Aspiration	84	1.590	454	4.179
Air conditioning	608	7.157	2.305	299.119
Process cooling	170	3.664	447	11.723
Electric motors/Inverter	120	7.580	852	12.059

Revised table (2023) with 2022 data and updated yearly (provided by ENEA):

Year	Implemented interventions (N°)	Planned interventions (N°)	Motors/Inverter on total implemented interventions of the year (%)	Motors/Inverter on total planned interventions of the year (%)	Implemented interventions: achieved savings (GWh)	Planned interventions: potential savings (GWh)	Implemented interventions: achieved savings (GWh / intervention with info)	Planned interventions: potential savings (GWh / intervention with info)
2019	188	1095	2%	4%	12.7	154.1	0.17	0.15
2020	25	122	7%	6%	0.2	28.6	0.02	0.24
2021	16	135	1%	7%	1.5	7.4	0.09	0.06
2022	17	99	5%	6%	9.8	23.2	0.28	0.27

As regards the **2019** data, after adjustments, the final amount of energy savings calculated for interventions carried out is **12.7 GWh/year** (N.B. due to later adjustments, the savings may relate to less than 188 interventions). Whereas savings for planned interventions is valued to **154.1 GWh/year**.

As for the **subsequent years**, we can observe the **trend** for which potential savings are larger than achieved savings. Thus, there is still a large potential for electric motors interventions. Although we must highlight that the number of implemented interventions is *de facto* smaller than planned interventions.

The above data relate to all sectors, including industry and tertiary: in fact, they refer to large companies, which can fall into all sectors, and energy-intensive companies, which belong only to the industrial sector. The table could undergo changes following further insights into specific sectors.

Limitations: notably, the above calculations refer to a sample of 8,000 enterprises compared to 3.8/3.9 millions of SMEs and large companies.

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> • Projects need to show min 5 tOE (~60 MWh) savings per measure to get accepted in White Certificates • High potential savings based on ENEA's monitoring • The number of implemented interventions is smaller than planned interventions (2019 - 2022). • The authority set up to define the incentives for the replacement of electric motors in Italy is the GSE (Energy Services Manager).
Recommendations	<ul style="list-style-type: none"> • The monitoring and evaluation of potential savings would be supported by a break-down into sectors and include different energy prices (electricity vs natural gas) in industry or other sectors, considering different company's requirements, size as well as reflecting the regional/national industrialization levels. • (energy) Audits can bridge such measures financial programmes and help companies identify (specially SMEs) which incentives are available to apply for. • Regarding SMEs, such measures would benefit from better coordination across also regional funds • Motors could become more in the focus if their savings get promoted and awareness is raised
Linked measures	/
Reference(s)	<p>Concerted Action Energy Efficiency Directive (CA EED) https://www.ca-eed.eu/ information platform to share to discuss policy measure experiences, and promote technical peer-to-peer exchange</p> <p>ENEA provides technical support in drafting Annual Report under Atr.7 of EED https://ec.europa.eu/energy/topics/energy-efficiency/targets-directive-and-rules/national-energy-efficiency-action-plans_en?redir=1</p>
Other	/
Thoughts, comments, considerations ...	N.B. ENEA was involved with the White certificates incentives mechanism until 2018, and it is now fully managed by GSE. However, ENEA will keep being involved in the data monitoring part.

EU-MORE



EUropean MOtor
REnovation initiative



Latvia

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Ivan Sangiorgio (IEECP)

List of Acronyms

Acronym	Text
EE	Energy Efficiency
ESM	Energy Saving Measure
NDPL2027	National Development Plan of Latvia 2021-2027
RES	Renewable Energy Sources
RRP	Recovery and Resilience Plan
SDSL2030	Sustainable Development Strategy of Latvia 2030



9.16 Latvia

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Latvia's [NECP](#) (2019):

At EU level, the energy policy for 2050 is defined in the EC Communication Roadmap for moving to a competitive low-carbon economy in 2050. The energy policy for 2030 in its turn is defined in the EC Communication Clean Energy For All Europeans. With regard to planning the development of Latvia the NECP is subordinated to SDSL203016 and NDPL2027.

There are currently a number of policy planning documents (including informative reports) in force in Latvia related to energy and climate change mitigation issues with objectives concerning energy and climate change mitigation, as well as policies for reaching these targets.

- 1) SDSL2030 lays down the following objectives in the context of the plan:
 - to ensure energy independence of the country by increasing self-sufficiency of energy and integrating in the EU energy networks;
 - to be the EU leader in the preservation, increase, and sustainable use of natural capital;
 - to preserve the originality of Latvia – the diverse natural and cultural heritage, typical and unique landscapes.

SDSL2030 includes targets for GHG emission reduction, the share of RES and energy intensity, as well as innovation goals for 2030.

LTESL203022 lays down the following objective in the context of the Plan:

- Competitive economy with a sustainable energy sector and increased security of energy supply.

LTESL2030 includes optional and non-binding targets for the use of RES, energy and energy sources, and the share of imports for 2030.

ODYSSEE-MURE Report:

Buildings is one of the top priorities of the national energy efficiency (EE) policy, being the first sector for energy consumption, followed by transport. High attention to EE of buildings is paid by the National Energy-Climates Plan 2030. In 2020 new measures to promote EE in single-family buildings and to provide assistance for families with children to purchase high EE dwelling were introduced.

Industry is the third sector in terms of final energy consumption. Since 2000 final energy consumption increased by 2.5%/year driven by a growth in activity and other factors. Half of these effects have been offset by energy savings thanks to technical improvements of the machineries and processes. A mix of investment co-financing, regulatory, information measures is used. Currently, over the 2014-2020 planning period, the energy efficiency investments in the manufacturing industry are co-financed by national operational programmes. In turn, the State Development Finance Institution ALTUM provides complementary measures. High attention to energy efficiency in industry is paid by "National Energy-Climates Plan 2030". See also the section "Overview" regarding mandatory implementation of energy audits and energy management systems.

A mix of investment co-financing, regulatory, information measures is used. Currently, over the 2014-2020 planning period, the energy efficiency investments in the manufacturing industry are co-financed by national operational programmes. In turn, the State Development Finance Institution ALTUM provides complementary measures. High attention to energy efficiency in industry is paid by "National Energy-Climates Plan 2030". See also the section "Overview" regarding mandatory implementation of energy audits and energy management systems.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The extent and scale of Latvia's initiatives concerning the substitution and upgrade of electric motors is limited and such initiatives not sufficiently targeted. Indeed, several technology-neutral policy measures for the industrial sector have been undertaken in the last years, in various forms of financial support for companies implementing energy efficiency projects. Policies focused on electric motor replacement are however missing and no disaggregated data about the technological features and impact of the implemented EE projects is (publicly) available.

9.16.1 Measure 1: Efficient use of energy resources, reduction of energy consumption and transfer to RES in manufacturing industry (2014-2020 Funds period)

	Overview
Short Description	Financial support for innovative energy saving technologies, energy efficiency measures or adoption of renewable energy sources. The measure has been co-financed by the EU Cohesion Fund 2014-2020.
Responsible Authority	Cabinet of Ministers, Ministry of Economy
Status	Ongoing
Issue Date	September, 2016
Start Date	2017
Ending Date	December, 2023
Duration	72 months
Reference:	https://likumi.lv/ta/id/284596 (first project call) https://likumi.lv/ta/id/296683 (second project call) https://likumi.lv/ta/id/310544 (third project call)

9.16.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The policy measure, whose implementation is under responsibility of the Ministry of Economy, is supported by the national Operational Programme "Growth and Employment 2014-2020," under Thematic Objective 4 "Supporting the shift towards a low-carbon economy in all sectors," and Specific Objective 4.1.1. "Promoting efficient use of energy resources and reducing energy consumption in the manufacturing industry sector". The Operational Programme receives co-financing from the EU Cohesion Fund 2014-2020 and its efforts are directed towards the advancement of novel energy-saving technologies and strategies that enhance energy efficiency and the share of RES in manufacturing industries.

The measure is articulated into three distinct open project calls in the period 2017-2023. The Cabinet of Ministers Regulation pertaining to the first project call was ratified on September 6th, 2016. The implementation of the projects from the third final call started in October 2020 and will last until the end of 2023.

The initiative is accessible to a wide range of enterprises, encompassing micro, small, medium, and large businesses.

The funding is granted for the following activities:

- Performing reconstruction or renovation works that increase the energy efficiency of industrial production buildings and warehouses;
- **Purchase of more energy-efficient production equipment and secondary process equipment supporting production processes to replace existing production equipment and secondary process equipment supporting production processes;**
- Recovery of secondary energy resources from production processes;
- **Renovation, reconstruction or creation of engineering systems in the production building, warehouse and production area;**
- Investments in the use of renewable energy sources;
- Preparation of project technical documentation;
- Providing project management and supervision.

The projects are expected to achieve the following quantitative energy efficiency objectives:

- A minimum 15% enhancement in energy efficiency subsequent to the implementation of ESMs.
- Heat energy consumption for industrial building heating not exceeding 110 kWh/m²/year (this requirement does not apply if energy efficiency improvements are solely directed at the production process).

The Cohesion Fund maximum co-financing for single project is 0.6 MEUR(1st call)and 1 MEUR(2nd and 3rd calls).

For the eligible costs corresponding to the part "a"¹⁴⁵ of the Article 38.3 of the Commission Regulation 651/2014 (the direct costs of energy efficiency improvement measure is precisely derived) - the maximum co-financing by Cohesion Fund is 30%.

For the eligible costs corresponding to the part "b"¹⁴⁶ of the Article 38.3 of the Regulation, the maximum co-financing by Cohesion Fund is: 45% (large enterprises), 55% (medium enterprises), 65% (small and micro-enterprises), calculated against the difference between the cost of energy efficiency project and the cost of reference scenario.

	Characteristics
Budget	20.3 MEUR from 2017 to 2023
Financing of the measure	EU Cohesion Fund 2014-2020
Policy focusses	Product (physical intervention)
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost, general financial viability, return on investment
Key Driver(s)	Central government regulation
Replicability	High
EU Inclusion	EED
Related Characteristics	-

¹⁴⁵ "where the costs of investing in energy efficiency can be identified in the total investment cost as a separate investment, this energy efficiency-related cost shall constitute the eligible costs"

¹⁴⁶ "in all other cases, the costs of investing in energy efficiency are identified by reference to a similar, less energy efficient investment that would have been credibly carried out without the aid. The difference between the costs of both investments identifies the energy efficiency-related cost and constitutes the eligible costs."

9.16.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

<p>The expected results and outcomes to be achieved by December 31 2023 are:</p> <p>Result indicators:</p> <ul style="list-style-type: none"> - Energy intensity in processing industry: 3.07 MWh/1000 EUR - Share of renewable energy resources in the energy consumption of the manufacturing industry: 51% <p>Outcome indicators:</p> <ul style="list-style-type: none"> - Number of companies that received support: at least 23 - Energy savings for merchants who received support: 79,400 MWh/year - Additional power produced from renewable energy resources: 8.9 MW - Calculated reduction of greenhouse gases per year: 6,122 tons of CO₂ equivalent <p>The reported achieved results of the measure until 2023 is estimated to be of 125604 MWh of cumulative annual energy savings and 12.46 kton CO₂. The beneficiaries (until March 2022) have been 73 with a total private investment of 55.38 MEUR.</p>
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	Impacts
Case level impact	High (>20%)
Policy level impact	High (>0.5%)
Size	NA
Energy	125604 MWh, 12.460 tCO ₂ (whole measure)
Impact evaluation	<ul style="list-style-type: none"> - Energy intensity in processing industry: 3.07 MWh/1000 EUR - Number of companies that received support: at least 23 - Energy savings for merchants who received support: 79,400 MWh/year - Calculated reduction of greenhouse gases per year: 6,122 tons of CO₂ equivalent

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Not available

9.16.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

N/A

	Lessons Learnt
Key takeaways	-
Recommendations	-

Linked measures	Energy audits/Energy Management Systems and Energy Efficiency Improvements in Large Enterprises and Large Electricity Consumers
Reference(s)	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1223
Other	https://videszinatne.rtu.lv/en/wp-content/uploads/2020/03/CEIM_Latvia_ENG-_fin_public_opt.pdf
Thoughts, comments, considerations ...	-

9.16.2 Measure 2: Improving energy efficiency and promoting the use of RES technologies in industry: EU funding 2021-2027 planning period.

	Overview
Short Description	Investment aid for the construction of new energy-efficient production premises, modernization of existing industrial production capacity by installing energy efficient production technologies and auxiliary process equipment; replacement of internal and external engineering networks and engineering systems in the production area with more energy efficient ones.
Responsible Authority	Cabinet of Ministers
Status	Ongoing
Issue Date	2021
Start Date	September, 2022
Ending Date	December, 2029
Duration	81 months
Reference:	https://likumi.lv/ta/id/336032

9.16.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The policy measure is financed by Latvia's Plan of EU Recovery and Resilience Facility (RRP) 2021-2026, Latvia's EU Cohesion Policy Programme for the 2021-2027 EU Funds planning period and Latvia's Just Transition Fund Territorial Plan. The measure will consist in three Open Calls. One third of the total support volume is provided for each of them. First Open Call was announced in 4th November 2022.

This measure will be implemented through three distinct Open Calls, each receiving one third of the total support allocation. The first Open Call was officially announced on November 4th, 2022.

The program aims to benefit a wide range of businesses, including micro, small and medium-sized enterprises (SMEs), as well as large enterprises, both privately and publicly owned, including municipal entities. Financial assistance will cover various activities, such as:

- Performing construction work on the structural components of non-residential buildings (in accordance with building classification standards).

- Renovating, reconstructing, or building engineering systems for non-residential buildings and production areas, including connecting to centralized heat supply systems and establishing heating units.
- Acquiring and installing new, more energy-efficient production equipment and auxiliary process equipment, in cases where existing equipment needs replacement to enhance production processes.
- Recovering secondary energy resources from production processes.
- Implementing energy-efficient lighting systems.
- Reconstructing internal and external heating networks and cooling supply systems.
- Providing architectural and construction supervision.
- Organizing and preparing the construction site area.
- Other necessary measures aimed at improving energy efficiency and sustainability of achieved outcomes.

The projects must achieve specific energy efficiency targets, including a minimum of 30% primary energy savings and a financial efficiency indicator of at least 0.4 MWh annual primary energy savings per 1000 EUR of capital grant. Each individual beneficiary (including related parties considered as a single entity) can receive a capital grant of 45% (Large companies), 55% (Medium companies) or 65% (micro and small companies) of the project's total cost.

Excluded from the aid are the following sectors:

(i) production of tobacco products, (ii) gambling and betting, (iii) fisheries and aquaculture, (iv) agriculture sector, (v) transport sector, (vi) wholesale and retail sale sector (vii) waste management sector, except several particular activities, (viii) any activities related to use of fossil energy resources, (ix) other specific activities.

	Characteristics
Budget	Public financing of 145 MEUR from 2022 to 2029
Financing of the measure	EU Cohesion Policy Programme 2021-2027 (36.975 MEUR) Latvia's RPP (75.267 MEUR) Latvia's Plan of EU Just Transition Fund (30 MEUR)
Policy focusses	Product (physical intervention)
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost, general financial viability, return on investment
Key Driver(s)	Central government regulation
Replicability	High
EU Inclusion	EED, NECP
Related Characteristics	-

9.16.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The final expected results and outcomes to be achieved are:	
-	Total cumulative annual energy savings: 12500 MWh in 2026, 24722 in 2029
-	Total cumulative annual CO ₂ savings: 1350 ton CO ₂ in 2026, 2670 in 2029
Other achievements:	
-	8.58 MEUR allocated in the first open call
-	21 submitted energy efficiency projects in the first open call

	Impacts
Case level impact	High (>20%)
Policy level impact	High (> 0.5%)
Size	No disaggregated data available for electric motors replacement/retrofit
Energy	Expected cumulative annual energy savings: <ul style="list-style-type: none"> - 12500 MWh in 2026 - 24722 MWh in 2029 Expected cumulative annual carbon savings: <ul style="list-style-type: none"> - 1350 tonCO₂ in 2026 - 2670 tonCO₂ in 2029
Impact evaluation	<ul style="list-style-type: none"> - 8.58 MEUR allocated in the first open call - 21 submitted energy efficiency projects in the first open call

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Not available

9.16.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

N/A

	Lessons Learnt
Key takeaways	-
Recommendations	
Linked measures	<i>Energy audits/Energy Management Systems and Energy Efficiency Improvements in Large Enterprises and Large Electricity Consumers</i>
Reference(s)	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/3885

	https://likumi.lv/ta/id/336032
Other	
Thoughts, comments, considerations ...	-

9.16.3 Measure 3: Loans and green bonds to improve the energy efficiency of businesses

	Overview
Short Description	Loans and green bonds provided by the state-owned ALTUM finance institution to support businesses in the implementation of energy efficiency measures
Responsible Authority	Central Government
Status	Ongoing
Issue Date	2017
Start Date	2018
Ending Date	-
Duration	-
Reference:	https://www.altum.lv/pakalpojumi/biznesam/aizdevumi-uznemumu-energoefektivitatei?tab=1 https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/3877

9.16.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

From MURE database:

Main conditions for the access to the loan:

- up to 5 MEUR and up to 90% of the project costs (beneficiary contribution from 10%)
- loan payback period is 5-15 years depending on the sector (see details below),
- fixed loan rate, 4.3% - 6.5%, is applied,
- "credit holidays" up to 12 months is applied.

The main criterion is adequate flow of money – payment of loan due to energy savings.

The loan can be received by wide range of interested parties of commercial sector – individual merchants, micro enterprises, SMEs, large enterprises, state and municipalities owned companies.

The financed areas are:

- Energy efficiency – for instance, **replacement of technologies to install energy efficient equipment and electrical appliances**, energy recuperation equipment, LED lighting, modernization of heat supply system (at least 5% energy savings shall be reached in case of modernising heat supply). Loan payback period 5-7 years;
- Renewable energy – solar PV and solar heat collectors, wind turbines, hydro energy technologies, biomass based heat boilers, combined heat-power technologies. Loan payback period 15 years;
- Green non-residential buildings, both construction of new ones and renovation of existing ones, the renovated building shall decrease heat energy consumption at least per 5%. Loan payback period 15 years;

- Sustainable transport – sustainable mobility, electrical vehicles (e.g. see TRA-LV4197), biogas-based transport. Loan payback period 7 years.

It is also provided the re-financing of the investments invested during two last years and purchase of used equipment.

Green bonds:

In October 2017 “ALTUM” had emitted 20 MEUR green bond (7-years tenor) under the Green Bond Framework 2017, becoming the first national development institution in the CEE countries that had issued the green bonds.

Green projects are evaluated according to: a) ALTUM’s creditworthiness appraisal methodology for business loans, b) the green bond framework and c) the related legislation. Potential green projects will be selected and approved in consensus by the Loan and Guarantee Department and the Energy Efficiency Programme Department. Only projects where there is a high likelihood that the net, long-term environmental effects are positive will be approved. The issuer informs that the experience with the selection process from the 2017 issuance is positive, and they are planning on continuing using the same process with a specialized unit responsible for the program implementation. In 2019 the issuer included a regional branch network in the process, the role of this network may be expanded in the future (CICERO Opinion 2021¹⁴⁷)

	Characteristics
Budget	NA
Financing of the measure	ALTUM financial institution
Policy focusses	Product (physical intervention)
Intervention Type	Equipment upgrade
Main Barriers Addressed	General financial viability
Key Driver(s)	Central government regulation
Replicability	Medium
EU Inclusion	EED
Related Characteristics	-

9.16.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

No data about the impact of loans for energy efficiency has been provided by ALTUM. Regarding green bonds, as at 30 June 2022, ALTUM had committed a total of 18.5 MEUR for green bond financed-projects. Of this amount 4.287 MEUR were committed to ESCOs. The projects that have been financed with green bonds so far are reported below.

Project ID	Project Name	Year of approval	Facility amount 30 June 2022, EUR	Disbursed amount 30 June 2022, EUR	Altum funding 30 June 2022, %	Reduced GHG emissions, tCO ₂ e p.a. MWh p.a.	Energy reduced, MWh p.a.	Reduction of energy use, %
1	ESCO-project (lighting)*	2018	1 000 000	1 000 000	66%	711	6 982	73%
2	ESCO-project (lighting)*	2018	800 000	800 000	90%	182	1 782	75%
3	Infrastructure energy efficiency , Salaspils	2018	51 049	51 049	85%	59	1 608	26%
4	Logistic warehouse lighting, Salaspils	2018	81 002	81 002	85%	40	394	76%

¹⁴⁷ https://www.altum.lv/wp-content/uploads/2022/06/second_opinion_cicero_green_altum_final.pdf



5	Renovation of heating, Rīga	2018	54 995	54 995	85%	12	117	65%
6	Wood drying chamber equipment, Rīga	2018	11 500	11 500	82%	2	18	38%
7	Renovation of boiler house, Mīlžkalne	2018	165 833	165 833	56%	-2	1 252	30%
8	Heating system automation, Sigulda	2018	62 475	62 475	85%	32	313	10%
9	Renovation of boiler house, Mīsa	2018	108 000	108 000	36%	36	528	9%
10	Renovation of boiler house, Vangaži	2018	1 118 445	1 118 445	53%	3 827	2 738	14%
11	ESCO-project (district heating)	2018	115 000	115 000	59%	0	507	24%
12	ESCO-project (district heating)	2019	597 152	597 152	37%	0	2 600	31%
13	ESCO-project (district heating)	2019	308 000	308 000	80%	0	156	2%
14	Renovation of boiler house, Ludza	2018	440 000	440 000	48%	88	3 370	11%
15	Renovation of lighting, Mežvidi	2018	55 000	55 000	18%	13	132	28%
16	Metalworking equipment, Rēzekne	2018	99 875	99 875	85%	5	48	27%
17	Renovation of boiler house, Talsi	2018/2019	1 705 846	1 705 846	60%	34	5 280	18%
18	ESCO-project (district heating), Lubāna	2018	125 000	125 000	77%	0	710	28%
19	Renovation of heating, Rauna	2018/2019	65 902	65 902	85%	0	434	75%
20	ESCO-project (lighting)*	2019	1 170 000	1 170 000	85%	510	5 000	67%
21	Film replacement for greenhouses, Lēdmane	2019	110 670	110 670	35%	0	1 424	26%
22	Biogas Cogeneration plant, Lēdmane	2019	231 507	231 507	75%	88	3 370	11%
23	Woodworking equipment, Kuldīga	2019	760 609	760 609	90%	46	452	36%
24	Tile block processing line, Auri	2019/2020	471 150	471 150	85%	40	225	37%
25	Woodworking equipment, Staicele	2019	638 255	638 255	58%	9	39	80%
26	Renovation and automation of heating system, Murmāstiene	2019	647 571	647 571	53%	0	413	80%
27	Renovation of heating and ventilation, Rīga	2019	200 979	200 979	85%	49	280	30%
28	Renovation of heating, Rīga	2019	80 060	80 060	85%	101	377	100%
29	Renovation of boiler house, Ādaži**	2020	440 640	440 640	52%	1 354	-1 288	-19%
30	Multifunctional CNC cutting and drilling equipment, Rīga	2020	179 506	179 506	85%	2	20	8%
31	Process management system, Rīga	2021	258 682	258 682	85%	1	9	31%
32	Woodworking equipment, Platone	2021	1 024 000	14 000	85%	10	530	10%
33	Painting chamber, Rīga	2021	97 260	73 988	82%	6	62	97%
34	Metal parts treatment equipment, Rīga	2022	110 202	110 202	85%	3	40	90%
35	Renovation of lighting, Mežvidi	2021	106 916	106 917	43%	9	120	16%
36	Air treatment equipment, Stopiņi	2021	38 215	38 215	84%	104	342	41%
37	Automated bottle filling machine, Ķekava	2021	158 000	158 000	72%	1	14	78%

Table 17: List of projects financed with ALTUM's green bonds until 30 June 2022

The total energy savings of the financed green projects is 40395 MWh/year and the carbon savings 7372 tCO₂/year.

No detailed information about the replacement/renovation of electric motors is available from the reported projects: the projects "Metalworking equipment" (16), "Tile block processing line" (24), "Woodworking equipment" (25), "Multifunctional CNC cutting and drilling equipment" (30), "Woodworking equipment" (32) and "Metal parts treatment equipment" (34) may include upgrades on electric motors, corresponding to the 16% of the total number of financed projects. The reduction of energy use of such projects has been 42% on average, ranging from 8% (project 30) to 90% (project 34).

Impacts

Case level impact	Strongly dependent on the case
Policy level impact	Medium (0.1 to 0.5%)
Size	No disaggregated data available for electric motors replacement/upgrade
Energy	Achieved cumulative annual energy savings (green bonds): - 40395 MWh in 2022 Achieved cumulative annual carbon savings (green bonds): - 7372 tonCO ₂ in 2026
Impact evaluation	- 18.5 MEUR committed as at June 2022 - 37 financed energy efficiency projects in the first open call

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

<p>Methology for savings calculation of green bond-financed projects¹⁴⁸. The actual reduction of GHG emissions for Energy Efficiency and Renewables project categories has been calculated based on respective conversion rates applied to estimated energy savings according to local methodology - Republic of Latvia Cabinet Regulation No.42 "Methodology for Calculating Greenhouse Gas Emissions" dtd 23 January 2018. Conversion rates for Latvia are based on the particular country's energy balance (LV energy consumption balance includes considerable portion of renewable energy) thus leading to lower reduction of GHG emissions as might be in other countries with different structure of the country's energy balance for projects with similar energy saving.</p> <p>When the project that was partially financed by Green Bond proceeds repays portion of the loan from external sources (for example, grant received), then such amount is deducted from the initial reported percentage of Green Bond funding (Altum funding, %) in the next Investors Report.</p>

9.16.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

N/A

Lessons Learnt	
Key takeaways	<ul style="list-style-type: none"> - Innovative green bonds funding framework, transparent monitoring of achieved energy and carbon savings from green bonds-funded projects; - Lack of publicly available data about achieved results from loans to energy efficiency projects; - General lack of detail in targeting the fundings towards electric motor upgrade;
Recommendations	Recommendations provided by CICERO Center for International Climate Research to the Green Bonds Framework designed by ALTUM:

¹⁴⁸ https://www.altum.lv/wp-content/uploads/2023/02/GB_project_by_project_30.06.2022.pdf

	<ul style="list-style-type: none"> - <i>Fossil fuel projects or equipment cannot be funded by green proceeds. However, there is a risk of involvement of carbon intensive sectors, and sectors using fossil fuels in their value chain.</i> - <i>Efficiency projects should not lead to prolonged life for technologies not compatible with zero carbon emission (lock-in). Also, be aware of possible rebound effects.</i> - <i>We encourage the issuer to be ambitious when selecting assets for funding within the energy efficiency category</i>
Linked measures	-
Reference(s)	https://www.altum.lv/wp-content/uploads/2023/02/GB_project_by_project_30.06.2022.pdf https://www.altum.lv/wp-content/uploads/2022/06/second_opinion_cicero_green_altum_final.pdf
Other	-
Thoughts, comments, considerations ...	-

EU-MORE



EUropean MOtor
REnovation initiative



Lithuania

of past and existing policy options for the
acceleration of electric motor renovation

EU-MORE

Authors:

Ivan Sangiorgio (IEECP)

List of Acronyms

Acronym	Text
NECP	National Energy and Climate Plan
PIP	Project Implementation Plan
PIS	Public Interest Service



9.17 Lithuania

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

From Lithuania's [NECP](#) (2023):

Key strategic documents integrated into the updated NECP:

1. The National Energy Independence Strategy was adopted in June 2018;
2. The National Climate Change Governance Agenda was adopted in June 2021;
3. National Air Pollution Reduction Plan adopted in April 2019 and updated in August 2022;
4. the updated NECPs are linked to the National Progress Plan adopted on 9 September 2020.
5. Resolution No 789 of the Government of the Republic of Lithuania of 29 September 2021 on the territory of the Republic of Lithuania;

Lithuania's energy intensity target is to reach the European Union average by 2030 and to reduce its energy intensity by 1.5 times compared to 2017. The objective is to continue the renovation of inefficient residential and public buildings, to increase consumer education and to improve the energy efficiency performance of businesses. New measures are also envisaged to improve the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies, and to create a legal requirement for companies to implement the measures recommended in energy efficiency audits in order to achieve energy efficiency results.

The claimed energy efficiency priorities for Lithuania are thus:

- To promote the complex renovation of multi-apartment residential and public buildings (priority for renovation of residential areas) and energy savings of 10–11 TWh by 2030;
- To promptly develop low-energy-intensive industries increasing energy efficiency, deploy and acquire the most up-to-date and environmentally friendly technologies and equipment.

From the [Lithuania IEA country report](#):

Under the Law on Energy Efficiency Improvement (2020), the Ministry of Economy and Innovation is required to achieve at least 5.5 terawatt hours (TWh) of mandatory energy savings in large energy-intensive industry and 5.5 TWh from small and medium-sized enterprises (SMEs).

The government offers subsidies to help SMEs perform energy consumption audits and implement energy efficiency improvement measures specified in the audits. For large industries, energy audits are mandatory and agreements are in place for the implementation of saving measures in return for a rebate from the public service tax.

Around 30–40 large industrial users have used ISO 50001 certification in the framework of their audits. Eighty per cent of Lithuania's ESCOs are focused on industry energy efficiency upgrades.

Between 2014 and 2020, the Programme for Promotion of Investment and Industrial Development supported a number of industrial projects to promote increased use of renewable sources of energy, more efficient and low-carbon technologies, and the implementation of energy audits and digitalisation (Republic of Lithuania, 2014).

Around 90 projects (with a total allocation of EUR 20.5 million) were dedicated to the installation of renewable energy production and the use of technologies for more efficient use of renewables in industrial enterprises for own consumption needs and to supply surplus energy to other industrial enterprises or centralised energy networks. Out of 90 projects, 72 were completed for an amount of more than EUR 15 million. Energy audits at industrial enterprises (65 projects) were supported with a budget of EUR 0.5 million. Around 20% of the 40 industrial enterprises that had performed energy audits were able to implement the energy efficiency measures recommended after the energy audits.

The programme also supported audits of industrial SMEs (98 projects) with a budget of EUR 53 million in order to assess the possibilities and perspectives of digitalisation of production processes, including the

use of equipment with integrated digitalisation technologies, based on the recommendations of the technological audit performed.

Focus on industrial electric motors:

In the NECP, future technology-neutral policies targeted to the industrial sector and including the upgrade of industrial electric motors as eligible activity are described:

- **PIS allowance for industry (EE5-E 2021-2028):** A support mechanism to finance the implementation of energy efficiency improvement measures in all major Lithuanian industrial plants that consume more than 1 GWh of electricity per year. Companies will receive compensation for the implementation of energy efficiency improvement measures by recovering 85 % of the public interest service price paid for the consumption of electricity in excess of 1 GWh in the previous calendar year, provided that the recovered funds are earmarked for investments in energy saving measures. Energy efficiency measures are planned to be implemented annually, leading to annual energy savings of around 77 GWh and energy savings of 4.23 TWh by 2030.
- **Implementation of energy efficiency measures by private legal entities according to energy audit reports (EE9-E 2021-2024, EE9-P 2025-2030):** The measure provides financial support to encourage companies to implement ESMs resulting from the energy audits (introduction of regulatory equipment, modernisation of lighting, installation and renewal of compressed air systems, upgrade of cooling systems, installation of efficient electric motors and other measures). Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of the energy efficiency improvement measures reported in the energy audits, i.e. comparable energy consumption before and after the introduction of the energy efficiency improvement measure.
- **Energy-saving agreements with state-owned and municipal-owned enterprises (EE6-E 2021-2030):** energy companies will save energy according to the energy levels indicated in the energy savings agreements (either by themselves or through others) by applying cost-effective energy efficiency improvement measures in final energy users' installations (installations, equipment, transport). This measure is expected to deliver savings of around 68 GWh annually and around 3.75 TWh by 2030.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The replacement of industrial electric motors is included in technology-neutral policy measures targeted to the industrial sector. No specific targets have been defined in terms of number and performance standards of the electric motors replacing old or inefficient ones. Little focused actions are being taken in this field.

9.17.1 Measure 1: Increase energy efficiency in industrial enterprises (private sector)

	Overview
Short Description	Competitive investment aid program funded by the EU Structural Fund 2021-2027, aimed at supporting the implementation of energy efficiency projects in industrial companies.
Responsible Authority	Ministry of Economy and Innovation (responsible authority), Innovation Agency (administering authority)
Status	Finished
Issue Date	2022
Start Date	December 2022
Ending Date	September 2029
Duration	81 months
Reference:	https://2021.esinvesticijos.lt/kvietimai/didinti-energijos-vartojimo-efektyvuma-pramones-imonese

9.17.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The programme plans to invest in increasing energy efficiency and reducing the intensity of energy consumption, enabling industrial companies to invest in the application of the latest and environmentally friendly equipment and technological solutions in production processes, ensuring the continuity of these production processes, i.e. updating the necessary technological equipment and the infrastructure of available technological processes, as well as equipment based on information and communication technologies and (or) sensors, controllers and actuators for the management of production facilities, enabling the increase of the energy efficiency of existing production equipment and (or) required to be integrated into newly purchased equipment and (or) existing production processes. Investment support is provided only for new equipment.

The activities foreseen by the project must comply with the measures recommended in the energy audit.

The project aims at least to a 30% reduction of direct and indirect greenhouse gas emissions. The start of project activities is no earlier than the submission of the PIP. Project activities must start within 6 months from the date of signing the project contract and the duration of implementation of project activities must not be longer than 36 months from the date of contract's signature. Projects must be completed at the latest by 1st September 2029.

The maximum amount of funding available for the project is 900.000 €, the minimum amount of funding available for the project is 75.000 €.

The selection of projects is carried out by means of a tender in one stage.

Documents required for the application are:

- Mandatory energy audit, prepared no earlier than 2 years before the submission of the PIP and an additional energy consumption audit, if the expediency of performing such an audit was determined during the mandatory audit (in the case of a large company)
- Energy audit, prepared no earlier than 2 years before the submission of the PIP (in the case of SMEs)
- Supporting documents for the project budget must be submitted (at least one commercial proposal, references to prices existing in the market, etc.)

The maximum possible financing part of the project is:

- Up to 50% in case of very small or small enterprise
- Up to 40% for medium-sized enterprises
- Up to 30% for large companies

An additional 15% is provided in case of projects implemented in the following counties: Alytus, Kaunas, Klaipėda, Marijampole, Panevėžys, Šiauliai, Tauragė, Telšiai and Utena.

Projects are selected through a tender, i.e. those with the most points are financed. The points assigned to a project follow three priority criteria:

- CO2 emissions reduction as reported in the energy audit (max. 5 points, weight 12)
- Project efficiency (the ratio between the amount of CO2 reduction planned by the applicant and the amount of funding requested)(max. 5 points, weight 4)
- Annual amount of primary energy saved (max. 5 points, weight 4)

The score of a project is determined as: $SCORE = P1*W1 + P2*W2 + P3*W3$, being P and W the points and weights assigned according to each criteria.

Characteristics	
Budget	35 M€, of which:

	<ul style="list-style-type: none"> - 20 M€ for companies operating in Middle and West Lithuanian regions (12 M€ for SMEs, 8 for large companies) - 15 M€ for companies operating in the capital (7.5 M€ for SMEs, 7.5 for large companies)
Financing of the measure	EU Structural Fund 2021-2027
Policy focusses	Physical intervention
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost, ROI
Key Driver(s)	Development Program Of The Ministry Of Economy And Innovation ¹⁴⁹
Replicability	Low (very targeted to specific regions of the country)
EU Inclusion	No
Related Characteristics	The program is technology-neutral and based on a competitive procedure, thus the scoring may be biased and favour specific technologies. The primary focus is however to privilege projects leading to high CO2 emissions savings.

9.17.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The final expected results of the measure to be achieved by 2030 are reported in the following ¹⁵⁰ table:		
Indicator	Unit of measurement	Final value (by date)
Companies that have implemented environmental innovation projects	%	64 (2029)
Jobs created in entities that received support	Full-time equivalents	260 (2029)
Private investments supplementing public support (of which: grants, financial instruments)	EUR	35169662 (2029)
SMEs carrying out internal innovations	# of companies	111 (2029)
Annual amount of primary energy consumption (of which: dwellings, public buildings, companies, other)	MWh/year	1429728 (2029)
Estimated emissions of GHG	tCO2/year	600486 (2029)
The number of implemented innovative projects	Units	100 (Q4 2023)
Supported companies (of which: micro, small, medium and large)	# of companies	669 (2029)
Companies that received support with grants	# of companies	644 (2029)

¹⁴⁹ <https://www.e-tar.lt/portal/lt/legalAct/8e51896000f111ed8fa7d02a65c371ad/asr>

¹⁵⁰ <https://2021.esinvesticijos.lt/dokumentai/kvietimo-didinti-energijos-vartojimo-efektyvuma-pramones-imonese-aprasas>

	Impacts
Case level impact	Medium (12%), calculated with respect to a total final consumption in the industrial sector of 42844 TJ/year (IEA, 2020)
Policy level impact	High (1.9%), calculated with respect to a total national energy consumption of 267287 TJ/year (IEA, 2020)
Size	Not available
Energy	Annual energy savings: 1429728 MWh/year by 2029 600486 tCO2/year by 2029
Impact evaluation	See above

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

Not reported in the project's call.

9.17.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

Simple and streamlined application process: the application process for funding needs to be simple and streamlined to make it easier for businesses to apply. The short duration of the call for projects may have hindered potential companies that intended to apply, especially SMEs.

Being in possess of an energy audit (not older than 2 years) may be an additional barrier for SMEs.

	Lessons Learnt
Key takeaways	General cross-cutting measure targeted to industrial companies and promoting the implementation of energy efficiency measures in specific regions of the country.
Recommendations	- Extend the call for projects application period
Linked measures	-
Reference(s)	https://2021.esinvesticijos.lt/kvietimai/didinti-energijos-vartojimo-efektyvuma-pramones-imonese
Other	https://innovationagency.lt/#%C4%AFra%C5%A1ai
Thoughts, comments, considerations ...	-

9.17.2 Measure 2: Agreements with energy companies on energy savings

Overview	
Short Description	Depending on the type of company, mandatory or voluntary agreements prescribed by the Energy Efficiency Law, to be stipulated by electricity and gas transmission system and distribution network operators must conclude with the Ministry of Energy publicly announced agreements for energy savings. Energy companies will save energy according to the levels of energy specified in the energy savings agreements (either on their own or through others) by applying cost effective energy efficiency improvement measures at the final energy customers' facilities (installations, equipment, transport).
Responsible Authority	Ministry of Energy
Status	Ongoing
Issue Date	2017
Start Date	2017
Ending Date	-
Duration	-
Reference:	https://www.e-tar.lt/portal/lt/legalAct/0af002e075c811e7827cd63159af616c

9.17.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The Efficiency Act legally regulates energy saving agreements. According to this law, state-owned operators of electricity and gas transmission systems and distribution networks are obliged to enter into publicly announced agreements with the Ministry of Energy due to energy saving. Other energy companies may also enter into energy conservation agreements with the Ministry of Energy.

The amount of energy savings to be achieved by energy companies is determined proportionally to the amount of final energy supplied to the consumers in the previous year.
Energy companies are obliged to save the amounts of energy determined in the agreements on energy savings (by themselves or through other persons) by implementing economically reasonable measures to increase the efficiency of energy consumption in the objects of final energy users (premises, devices, transport objects, etc.).

Every agreement specifies:

- The energy savings and/or greenhouse gas savings required by the energy company and a timetable for saving this amount;
- The procedure for submission of reports on the amount of energy saved (report form, submission periods);
- Information on energy efficiency improvement measures that ensure mandatory energy savings;
- Financial indicators of investments in energy efficiency improvement measures and their calculation methods;
- The duration of the agreement and the procedure for its extension.

Characteristics	
Budget	Not

Financing of the measure	Not expected
Policy focusses	Physical and soft intervention
Intervention Type	Equipment upgrade, increasing awareness
Main Barriers Addressed	Ease of regulation
Key Driver(s)	Energy Efficiency Action Plan (2017)
Replicability	Medium (common energy efficiency agreements, but mandatory for state-owned companies only)
EU Inclusion	Yes, included in the NECP as EE6-E
Related Characteristics	-

9.17.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

5.5 TWh of expected energy savings in the period 2021-2030¹⁵¹.

	Impacts
Case level impact	Low (1.84%, calculated with the data for policy measure impact ¹⁵² by MURE database and final energy consumption for the industrial sector in Lithuania by IEA ¹⁵³).
Policy level impact	Low (0.29%, calculated with the data for policy measure impact ¹⁵⁴ by MURE database and final energy consumption in Lithuania by IEA ¹⁵⁵).
Size	Not found
Energy	218630 MWh in 2017
Impact evaluation	-

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

The following methods are used to estimate the energy savings achieved through the application of efficiency policy measures that have the effect of reducing final energy consumption¹⁵⁶.

The energy saved by implementing energy efficiency-enhancing measures is evaluated:

- when measuring, where the energy savings resulting from the implementation of efficiency measures or a set of efficiency measures are determined by recording the actual reduction in

¹⁵¹ https://energy.ec.europa.eu/system/files/2022-08/lt_final_necp_main_en.pdf

¹⁵² <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1205>

¹⁵³ <https://www.iea.org/countries/lithuania>

¹⁵⁴ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1205>

¹⁵⁵ <https://www.iea.org/countries/lithuania>

¹⁵⁶ <https://www.e-tar.lt/portal/lt/legalAct/Oaf002e075c811e7827cd63159af616c>

- energy consumption, taking due account of factors such as the use of financial support, changes in land use and climatic conditions that may affect energy consumption;
- theoretically calculating the saved energy, when a theoretical evaluation of the technical parameters of the devices is carried out. Such a method can only be applied when it is difficult or disproportionately expensive to determine reliable measurement data for a specific device, or when it is carried out by qualified experts who are independent of the countries implementing the efficiency measures, following established methodologies and criteria;
- theoretically calculating energy savings based on independently observed results of previous energy efficiency improvements in similar installations.

The impact of agreements on consumer education and counseling on the reduction of energy consumption is evaluated:

- taking into account the results of surveys, which determine the reaction of consumers to advice, information campaigns, energy efficiency labeling labels, certification schemes or the use of smart metering devices. This method can only be used to calculate energy savings due to changes in consumer behavior. It cannot be applied when calculating the energy saved after installing energy efficiency improvement measures;
- taking into account the consumer information measures applied by the participating country, which may include the publication of information to end users about the benefits of efficiency measures on the Internet, in the press, in other distributed publications, the organization of energy saving publicity events, advice by phone or on the spot, training on how to operate heating or cooling systems, reports on annual energy consumption and other measures, but not limited to them.

Energy savings from other energy efficiency measures can be estimated using measurement-based data:

- by directly measuring energy consumption in the facility where the measure was implemented (specific technological device, process, building heating system, lighting devices, etc.);
- data of bills of energy consumption for the relevant period provided by energy companies before and after the implementation of the measure;
- energy sales data of energy companies, collected before and after the implementation of the measure;
- equipment and device sales data;
- applied research and survey data.

The amount of energy saved is calculated for individual energy efficiency policy measures using the "individual-to-total" method. In this case, using the "individual-to-total" method, the amount of energy saved due to each separately implemented energy efficiency improvement measure is assessed by summing up the energy savings achieved by them. The total annual national energy savings is calculated by summing up the savings of individual energy efficiency policy measures.

9.17.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

No significant barriers to the implementation have been identified.
There is the need of a proper monitoring platform and (public) reporting of the achieved energy savings.

	Lessons Learnt
Key takeaways	-
Recommendations	Need of a national monitoring platform

Linked measures	-
Reference(s)	-
Other	Ministry of Energy (https://enmin.lrv.it/en/)
Thoughts, comments, considerations ...	-

EU-MORE



**EUropean MOtor
REnovation initiative**



Luxembourg

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

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List of Acronyms

Acronym	Text
EEO	Energy Efficiency Obligation
ESR	Effort Sharing Regulation
GHG	Greenhouse Gas
HGV	Heavy Goods Vehicles
NECP	National Energy and Climate Plan
NEEAP	National Energy Efficiency Action Plans
SME	Small and Medium Enterprise



9.18 Luxembourg

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The Luxembourgish government has explicitly stated its willingness for being actively involved in the European energy transition, becoming a country of climate solutions and a hub for innovation. The Luxembourgish energy transition has already started and has been actively addressed in the past years. The transition is also part of the Third Industrial Revolution process, initiated in 2015 tackling various fields, ranging from energy efficiency in new buildings to utilising more sustainable means of transport. When considering energy efficiency specifically, Luxembourg has a target of 40–44% by 2030 (compared to the EU PRIMES model (2007)). Luxembourg has adopted three National Energy Efficiency Action Plans (NEEAPs) between 2008 and 2014; with the Fourth one being the most recent one, adopted by the Government in 2017 with goals until 2020. Luxembourg plays a leading role in Europe in the field of building energy efficiency, with compulsory nearly zero-energy building standards for newly constructed residential buildings since January 2017. Additionally, policy instruments such as aid for private households and municipalities and reduced-interest loans from banks for energy renovation have been implemented. In the industry sector, policy measures aimed at increasing the energy efficiency of processes and enhancing the utilisation of renewable energy have also been implemented.

The energy policy framework in Luxembourg is also affected by its geo-physical and industry characteristics. In fact, Luxembourg is one of the few countries in the European Union (EU) that does not dispose of any fossil resources, refining capacity, gas reservoirs and/or seaports. For these reasons, Luxembourg is highly energy dependent and does not have great opportunities to influence its security of supply through national measures. Rather, it relies on great and close cooperation with neighbouring countries, being part of the Pentalateral Energy Forum (composed of Austria, Belgium, France, Germany, the Netherlands and Switzerland).

The main Governmental bodies involved in the energy policy framework are mainly members of the Parliament, the Ministry of Energy and Spatial Development, and the Ministry of Environment, Climate and Sustainable Development. Nonetheless, when delineating the latest National Energy and Climate Plan (NECP), these Governmental bodies were in close collaboration with civil society organisations, business, science and public administration representatives. Additionally, citizens were also directly involved, as well as all other private stakeholders. Finally, two stakeholders worth of notice are: FEDIL, a multisectoral business federation, representing the industrialists and entrepreneurs in Luxembourg; and Klima-Agence, an organisation supported by the Government, aiming to help individuals, institutions, municipalities and professionals to implement climate and energy policies as set in the NECP.

In its NECP, Luxembourg addresses different aspects related to the energy transition. With regards to its greenhouse gas (GHG) emissions reduction, it places as an objective to reduce its emissions by 55% by 2030 compared to 2005, 15 percentage points higher than the 40% suggested objective under the Effort Sharing Regulation (ESR). When considering renewable energy, here a target of 25% of gross final energy consumption in 2030 was posed, sufficiently higher than the 22% resulting from the formula in Annex II of the Governance Regulation¹⁵⁷. Energy efficiency is considered as a top priority. Luxembourg's objective of 40–44% reduction in final energy consumption (i.e., 3.06 Mtoe) was considered of sufficient ambition by the European Commission¹⁵⁸. Whereas the NECP provides many elements related to energy efficiency in the residential sector and the promotion of nearly zero-energy

¹⁵⁷ The Commission's recommendations with regard to the Member States' renewable ambitions are based on a formula set out in this Regulation. The formula is based on objective criteria.

¹⁵⁸ [https://energy.ec.europa.eu/system/files/2021-](https://energy.ec.europa.eu/system/files/2021-01/staff_working_document_assessment_necp_luxembourg_en_0.pdf)

[01/staff_working_document_assessment_necp_luxembourg_en_0.pdf](https://energy.ec.europa.eu/system/files/2021-01/staff_working_document_assessment_necp_luxembourg_en_0.pdf)

buildings, it does not explain the application of the “energy efficiency first” principle and does not specify the envisioned reduction in primary energy consumption. The plan further tackles the energy security sphere, mentioning how this will be obtained by energy efficiency measures in buildings and transport, making the latter free and more electrified; and by strengthening the local renewable energy production. In the plan, aspects of a just and fair transition and energy poverty are also addressed, providing information on the various impacts the transition can have and the number of energy poor households present in the country and how to improve these figures. Finally, it must be noted that Luxembourg aims to become an international hub for climate-related startups, and as such contains various national objectives and targets on research, innovation, and competitiveness. Nonetheless, the additional investment needs were not provided in the NECP.

The main energy efficiency policies and measures present in the NECP are described in the following paragraph. A first measure is to develop a large energy efficiency investment market, by combining audits including an audit transparency platform and an energy efficiency financing fund (de-risking), for industry, Small and Medium Enterprises (SMEs) and large office buildings; further strengthening the voluntary agreement with industry (“Accord volontaire”) and expanding it to SMEs, continuing and extending the energy efficiency obligation (EEO) for all sellers of energy. A second policy is to increase energy efficiency in transport through traffic avoidance, massive expansion of public transport and the repaid development of electromobility in cars and vans (premiums, establishing a nationwide fast charging network). Thirdly, renovate the existing housing stock (3% renovation rate at 72% renovation depth on average) and build low-energy and energy-plus buildings by law for residential and single-purpose buildings. Lastly, other measures include the reduction of sale of diesel to transiting HGVs, large-scale training programmes for tradespeople, engineers and architects. Finally, the state and municipalities should play an exemplary role in their buildings and lighting.

When considering energy efficiency measures in the industry sector specifically, the main measure implemented is the previously mentioned voluntary agreement (“Accord volontaire”). This is an agreement between the Luxembourgish government, FEDIL (the Luxembourgish Business Federation) and Klima Agence GIE (a government-supported organisation). The first agreement came into force in 1996 and has been renewed ever since. Part of the Fourth National Energy Efficiency Action Plan (NEEAP) and of the NECP, this voluntary agreement has been renewed in 2021 to last until the end of 2023¹⁵⁹. The agreement aims to improve energy efficiency in the industrial sector as a whole. Currently, 50 energy-intensive companies are signatories of the agreement. The main target/objective is to achieve 4.5% improvement in the overall energy efficiency of all participants from the start of 2021 to the end of 2023. The previous period was from 2017 to the end of 2020 with an improvement target of 7%. The agreement does not mention electric motors specifically. Each company under the agreement will have to present annual reports related to their energy efficiency measures and savings and perform energy audits. The energy audits are expected to be extended to medium-sized industrial processes and office buildings. The companies part of this agreement, once their targets are met, will be able to benefit from several advantages, stemming from the support of Klima Agence to help in the process, but also savings on taxation of energy products and electricity as allowed under the European Directive 2003/96/EC. Other measures in the sector include an energy savings obligation scheme and a financial aid tool, namely the pre-financing and risk management tool, aimed at increasing investment in energy efficiency measures through improved use and a more transparent analysis of data from existing building and industrial projects.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

Luxembourg’s effort in energy efficiency in general has been deemed as sufficient by the European Commission’s assessment of the NECP. The energy efficiency efforts are very much focused on the

¹⁵⁹ <https://www.klima-agence.lu/en/fedil-voluntary-agreement>

residential sector and transport sector. Specifically, Luxembourg is one of the EU's frontrunners in nearly- or zero-energy buildings implementation. Nonetheless, in the industry sector specifically, the efforts are rather limited. Industries account for about 30% of the country's final energy consumption¹⁶⁰. Additionally, Luxembourg is highly import-dependent when it comes to energy, as it does not have any fossil fuel resources or gas refineries. Therefore, the focus on the building's sector is understandable. Similarly, it is understandable that the efforts in the energy efficiency of the industry sector take a general form where general savings are considered rather than policies focused on the renewal of electric motors specifically. Therefore, Luxembourg is certainly not a frontrunner in the renewal of electric motors in the industry sector. However, considering its size and geo-physical characteristics, it could be defined as being on the right track with regards to energy efficiency in industry, with more progress being possible considering the renewal of electric motors specifically.

9.18.1 Measure 1: Voluntary Agreements (“Accord Volontaire”)

Overview	
Short Description	This is the main policy related to energy efficiency in the industry sector in Luxembourg. Whereas not directly related to the replacement of electric motors, it aims at improving the energy efficiency in industries in general. Based on a voluntary agreement, industries commit to improve their energy efficiency and provide annual reports about their commitment.
Responsible Authority	Ministry of Energy and Spatial Development, Ministry of Environment, Climate and Sustainable Development, FIDEL, Klima Agence
Status	Ongoing
Issue Date	1996
Start Date	1996
Ending Date	December, 2023
Duration	27 years
Reference:	https://www.klima-agence.lu/en/fedil-voluntary-agreement

9.18.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes.

The measure is targeted at energy-intensive companies in the industry and tertiary sector, including SMEs. All energy-intensive companies are eligible to be part of the agreement. The companies made a commitment to reach a common target of a 4.5% improvement in the overall energy efficiency of all participants by the end of 2023 (starting from 2021)¹⁶¹. Electric motor renovation is not mentioned specifically but is one energy efficiency improvement action that would help reaching the common target. The participating enterprises are required to finance the energy efficiency requirements themselves. In return, they are exempted from a proportion of the tax on electricity and gas¹⁶². In the European Commission's assessment of Luxembourg's most recent NECP, the voluntary agreement was defined as *credible* policy, “but their actual impact on the cumulative energy savings target is uncertain as there is no detailed description of measures including estimated cumulative energy savings and other elements required by Annex III to the Governance Regulation.”

¹⁶⁰ <https://www.klima-agence.lu/en/fedil-voluntary-agreement>

¹⁶¹ <https://www.klima-agence.lu/en/fedil-voluntary-agreement>

¹⁶² Fourth NEEAP Luxembourg

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	Characteristics
Budget	Voluntary agreement based on self-funding.
Financing of the measure	Companies adhering to the agreement will be exempted from taxes on electricity and gas.
Policy focusses	Policy focused on service interventions.
Intervention Type	Incentive-based.
Main Barriers Addressed	Industrial energy efficiency in general.
Key Driver(s)	EU directive related to tax incentives on electricity and gas resulting from energy savings (Directive 2003/96/EC).
Replicability	Very high, as it has been renewed several times. First agreement came into form in 1996 and lasted until 2000. Thereafter it was renewed several times with the current one going from January 2021 to December 2023.
EU Inclusion	Yes, it is included in the NECP.
Related Characteristics	Energy audits need to be performed and a yearly progress report needs to be delivered. Additionally, the obligated parties need to be met regularly and experiences need to be exchanged. Energy efficiency trainings need to be offered to employees.

9.18.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

In the period 2011–2016 154 GWh were saved, whereas in the period 2017–2020 368 GWh were saved. The targets have been achieved in the past, so the target of 4.5% saving in overall energy efficiency between 2021 and 2023 is expected to be achieved. Considering the previous results, an average of 261 GWh can be expected to be saved (as it is expected that the total energy consumption has lowered, as this was the trend from 2017 to 2020¹⁶³).

	Impacts
Case level impact	Low
Policy level impact	Low
Size	Unknown
Energy	Expected around 261 GWh of energy savings (own calculation).
Impact evaluation	The measure managed to achieve the predetermined goal of general energy savings/energy efficiency improvement.

¹⁶³ https://www.klima-agence.lu/sites/default/files/2022-06/bilan_AV_2020_VE_version_publique_KA_220513.pdf

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Not available.

9.18.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

The voluntary agreement form proved to be very successful as it was renewed multiple times. No major barriers can be found as of today as there are over 20 years of experience in making the measure work. Perhaps, the energy efficiency target could be made more ambitious.

	Lessons Learnt
Key takeaways	The measure was found to be very successful. The majority of energy-intensive companies in Luxembourg adhere regularly. The incentive for companies to adhere to the program is appealing.
Recommendations	The measure should be more detailed, as now only general energy efficiency is tackled (e.g., no focus on electric motors specifically).
Linked measures	"De-risking": a pre-financing and risk management tool included in the latest NECP.
Reference(s)	All the references used throughout the report can be found as footnotes.
Other	
Thoughts, comments, considerations ...	No specific policy measure related to the renovation of electric motors in industries in Luxembourg could be found. It needs to be considered that Luxembourg is among the smallest countries in Europe, with a very high energy import dependency and below-average industrial capacity. Hence, whereas the tendency of making general energy efficiency policy measures is understandable, nonetheless these should be made more detailed.

EU-MORE



**EUropean M0tor
REnovation initiative**



Malta

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Giulia Viero (IEECP)



9.19 Malta

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Malta's National Energy and Climate Plan (NECP) is presented to ensure the achievement of the Union's 2030 long-term objectives and targets in line with the Union's international commitments under the Paris Agreement. The Ministry for Energy and Water Management is the lead Ministry in the development of the NECP, and other national governmental entities are considered as key stakeholders responsible for the implementation of specific sections of national energy and climate policies. The following Ministries are considered as important contributors to the drafting of the Plan and have been tasked with providing input to sections falling under their remit: The Office of the Prime Minister, Ministry for the Environment, Sustainable Development and Climate Change, Minister for Transport, Infrastructure and Capital Projects, Ministry for the Economy, Investment and Small Business, Ministry for Finance, Ministry for European Affairs and Equality, Ministry for Education and Employment, Ministry for Justice, Culture and Local Government, and Parliamentary Secretary for Financial Services, Digital Economy and Innovation.

Malta's NECP aims to reach an energy intensity of 0.07 toe/€2005 in 2030 and to reach energy savings obligations under Article 7 of the Energy Efficiency Directive. Energy savings obligations and incentives for all energy end-use sectors are provided through measures such as electricity tariffs supporting energy efficiency, support schemes for services and industry, government leading by example, and projects in primary water network and wastewater treatment plants. Financing schemes/instruments and fiscal incentives are used to incentivize target sectors to adopt more energy-efficient technologies. Regulations and voluntary agreements with relatively high consumers of energy are encouraged to adopt more energy-efficient technologies. Public Sector leading by example whereby Government and public entities are being seen to actively pursue energy-efficient measures and projects.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

No specific policy measures directly addressing the replacement of industrial electric motors have been adopted or declared.

9.19.1 Measure 1: Aid Investment Scheme for Businesses

	Overview
Short Description	Aid in the form of a cash grant or tax credit to support companies in implementing energy efficiency projects.
Responsible Authority	Energy and Water Agency, Malta Enterprise
Status	Ongoing
Issue Date	October, 2020
Start Date	2021
Ending Date	November, 2023
Duration	36 months
Reference:	https://www.gov.mt/en/Government/DOI/Press%20Releases/Pages/2020/October/08/pr201929en.aspx https://energywateragency.gov.mt/schemes-1/investmentaidscheme/ https://stateaid.gov.mt/wp-content/uploads/2023/04/Investmen%E2%80%8Bt-Aid-for-Energy-Efficient-Projects-applicable-as-of-1-June-2020.pdf

9.19.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The aid supports the direct investment in more efficient equipment through the implementation of one of the below:

- investment in substitution or upgrading of equipment and installations to reduce energy consumption;
- renovation or upgrading of equipment of existing installation for heating (or cooling) systems;
- the improvement of energy efficiency of existing illumination systems.

The project must entail an investment of at least ten thousand Euro (€10,000) that is directly related to achieving energy savings and has to provide a supporting justification from a competent person that the resultant estimated energy saving to be achieved as a result of implementing the proposed investment will be achieving at least a 10% reduction in the overall enterprise's consumption. Approved projects must commence within six months from the date they are approved and should be completed within thirty-six months from approval date.

The eligible costs, which should be directly linked to the achievement of a higher level of energy efficiency, shall be determined as follows:

- a) where the costs of investing in energy efficiency can be identified in the total investment cost as a separate investment, this energy efficiency-related cost shall constitute the eligible costs;
- b) in all other cases, the costs of investing in energy efficiency are identified by reference to a similar, less energy efficient investment that would have been credibly carried out without the aid. The difference between the costs of both investments identifies the energy efficiency-related cost and constitutes the eligible costs.

Aid shall not be granted to investment in new buildings or extensions of existing buildings and on investments related to the generation of electricity such as PV installations.

Costs not directly linked to the achievement of a higher level of energy efficiency shall not be eligible. Aid shall not be granted where investment and/or improvements are undertaken to comply with Union standards already adopted, even if they are not yet in force.

	Characteristics
Budget	15 M€ in total, 5 M€ per year
Financing of the measure	Ministry for the Economy, Investment and Small Businesses
Policy focusses	Physical intervention
Intervention Type	Equipment upgrade
Main Barriers Addressed	General financial viability, return on investment
Key Driver(s)	EED
Replicability	High
EU Inclusion	Not included (in the 2019 draft of NECP)
Related Characteristics	-

9.19.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

No information about the expected and achieved results are publicly available.

	Impacts
Case level impact	Case level impact
Medium	Medium
Policy level impact	Policy level impact
Medium	Medium
Size	Size

(If available) Provide a description of the method used for calculating the final energy- / cost- savings achieved through the measure.

Not available.

9.19.1.3 *Lessons Learnt*

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

- (Publicly available) targets in terms of energy savings/GHG emissions reduction are needed
- A monitoring platform is needed
- The eligible activities for the aid should be better described and more targeted to projects with high impact in terms of energy savings/GHG emissions reduction
- Simple application procedure (Malta Enterprise application platform)
- Both electric motors replacement and retrofit are eligible projects;

	Lessons Learnt
Key takeaways	Simple application procedure (Malta Enterprise application platform); Both electric motors replacement and retrofit are eligible projects;
Recommendations	(Publicly available) targets in terms of energy savings/GHG emissions reduction are needed; A monitoring platform is needed; The eligible activities for the aid should be better described and more targeted to projects with high impact in terms of energy savings/GHG emissions reduction;
Linked measures	Not found.
Reference(s)	https://maltaenterprise.com/support/investment-aid-energy-efficiency-projects
Other	
Thoughts, comments, considerations ...	



Netherlands

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

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List of Acronyms

Acronym	Description	English
EIA	Energie-investeringsaftrek	Energy-Investment Allowance
EZK	Ministerie van Economische Zaken en Klimaat	Ministry for Economic Affairs and Climate
PBL	Planbureau voor de Leefomgeving	Environmental Assessment Agency
RVO	Rijksdienst Voor Ondernemend Nederland	Dutch Enterprise Agency



9.20 Netherlands

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Taken directly from the submitted [Draft update of the National Plan Energy and Climate 2021-2030](#) (NECP, 2023)

Section:

"1.1 Summary

- I. Political, economic, environmental, and social context of the plan

(...)

"The urgency of the climate issue is also reflected in the 2022 Dutch Coalition Agreement. It was agreed that the new government would bring the Dutch Climate Law into line with the European Climate Law. In 2050, the Netherlands is part of a climate-neutral Europe. The national interim target for 2030 shall be strengthened to at least 55 % net greenhouse gas emission reduction by 2030 compared to 1990. In order to achieve this target, it has been agreed to focus the policy on a higher challenge of around 60 % by 2030. The policy was developed in the Climate Policy programme published in June 2022 and the additional policy package agreed by the government in April 2023 ('Spring Decision-making Climate Action').

The mission of this new policy is to achieve a just, feasible and ambitious climate policy:

- **Fair:** In climate policy, the government takes account of the benefit to society, taking into account the contribution to the objectives and the (national) costs to society. The government wants the 'emitter' to pay, and that it pays for sustainability. We also look at ability to pay. For example, the government does not want only people who can pre-finance investments to benefit from public schemes. Strong shoulders are expected to be able to bear heavier burdens: increases in the burden on low and middle-income earners shall be minimised as far as possible. When designing subsidy schemes, we look not only at the greatest impact on the goals, but also at whether public support is channelled to households and entrepreneurs who need it most. Because of financial concerns, limited time or less digital skills, there is a growing group of people struggling to get involved in the transition. For example, they have no savings to make their homes more sustainable, do not know how to apply for subsidies or do not have time to make their homes more sustainable. Whether they live in a rented house which makes them dependent on the landlord for sustainability. The government wants to provide additional support to this group through subsidies and care.

- **Implementable:** With the pace we need to make, we are looking for the limits of what is feasible until 2030. Because of the need to catch up, tensions are emerging. Is the necessary infrastructure in place in good time? Are there enough skilled people to do the job? Can the Cabinet and Chambers be sufficiently speeded up with the comprehensive legislative programme? We already see that it is sometimes piking and scratching. Because of the urgency of the climate challenge, this cannot be a reason for scaling back measures and ambitions. Instead, we are working on targeted solutions that will do everything we can to accelerate policy implementation. The challenges surrounding the electricity grid are being addressed through the National Action Programme for Network Conductions (LAN). Network operators shall make investments to accelerate the expansion of the grid and to use it flexibly and optimally. The government makes it legally possible to speed up procedures, and thus lead times, for energy infrastructure projects. The government is also ready to participate in regional network companies so that they have sufficient capital to invest vigorously in expanding the electricity grid. The Government responds to the call of the parties to the Rijksregie through the Multiannual Programme for Infrastructure and Climate Action (MIEK), so that network operators can better plan and prioritise investments and focus on areas where capacity is most refurbished and expansion is the most urgent for society. With the arrival of the National Energy System Plan (NPE), we want to better

anticipate future developments by planning and programming ahead. With the introduction of the National Industry Sustainability Programme, there will be a stronger responsibility for making industry more sustainable and more coherent between the various initiatives. To avoid shortages of professionals leading to delays in implementation, the government has recently launched an Action Plan on Green and Digital Jobs. We also call on employers to continue investing in reskilling and upskilling professionals.

• **Ambitious:** The Dutch contribution to a climate-neutral Europe is enshrined in the Dutch Climate Law. This also applies to the 2030 interim target of achieving at least 55 % greenhouse gas emission reductions at national level. We are pushing for around 60 % reduction, and we are committed to “overprogramming” measures. With this, the government, together with the elaboration of the Coalition Agreement as laid down in the Climate Policy Programme, expects the ambition of at least 55 % reduction to come within reach.”

II. The European Energy Union

The Paris Agreement agreed to keep average global warming well below 2 °C, with a target of 1.5 °C. The European Union, on behalf of the Member States, has made firm commitments to reduce greenhouse gas emissions by at least 55 % by 2030 compared to 1990 levels. Cooperation within the European Union creates synergies between countries in the fight against climate change and the energy transition, making them more efficient and effective.

In the European Union, major steps have been taken in recent years to translate the objectives of the Paris Agreement into European objectives and legislation. The Netherlands endorses the European climate objectives. As described in the previous section, the national strategy to achieve the long-term reduction targets is set out in the Climate Plan, which is largely based on the Climate Agreement. Given the integral nature of the Climate Agreement, it addresses the five dimensions of the Energy Union (decarbonisation, energy saving, energy security, internal energy market, and research and innovation). These are divided into five sectors, namely electricity, industry, mobility, agriculture and land use, and built environment, and in a number of cross-cutting topics, namely electrification, hydrogen, bio-raw materials, innovation, labour market and training, financing, citizen participation, spatial integration and regional energy strategy (RES).

The Russian invasion of Ukraine has further highlighted the importance of close European energy cooperation, including in the areas of security of supply and affordability of energy. EU Member States have jointly taken several measures under REPowerEU 8 to phase out Europe’s dependence on Russian fossil fuels as soon as possible and to increase the security of supply of natural gas and reduce high prices for European citizens. These include agreements on the timely and adequate filling of gas deposits, the achievement of gas savings and the setting up of a mechanism for joint procurement of gas.

III. National emission reduction target

With the climate and energy paragraph in the Coalition Agreement, the Dutch government increased its climate ambition in early 2022. The 2019 Climate Agreement aimed to reduce greenhouse gas emissions by 49 % by 2030 compared to 1990 and 95 % by 2050. In the Coalition Agreement, the Netherlands increased this to at least 55 % net reduction in greenhouse gas emissions compared to 1990 and is part of a climate-neutral Europe in 2050, in line with the European Climate Law. The Coalition Agreement agreed to focus climate policy on a higher target of around 60 % reduction so that the climate law target is more likely to be achieved.

The June 2022 Climate Policy Programme, which complements the 2020 Climate Plan, developed the policy towards the higher 2030 target. Compared to 1990, the Netherlands is expected to reduce greenhouse gas emissions by 39-50 % in 2030, as projected by the PBL in the 2022 KEV, if the policy deployed is speedily and fully implemented.

In the spring decision making in April 2023, the government subsequently presented an additional package of measures with an envisaged reduction of around 22 megatons of greenhouse gas emissions by 2030 (on top of the projections in the KEV2022). With this, together with the elaboration

of the Coalition Agreement as laid down in the Climate Policy Programme, the government expects the ambition of at least 55 % reduction to come within reach.”

Section 3.2 (p.82):

“Industry

For the industry sector, there are several policy instruments that are being used. On the one hand, industrial companies are faced with the energy saving obligation. This is described in more detail above. In addition, a levy is paid in the Netherlands for CO₂ emissions from industrial companies. This is done by the EU ETS, but the Netherlands has also introduced a national CO₂ levy for industry that may be higher than the ETS price. Tailor-made arrangements are being made with the largest industrial companies to make their entire business sustainable.

In addition to obligations and pricing, industry in the Netherlands is also supported to save energy. For example, companies are entitled to the aid scheme for Accelerated Energy and Climate Investments (VEKI), which has been earmarked for EUR 2023 138 million. For more innovative projects, industry is eligible for the Demonstratie Energie Innovatie (DEI+) subsidy scheme, which is budgeted in EUR 2023 65 million. Finally, industrial companies can benefit from tax schemes such as the Energy Investment Deduction (EIA) and the Environmental Investment Deduction (MIA/Vamil). Finally, companies are entitled to the Stimulerend Sustainable Energy Production (SDE++).”

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The Netherlands is and remains ambitious and objectively at the forefront of the energy transition, introducing advanced policy measures targeting EU-MORE related measures for (industry) companies.

An important (new) development within the Dutch legislative framework is the requirement (as of end of 2023) for large companies to analyse all motor driven systems larger than 15 kW. This happens as part of the mandatory energy audit which is implemented nationally (refer to the ‘onderzoekplicht’ and ‘informatieplicht’) and overlaps with the mandatory energy audits for large companies required by the EED Art.7/8 every 4 years.

This specific inclusion of motor driven systems in the mandatory energy audit is an important development that could be the first step towards accelerated uptake and implementation of specific policy measures targeted at the replacement of old- and inefficient electric motors.

In regard to this review, three measures were found that stipulate the replacement of electric motors for energy efficiency improvements: 1. the Energie-investeringsaftrek (EIA), 2. the Versnelde klimaatinvesteringen industrie (VEKI), and 3. the Milieu-investeringsaftrek (MIA) & Willekeurige afschrijving milieu-investeringen (VAMIL). Each identifying and targeting the replacement of electric motors in processes through various intervention types and are described in detail below.

However in each of the identified measures the replacement of electric motors is part of wider policy and technical interventions providing blanket EE improvements to companies or the industry sector.

The Dutch ‘Energy List’ provides detailed specification for eligible (technical) measures which, in relation to EU-MORE, includes IE3, IE4 and IE5 electric motors for use in (industry) company processes. More on this below.

9.20.1 Measure 1: Energie-investeringsaftrek (EIA)

Overview	
Short Description	EIA stands for Energy-Investment Allowance and allows companies to receive a tax deduction for investments made that are included in the Energy List (referred to as 'company resources') and that result in substantial energy savings. Companies can deduct 45.5% of the investment costs from their taxable profit.
Responsible Authority	The measure was introduced by the Dutch Ministry of Economic Affairs and Climate (EZK) https://www.rijksoverheid.nl/ministeries/ministerie-van-economische-zaken-en-klimaat And is administered by the Netherlands Enterprise Agency, 'Rijksdienst Voor Ondernemend Nederland' (RVO) https://english.rvo.nl/ and the Tax Administration 'Belastingdienst' https://www.belastingdienst.nl/
Status	Ongoing
Issue Date	1997
Start Date	1997
Ending Date	
Duration	Ongoing (>25 years)
Reference:	Dutch: https://www.rvo.nl/subsidies-financiering/eia/ondernemers English: https://english.rvo.nl/subsidies-programmes/energy-investment-allowance-eia#

9.20.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

Through the EIA companies can receive a tax deduction for clearly defined investments and for tailor-made investments that result in substantial energy savings. With a minimum amount of €2.500 and a maximum investment amount of €136 M EUR

Companies can deduct 45.5% of the investment costs from the taxable profit. This is possible on top of the usual depreciation. These investments are described as 'company resources' and are specific to technologies that are included in the annually revised 'Energy List'¹⁶⁴.

Conditions:

The EIA is a scheme for companies, not for private individuals, associations or foundations. The conditions to qualify for EIA are that:

- You are an entrepreneur in the Netherlands, Aruba, Curacao, Sint Maarten or the BES Islands.
- You pay income tax or company tax.
- Your investment is included in the Energy List (referred to as 'company resources').
- The company resource meets the requirements for the Energy List.
- The company resource has not been used before.
- You report the company resource on time (main rule: within 3 months after the order to supply).

¹⁶⁴ <https://www.rvo.nl/sites/default/files/2022-12/Brochure-EIA-Energielijst2023.pdf>

If a specific investment is not on the Energy List companies can report the investment under a generic code and include an energy-saving calculation to demonstrate that equipment that is not on the energy list meets EIA standards.

Companies can also submit proposals to try and include the investment in the Energy List of the following year. This procedure is in Dutch and is called 'Leveranciersvoorstel voor Energielijst'.

Specific to EU-MORE is the inclusion on the Energy List of investments in HR electric motor [W]¹⁶⁵

For use in:

- a. electric motor, designed for direct connection to the electricity grid
- b. Ex eb electric motor, designed for direct connection to the electricity grid,
- c. electric motor, designed for variable speed and not connected directly to the electricity grid

a. and consisting of:

2, 4 or 6-pole electric motor with a nominal power of less than 75kW or greater than 200kW or 8-pole electric motor that meets the IE4 efficiency class measured in accordance with NEN-EN-IEC 60034-30-1:2014;

b. and consisting of:

Ex eb electric motor, which meets the IE3 efficiency class measured in accordance with NEN-EN-IEC 60034-30-1:2014;

c. and consisting of:

electric motor, which complies with the IE5 efficiency class in accordance with NVN-CLC-IEC/TS 60034-30-2:2021, electronic speed control, (possibly) integrated gear unit (not being a worm gear unit).

Synchronous motors (including direct current motors) can be reported under category c.

Apart from the expenses for the company resource, all expenses that are technically necessary and purely for that company resource are expenses eligible for the EIA. These are usually the material and fitting expenses of the company resource.

Private individuals, associations or foundations cannot use the EIA. Lease constructions or ESCOs (Energy Service Companies) allow several parties to benefit from the EIA. The investing party obtains the fiscal advantage, while the party using the energy investment saves on costs/energy use.

Characteristics							
Budget	<p>The budget for the EIA in 2023 is €249 million with a 45.5% rate deducted from taxable profit.</p> <p>The budget for 2023 was increased by €100 Million compared to 2022.</p> <p>The government writes in the Budget Memorandum and the accompanying budgets that due to the increased inflation and energy prices, companies are making extensive use of the EIA. But even before 2022, according to the government, applications for the scheme increased and this trend will continue.</p> <p>To give companies extra support and to accommodate the higher demand, the government is structurally increasing the budget for the EIA.</p>						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Year</th> <th style="width: 35%;">Available Budget (MEUR)</th> <th style="width: 50%;">Rate deducted from taxable profit</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Year	Available Budget (MEUR)	Rate deducted from taxable profit			
Year	Available Budget (MEUR)	Rate deducted from taxable profit					

¹⁶⁵ <https://data.rvo.nl/subsidies-regelingen/milieulijst-en-energielijst/eia/hr-elektromotor-w-2>

	2014	111	41.5%	
	2015	101	41.5%	
	2016	161	58%	
	2017	166	55%	
	2018	149	55%	
	2019	147	45%	
	2020	147	45%	
	2021	149	45.5%	
	2022	149	45.5%	
	2023	249	45.5%	
Financing of the measure	Government provided budget available through tax deduction.			
Policy focus	Product			
Intervention Type	Deduction on taxable profit of company			
Main Barriers Addressed	<p>The EIA is one of the factors that influences the investment decision in energy-efficient technologies. The EIA aims to realize energy savings by accelerating the market introduction of innovative assets that are more efficient than the assets currently available in the market. Energy-efficient technologies, especially in the initial phase, often have additional costs. The EIA shortens the payback period through a (one-off) subsidy in the form of a tax deduction on the purchase of an energy-efficient means of production. If this payback period is short, the government does not have to pay the entrepreneur to buy an energy-efficient asset, that is what the entrepreneur does then by itself.</p> <p>As of 2017, the savings standards within the EIA have been expanded. In principle, more investments qualify for the EIA, including more innovative ones projects that require a longer payback period. Due to these changes, it is reasonable that the range of payback times of supported investments has been expanded.</p> <p>Main Barriers addressed: (Financial)</p> <ul style="list-style-type: none"> • High costs • Financial risk for companies • Long return on investment <p>Source: PBL https://www.pbl.nl/</p>			
Key Driver(s)	Decision to stimulate the uptake and implementation of investments in Energy Saving Technologies made by the Dutch Ministry of Economic Affairs and Climate (EZK)			
Replicability	High			
EU Inclusion	Yes, The EIA is an important policy incentive to stimulate the uptake of energy saving measures.			
Related Characteristics	The requirement criteria for eligibility of high-efficiency electric motors on the energy list was tightened to match developments in the market. An assessment of these efficiency criteria happens annually.			

9.20.1.2 Impacts

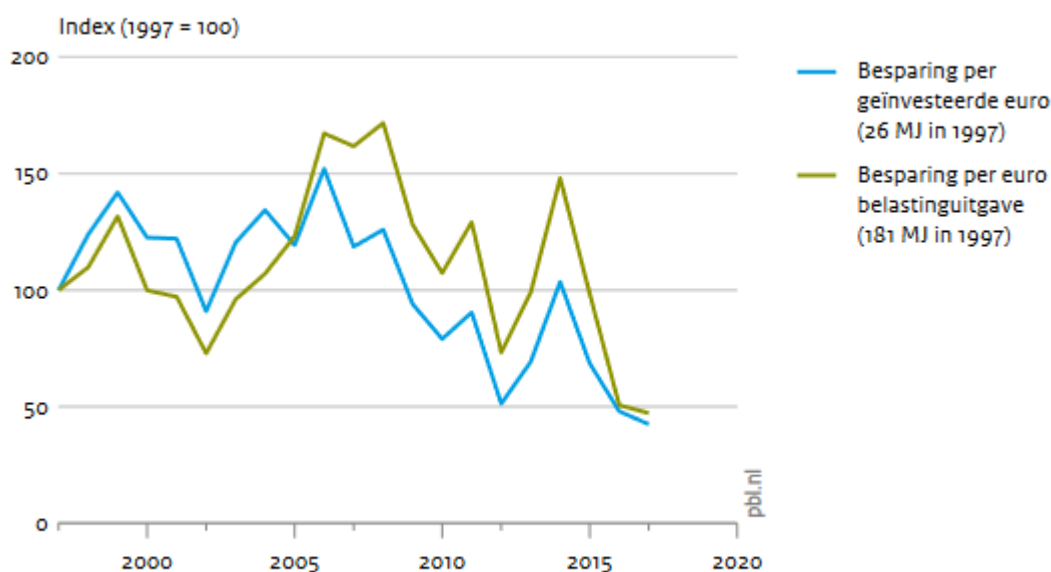


A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Taken and translated from the EIA impact evaluation study done by PBL (2020)¹⁶⁶
 The effectiveness of the EIA is relatively high, but is gradually declining. The effectiveness of the EIA, measured as energy savings per euro of tax expenditure, appears to be high compared to other schemes. Even considering freeriders, the benefits per euro of public money are still very decent. Converted to euros per tonne of CO2 saved emission, it concerns a subsidy 'effectiveness' between 2012 and 2017 of an average **of 14 euros per ton of CO2** and **when taking into account freeriders between 21 and 46 euros per tonne of CO2**. This is one compared to other grants relatively cheap way to save on CO2.

However, this effectiveness gradually decreases (see figure), which also depends on the choice to focus the EIA only on energy-saving technology and no longer on investments in sustainable energy because the former yields more per euro of investment according to existing calculation rules. It's also likely that the current subsidized techniques save less per euro of tax expenditure than in the past because the 'low-hanging fruit' has been picked.

Jaarlijkse energiebesparing van energie-investeringsaftrek per euro



Bron: CBS en RVO.nl; bewerking PBL/CE Delft

Taken from the annual summary report on the EIA (2021):

- 1,074 kilotonnes: total CO2 reduction per year through energy-saving investments in 2021
- 607 million m3: energy savings in m3 natural gas (equivalent)
- 330,000: number of households comparable to 522 million m3 of natural gas (equivalent)

Impacts	
Case level impact	High (>20%)
Policy level impact	High (>0.5%)

¹⁶⁶ <https://www.pbl.nl/sites/default/files/downloads/pbl-2020-energie-investeringsaftrek-freeriding-binnen-de-perken-achtergrondstudie-4130.pdf>

Size	<ul style="list-style-type: none"> • € 2,187 million: total amount that companies in the Netherlands invested in sustainable technology • 20%: the increase in the total investment amount compared to 2020 • 19,479: total number of EIA applications (+29 compared to 2020) • 11,325: number of companies who submitted an EIA application compared to 2020 <p>As per 2021 reported numbers EIA¹⁶⁷ relating to the investment on motors:</p> <p>Category: Buildings Others: # requests received 2.997 Amount: €364,7 M EUR</p> <p>Category: Processes Others: # Requests 821 Amount: €763,7 M EUR</p> <p>Category: Transport Others: # requests: 475 Amount: 68,8 M EUR</p>
Energy	<ul style="list-style-type: none"> • 1,074 kilotonnes: total CO2 reduction per year through energy-saving investments in 2021 (other source state an annual CO2-reduction between 0,7 to 1,5 Mto) • 607 million m³: energy savings in m³ natural gas (equivalent) • 330,000: number of households comparable to 522 million m³ of natural gas (equivalent)
Impact evaluation	<p>2021 in a nutshell</p> <ul style="list-style-type: none"> • 11% : the net benefit that the EIA provided entrepreneurs in 2021 with their energy-saving investments

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

For an overview of the EIA impact calculations revert to section G of the published EIA Policy Evaluation Report 2012-2017¹⁶⁸

No calculation specific to the motors affected by the measure is available.

9.20.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure’s implementation. The main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

An evaluation of the EIA and conclude that the EIA gives an effective stimulus to invest in energy savings, although many of the investments would have occurred anyway. This policy measure copes with a relative high amount of calculated ‘Freeriders’ and expects this to be around 50% of the measures.

Furthermore the EIA and the accompanying Energy List is both a positive and a negative.

¹⁶⁷ <https://www.rvo.nl/subsidies-financiering/eia/ondernemers/jaarcijfers-2021>

¹⁶⁸ <https://www.rvo.nl/sites/default/files/2018/06/rapport-beleidsevaluatie-eia-2012-2017.pdf>



It provides confidence to companies to make investments to measures that were perhaps deemed to risky, or simply unknown. The negative is that this might also hamper the introduction and uptake of new technologies – as due to its long existence the energy list has become a staple and primary source for ESM assessment.

The attention to cleaner technologies as a result of the Energy List is considerable. The effect of incorporating clean technology has already been mentioned on the energy list. In the most recent evaluation, more than 50 percent of the applicants indicated that they were aware of the existence of the EIA before making the investments, while 35 percent became aware of the scheme when making the investment and finally 6 percent after the investment (CE Delft 2017: 35). The attention value effect occurs in particular in the first group, namely familiarity with the EIA prior to the investment.

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> • Relatively large number of free-riders compared to other measures (~50%) • Energy lists a staple within Dutch industry. • Cheap way to save CO2 calculated at 14 €/tCO2 eq. <p>All the above are not specific to motors</p>
Recommendations	<p>taken from the policy evaluation report¹⁶⁹</p> <p>Recommendation 1: Maintain the dynamics on the Energy List The dynamics on the Energy List are the main driver for accelerated market introduction and expansion of energy-efficient techniques. This involves the introduction of new technologies, removal of existing techniques, but precisely also for the interim tightening of performance standards. The dynamics can be increased via one of these three buttons. At the time when a market for energy-efficient technology is mature, then this technology can be added to the Energy List.</p> <p>Recommendation 2: Consider lowering the effective deduction rate. The reason for this (repeated) recommendation is the observation that the amount of the benefit is more important than the existence of the regulation and more specifically the Energy List. Lowering of effective deduction rate can lead to fewer freeriders (in a financial sense), largely with maintaining the attractiveness of the scheme.</p>
Linked measures	VEKI MIA Vamil
Reference(s)	
Other	
Thoughts, comments, considerations ...	

9.20.2 Measure 2: Versnelde klimaatinvesteringen industrie (VEKI)

	Overview
Short Description	The VEKI subsidy scheme offers subsidy possibilities for investment projects in emission reduction technologies in industry that have passed development and

¹⁶⁹ <https://www.rvo.nl/sites/default/files/2018/06/rapport-beleidsevaluatie-eia-2012-2017.pdf>

	demonstration, but still have high investment demands and pay back times in excess of 5 years. Eligible projects include e.g. investments related to energy efficiency, recycling of waste, local infrastructure and/or other CO2 reduction technologies.
Responsible Authority	Rijksdienst Voor Ondernemend Nederland (RVO) Ministerie van Economische Zaken en Klimaat (EZK)
Status	Ongoing
Issue Date	2019
Start Date	2019
Ending Date	Ongoing
Duration	Ongoing
Reference:	https://www.rvo.nl/subsidies-financiering/veki

9.20.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The Accelerated Climate-related Investments in Industry (VEKI) is a subsidy scheme for entrepreneurs who want to apply CO₂-saving techniques within their company which have a payback period of more than 5 years. The subsidy is intended for investments in proven CO₂-reducing techniques, meaning the technology used must have been used before in the Netherlands and have a significant impact on CO₂ reduction.

The VEKI grants subsidies for investments in the following themes:

- Energy Efficiency: subsidy for investments that will reduce energy consumption within (the production process of) a company.
- Recycling and reuse of waste: reprocess waste into products, materials or substances for the original purpose or another purpose, or reuse, meaning any operation involving products or components that are not waste but reused for the same purpose for which they were intended.
- Local infrastructure: investments in local infrastructure facilities that must meet certain conditions.
- Other CO₂-reducing measures: the investment must lead to fewer emissions of CO₂ or other greenhouse gases within a company's production process.

Taken and adapted after verification from ODYSSEE-MURE database¹⁷⁰

The VEKI measure is part of the Topsector Energie

Key Characteristics	
Budget	For the period March 2023 to Januari 2024, the budget for the VEKI subsidy scheme was € 138.000.000.
Financing of the measure	National Subsidy
Policy focus	Product

¹⁷⁰ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/4642>

Intervention Type	Climate-related investments in industry
Main Barriers Addressed	High investment costs Long return on investment >5 years
Key Driver(s)	No key driver – general transition towards a clean and sustainable industry, Ensuring general competitiveness in industry
Replicability	High
EU Inclusion	Yes, NECP
Related Characteristics	

9.20.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Facts and figures VEKI (2021):

- In 2021, 30 projects have been committed with a total amount of 62.2 million euros.
- In 2021, EUR 57.4 million has been committed to large companies, EUR 3.7 million to SMEs, and EUR 1.1 million to other companies.
- The Accelerated Climate Investments in Industry scheme started in 2019. In 2019, there were seven committed projects with a total amount of 3.5 million euros. In 2020, there were 22 committed projects with a total amount of 21.2 million euros.

Key results 2019-2021:

- Companies use the subsidy for sustainability projects that use various techniques. In 2021, a committed subsidy of 39.1 million euros will go to process improvement/energy savings via the VEKI. In addition, 23 million euros were committed to circular projects. In 2019, 2020 and 2021, a total of 55.4 million euros went to process improvement/energy saving, 28.8 million euros to circular projects, 1.7 million euros to industrial residual heat and 1 million euros to CO2 capture and (re)use.
- Companies build sustainable production installations with the support of the VEKI. In the period 2020-2025, 59 are expected, of which 47 installations in the industrial route process improvement/energy saving.

Table of Committed innovation subsidy through the VEKI per intervention category in mln euro's:
(CO2 capture and reuse, process improvement and energy use reduction, residual heat industry, circularity.)

Gecommitteerde innovatiesubsidie via de VEKI per industrieroute in de periode 2019-2021, in miljoenen euro's				
	CO2 afvang en (her)gebruik	Procesverbetering en energiebesparing	Restwarmte industrie	Circulair
2019		3,5		
2020	1	12,7	1,7	5,7
2021		39,2		23,1

Expected number of interventions deployed per industry sector per year (period 2020-2025)

Aantal verwachte deployment installaties per industrieroete, per jaar (2020-2025)

	CO2 afvang en (her)gebruik (CCU)	Procesverbetering en energiebesparing	Restwarmte industrie	Circulair
2020		6		
2021	1	12	1	1
2022		13		3
2023		12	1	4
2024		3		1
2025		1		

**Committed subsidy amount per company type (Large industry, SMEs, other) in % of total:
Gecommitteerde subsidie naar organisatietype (% van totaal)**

	Grootbedrijf	MKB	Overig
2019	68	32	0
2020	39	61	
2021	92	6	2

More details on the achieved results are available here (EZK)¹⁷¹

All above impact results of the VEKI do NOT relate directly to the early replacement of electric motors (EU-MORE), rather these are a small part of the investments covered by the subsidy.

Impacts	
Case level impact	High
Policy level impact	Medium

¹⁷¹ <https://www.bedrijvenbeleidinbeeld.nl/beleidsinstrumenten/versnelde-klimaatinvesteringen-industrie>

Size	Unknown - High
Energy	N/A
Impact evaluation	See above

Description of the method used for calculating the final energy- / cost- savings achieved through the measure

These savings are calculated as direct measurements reported through the submitted reports as part of the subsidy application process.

9.20.2.3 Lessons Learnt

	Lessons Learnt
Key takeaways	-
Recommendations	-
Linked measures	-
Reference(s)	Related legislation VEKI Manual for applications
Other	RVO, MeZK
Thoughts, comments, considerations ...	For more detailed and up-to-date information on the VEKI refer to the main page of the measure ¹⁷² . There is a lot of information available, too much even to include in this overview report. The VEKI is intended to give long(er) term stimulation support for measure implementation with >5 year ROI.

9.20.3 Measure 3: Milieu-investeringsaftrek (MIA) & Willekeurige afschrijving milieu-investeringen (VAMIL)

	Overview
Short Description:	The Environmental investment deduction (MIA) and Arbitrary depreciation of environmental investments (VAMIL) acts offer tax benefits for entrepreneurs who invest in environmentally friendly business assets.
Responsible Authority:	Rijksdienst voor Onderneming Nederland (RVO) Ministerie van Economische Zaken en Klimaat (EZK)
Status:	Ongoing
Issue Date:	-
Start Date:	1991
Ending Date:	Ongoing
Duration:	Ongoing
Reference:	https://www.rvo.nl/subsidies-financiering/mia-vamil/

¹⁷² <https://www.rvo.nl/subsidies-financiering/veki>

9.20.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

Environmental investment Deduction (MIA)/Arbitrary depreciation of environmental investments (VAMIL)

The Environmental Investment Deduction (MIA) and the Arbitrary Depreciation of Environmental Investments (VAMIL) are tax benefits for entrepreneurs who invest in environmentally friendly business assets.

MIA

The environmental investment deduction offers entrepreneurs the opportunity to reduce the taxable profit. Businesses can deduct up to 45% of the investment amount from the profit. The percentage of the deduction depends on the environmental effects and the prevalence of the asset.

VAMIL

With the VAMIL businesses can write off an investment at any time. The random depreciation is limited to 75%. By depreciating more quickly, businesses can reduce their taxable profit and thus pay less tax in that year, offering liquidity advantages.

Combination MIA and VAMIL

The MIA and VAMIL are two different schemes but are often combined. Both schemes use a joint list, the Environmental List¹⁷³. This list contains all assets that qualify for MIA and/or VAMIL. A new Environmental List is published every year. You can download the environmental lists from the RVO website.

Conditions

In principle, every company that pays income or corporation tax in the Netherlands can make use of the MIA/VAMIL. Companies are eligible for the MIA/VAMIL if their investment meets the following conditions, among others:

- The asset is on the environmental list.
- The asset has not been used before.
- The investment must relate to the purchase and production costs of the asset.
- The amount of environmental investments must be at least € 2,500 per asset.

Companies cannot receive an energy investment credit and an environmental investment credit at the same time for the same business asset. Companies can, however, combine the MIA with the small-scale investment allowance.¹⁷⁴

	Characteristics
Budget	The available budget for 2023 for the MIA is € 192 mln and for the Vamil in 2023 €25 mln.

¹⁷³ <https://www.rvo.nl/sites/default/files/2023-04/RVO-Brochure-Milieulijst-2023-2.pdf>

¹⁷⁴

https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/winst/inkomstenbelasting/inkomstenbelasting_voor_ondernemers/investeringsaftrek_en_desinvesteringsbijtelling/milieu_investeringsaftrek_mia_willekeurige_afschrijving_milieu_investeringen_vamil

	Both measures include but do not focus on Electric Motors specifically, however the replacement of inefficient motors are included in the environmental list, and therefore eligible.
Financing of the measure	Tax incentive
Policy focusses	Products
Intervention Type	Tax benefits for companies making environmental sound investments
Main Barriers Addressed	Reduction of risk, financial viability improvement
Key Driver(s)	General transition to a sustainable future
Replicability	High
EU Inclusion	Yes, NECP, Other - The MIA/Vamil are a large and successful measure and been part of the Dutch climate strategy for a period of time.
Related Characteristics	

9.20.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Taken and translated from the policy evaluation done by CE Delft in 2018¹⁷⁵

“Impact evaluation:

We conclude that the cost-effectiveness of the MIA\Vamil is high. This applies from both perspective of government and business.

Administrative costs are incurred by RVO for the implementation of the scheme (assessment of applications, communication and ICT) and the tax authorities (checking the tax return). When we look at the relationship between the implementation costs and the amount provided to the business sector, then the implementation costs amount to 2.2%. That is stable compared to the previous one Evaluation.

Companies spend about 1 to 4 hours on an application. Converted to costs, this means 2.7% of the financial benefit provided. This is higher than the EIA, because the scheme is somewhat more complex.

Companies indicate that they find these costs acceptable in relation to the investment deduction yields them.

The scheme is intended to provide a choice for already planned investments in business assets influence towards the environmentally friendly alternative. The scheme succeeds in this. If we look at the amount of investment that is realized with every euro of tax support, we will see that per euro government budget will be € 8.2 to € 11.9 net in environmentally friendly business assets invested. This ratio is comparable to the period of the previous evaluation, and higher than the EIA.

The extra investments provoked are below, because the extra investments are only the additional costs of the environmentally friendly alternative.

Not only the MIA, but especially the Vamil is a scheme with a large tax multiplier. That comes because the government calculates with a lower internal interest rate than the business community. As a result, the fiscal loss of the government budget accounts for only about 50% of the fiscal support to the business community.”

¹⁷⁵ <https://zoek.officielebekendmakingen.nl/blg-844709.pdf>

	Impacts
Case level impact	High
Policy level impact	Medium
Size	Large, specific results on the number of applications relating to electric motors are unknown/could not be found
Energy	
Impact evaluation	See the general impact evaluation text above

9.20.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

It is known for several years that there is the issue of 'free-riders', which are the companies that would've made the investment regardless of availability of the scheme. This reduces the overall effectiveness of the measure.

This, however, is found to be unavoidable and an acceptable issue for guaranteeing the measures existence. And when considering these freeriders in the policy measure results the MIA/VAMIL remain cost-effective in comparison to other related measures.

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> • Issue of free-riders exists, however this is known and acceptable. • The environmental list is an important tool for both suppliers and consumers of innovative technologies. • Overall cost-effectiveness of the measure remains (very) high
Recommendations	Remain vigilant in overlap of measures which happened in the early existence of the MIA/Vamil, leading to stacked benefits for companies.
Linked measures	EIA, Veki
Reference(s)	Energijijst 2023 Milieulijst 2023
Other	RVO, EZK
Thoughts, comments, considerations ...	

EU-MORE



**EUropean M0tor
REnovation initiative**



Poland

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Ivan Sangiorgio (IEECP)

List of Acronyms

Acronym	Text
URE	Energy Regulatory Office
NFOSiGW	National Fund for Environmental Protection and Water Management



9.21 Poland

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The following authorities are involved in design and implementation of the policy measure targeted to the energy sector:

- The National Fund for Environmental Protection and Water Management (Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej - NFOSiGW): NFOSiGW provides financial support for projects aimed at improving energy efficiency and reducing environmental impact.
- The Ministry of Climate and Environment (Ministerstwo Klimatu i Środowiska) is responsible for formulating and coordinating Poland's energy and environmental policies. It plays a central role in shaping the country's approach to energy efficiency and sustainability.
- The Energy Regulatory Office (Urząd Regulacji Energetyki - URE) is responsible for regulating the energy sector, ensuring compliance with energy efficiency standards, and promoting market competition in the energy industry.
- The Ministry of National Assets is responsible for implementing the NECP, which includes objectives, targets, and policies and measures related to energy and climate.

The National Energy and Climate Plan for 2021-2030 sets the following climate and energy goals for 2030:

- -7% reduction in greenhouse gas emissions in sectors not covered by the ETS compared to the level in 2005,
- 21-23% of the share of renewable energy sources in final gross energy consumption (the 23% target will be achievable if additional EU funds are granted to Poland, including those earmarked for just transformation), taking into account:
- 14% share of renewable energy sources in transport
- Annual increase in the share of renewable energy sources in heating and cooling by 1.1 points. percent on average per year, increase in energy efficiency by 23% compared to PRIMES2007 forecasts, reduction to 56-60% of the share of coal in electricity production.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

The replacement of industrial electric motors is potentially an eligible measure for the white certificates scheme. No other policy measures specifically targeted to such ESM were available.

9.21.1 Measure 1: System of White Certificates

	Overview
Short Description	Scheme of energy efficiency certificates granted for the energy-saving effects achieved through the execution of the modernization project.
Responsible Authority	Energy Regulatory Office - URE
Status	Ongoing
Issue Date	April 2011
Start Date	2013
Ending Date	2030 (not confirmed)
Duration	17 years (not confirmed)
Reference:	https://bip.ure.gov.pl/

9.21.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

In 2013, the Polish government introduced an energy efficiency mandate aimed at achieving energy savings totaling 2,645 Mtoe between 2016 and 2020. This mandate encompasses all sectors except for transportation, focusing on electricity, gas, and district heating as the key fuel targets. Entities subject to this mandate include electricity, natural gas, and district heating companies that provide services to end consumers, as well as members of commodities exchanges and commodity brokerage firms.

Eligible energy efficiency measures comprise a comprehensive list of actions outlined in the Energy Services Directive's Annex, covering areas such as building insulation, heating systems, appliances, lighting, and waste heat recovery. Behavioral changes are excluded from the eligible measures.

The achieved energy savings are determined through two methods: deemed savings and scaled savings. Energy efficiency projects with an average annual energy savings exceeding 100 toe require post-implementation verification through an energy audit. This audit must be conducted by an auditor different from the one who performed the initial project audit.

Projects falling below the 100-toe threshold are subject to random sampling verification.

Certificates representing these energy savings can be traded on the Polish Power Exchange. In cases where obligated parties fail to meet the required savings targets, penalties of up to 10% of their revenue may be imposed.

The categories of measures eligible for white certificates are:

- 1) Increasing energy savings by end-users.
- 2) Increase energy savings by energy producers from devices used for their production needs.
- 3) Reducing the electricity, heat or natural gas loss in transmission or distribution.

The first category includes all end-use sectors. The second category applies only to devices used for production needs, defined as a group of support objects or installations within the meaning of Article 3 Section 10 of the Act from the 10th of April 1997 - Energy Law, aimed at process of generating electricity or heat (which can be e.g. motor conveyor belt feeding coal to the mill in the plant). Whereas, the category of reducing electricity, heat and natural gas loss in transmission and distribution, concerns the modernization of energy carrier transportation networks as well as the corresponding objects associated to these processes.

	Characteristics
Budget	About 150 k€/year for system administration
Financing of the measure	Trade-in scheme
Policy focusses	Physical intervention
Intervention Type	Market-based Instruments - Energy saving obligation
Main Barriers Addressed	Ease of regulation
Key Driver(s)	EED
Replicability	High, White Certificates scheme has been already adopted in several EU countries.
EU Inclusion	Included in the NECP

Related Characteristics	-

9.21.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The expected impact of the white certificates scheme is reported in the following table¹⁷⁶:

Year:	2021	2030
GWh:	4.06	8.14
kt CO2:	1469	2938

On URE's website aggregated data on the energy efficiency certificates issued until 2016 are available for the three categories of projects defined by the scheme. Focusing on *Category 1 - Increasing energy savings by end users*, the following tables report the cumulative results in terms of number of implemented projects, primary energy savings and CO2 emissions reduction in the years 2013-2016. Note that data for specific months might be missing.

2013	Number of certificates issued (cumulative)	Total cum. primary energy savings (ktoe)	Total cum. estimated CO2 emission reductions (kton)
December	18	64,24	219

2014	Number of energy efficiency certificates issued (cumulative)	Total declared primary energy savings (ktoe)	Total estimated CO2 emission reductions (kton)
January	24	93.26	334.197
February	34	126.56	448.597
March	37	127.74	453.36

¹⁷⁶ <https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/294>

April	41	162.98	573.75
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May	42	184.9	648.63
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2015	Number of energy efficiency certificates issued(cumulative)	Total declared primary energy savings (ktoe)	Total estimated CO2 emission reductions (kton)
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January	84	243.05	998.27
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February	192	534.26	1992.05
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March	202	559.50	2092.25
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May	203	560.95	2098.00
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June	203	560.95	2098.00
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July	204	572.57	2104.37
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October	278	777.41	262495.07
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November	510	1434.77	264725.02
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December	577	1560.64	265210.05
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2016	Number of energy efficiency certificates issued (cumulative)	Total declared primary energy savings (ktoe)	Total estimated CO2 emission reductions (kton)
June	578	1560	265211
July	783	2361	267816
August	1141	3290	271134
September	1316	3728	272708
October	1342	3772	272861
November	1350	3783	272915
December	1374	3811543,828	273009793,434

	Impacts
Case level impact	High (based on analogous white certificate schemes)
Policy level impact	High (>0.5%)
Size	Not available
Energy	44328 GWh (Category 1 – end users), 273009793 tCO ₂
Impact evaluation	-

(If available) Provide a description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Not available

9.21.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. Also include (if applicable) the main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

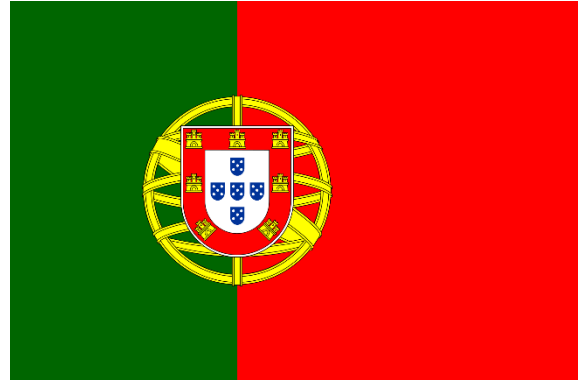
- The scheme has proved to lead to high policy level impact; the case level impact may be considered similar to other white certificate schemes.
- Need for an improved monitoring platform, able to disaggregate data by sector/ESM technology.
- Information about the energy saving measures implemented within the White Certificate scheme are stored and publicly available

	Lessons Learnt
Key takeaways	The scheme has proved to lead to high policy level impact; the case level impact may be considered similar to other white certificate schemes. Information about the energy saving measures implemented within the White Certificate scheme are stored and publicly available
Recommendations	Need for an improved monitoring platform, able to disaggregate data by sector/ESM technology.
Linked measures	-
Reference(s)	-
Other	-
Thoughts, comments, considerations ...	-

EU-MORE



**EUropean MOtor
REnovation initiative**



Portugal

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

João Fong (ISR-UC)

List of Acronyms

Acronym	Text
SGCIE	Sistema de Gestão de Consumos Intensivos de Energia (Intensive Energy Consumption Management System)
CIE	Energy Consuming Installations
PREn	Energy Consumption Rationalisation Plan
ARCE	Energy Consumption Rationalization Agreement
DGEG	Directorate-General of Energy and Geology
PPEC	Energy Efficiency Promotion Plan



9.22 Portugal

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Portugal has a wide range of sectoral instruments in the area of climate action and energy, which have effectively delivered on EU and international commitments. The 2030 National Energy and Climate Plan, the Carbon Neutrality Roadmap 2050, and the Basic Climate Law are noteworthy. The National Programme for Spatial Planning Policy and the Circular Economy Action Plan embody the three main axes of environment and climate action policy. The main sectoral policy instruments at the national level that contribute to the achievement of the energy and climate targets and objectives of the NECP 2030, while contributing to the Energy Union dimensions of decarbonization, energy efficiency, energy security, internal energy market, and research, innovation, and competitiveness, are identified below. The implementing authorities include the Council of Ministers, the Portuguese Environment Agency, DGEG - Directorate-General of Energy and Geology, and ADENE (Energy Agency) which is responsible for the operational management.

The NECP 2030 aims to achieve the EU's 2030 climate and energy targets, including a 55% reduction in greenhouse gas emissions compared to 2005, a 49% share of renewable energy in final energy consumption, and a 35% improvement in energy efficiency (reduction of primary energy consumption compared to 2005). The NECP 2030 also aims to achieve carbon neutrality by 2050, in line with the Carbon Neutrality Roadmap 2050. The NECP 2030 focuses on decarbonization, energy efficiency, energy security, internal energy market, and research, innovation, and competitiveness.

Relevant policies in the field of energy efficiency are the management system obligation for intensive energy consumers.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

Portugal has implemented policy measure targeting motor replacement directly (e.g. Plano de Promoção da Eficiência no Consumo de Energia) and indirectly (SGCIE - Management System for Intensive Energy Consumers, Energy Efficiency Fund).

Measure 1: SGCIE - Management System for Intensive Energy Consumers

	Overview
Short Description	The SGCIE is the national implementation of Article 8 of the EED requiring Energy Intensive Consumers (>500 Toe/year) to carry out energy audits resulting in Energy Consumption Rationalisation Plans (PREn) that include minimum energy efficiency goals.
Responsible Authority	DGEG - Directorate-General of Energy and Geology ADENE (Energy Agency) is responsible for the operational management
Status	Ongoing
Issue Date	April, 2008
Start Date	April, 2008
Ending Date	-
Duration	-
Reference:	https://sgcie.pt/ Decree-Law 68-A/2015 (link)

9.22.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The acronym SGCIE stands for "Sistema de Gestão de Consumos Intensivos de Energia", which translates to "Intensive Energy Consumption Management System". It is the transposition of the article 8 of the EED into national law through Decree-Law 68-A/2015.

It applies to intensive energy consuming installations (CIE) with energy consumption equal to or greater than 500 toe/year.

SGCIE foresees that CIE facilities must periodically conduct energy audits that focus on the conditions of energy use and promote the increase of energy efficiency, including the use of renewable energy sources. It also foresees the preparation and execution of Energy Consumption Rationalization Plans (PREn) that contemplate minimum energy efficiency goals. The PREn, when approved, constitute the Energy Consumption Rationalization Agreements (ARCE) signed with the DGEG. Their compliance is required for operators to receive associated incentives (e.g. financial incentives from the Energy Efficiency Fund)

The Energy Consumption Rationalisation Plan (PREn) is drawn up based on the mandatory energy audit reports and must foresee the implementation, in the first three years, of all identified measures with a return on investment period of less than or equal to five years for installations with energy consumption equal to or greater than 1000 toe/year, or with a ROI of less than or equal to three years for other installations.

The PREn should also set targets for Energy Intensity, Specific Energy Consumption and Carbon Intensity. These targets should be:

- At least a 6% improvement in the Energy Intensity and Specific Energy Consumption, over eight years, for installations with an energy consumption of 1000 toe/year or more, or a 4% improvement for other installations;
- At least the maintenance of the historical values of carbon intensity.

As of 2023 there were 1362 companies registered in the SGCIE (764 < 1000 toe/year and 598 > 1000 toe/year). Over 85% of these companies are in the industrial sector.

The maximum total budget for companies is 300 000 €

- For facilities with a consumption of less than 1000 TOE/year - Reimbursement of 50% of the cost of compulsory energy audits, up to a limit of € 750, recoverable from the execution and progress report (REP) that verifies the execution of at least 50% of the measures set forth in the ARCE. Reimbursement of 25% of the investments made in equipment and systems for managing and monitoring energy consumption up to a limit of € 10,000.

	Characteristics
Budget	-
Financing of the measure	The measure is funded through the national Energy Efficiency Fund
Policy focus	Physical intervention
Intervention Type	Energy audits / Equipment upgrade

Main Barriers Addressed	- Lack of awareness / data availability - Lack of expertise - Identification of inefficient equipment / processes - Identification of energy-saving cost-effective measures - Lack of capital
Key Driver(s)	EU Directive (EED)
Replicability	High
EU Inclusion	Yes, transposition of Article 8 of the EED Directive. Also included in the NECP.
Related Characteristics	-

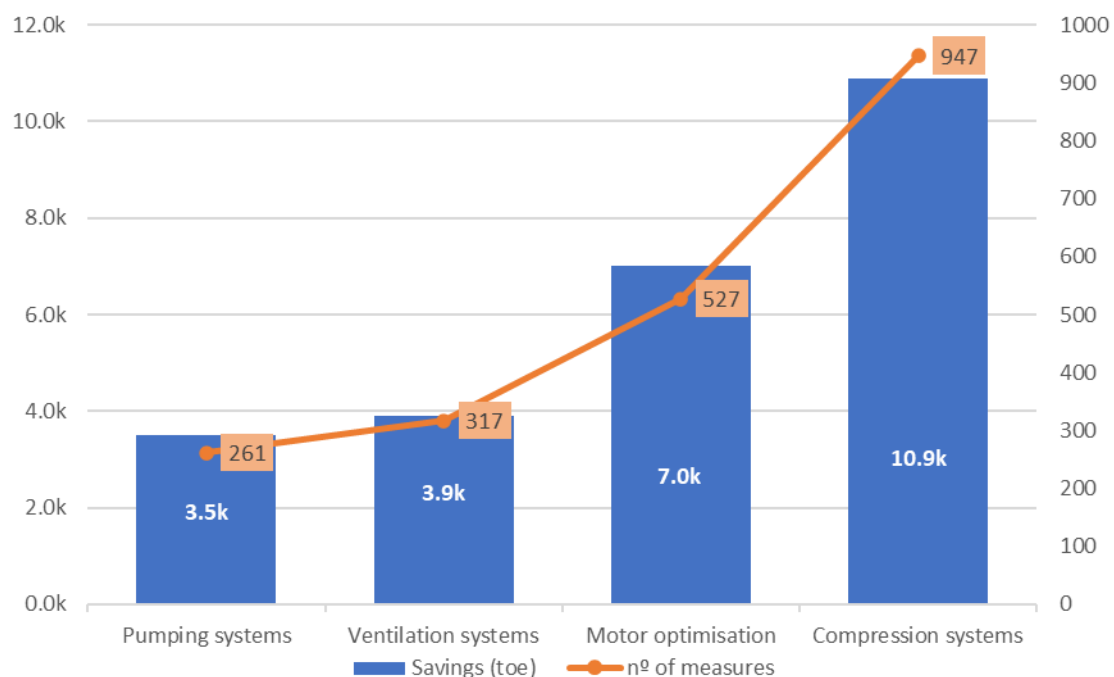
9.22.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation, wherever possible specific to electric motors

From 2008 to 2022 a total of 2035 energy rationalisation plans (PREn) were approved. The rationalisation measures proposed in those plans represent a potential for the reduction of energy consumption of 7% when comparing the reference year to the final date of the plan (8 years).

Of these plans, a total of 1434 included measures relating to motor optimisation which cover upgrading of motor efficiency and inclusion of VSDs. The measures proposed in the PREn have an energy savings potential of 24,500 toe/year with corresponding GHG reduction of 137,500 tCO_{2eq}. These energy savings would result in cost savings of 27,4M€. Suggested measures have an average payback time of 2,2 years.

The potential savings relating to motor optimisation measures represent around 25% of the total primary energy savings achieved through the SGCIE scheme.



Savings and number of measures in electric motor systems, SGCIE (2006-2021)

	Impacts
Case level impact	High
Policy level impact	High (2%), calculated with respect to the total final electricity consumption of 1.38 Mtoe in 2020 (Eurostat)
Size	See in 1.1.2
Energy	24500 toe/year, 137500 tCO _{2eq} /year
Impact evaluation	■

Description of the method used for calculating the final energy - and/or cost- savings achieved by the measure and specific to that of electric motor replacement.

The Portuguese Energy Agency (ADENE) undertakes monitoring and evaluation of the PREn to check the development of energy consumption and the specific energy consumption of the audited companies. This monitoring and evaluation are congregated in a database of energy efficiency indicators. The indicators are production, energy consumption, specific energy consumption and other data that are in the Energy Consumption Rationalization Plan.

The typology of the calculation method used is monitoring of energy consumption indicators (either unit energy consumption for whole sectors or sub-sectors, or, specific energy consumption indicators for specific end-use equipment).

The typology of the baseline used in the evaluation method is the "actual before" energy consumption, which meters the energy consumption for the site, equipment, etc, where the energy efficiency action was implemented.

Measure 2: Plano de Promoção da Eficiência no Consumo de Energia (PPEC) / Energy Efficiency Promotion Plan

	Overview
Short Description	Incentive mechanism to promote actions to improve efficiency in electricity consumption.
Responsible Authority	ERSE - Entidade Reguladora dos Serviços Energéticos
Status	Ongoing
Issue Date	First launched in 2006
Start Date	2007
Ending Date	Ongoing
Duration	-
Reference:	https://www.dgeg.gov.pt/pt/areas-setoriais/energia/eficiencia-energetica/financiamentos/plano-de-promocao-da-eficiencia-no-consumo-de-energia-eletrica-ppec/

9.22.1.3 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The Energy Efficiency Promotion Plan (PPEC) consists of an incentive mechanism that aims to promote actions to improve efficiency in electricity consumption. To this end, suppliers, network operators and entities that promote and defend the interests of electricity consumers in Portugal propose measures (tangible and intangible) that go through a selection process managed by ERSE (Regulatory Entity). These actions are aimed at electricity consumers in the various market segments, such as Industry and Agriculture, Commerce and Services, and Residential. The selected actions are funded through a tariff surcharge included in the energy bill (Global Use of the System). The PPEC had its first edition in 2007 and it is now in its 7th edition.

Measures relating to electric motors were approved in the 4th edition (2011/2012), 5th edition (2013/2014) and 6th edition (2017/2018). No measures for electric motors are included in the current edition.

4th edition (2011/2012)

One measure was proposed promoting the replacement of inefficient EFF3 motors (now IE0) for high-efficiency motors (IE2) in the power rang 0,75kW – 250kW. A financial incentive equal to the average price difference between an IE1 motor and an IE2 motor was given to the operator after installation. The measure had a budget of 363 362€ for the replacement of 620 motors but only 57 were replaced (43 501€). Only 54 applications were submitted of which only 7 were completed.

5th edition (2013/2014)

One measure was proposed promoting the replacement of inefficient EFF3 motors (now IE0) for high-efficiency motors (IE2) in the power rang 0,75kW – 250kW. A financial incentive of 50,6% of the average IE2 motor price (including installation costs) was given. The measure also foresaw a rapid assessment of the use profile and load of the motor to ensure a correct dimensioning of the replacement motor.

This measure is targeted at industrial users working at least two shifts.

The measure had a budget of 449 514€ of which 448 834€ were executed. A total of 326 motors were replaced of the 450 initially envisaged.

Total savings of 78GWh were achieved with a corresponding reduction of GHG of 28 thousand tCO_{2eq}. Additionally, the collection of the old motor for recycling was foreseen, with the transportation costs of the new motor being covered by the scrap value of the old motor.

6th edition (2017/2018)

A measure to promote the installation of High Efficiency Motors (HEMs), within the 0,75kW to 400kW power range, in the manufacturing, agricultural and fisheries sectors as a replacement for low efficiency motors (motors of efficiency class below IE1) was approved. The objective was to replace these inefficient motors with IE3 or IE4 motors.

A financial incentive of 51,1% of the average new motor price (including installation costs) was given. The measure also foreseen a rapid assessment of the use profile and load of the motor to ensure a correct dimensioning of the replacement motor.

The measure had a budget of 896 767€ for the replacement of 420 motors.

The estimated electricity savings generated by the measure were of 115 GWh with a corresponding reduction of GHG of 43 thousand tCO_{2eq}.

Additionally, the collection of the old motor for recycling was foreseen, with the transportation costs of the new motor being covered by the scrap value of the old motor.

	Characteristics
Budget	896 767€ for the 6 th edition
Financing of the measure	PPEC measures are funded a tariff surcharge included in the energy bill (Global Use of the System).



Policy focus	PPEC measures can be “tangible”, i.e., focused on product replacements/physical interventions or “intangible” focused on education / capacity building. Measures targeting electric motors were “tangible”.
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost, general financial viability, return on investment, lack of promotion through traditional means.
Key Driver(s)	PNAC 2006
Replicability	High
EU Inclusion	Yes (included in NECP)
Related Characteristics	-

9.22.1.4 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

For the latest edition, the measure had a budget of 896 767€ for the replacement of 420 motors. The estimated electricity savings generated by the measure were of 115 GWh with a corresponding reduction of GHG of 43 thousand tCO _{2eq} .
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	Impacts
Case level impact	High
Policy level impact	High
Size	420 electric motors for a total budget of 896 767 €
Energy	115 GWh of electricity savings
Impact evaluation	-

9.22.2 Energy Efficiency Fund (EEF)

	Overview
Short Description	Call 13 of the EEF provides a financial incentive for electric motors included in the Energy Consumption Rationalization Agreements (ARCE) signed under the SGCIE scheme (see 1.1.). The measure also covers the production of heat/cold and industrial process improvement.
Responsible Authority	DGEG - Directorate-General of Energy and Geology
Status	Ended
Issue Date	2015
Start Date	-
Ending Date	-
Duration	-
Reference:	https://www.pnaee.pt/fee/

1. Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The EEF is a financial instrument capable of financing the programmes and measures set out in the National Energy Efficiency Action Plan (NEEAP), namely by supporting projects of a predominantly technological nature in the areas of transport, residential and services, industry and the public sector and by supporting actions of a transversal nature inducing energy efficiency in the areas of behaviour, taxation and incentives and financing. The FEE may also support projects not included in the PNAEE but which prove to contribute to energy efficiency.

Call 19 of the EEF aims to support the development of projects and initiatives that promote energy efficiency by financing projects that correspond to the "Industry" area and measures inserted in the Portuguese NEEAP 2016 named "SGCIE - Medidas Transversais" or "SGCIE - Medidas Específicas", which, among others, provides support to projects that lead to the increase of energy efficiency through the optimization of processes and introduction of new technologies.

The measure provided an incentive of 25% up to a limit of 65 000€. The total budget was of 800 000€.

	Characteristics
Budget	800000 €
Financing of the measure	-
Policy focus	Physical
Intervention Type	Equipment upgrade
Main Barriers Addressed	General financial viability
Key Driver(s)	-
Replicability	-
EU Inclusion	-
Related Characteristics	-

EU-MORE



**EUropean M0tor
REnovation initiative**



Romania

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

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List of Acronyms

Acronym	Text
EE	Energy Efficiency
EIB	European Investment Bank
FREE	Romanian Energy Efficiency Fund
NEEAP	National Energy Efficiency Action Plan
TA	Technical Assistance



9.23 Romania

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The Romanian NECP published in 2020¹⁷⁷ cited the importance of promoting the transition to a circular economy. Specifically, it suggests that recycling and waste management can contribute to the achievement of energy efficiency targets by reducing the consumption of energy used in the processing of raw materials within industry. Additionally, increasing energy efficiency in the industrial sectors regulated by the EU ETS, which can be achieved by many means, will cause a reduction in the energy consumption of industries, thereby contributing to the reduction of GHG emissions in the sector.

Romania's NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP 2014–2020 - approved by Governmental Decision no. 122/2015), and more specifically, P5 Energy efficiency in the ETS sector industry was designed to promote the above-mentioned transition.

In August 2014 Law no. 121/2014 on energy efficiency entered into force. The Law transposes the European Union regulations set out under Directive 2012/27/UE regarding energy efficiency into national legislation¹⁷⁸. The main purpose of the Law is to establish a coherent legislative framework for the development and application of the national energy efficiency policy in order to achieve the national target for increasing energy efficiency.

The main responsibility of implementing Directive 2012/27/UE on energy efficiency (EED) lay with the National Regulatory Authority for Energy (ANRE) through the Energy Efficiency Department; established by the above-mentioned Law no. 121/2014 on energy efficiency, which is responsible for transposing the provisions of the law into secondary legislation.

According to the Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency¹⁷⁹, improving energy efficiency is a key priority of national energy policy, due to the increased importance of achieving security of supply of energy, sustainable development and competitiveness, saving primary energy resources and reducing greenhouse gas emissions. In the context of the objectives undertaken at the EU level to reduce primary energy consumption by 20 % by 2020, Romania had set itself a primary energy consumption target of 43 million toe by 2020 (under its first National Energy Efficiency Action Plan - NEEAP 1), which is a 19 % reduction on the consumption forecast in 2007. An average primary energy consumption of 35105 million toe was achieved in the period 2010–2012, compared to 39799 million toe in 2008. Industry, as the main sector affected by the economic crisis which began in 2009, was responsible for this decrease. Directive 2012/27/EU stated that the regulatory framework for the establishment and operation of ESCOs was to be developed by 2016, in parallel with development of the market for these energy service companies and promotion of energy performance contracts. The industrial sector was one of the priorities identified with regard to sectoral energy efficiency programmes, as both energy management based on systematic energy audits as well as the analyses of the potential for introducing energy efficient equipment, both in heavy industry and within SMEs was noted.

Romania also undertook the reduction of the final energy consumption in the sectors falling within the scope of the Energy Services Directive (ESD) by 1.5 % per year during the period 2008–2016, compared to the average recorded during the period 2001–2005 in NEEAP 1. The second NEEAP included a separate chapter on primary energy saving measures in the energy sector (electricity generation and heat production, power transmission and distribution, promotion of renewable energy sources) in order to meet the planned target for 2020.

¹⁷⁷ https://energy.ec.europa.eu/system/files/2020-06/ro_final_necp_main_en_0.pdf

¹⁷⁸ https://www.ca-eed.eu/ia_document/national-implementation-report-2016-romania/

¹⁷⁹ https://energy.ec.europa.eu/system/files/2014-11/article7_en_romania_0.pdf

In order to ensure a clear and consistent transposition of Directive 2012/27 / EU into national legislation in accordance with the reasoned opinion issued by the European Commission regarding the case 2014/0367, an amendment to supplement Law no. 121/2014 on energy efficiency was submitted in March 2016. The main proposed amendments were as follows:

- ANRE's Department for energy efficiency encourages training programs for the qualification of energy auditors, aiming to ensure a sufficient number of available experts;
- Operators exceeding 1000 toe energy consumption have to carry out an energy audit every four years on a profile established by the operator, which represents at least 50% of the total energy consumption of the economic operator; the audit is carried out by an individual or legal entity authorized by law and underpinning the establishment and implementation of measures to improve energy efficiency;
- Economic operators with an energy consumption under 1000 toe, with the exception of SMEs, are obliged to carry out an energy audit every 4 years on a representative energy consumption profile chosen by the operator;
- The Ministry of Energy, SMEs and Business Environment shall develop programs to encourage SME's to undergo energy audits and the subsequent implementation of the recommendations of these audits;
- The Ministry of Energy, SMEs and Business Environment may set up support schemes for SME's, including if they have concluded voluntary agreements, to cover the costs of an energy audit and implementation of highly cost-effective recommendations from the energy audits, without bringing prejudice to the state aid legislation;

Following the provisions of the Law no. 121/2014 on energy efficiency for the transposition of the Directive 2012/27/UE regarding energy efficiency, the Romanian authorities approved by Governmental Decision no 122/2015 the National Energy Efficiency Action Plan (2014-2020).

The support scheme for promoting high-efficiency cogeneration has been approved in Romania by Governmental Decision no 219/2007 for the promotion of cogeneration based on useful heat demand. The bonus scheme represents state aid operational type (N 437/2009 - Romania), authorized by the European Commission being implemented by Government Decision No 1215/2009, establishing the criteria and the conditions required for the implementation of the support scheme for the promotion of high-efficiency cogeneration based on a useful heat demand. In 2015, the Governmental Decision no 219/2007 for the promotion of cogeneration based on useful heat demand was modified by the Governmental Decision no 846/2015.

Secondary legislation on energy efficiency issued by the Romanian Energy Regulatory Authority include the following:

- ANRE Decision no.2794/2014 - Regulation for certification of energy managers and energy service provider companies and Regulation for authorising industrial energy auditors
- Decision ANRE no.2123/2014 Guide for energy audit - it includes minimum criteria for energy audits according to Energy Efficiency Directive 27/2012/CE;
- Model for developing the Program for increasing energy efficiency for industrial units ANRE Decision no. 8/DEE/12.02.2015
- Decision no. 13/DEE/2015 regarding the approval of the syllabus of specialized courses in the field of energy management and energy audits development.
- ANRE Order No. 95/2015 amending the approval of contribution for high-efficiency cogeneration and certain provisions on its invoicing;
- ANRE Order No. 61/2015 on approving the calculation method for establishing the quantity of electricity produced by high efficiency cogeneration in for certification by guarantee of origin;
- ANRE Order No. 10/2015 on the approval of the Methodology for monitoring and reporting data regarding the support scheme on the promotion of high efficiency cogeneration based on the useful heat demand;

Regarding the policy measures to set up the energy efficiency obligation scheme, Romania has opted for a range of alternative policy measures achieved through specific energy efficiency programmes and the establishment of an Energy Efficiency Investment Fund (EEIF) or the development of the existing Energy Efficiency Fund (REEF).¹⁷⁹

In 2018, the EED was amended as part of the European Commission's 'Clean Energy for All Europeans' package, updating some specific provisions and introducing several additional elements. Above all, it established a new headline EU energy efficiency target for 2030 of at least 32.5% primary energy savings, with the possibility of an upward revision in 2023. To achieve this target, each Member State was required to achieve higher annual energy savings obligations (+0.8%).¹⁸⁰ The EED introduced a legal and operational definition of the 'energy efficiency first' principle and specifies the scope of its application. The principle will henceforth apply to energy systems and all sectors that have an impact on energy consumption and energy efficiency; public procurement processes (contracts and concessions) above a certain value; and energy transformation, transmission, and distribution. Most importantly, it includes an obligation to consider energy efficiency solutions in policy and investment decisions in energy systems and non-energy sector. The new EED proposal entailed specific actions to improve energy efficiency in industry, heating and cooling systems, energy networks and transport.

Annual energy savings of 0.6 Mtoe in industry were planned, which means doubling the annual savings as planned in the NEEAP IV for 2020. Existing measures included¹⁸¹:

- Obligatory energy audits for large energy consumers;
- Energy audits and energy management in other enterprises;
- Romanian Fund for Energy Efficiency – FREE. A revolving loan fund, funded by GEF and implemented by World Bank for EE projects in the industry sectors.
- In 2019 Procredit bank had signed a climate action multibeneficiary loan for SMEs & Mid-caps in Romania and Bulgaria with the EIB for EUR 30–35.

New planned measures/priorities in the NECP include:

- Installation of smart meters and demand side response systems in the service sector;
- Energy audits programme for SMEs;
- EE as a positive side effect of other measures, e.g. use of best available technology in industry, promotion of circular economy, decarbonisation of the lignite firing power plant CE Oltenia; etc.

Based on the Odyssee-Mure database¹⁸², by sectors, the highest progress in terms of energy efficiency in Romania was registered in industry (almost 45%), followed by buildings (44%), transport (43%), and in services (28%).

Energy audit requirements and standards in Romania¹⁸³

The current status of implementation of the mandatory energy audit requirements of Article 8 of Directive 2012/27/EC on Energy Efficiency (the Energy Efficiency Directive or EED) in Romania is that it is fully implemented by Law no. 121 on Energy Efficiency dated 18/07/2014 and in force (from 01/08/2014). Qualifying undertakings must undertake energy audits by 05/12/2015 and every four years thereafter if they continue to qualify. Qualifying undertakings are those which meet one of the following:

1. i. Economic operators which are consuming energy over 1,000 tonnes equivalent petroleum/year; or

¹⁸⁰ https://www.enpg.ro/wp-content/uploads/2022/04/Policy-Fiche_EED_April-11-2022.pdf

¹⁸¹ https://www.fi-compass.eu/sites/default/files/publications/The%20potential%20for%20investment%20in%20energy%20efficiency%20through%20financial%20instruments%20in%20the%20European%20Union%20-%20Romania%20in-depth%20analysis_0.pdf

¹⁸² <https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/romania.html>

¹⁸³ <https://cms.law/en/int/expert-guides/cms-expert-guide-to-energy-audit-requirements-and-standards/romania>

2. ii. Economic operators which are consuming energy under 1,000 tonnes equivalent petroleum/year (except SMEs).

An SME is defined as an undertaking with i) << 250 employees; and ii) an annual turnover of ≤ EUR 50m, and/or an annual balance sheet total of ≤ EUR 43m.

There is no concept of “qualification date” under implementing Romanian law 121/2014. Qualifying undertakings have to comply with the obligations from the date on which the implementing legislation entered into force and must complete energy audits by the compliance deadline. Civil fines for non-compliance lie between RON 1,000 (approximately EUR 225) and RON 200,000 (approximately EUR 44,955).

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

No policy measures specifically targeted to the replacement of electric motor has been implemented in the country.

9.23.1 Measure 1: EIB loans for energy efficiency projects

Overview	
Short Description	EIB loans to improve improve competitiveness and access to finance at favourable conditions for SMEs and mid-caps in Romania and Bulgaria, with a special focus on energy efficiency.
Responsible Authority	PROCREDIT BANK (BULGARIA) AD, PROCREDIT BANK SA
Status	Ongoing
Issue Date	June, 2019
Start Date	January, 2020
Ending Date	Not found
Duration	Not found
Reference:	https://www.eib.org/en/projects/pipelines/all/20190299

9.23.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

In 2002, the World Bank had set up the **Romanian Energy Efficiency Fund (FREE)** as proposed by the Global Environment Facility. The fund aimed at enabling companies in the industrial sector, and other energy consumers, to adopt and utilise energy-efficient technologies, financed under commercial criteria. The fund was accompanied by a TA facility operated under FREE to partially cover initial transaction costs. The total cost of capital injection (USD 8m) and TA facility was USD 34m. The fund has facilitated investments of USD 83m with USD 27m loans provided by FREE in 43 projects. The co-financing of FREE lending is mainly from commercial banks and to a lesser degree from project sponsors and public sources. The minimum size of the loans is USD 1m and repayment time is 4–5 years. Investments supported must in majority include EE measures, but also other associated cost are eligible. Investments include investments in industrial processes, district heating, equipment and ESCOs. It is planned to continue the fund and to upscale it in the future.¹⁸¹

PROCREDIT BANK (BULGARIA) AD, PROCREDIT BANK SA¹⁸⁴

Reference: 20190299

Release date: 19 June 2019

Signed - 17/01/2020

Promoter – Financial Intermediary

Location

- [Bulgaria](#)
- [Romania](#)

The project consists of a dedicated EIB loan to finance eligible investments promoted by small and medium-sized enterprises (SMEs) and mid-caps in Romania and Bulgaria, with a Climate Action window of at least 30%. This operation will improve competitiveness and access to finance at favourable conditions for SMEs and mid-caps in Romania and Bulgaria, with a special focus on energy efficiency. The proposed EIB finance (Approximate amount) is EUR 30 million. Final beneficiaries will be requested to comply with applicable national and EU legislation, as appropriate.

On 18 July 2022, Romania enacted **Governmental Emergency Ordinance No. 112/2022 (GEO 112)**, which establishes, amongst others, a financial support scheme for large, medium and small companies aimed at stimulating investments in energy efficiency in Romania.¹⁸⁵ GEO 112 is designed to provide financial support for businesses in Romania to achieve energy efficiency (**EE**) by giving grants to companies for implementing energy-saving measures at their industrial and auxiliary buildings or through technological processes; and producing green energy for their own consumption ("**EE Financial Scheme**"). As part of this EE Financial Scheme, grants will have a minimum value of EUR 50,000 and a maximum value of EUR 500,000 with the exception of those awarded under the *de minimis* scheme where the maximum value will be EUR 200,000.

The overall budget allocated to the EE Financial Scheme is EUR 411,764,000 of which:

- EUR 350 million is non-reimbursable external funds allocated to Romania within the Framework of Large-Scale Infrastructure Operational Programme (LSIOP) and financial resources allocated through the Cohesion Fund; and
- EUR 61,764,000 is from the Romanian state budget allocated through the Ministry of Investments and European Projects.

Who can apply for EE Financial support?

According to GEO 112, the following entities can apply for funding under the EE Financial Scheme:

- Large companies with more than 250 employees and a net yearly turnover of more than EUR 43 million;
- Small and medium enterprises (SMEs) and microenterprises with the observance of EU Commission Regulation No. 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty.

Additionally, the companies must carry out activities for production of goods or provision of services except for real estate investments, consultancy services, technical-assistance services and activities included in Annex No. 1 of Governmental Decision No. 780/2006 on establishing the greenhouse gas emissions trading scheme.

What does the EE Financial Scheme entail?

¹⁸⁴ <https://www.eib.org/en/projects/pipelines/all/20190299>

¹⁸⁵ <https://cms-lawnow.com/en/ealerts/2022/07/romanian-government-offers-companies-up-to-eur-500-000-to-achieve-energy-efficiency>

GEO 112 provides four large categories of investments that may be funded through the EE Financial Scheme:

1. investments for reducing energy consumption of buildings (except administrative buildings or buildings not used by the company for production or service activities) through works on the buildings' covering, roofing, cladding including consolidation works, the buildings' utility systems, and for the purchase of equipment, machinery and specific facilities needed to produce the energy required for the buildings;
2. investments in specific equipment, machinery and tools needed for generating energy from renewable sources (except biomass) for the consumption of companies that fall within the specific production capacity of the prosumer (i.e. as defined in Law No 123/2012 on Electricity and Natural Gas);
3. investments in energy efficiency measures at the level of cogeneration or trigeneration units, existing or new, including investments for modernisation, rehabilitation and the increase of already installed capacities from renewable sources intended for their own consumption, which falls within the specific production capacity of the prosumer;
4. investments to reduce energy consumption and greenhouse gas emissions through systems dedicated to modernising, monitoring and making energy consumption more efficient, which will necessarily include the installation of an energy management system (EMS) that provides overall metering of energy consumption at the company level, produces statistics on consumption, records and analyses centralised data, reports regularly on these data and makes energy consumption more efficient in real time. The purchase of specific equipment, machinery and tools that are part of the production and service process is possible if it is for the replacement of current equipment, machinery and tools with higher energy consumption and will lead to a reduction of energy consumption compared to the initial consumption.

The grants from the EE Financial Scheme will be awarded following a call for projects, and will observe the principles of transparency and competitiveness. Companies must submit a single application that may cover more than one industrial facility.

The applications must be submitted exclusively through the "IMM Recover" platform. The same platform will be used for evaluating and selecting the successful applicants for the funding of their projects.

Following the call for projects - within the limits of the EE Financial Scheme's budget - a funding contract will be concluded by the LSIOP Management Authority with the applicant that meets the selection criteria set out in Article 13 and in Annex No. 1 to GEO 112.

To be eligible for funding, the applicant companies must also meet a range of criteria listed in Article 11 of GEO such as:

- they should have been incorporated prior to 31 Dec 2021;
- they should not have received financial support from public funds, including European Union funds, in the last five years for the same eligible costs;
- they must submit an energy consumption analysis, carried out by an independent and authorised expert, containing initial and projected specific energy parameters that represent minimum targets to be met by the beneficiaries at the end of the project-implementation period and to be maintained thereafter;
- they must ensure the sustainability of the investment project (i.e. maintaining the specific energy parameters to which each company committed) for a period of at least five years after the expiry of the project implementation period; etc.

The beneficiaries of the funding must finish their investment projects and achieve the assumed energy parameters by 31 December 2023. If the beneficiaries do not achieve the specific energy parameters assumed through their funding application, they will be liable to repay the amounts received, plus applicable interest.

Characteristics



Budget	411,764 Million EUR
Financing of the measure	<ul style="list-style-type: none"> • EUR 350 million is non-reimbursable external funds allocated to Romania within the Framework of Large-Scale Infrastructure Operational Programme (LSIOP) and financial resources allocated through the Cohesion Fund; and • EUR 61,764,000 is from the Romanian state budget allocated through the Ministry of Investments and European Projects.
Policy focusses	Physical
Intervention Type	Equipment upgrade
Main Barriers Addressed	High initial cost
Key Driver(s)	Governmental Emergency Ordinance No. 112/2022
Replicability	High
EU Inclusion	-
Related Characteristics	-

9.23.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Data about the impact of the measure not available yet.

	Impacts
Case level impact	Low
Policy level impact	High
Size	Not available
Energy	Not available
Impact evaluation	Not available



Slovakia

Review of past and existing policy options for the acceleration of electric motor renovation

EU-MORE

Authors:

Ivan Sangiorgio (IEECP)

List of Acronyms

Acronym	Text
SlovSEFF	Slovak Sustainable Energy Financing Facility
EBRD	European Bank for Reconstruction and Development
SIEA	Slovak Innovation and Energy Agency



9.24 Slovakia

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

The Ministry of the Economy is the general coordinator of the energy efficiency agenda, focusing primarily on energy savings in all sectors of the national economy, and has set up an interdepartmental working group with the participation of all relevant central government bodies to this end.

The Slovak Innovation and Energy Agency was established as a state contribution organization by the decision of the Minister of Economy. It acts as an intermediary body and implementation agency for EU structural funds and collects data on energy efficiency and the use of renewable energy sources.

The Ministry of Environment of the Slovak Republic is responsible for drawing up national environmental and climate policies.

The Slovak Government Council for the European Green Deal was created in 2021 to serve as an expert, advisory, coordination, and initiative body of the Slovak Government on matters relating to the European Green Deal as a vision for achieving the Sustainable Development Goals and the transition to a carbon-neutral economy by 2050 and the related implementation of key policies and measures.

The NECP aims to achieve the national objectives and targets for decarbonization, energy efficiency, energy security, internal energy market, research, innovation, and competitiveness. The document identifies key policies and measures that will deliver on the Paris Agreement headline target of limiting global temperature growth to no more than 2 °C by the end of the century and pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels. The long-term priority of Slovakia's energy policy is to build a competitive low-carbon economy towards carbon neutrality. The transition to a low-carbon economy entails additional costs to be paid by consumers or taxpayers. For this reason, measures will need to be taken that respect the energy efficiency first principle, whereby renewable energy sources should not be a primary objective, but only one of the tools for such a transformation.

The NECP lists several policies and measures related to energy efficiency, including the Ecodesign Framework Directive, Energy Labelling Directive, Directive on the energy performance of buildings, and Energy Efficiency Directive.

The NECP sets a national indicative energy efficiency target of 23% for final energy consumption in 2020 (Eurostat) and national indicative contributions of the EU target of 32.5% in 2030 energy efficiency measures, in particular buildings and industry. The Slovak Republic's priority in the field of energy efficiency is to further reduce the energy intensity of the Slovak economy in order to reach the level of the European average.

No information about ongoing policy measures targeted to the industrial sector are available, neither in the NECP or on implementing authorities' websites¹⁸⁶¹⁸⁷.

The latest measures implemented for the industrial sector were the SlovSEFF III program (ended in 2020) and negotiated voluntary agreements for energy-intensive industries.

¹⁸⁶ <https://www.economy.gov.sk/en>

¹⁸⁷ <https://www.siea.sk/en/>

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

In the national policy framework, no past or current measures are directly targeted to the replacement of electric motors. In general, the country is not putting effort on energy efficiency policies targeted to the industrial sector.

9.24.1 Measure 1: Slovak Sustainable Energy Financing Facility (SLOVSEFF III)

	Overview
Short Description	Combination of loans provided by the EBRD with a grant component for projects related sustainable energy.
Responsible Authority	EBRD in collaboration with the Ministry of Environment of the Slovak Republic
Status	Ongoing
Issue Date	2014
Start Date	2014
Ending Date	2020
Duration	6 years
Reference:	https://www.crz.gov.sk/data/att/1137440_dokument1.pdf

9.24.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The Slovak Sustainable Energy Financing Facility (SlovSEFF) aims to promote energy efficiency and renewable energy projects with private industrial companies, municipalities, small and medium-sized enterprises (SMEs), and large companies¹⁸⁸¹⁸⁹.

Eligible projects for SlovSEFF are divided into three categories: renewable energy, industrial energy efficiency, and housing energy efficiency. Each category has specific eligibility criteria that need to be satisfied. Energy efficiency sub-projects category includes those sub-projects which comprise of equipment, systems and processes that enable reduction in primary energy consumption and/or final consumption of electricity and/or fuels (either of fossil or renewable origin) and/or other forms of energy (which can be ultimately related to the use of electricity and/or fuels) for:

(i) the production of goods and/or provision of energy services auxiliary to the production of goods;

(ii) the provision of services directly related to the industrial sector.

Examples of such projects include but are not limited to:

- On site natural gas, biogas or biomass fired co-generation of heat and electricity.
- Fuel switch projects from high (coal, lignite) to low carbon intensive fuels;
- Rehabilitation of boilers (enhanced controls, economizers, improved insulation, regenerative burners, automatic blow-down, etc.);
- Replacement of old gas boilers with condensing boilers;
- Switch from electricity heating to fuel based direct heating;

¹⁸⁸ [https://www.ebrd.com/documents/evaluation/2013-the-slovak-sustainable-energy-finance-facility-\(slovseff\).pdf](https://www.ebrd.com/documents/evaluation/2013-the-slovak-sustainable-energy-finance-facility-(slovseff).pdf)

¹⁸⁹ <https://adelphi.de/en/publications/the-slovak-sustainable-energy-financing-facility-slovseff>

- Process improvements including enhanced controls;
- Biomass processing facilities (pelletising, carbonising);
- Rehabilitation of steam distribution systems: installation of steam traps, increased condensate recovery, etc.; Installation of heat recovery from processes (e.g., installation of economisers for preheating purposes, heat recovery for space heating, heat recovery for drying, etc.)
- Installation of absorption chillers;
- Installation of new chillers;
- **Installation of Variable Speed Drives on selected electric motors;**
- Rehabilitation of compressed air systems (e.g., decentralisation and/or resizing of air compressors, replacing of old air compressors with new efficient ones);
- Rehabilitation of power distribution systems (e.g., replacement of old or oversized transformers, installation of capacitors to reduce reactive power consumption, etc.);
- Implementation of Energy Management Systems or Building Management Systems;
- Implementation of energy saving measures in the built environment (e.g., insulation of walls, roofs and floors; installation of rolling doors; installation of new windows;
- Installation of new heating and ventilation systems; installation of high energy efficiency lighting; etc.); and
- Electric or CNG fuelled vehicles.

The eligible projects thus clearly includes the efficiency upgrade of electric motors.

The incentive for industrial energy efficiency projects is calculated as $20 / tCO_2e/year \times years \times annuity\ factor$, with a maximum of 20% and a minimum of 5% of the sub-loan amount.

Individual industrial energy efficiency sub-projects cannot exceed 5 M€ unless EBRD gives consent case by case. The minimum IRR for such projects must be 8% (excluding incentive payment).

	Characteristics										
Budget	In 2014: Residential Energy Efficiency 8 M€, Renewable energy 18 M€, Industrial energy efficiency 14 M€ (Total: 40 M€) Several budget extensions have been adopted in the following years (additional 30 M€ as at November 2019 ¹⁹⁰)										
Financing of the measure	Carbon credit scheme, public funds										
Policy focusses	Physical intervention										
Intervention Type	Equipment upgrade										
Main Barriers Addressed	High initial cost, return on investment										
Key Driver(s)	None										
Replicability	Low										
EU Inclusion	Included in the NECP										
Related Characteristics	<p>The following table includes the indicators to be monitored and reported in an industrial energy efficiency project:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 2px;">Energy consumption before the retrofit (by energy source)</td> <td style="text-align: right; padding: 2px;">kWh</td> </tr> <tr> <td style="padding: 2px;">Energy consumption after the retrofit (by energy source)</td> <td style="text-align: right; padding: 2px;">kWh</td> </tr> <tr> <td style="padding: 2px;">Total investment costs divided by sources of funding (EBRD, state budget, own resources)</td> <td style="text-align: right; padding: 2px;">euro</td> </tr> <tr> <td style="padding: 2px;">For combined generation of heat and power reduction of consumption of primary energy -sources (by energy source)</td> <td style="text-align: right; padding: 2px;">kWh/year</td> </tr> <tr> <td style="padding: 2px;">For renovation and modernisation of equipment for power generation and equipment for heat production reduction of consumption of primary energy -sources</td> <td style="text-align: right; padding: 2px;">kWh/year</td> </tr> </tbody> </table>	Energy consumption before the retrofit (by energy source)	kWh	Energy consumption after the retrofit (by energy source)	kWh	Total investment costs divided by sources of funding (EBRD, state budget, own resources)	euro	For combined generation of heat and power reduction of consumption of primary energy -sources (by energy source)	kWh/year	For renovation and modernisation of equipment for power generation and equipment for heat production reduction of consumption of primary energy -sources	kWh/year
Energy consumption before the retrofit (by energy source)	kWh										
Energy consumption after the retrofit (by energy source)	kWh										
Total investment costs divided by sources of funding (EBRD, state budget, own resources)	euro										
For combined generation of heat and power reduction of consumption of primary energy -sources (by energy source)	kWh/year										
For renovation and modernisation of equipment for power generation and equipment for heat production reduction of consumption of primary energy -sources	kWh/year										

¹⁹⁰ <https://www.ebrd.com/work-with-us/projects/psd/slovseff-iii---slovak-ee-framework.html>

	For renovation of systems of production of pressurised air - reduction of specific energy consumption (by energy source)	kWh/m ³
	For management systems, energy management systems - reduction of energy consumption (by energy source)	kWh/year
	Total floor area	m ²
	For thermal insulation of the building envelope, replacement of the windows and doors: - insulated area (area of replaced windows/doors) - energy savings (by energy source)	m ² kWh/m ²
	For modernisation of the lighting systems - reduction of electricity consumption in the operation of the lighting systems	kWh/year
	For modernisation of the space heating, air conditioning and water heating systems - reduction of energy consumption (by energy source)	kWh/year
	Total GHG emission reductions	tCO ₂ e/year

9.24.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Detailed information about the policy is available for its first and second edition only. This has been reported in the following table¹⁹¹:

		SlovSEFF I	SlovSEFF II	TOTAL
Housing projects	Number	251	348	599
	Investment	EUR 32.6 million	EUR 58.9 million	EUR 91.5 million
Industrial projects	Number	34	42	76
	Investment	EUR 19.3 million	EUR 21.2 million	EUR 40.5 million
Renewable energy projects	Number	8	7	15
	Investment	EUR 8.1 million	EUR 9.8 million	EUR 17.9 million
Emission savings per year		63,564 tCO ₂	50,948 tCO ₂	114,512 tCO ₂
Primary energy savings per year		283 GWh	300 GWh	583 GWh
Average energy saving in housing projects		32%	35%	33%

For SlovSEFF III the impact has been estimated via projections, assessing 40.7 GWh/year and 9.9 ktCO₂/year of energy and CO₂ emissions savings resulted by the projects implemented until 2018. No more recent data was available.

	Impacts
Case level impact	-

¹⁹¹ <https://www.euki.de/wp-content/uploads/2018/12/Fact-Sheet-SlovSEFF-Energy-Financing-Facility-SK.pdf>

Policy level impact	Low (<0.1%)
Size	Not found
Energy	40.7 GWh/year, 9.9 ktCO ₂ /year for projects implemented until
Impact evaluation	-

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Not found

9.24.1.3 *Lessons Learnt*

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

SlovSEFF stood out as an innovative policy tool because it offers essential technical support from project consultants to assist local bank clients in identifying the most suitable energy efficiency investments.

Furthermore, the SlovSEFF program incorporated an integral incentive payment system. Under this system, all renewable energy and industrial energy efficiency projects that successfully pass verification receive a one-time payment as compensation for their carbon reduction efforts.

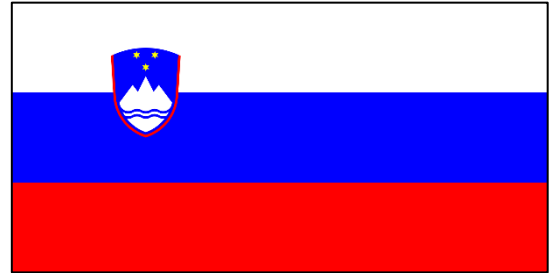
The main barriers encountered during the implementation of the policy in the industrial sector were low level of awareness in many companies and limited knowledge of available technologies to reduce energy consumption.

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> - Combination of technical assistance and incentive payments is considered a success factor - Low level of awareness in companies
Recommendations	- Need of a monitoring platform for impact evaluation
Linked measures	No follow-ups were conducted for the measure
Reference(s)	https://adelphi.de/en/publications/the-slovak-sustainable-energy-financing-facility-slovseff
Other	-
Thoughts, comments, considerations ...	No information about the measure is available after 2018, as well as data about achieved impact.

EU-MORE



**EUropean M0tor
REnovation initiative**



Slovenia

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Ivana Rogulj (IEECP)



List of Acronyms

Acronym	Text
EEOS	Energy efficiency obligation scheme



9.25 Slovenia

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Slovenia started the implementation of the legislative framework for energy efficiency with the First and Second Action Plan for energy efficiency for the period until 2020, within the framework of the Directive 2012/27/EU. In that period Slovenia pursued the set goal with a series of introduced measures to promote the efficient use of energy, with the implementation of which in the second action plan it was expected to achieve final energy savings of 4,040 GWh by 2020. One of the most important measures of energy efficiency in Slovenia is EEOS. The government (Ministry of Infrastructure) sets the rules. The implementation of the scheme is supervised by the Slovenian Energy Agency (authority regulating the energy markets) with a team dedicated to monitoring and verification. The Centre for Energy Efficiency of the Jožef Stefan Institute provides a technical support (especially in the development of the calculation methods).¹⁹²

Following the entry into force of the State Administration Act in February 2023, the Ministry of the Environment, Climate and Energy performs tasks in the areas of... climate change and waste management, energy, energy efficiency. A number of other ministries are also involved in the implementation of the measures. An interdepartmental expert group of various ministries has been set up to support the drafting of the updated NECPs.

Overview of key objectives from the NECP in the dimension “energy efficiency” relevant for industry includes:

- accelerating energy and material efficiency improvements in all sectors (including energy supply) as a key enabler of a successful exit from the energy crisis and the effective implementation of the green transition (and thus reducing the consumption of energy and other natural resources) in accordance with the energy efficiency first principle, which is a prerequisite for a successful and competitive transition to a climate-neutral society;
- to improve energy efficiency and the volume of annual savings under the mandatory savings scheme by 2030, at least in line with the indicative target to be set in the new Energy Efficiency Directive;
- ensure that the policies and measures adopted are systematically implemented so that final energy consumption does not exceed 51 TWh (4.426 ktoe) (*note: Around 28% of final energy consumption comes from industry*);
- active and accelerated support to industry to increase efficiency and competitiveness, the uptake of new efficient green technologies and the circular economy,
- accelerate the implementation of information, awareness-raising and training programmes for different target groups on the benefits and practical aspects of developing and applying technologies for energy efficiency and exploitation of RES and understanding the concept of sufficiency and motivation for less material wellbeing.

The new annual savings over the period from 1 January 2021 to 31 December 2030 must be at least 1.49 % of annual final energy consumption, averaged over the most recent three-year period prior to 1 January 2019, in accordance with the new Energy Efficiency Directive. The obligation will be split between 2021 and 2030 between the contribution of EEOS and an alternative measure – the implementation of the Eco Fund programmes and tax mechanisms.

Both have industrial measures included.¹⁹³

Most relevant industrial measures are:

- Financial incentives for energy efficiency and RES in industry

¹⁹² [Slovenia_factsheet_ENSMOV_EEOS_final.pdf \(energysavingpolicies.eu\)](#)

¹⁹³ [EN_SLOVENIA_DRAFT_UPDATED_NECP.pdf \(europa.eu\)](#)

- Promoting energy audits in industry
- Promoting of energy management systems in industry
- Promoting energy efficiency and renewable energy use in industry
- Additional measures in industry sector

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

There is not a lot of information available, whereas there obviously is implementation and savings deriving from the measures. Most of the savings in period until 2020 were achieved in industry.

9.25.1 Measure 1: Financial incentive for increasing the efficiency and use of RES in industry (same for SMEs)

	Overview
Short Description	Financial incentives in the form of revolving funds for energy efficiency measures and the improvement of the efficient use of renewable energy sources.
Responsible Authority	Ministry of Infrastructure (to 2023) Ministry of the Environment, Climate and Energy (from 2023) Eco fond – Eko sklad
Status	Ongoing
Issue Date	2017
Start Date	2017
Ending Date	2030
Duration	13y
Reference:	Subvencije in ugodni krediti za okolju prijazne naložbe Eko sklad EN_SLOVENIA DRAFT UPDATED NECP.pdf (europa.eu)

9.25.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

This measure was part of NEEAP and is part of NECP's alternative measure with the joint name: *Eco Fund program funding*.

It includes financial support for energy efficiency and use of renewable energy sources in industry. The financial support for this purpose is also included in the Operational Programme for the Implementation of the European Cohesion Policy for the period 2014-2020 (OP EKP) for Slovenia.

The Eco Fund offers favourable loans with a subsidised interest rate for industry and service sector, intended to finance various investments in environmental protection.

Looking into Eco Fund website reveals a stream of loans for electric motors¹⁹⁴:

....

9) measures for efficient use of energy in production and business facilities, which are based on the performed energy audit, namely:

....

b) installation of energy-efficient electric motors, frequency converters and systems for the preparation of compressed air.

¹⁹⁴ [Microsoft Word – 8_Objava JP 71P023_poslano_na_UL_kon_na.docx \(ekosklad.si\)](#)

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	Characteristics
Budget	Budgets are shown in lump sum so unable to detect what amount is dedicated to industry or electric motors.
Financing of the measure	A combination of grants and in this case loans
Policy focusses	Product
Intervention Type	equipment upgrade
Main Barriers Addressed	High initial cost
Key Driver(s)	EED Article 7(8)
Replicability	Too general to define replicability
EU Inclusion	EED Article 7(8), NECP
Related Characteristics	-

9.25.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Evaluation about the project's impact or separated energy savings from specific intervention are not available.

	Impacts
Case level impact	Low
Policy level impact	Low
Size	n.a.
Energy	n.a.
Impact evaluation	Information is not available, however based on information from Odysee Mure the improvement of energy efficiency in industry in Slovenia (manufacturing, construction and mining without extraction of energy fuels) presents a vital element for the achievement of smart growth and sustainable development. Industry uses about a quarter of end-use energy consumption and produces 14 % of all GHG emissions in Slovenia.

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

Same as for Measure 3 added below.

9.25.1.3 Lessons Learnt



Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

More detailed monitoring is needed.

	Lessons Learnt
Key takeaways	To be able to evaluate influence, more detailed reports are needed.
Recommendations	As above.
Linked measures	Measure is continuous since introduction.
Reference(s)	NA
Other	Ministry of the Environment, Climate and Energy (from 2023) Eco fond - Eko sklad
Thoughts, comments, considerations ...	

9.25.2 Measure 2: Financial incentives for efficient electricity consumption

Overview	
Short Description	This is a measure to stimulate the improvement of the efficient use of electricity in industry with multiple actions.
Responsible Authority	Ministry of Infrastructure (to 2023) Ministry of the Environment, Climate and Energy (from 2023) Eco fond - Eko sklad
Status	Ongoing
Issue Date	2008
Start Date	2008
Ending Date	2030
Duration	22
Reference:	Energy Efficiency Policies & Measures Database, Graph and Summary Table (odyssee-mure.eu)

9.25.2.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

This is a measure to stimulate the improvement of the efficient use of electricity in industry.

Electricity consumption in industry presents about 36% (about 7 176 GWh/year) of all final energy consumption in industry. Electricity consumption in industry was increased for 30.7% in 2005 in comparison to the year 2000 or in average for 5.5%/year.

The share of electricity consumption for electrical motors in industry is about 50%, of which are:

- around 50% for pumps and ventilators,
- 10% for preparation of compressed air,
- 8% for lighting,
- 5% for cooling,
- 5% for ventilation and air-conditioning and
- other amounts for various purposes.

The financial supporting includes measures (activities) to improve the technologies:

- energy-efficient electric motors,
- frequency regulation of motor revolutions,
- energy-efficient pumps and ventilators,
- energy-efficient systems for preparing compressed air,
- energy-saving lighting.

Individual targets of energy efficiency activities are expected to achieve the following effects:

- replacement of electric motors with high-efficiency motors (EU standard IE3) and replacement of oversized motors with smaller ones will enable a 4% saving of electricity, which produces greater effects in motors with a higher number of operating hours.
- frequency inverters to regulate motor revolutions - enable at least a 20% saving of electricity.
- replacing pumps with energy-saving ones (with frequency inverters) achieves a 2% saving of electricity.
- replacing ventilators with energy-saving ones (with frequency inverters) achieves a 25% saving of electricity.
- by eliminating leaks, regulating the distribution of compressed air and optimising regulation, electricity consumption is reduced by at least 10%, and by replacing compressors, by around 25%.
- the installation of energy-efficient lights (fluorescent and electronic control gears) and optimising regulation of lighting etc. reduces electricity consumption by around 45%.

The necessary amount of public fund for implementing the measures in the period 2011- 2016 is estimated at 12 million EUR (EUR 9 million as incentives for industry and EUR 3 million for service companies). The measures are planned in the National Energy Efficiency Action Plans and NECP.

	Characteristics
Budget	The necessary amount of public fund for implementing the measures in the period 2011- 2016 is estimated at 12 million EUR (EUR 9 million as incentives for industry and EUR 3 million for service companies). Later budgeting is not available.
Financing of the measure	Incentives
Policy focusses	Products
Intervention Type	Equipment upgrade
Main Barriers Addressed	Not clear
Key Driver(s)	EED Article 7(8)
Replicability	Too general to define replicability
EU Inclusion	EED Article 7(8), NEEAP, NECP
Related Characteristics	-

9.25.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Evaluation about the project's impact or separated energy savings from specific intervention are not available.

	Impacts
Case level impact	High
Policy level impact	High
Size	n.a.
Energy	Cumulative annual savings in 2020: 1.3 PJ, no new information available
Impact evaluation	Information is not available, however based on information from Odyssee Mure the improvement of energy efficiency in industry in Slovenia (manufacturing, construction and mining without extraction of energy fuels) presents a vital element for the achievement of smart growth and sustainable development. Industry uses about a quarter of end-use energy consumption and produces 14 % of all GHG emissions in Slovenia.

Description of the method used for calculating the final energy- / cost- savings achieved through the measure.

Same as for Measure 3 added below.

9.25.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

More detailed monitoring is needed.

	Lessons Learnt
Key takeaways	To be able to evaluate influence, more detailed reports are needed.
Recommendations	As above.
Linked measures	Measure is continuous since introduction.
Reference(s)	NA
Other	Ministry of the Environment, Climate and Energy (from 2023) Eco fond – Eko sklad
Thoughts, comments, considerations ...	This measure seems as straightforward regarding its contribution towards EU MORE targets, however needs more reporting to be replicable.

9.25.3 Measure 3: Energy efficiency obligation scheme

	Overview
Short Description	Energy efficiency obligation scheme as per Article 7(8) of the EED

Responsible Authority	Ministry of Infrastructure (to 2023) Ministry of the Environment, Climate and Energy (from 2023)
Status	Ongoing
Issue Date	2010
Start Date	2010 with update in 2015
Ending Date	2030
Duration	20
Reference:	Slovenia_factsheet_ENSMOV_EEOS_final.pdf(energysavingpolicies.eu)

9.25.3.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

The obligation scheme is built on a previous scheme started in 2010 collecting funds through fees on energy prices. The current rules of the scheme entered into force in 2015. All energy suppliers have now to achieve energy savings targets.

About 30 standardised actions (with deemed savings) cover all end-use sectors. Other actions can be reported through energy audits. Actions improving the efficiency of district heating, cogeneration and cooling installations are also eligible. About 57% of the savings achieved in 2018 came from 3 action types: cogeneration (23%), fuel additives (19%) and energy efficient lighting in residential sector (15%).

The Ministry of Infrastructure (or Energy) sets the rules. The implementation of the scheme is supervised by the Slovenian Energy Agency (authority regulating the energy markets) with a team dedicated to monitoring and verification. The Centre for Energy Efficiency of the Jožef Stefan Institute provides a technical support (especially in the development of the calculation methods). In 2018 there were 242 obligated parties (OPs) that are the suppliers of electricity, natural gas, heat (district heating), and liquid and solid fuels to final customers in all end-use sectors (with a lower target for transports: 0.25%/a for the whole period). The scheme does not include a trading market. But OPs may fulfil their obligations by making a payment to the Eco Fund (fee equal to the average costs per kWh saved as observed for Eco Fund programmes). OPs may also have agreements to transfer projects between them or from ESCos, before reporting to the Energy Agency.

	Characteristics
Budget	There are no publicly available data on costs incurred by the obliged parties.
Financing of the measure	Obligation parties
Policy focusses	Both
Intervention Type	All available in measures catalogue linked to below described savings calculations
Main Barriers Addressed	Not clear
Key Driver(s)	EED Article 7(8)
Replicability	Too general to define replicability
EU Inclusion	EED Article 7(8), NEEAP, NECP
Related Characteristics	-

9.25.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

Evaluation about the project's impact or separated energy savings from specific intervention are not available.

	Impacts
Case level impact	High
Policy level impact	High
Size	n.a.
Energy	116 GWh were saved in 2020 in industrial sector, but the specific details are not available.
Impact evaluation	OPs made most of the savings in the industry. These savings are demonstrated by performing an energy audit, however the numbers are not precise.

Description of the method used for calculating the final energy - / cost- savings achieved through the measure.

More information is available in [StreamSAVE](#) project reports

Installation of electric motors¹⁹⁵

Energy saving is the difference between the use of electricity of old motor and the installation of an energy-efficient electric motor, calculated on the basis of information on power, number of operating hours, load factor and condition, or any improvements to the drive systems. The load factor can be calculated on a case by case basis and, exceptionally, normalised values may be used for lower power systems.

Energy savings from the installation of the new efficient electric motor are calculated using the following equations:

$$FE_{motor} = \left(\frac{1}{\eta_{old} - 0.02} - \frac{1}{\eta_{ef}} \right) \cdot P_M \cdot t_M \cdot LF$$

Note: Ageing and the impact of rewinding the old electric motor are also taken into account by reducing the efficiency by 2 %.

Where:

FE_{motor}	Energy saving [kWh/year] due to implementation of new motor.
η_{old}	Efficiency of the conventional old motor (the one being replaced).
η_{ef}	Efficiency of the new efficient motor (one being installed).
P_M	Installed nominal electric power [kW] of the new electric motor.
t_M	Number of yearly operating hours [h].

¹⁹⁵ <http://www.pisrs.si/Pis.web/npb/2017-01-0676-2015-01-2730-npb1-p1.pdf>

<i>LF</i>	Load factor to be determined on the basis of an analysis of the performance of a specific motor system.
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The reduction of CO₂ emissions (CES) is calculated according to the formulas below:

$$CES_{STE} = FE_{motors} \cdot ef_{el}$$

where:

<i>CE_{STE}</i>	Reduction of CO ₂ emissions [kg CO ₂ /year] when installing a new electric motor.
<i>ef_{el}</i>	Emission factor for electricity [kg CO ₂ /kWh]

Installation of VSD

The energy saving is calculated on the basis of the energy savings factor due to the installation of the frequency converter, which is determined on the basis of an analysis of the operation of a specific propulsion system. Normalized savings can be used for simple appliances.

Energy savings from the installation of the new efficient electric motor are calculated using the following equation:

$$FE_{VSD} = \frac{P_M}{\eta} \cdot t_M \cdot LF \cdot f$$

Where:

<i>FE_{VSD}</i>	Energy saving [kWh/year] due to implementation of the VSD.
<i>η</i>	Efficiency of the motor.
<i>P_M</i>	Installed nominal electric power [kW] of the new electric motor.
<i>t_M</i>	Number of yearly operating hours [h].
<i>LF</i>	Load factor to be determined on the basis of an analysis of the performance of a specific motor system.
<i>f</i>	Energy savings factor due to the installation of the frequency converter – the savings must be determined on the basis of an analysis of the operation of a specific propulsion system; for simple devices, the normalized savings set out in table below.

9.25.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

More detailed monitoring is needed.

Lessons Learnt	
Key takeaways	To be able to evaluate influence, more detailed reports are needed.
Recommendations	As above.
Linked measures	Measure is continuous since introduction.

Reference(s)	NA
Other	Ministry of the Environment, Climate and Energy (from 2023)
Thoughts, comments, considerations ...	As other EEOS, it is harder to evaluate specific contribution of one action.

EU-MORE



**EUropean M0tor
REnovation initiative**



Spain

Review of past and existing policy options for
the acceleration of electric motor renovation

EU-MORE

Authors:

Giulia Viero (IEECP)



List of Acronyms

Acronym	Text
EuPs	Energy-using Products



9.26 Spain

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

[Spain's NECP](#): "In particular, the Commission's recommendations may address (i) the level of ambition of objectives, targets and contributions with a view to collectively achieving the Energy Union objectives and, in particular, the Union's 2030 targets for renewable energy and energy efficiency as well as the level of electricity interconnectivity that the Member State aims for in 2030". The Measure 2.5 (*Improvements in the technologies and industrial processes*) includes the renovation of industrial processes including energy efficiency measures, particularly in SMEs, but applies to all industries. Also, promotes investments in these substitutions by using BTAs (Best technologies available). It mentions this measure is linked to ISO50001.

Odysse-Mure database: 2 policy documents were found on the "Recast Ecodesign Directive for Energy-related Products (Directive 2009/125/EC) - Ecodesign requirements for energy-related products (recast)"

- *Household sector* (not within this research scope);
- *Services sector* (within this research scope).

The Ecodesign requirements, approved by Royal Decree 1369/2007, involve an addition to the already existing national legislation on the equipment in the buildings of the tertiary sector. The joint implementation of both measures will enhance the impact on the affected products, resulting in greater penetration of more efficient products on the market.

The Regulation 2019/1781 prescribes the rules to be followed for the ecologic design of electric motors^{196 197}:

- o Applies to electric motors up to 1.000 kW
- o Establishes requirements for electric motors and speed variators. For electric motors, efficiency level should be minimum IE3. When using speed variators, the power losses in variator+motor should not lead to a lower efficiency level than the stipulated for IE2.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

Energy efficiency measures in industries, with special focus on substitution of equipment by more efficient, should lead to 10.260 kTOE of accumulated final energy savings in the period 2021-2030. Considering that electric motors in industries can be responsible of 50% of the energy demand, the potential for this period is over 5.000 kTOE in total.

Larger industries, due to obligations in energy audit developments, are taking the lead of the substitution of electric motors. SMEs are also renovating electric motors but in a lower number, due to both the size of the companies (less motors) and economic reasons (more difficult competitiveness).

¹⁹⁶ <https://static.weg.net/medias/downloadcenter/h8f/h1a/WEG-new-european-efficiency-regulations-50103352-guide-spanish-web.pdf>

¹⁹⁷ <https://www.boe.es/doue/2019/272/L00075-00094.pdf>

9.26.1 Measure 1: Ecodesign requirements for EuPs Royal Decree 1369/2007

Overview	
Short Description	The Ecodesign requirements are to be applied to energy-using products (EuPs) for their functioning with a view to contributing to sustainable development and the preservation of the environment through an increase of energy efficiency, a decrease of pollution and an increase in the security of energy supply.
Responsible Authority	Central Government Trade Associations
Status	Ongoing
Issue Date	2007
Start Date	2007
Ending Date	-
Duration	Ongoing (15 years)
Reference:	https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1912 NECP 2021-2030, original in NECP 2021-2030, original in Spanish , English version EC's individual assessment (SWD/2020/908) in Spanish or English

9.26.1.1 Main Description

A detailed description of the policy measure – including references to (if applicable) anchoring national law, EU directives, other schemes

This Royal Decree considers a series of enforcement measures establishing the ecodesign requirements needed for specific EuPs or their environmental features. To achieve this objective, it is necessary to act from the very product-design phase, as the pollution brought about during its shelf-life is in fact determined during this phase:

- the manufacturer will draft a technical documentation register, enabling to assess the compliance of the EuPs with the requirements of the applicable enforcement measure;
- the decree requires – on the part of the manufacturer – to provide information that may have an influence on the way to deal, use or recycle the EuP;
- the documentation will include:
 - a general description of the EuP and its established use;
 - the results of the environmental assessment studies duly carried out by the manufacturer;
 - the eco-profile if it is so required by the enforcement measure;
 - productive design specification elements in relation to the environmental design features of the product;
 - the results of the measurement in relation to the Ecodesign requirements carried out.

Target audiences: Large Enterprises; SMEs; Local Authorities; Professional Associations

Targeted end use or type: Space heating; Lighting; Refrigeration; Cooking; Washing. Specifically, this Royal Decree makes up by itself an enforcement measure as regards energy efficiency, in the framework to establish the Ecodesign requirements applicable to EuPs. In this way, with the approval of this Royal Decree, the pre-existing regulation are updated in this sense, and it adjusts them to its application scope, as regards the performance and energy efficiency of new hot water boilers fed with either liquid or gas fuels, fridges, freezers and household electric appliances and of fluorescent lamp ballasts.

As regards energy consumption when in use, an energy efficiency level will be established, trying that the EuP representative models should have a minimum shelf-life cost for end-users, bearing in mind the consequences to other environmental aspects.

	Characteristics
Budget	-
Financing of the measure	-
Policy focusses	Physical intervention
Intervention Type	Mandatory standards - Regulation for building equipment/appliances - Minimum Energy Performance for building equipment/appliances Mandatory standards - Other regulations - Energy efficiency regulation for public lighting Mandatory information - Energy management obligations - Energy managers
Main Barriers Addressed	Ease of Regulation
Key Driver(s)	Directive
Replicability	High
EU Inclusion	Yes. This Royal Decree builds on the current Ecodesign Directive 2009/125/EC
Related Characteristics	The Ministry of the Presidency, in joint proposal with the Ministry of Industry, Tourism and Commerce and the Ministry of the Environment will announce, within the scope of the competences of the State's General Administration, the regulations of an exclusively technical nature that may be necessary to ensure the suitable application of the Ecodesign requirements. Likewise, the regulations will have the competence to modify the technical conditions established in compliance with the technical innovations that may take place.

9.26.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The regulation is expected to improve Spain products' circularity, energy performance and other environmental sustainability aspects.
It is expected a reduction in the energy demand and CO2 emissions and better overall management as new motors are able to send/receive more data (ISO50001).

	Impacts
Case level impact	High (>30% in the industry sector and probably similar in overall electric motors)
Policy level impact	Medium (0.1-0.5%)
Size	Not available
Energy	Overall more than 50% electric motors below IE0 or IE1. Changing to IE3 or IE4 should lead to 3-4% better energy efficiency. Considering also speed variators the increase could go up to 30%. As indicated above, 5.000 kTOE savings could be reached.

Impact evaluation	-

9.26.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation. The main barriers found that hamper and/or the conditions that are necessary for the implementation of the measure.

An outstanding issue is that Ecodesign specific requirements in relation to some environmental aspects with an important environmental impact may be further introduced.

	Lessons Learnt
Key takeaways	-
Recommendations	-
Linked measures	<ul style="list-style-type: none"> • Law 15/2014, of September 16, on the rationalization of the Public Sector (Public procurement)(SER-ES1920) • Ecological Public Procurement Plan (PCPE)(SER-ES4099)
Reference(s)	<ul style="list-style-type: none"> • Directive 92/75/EEC of 22 September 1992 on the indication by labeling and standard product information of the consumption of energy and other resources by household appliances • Royal Decree 275/1995, dated 24th February, relating to the performance requirements for new hot water boilers fed with both liquid and gas fuels. • Royal Decree 1062/1998, dated 29th May, establishing the energy performance requirements for fridges, freezers and household electric appliances. • Royal Decree 838/2002, dated 2nd August, establishing the energy efficiency requirements for fluorescent lamp ballasts. • Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council • Royal Decree 1369/2007, dated 19th October, on the establishment of an ecodesign to be applied to EuPs • IEA. (2023). Policies database. Available at Fehler! Linkreferenz ungültig. (filter: "electric motor", "Spain")
Other	
Thoughts, comments, considerations ...	

EU-MORE



European Motor
REnovation initiative



Collection Template

of past and existing policy options for the
acceleration of electric motor renovation

Sweden

João Fong (ISR-UC)

List of Acronyms

Acronym	Text
PFE	Programme for Energy Efficiency
RSE	Swedish Ministry of Climate and Business
SEA	Swedish Energy Agency



9.27 Sweden

Introduction and description of the national policy framework and important related national programmes, measures and/or developments:

Energy and climate policies in Sweden are closely aligned with the goals of the Energy Union's five dimensions and based on the same three pillars as EU energy cooperation: sustainability, competitiveness and security of supply. Therefore, Swedish energy policy will enable the shift to an ecologically sustainable society by establishing the necessary framework for economical, sustainable energy consumption as well as a cost-effective Swedish energy supply system with minimal adverse effects on the environment, public health, and climate. Sweden aims to achieve zero net greenhouse gas emissions into the environment by 2045. Additionally, emissions from businesses operating inside its borders must decrease by at least 85% from 1990 levels.

Table 1. Overview of national targets for energy and climate policy¹⁹⁸

Targets	Target year	Base year
Sweden shall have no net emissions of greenhouse gases into the atmosphere, and then achieve negative emissions. No more than 15 % of the emission reductions shall be achieved through accompanying measures.	2045	1990
75 % reduction in emissions from sectors outside the EU ETS. Up to 2 % through accompanying measures.	2040	1990
63 % reduction in emissions from sectors outside the EU ETS. Up to 8 % through accompanying measures.	2030	1990
70 % reduction in transport emissions	2030	2010
100 % fossil-free electricity production	2040	
50 % more efficient energy use	2030	2005

A framework for Swedish climate policy was established by the Swedish Parliament in June 2017 (Government Bill. 2016/17: 146, bet. 2016/17: MJU24, rskr. 2016/17:320). The framework for climate policy establishes long-term requirements for businesses and society and comprises national climate targets, a Climate Act and a Climate Policy Council.

The Climate Act entered into force on 1 January 2018. Briefly, this means the following:

- Government policy must be based on the stated climate goals.
- Every year, government must present a climate report in its budget bill.
- Every four years, the government must draw up a climate policy action plan. It must report how the climate goals are to be achieved using the policy and what needs to be done if the goals do not appear to be achievable.

Brief evaluation of the overall size and scope of national actions in relation to the replacement of electric motors and the EU-MORE project as a whole

No specific measures addressing the energy efficiency of electric motors or motor systems were found.

Four policy measures were identified that are aimed at promoting energy efficiency in industry in general and, therefore, may contribute to the replacement of old inefficient motors. These are:

- PFE – Programme for energy efficiency. Voluntary agreements with possibility for reduced energy taxes. 2005–2015
- Energikartläggningsscheckar – Energy audit programme for firms not covered by PFE, mostly SMEs (subsidised energy audits). 2010–2014
- Energy audits for larger firms (according to EED (2012/27)), ongoing.
- Energisteget – Financial support for deeper analyses of measures identified in energy audits. 2018–2019

These measures will be described in more detail in this report.

¹⁹⁸ National Energy and Climate Plan (NECP) for Sweden, 2023

9.27.1 PFE – Programme for energy efficiency

Overview	
Short Description	PFE was a programme to improve energy efficiency in Swedish energy-intensive industry through a new law that regulated long-term agreements between the state and energy-intensive companies in the form of a programme.
Responsible Authority	Swedish Energy Agency (SEA) Ministry of Climate and Business (RSE)
Status	Ended
Issue Date	2004
Start Date	2004
Ending Date	2015
Duration	11 years
Reference:	www.energimyndigheten.se

9.27.1.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

The PFE was implemented in 2004 through a new law that regulated long-term voluntary agreements between the state and energy-intensive companies in the form of a programme. The law set a number of qualitative requirements for companies to achieve within the five-year programme period. In exchange, companies received a reduced electricity tax of 0.005 SEK/kWh.

The companies' commitment was to:

- implement and certify an energy management system,
- carry out a comprehensive energy audit,
- implement electricity efficiency measures to achieve the company's energy efficiency targets/commitments,
- Introduce energy considerations in purchasing and design processes.

After completing the five-year cycle, from 2009 onwards companies were able to participate in a second programme cycle. Most companies completed the programme in 2014.

Measures that can be related to motor drives touch many different areas of action and account for about 25% of the efficiency improvements - **11% of which in pump systems and only 2% of measures relating to motor replacement.**

The companies have reported that more than 70 per cent of the implemented measures had a payback period of less than 3 years.

	Characteristics
Budget	N/A
Financing of the measure	Tax exemption
Policy focus	Physical interventions
Intervention Type	Voluntary agreement / Energy audits / Equipment upgrade / Tax exemption
Main Barriers Addressed	<ul style="list-style-type: none"> - Lack of awareness / data availability - Identification of inefficient equipment / processes - Identification of energy-saving cost-effective measures - High initial costs - Return on investment
Key Driver(s)	Financial
Replicability	High
EU Inclusion	No
Related Characteristics	-

9.27.1.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation, wherever possible specific to electric motors

The programme attracted more participants than expected with more than 100 companies participating in the PFE. Virtually all energy-intensive companies with an energy consumption above 100 GWh per year participated, but only a few energy-intensive SMEs. The reported electricity efficiency improvement of 3 TWh per year corresponds to a 10% reduction in the total electricity consumption of the companies. Estimates made by the companies and assessments in academic reports show that about one third of the efficiency gains probably occurred without the PFE. This gives a net result of 2 TWh per year¹⁹⁹. **Of these savings, around 25% are attributable to measures in motor driven systems (Fans, compressors, pumps, refrigeration systems, etc.) which corresponds to around 500 GWh per year.**

	Impacts
Case level impact	High
Policy level impact	High
Size	-
Energy	Around 500 GWh per year, for motor system related measures (of 3000 TWh per year total).
Impact evaluation	-

(If available) Description of the method used for calculating the final energy - and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

Although no information was found specifically related to measures implemented on motor systems, the overall cost-effectiveness of the 2500 measures was positive with companies reporting an

¹⁹⁹ [10 år med PFE: Resultat, erfarenheter och slutsatser, Statens energimyndighet, 2016](#)

average payback of less than two years. Approximately SEK 2 billion (177 M€) were invested within the programme.

9.27.1.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

According to the Swedish Energy Agency report "10 år med PFE":
"Fundamental to the positive results of the PFE was that the state, through the tax reduction, showed a clear direction on the issue and at the same time took into account the global competitiveness of the energy-intensive industry. The companies' management teams recognised this and in turn took responsibility for the energy efficiency work in the companies."
"The core of the PFE was the requirement to implement an energy management system. This increased the systematic nature of the change process, which led to an organisational change in the companies. [...]above all, the work on energy efficiency became an issue that was present in the daily work."

The main area for improvement identifies was:
"Before developing a new policy instrument, an impact assessment should be produced that identifies the market failure or objective that needs to be corrected/achieved. There should also be a plan for what will be followed up and evaluated and how it will be carried out."

	Lessons Learnt
Key takeaways	-
Recommendations	-
Linked measures	
Reference(s)	https://energimyndigheten.w2m.se/FolderContents.mvc/Download?ResourceId=5645
Other	-
Thoughts, comments, considerations ...	-

9.27.2 Energikartlägningscheckar (SEAP)

	Overview
Short Description	Support for energy audits in SMEs
Responsible Authority	Swedish Energy Agency
Status	Closed
Issue Date	2010
Start Date	2010
Ending Date	2014
Duration	4 years
Reference:	-

9.27.2.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

Energikartlägningscheckar is a program launched by the Swedish Energy Agency offering monetary support for energy audits in SMEs. Under this programme, a subsidy of 50% of the cost of an energy audit is provided to companies up to a maximum of SEK 30,000. Larger companies could also apply to participate if they could demonstrate that they needed the financial assistance in order to conduct an energy audit. Nevertheless, businesses who were already a part of PFE were not eligible to apply for SEAP. Businesses that use more energy than 0.5 GWh annually were eligible for the subsidy. The energy audit had to contain an overview of the company's annual energy use specified in MWh per year and price for each energy carrier. They should also propose energy efficiency measures for different processes and process equipment²⁰⁰. Those companies that received a subsidy had to present an energy plan where they listed the energy efficiency measures that they planned to implement within two years. A total of 1000 companies applied for the support - 50% of which belonged to the industrial sector - and 760 audit reports were approved by the SEA.

²⁰⁰ <https://energimyndigheten.a-w2m.se/Test.ashx?ResourceId=2457>

	Characteristics
Budget	N/A
Financing of the measure	N/A
Policy focus	Product / Physical energy savings
Intervention Type	Energy audits
Main Barriers Addressed	<ul style="list-style-type: none"> - Lack of awareness / data availability - Identification of inefficient equipment / processes - Identification of energy-saving cost-effective measures - High initial costs - Return on investment
Key Driver(s)	-
Replicability	High
EU Inclusion	No
Related Characteristics	-

9.27.2.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

The energy use of the companies participating in the analysis is 5,370 GWh/year. In total, the energy savings account for 589 GWh/year, which represents 11% of the energy use. The savings for different unit processes are presented in the next figure. The highest energy savings are in Ventilation (26%) and Space heating (24%), followed by Production processes (22%) and Lighting (8%).

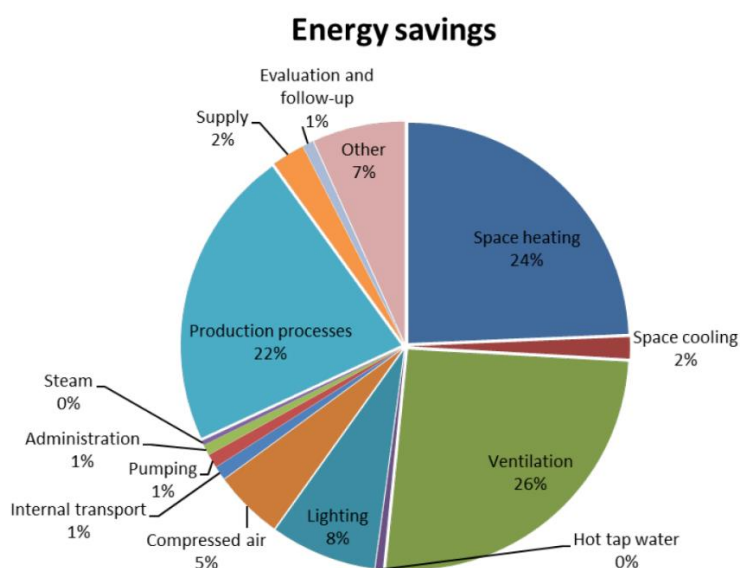


Figure 17 Energy saving potential for different unit processes²⁰¹

The program resulted in energy savings equivalent to 589 GWh/year or 314.5 GWh/year when considering only those measures that were reported to the SEA as to be implemented within two years. A total of 5,941 energy efficiency measures were suggested whereas 3,234 measures were

²⁰¹ Svetlana Paramonova and Patrik Thollander, Ex-post impact and process evaluation of the Swedish energy audit policy programme for small and medium-sized enterprises, Journal of Cleaner Production, 2016. 135, pp.932-949.

reported to the SEA to be implemented in the next two years, which represents a 53% implementation rate.
Taking into account a spillover effect of 22% and a free-rider effect of 15% (derived from the company visits), while neglecting a double counting, the net energy savings increases to around 630 GWh/year for the suggested measures and to around 340 GWh/year for only the measures that were reported to the SEA.

	Impacts
Case level impact	Medium (5-20%)
Policy level impact	Low (<0.1%)
Size	N/A
Energy	589 GWh/yea
Impact evaluation	-

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

For the calculation of the impacts of the programme, both in terms of energy savings and cost-effectiveness, data from the 713 approved energy audit reports was used.
The energy savings were calculated using the following formula:

$$\text{Net energy savings} = \text{Gross energy savings} * \text{double counting coefficient} * (1 + \text{spillover effect} - \text{free-rider effect})$$

where:

- double counting coefficient (0÷1) considering mutual energy savings from different EEMs or public programs;
- spill-over energy effect – indirect energy savings from EEMs or public programs;
- free-rider effect – energy savings by free-riders or those program participants who would have undertaken EEMs anyway.

9.27.2.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure’s implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

The evaluation of the SEA programme carried out by Paramova and Tollander²⁰¹ highlighted a number findings, namely:

- Only three companies said that they would have made an energy audit without monetary support from the SEA. This support was a good motivation to perform energy use analysis in their facilities which would otherwise seem costly.
- The visited companies mentioned that participation in the SEAP helped reduce barriers to energy efficiency. They mentioned lack of knowledge, lack of interest by top management, lack of time, other priorities, lack of staff responsible for energy, other priorities for capital investments, and lack of access to capital.
- In the majority of cases it is possible to find further energy efficiency improvement areas, underlining the requirement to support energy auditors with such standardized energy audit tools as an EEMs database.

- The interviewed companies recognized an importance of energy management measures and measures requiring behavioural changes.

	Lessons Learnt
Key takeaways	-
Recommendations	-
Linked measures	-
Reference(s)	Svetlana Paramonova and Patrik Thollander, Ex-post impact and process evaluation of the Swedish energy audit policy programme for small and medium-sized enterprises, Journal of Cleaner Production, 2016. 135, pp.932-949. http://dx.doi.org/10.1016/j.jclepro.2016.06.139
Other	-
Thoughts, comments, considerations ...	-

9.27.3 Energisteget

Overview	
Short Description	The Energisteget (Energy Step) was a program where companies in sectors from mining to the manufacturing industry had the opportunity to apply for support for investments or planning with the aim of making their operations more energy efficient.
Responsible Authority	Swedish Energy Agency
Status	Ended
Issue Date	-
Start Date	2018
Ending Date	2020
Duration	2 years
Reference:	https://www.energimyndigheten.se/energieffektivisering/program-och-uppdrag/energisteget2/

9.27.3.1 Main Description

A detailed description of the policy measure and how it relates specifically to EU MOREs topic of electric motors – including references to (if applicable) anchoring national law, EU directives, other schemes

In 2018-2020, the Swedish Energy Agency ran the Energisteget programme with support for investments and projects to improve energy efficiency in sectors from the mining to the manufacturing industry that are covered by the law on energy mapping in large companies. The programme has targeted large companies operating in the mining and manufacturing industry. This is a well-defined group of about 475 companies that account for about 90 % of Swedish industrial companies' energy use (147 TWh) and also almost 40 % of Sweden's total energy use. Energisteget is intended to help improve companies' decision-making basis for energy efficiency measures and increase companies' incentives to choose more energy-efficient measures in order to reduce energy costs and improve their competitiveness.

The programme had a budget of SEK 105 million (about 9 M€) in state aid for the period 2018-2020. Companies could apply for support for energy efficiency measures that met the following criteria:

- In-depth planning of measures identified in the energy audit. Additional planning is needed for more complex measures to complement the energy audit already carried out by the company in order to describe and minimise the risks of the investment. The aim was to improve the companies' decision-making basis for possible investments.
- Investment aid that increases incentives for companies to choose more energy-efficient measures in order to implement measures that do not meet the company's investment criteria and therefore would not otherwise have been implemented.

Aid for investments could be granted at a maximum of 30% of the company's eligible investment costs, and the estimated payback period for an energy efficiency project should be at least 3 years. For design work, support could be provided up to a maximum of 50% of the company's energy-related design costs.

	Characteristics
Budget	SEK 105 million (about 9 M€)
Financing of the measure	-
Policy focus	Physical interventions
Intervention Type	Equipment upgrade
Main Barriers Addressed	high initial cost, general financial viability, return on investment
Key Driver(s)	National law
Replicability	High
EU Inclusion	-
Related Characteristics	-

9.27.3.2 Impacts

A detailed description of the final (expected) results of the measure implementation and any achievements related to the measure implementation.

In total, the Swedish Energy Agency received 129 applications totalling SEK 138 million from 88 companies. This represents 17% of the 475 companies that were eligible for the programme. 108 projects were approved representing a support of SEK 105.7 million, of which SEK 83.7 million has been granted for 68 investments and SEK 22 million for 40 projects. Faugert & Co Utvärdering evaluated the programme on behalf of the SEA and concluded that Energisteget was essentially a very well-functioning programme that contributed to energy efficiency improvements that would not otherwise have occurred in Swedish industry. Energisteget's support has created the conditions for implementing measures that the energy audits have identified as advantageous, but which are not prioritised, often for financial reasons. Energisteget's support is estimated to provide a potential energy saving of 0.58 TWh/year (0.43TWh/year as a result of support for project planning and 0.15TWh/year resulting from support to investments).

Other impacts include the increased awareness towards energy efficiency within participating companies staff. In some cases, companies have identified additional energy efficiency measures through the project.

	Impacts
Case level impact	Low
Policy level impact	Low
Size	N/A
Energy	0.58 TWh/year
Impact evaluation	-

(If available) Description of the method used for calculating the final energy- and/or cost- savings achieved by the measure and specific to that of electric motor replacement. For

N/A

9.27.3.3 Lessons Learnt

Description of the lessons learnt and/or (initial) feedback gathered in response to the measure's implementation specific to electric motors. Also include (if applicable) the main barriers that would hamper and/or the conditions that are necessary for the implementation of the measure.

The programme's Evaluation Report: Tre år med Energisteget (three years of Energy Step) identified the merits and shortcomings of the action, namely:

- "Energisteget was essentially a very well-functioning programme with administrative processes that are well adapted to a target group that often lacks the time and resources to prioritise work on energy efficiency. Overall, participating companies find that both the application process and reporting are not particularly burdensome for a public support programme. In addition, participating companies have a very high level of confidence for the Swedish Energy Agency, both as coordinator of the programme and for the area expertise possessed by the agency's staff."

- "There is great commitment among participating companies to continue their work on energy efficiency. Many companies express a desire for further opportunities for knowledge exchange between participating companies, both for suggestions for new energy efficiency measures, but also to further develop their understanding of different technologies. Participating companies see that the conditions for this knowledge exchange have so far been limited within the programme. Given that the programme contributes to both knowledge and skills development and to companies discussing, reflecting and reviewing their energy use to a greater extent, this should be further exploited."

	Lessons Learnt
Key takeaways	<ul style="list-style-type: none"> - Confidence in the public authority contributes to success of measures - Application and reporting processes should be simple - Energy efficiency networks should be exploited
Recommendations	
Linked measures	Mandatory energy audits in large companies
Reference(s)	https://www.energimyndigheten.se/energieffektivisering/program-och-uppdrag/energisteget2/ Evaluation Report: Tre år med Energisteget https://energimyndigheten.a-w2m.se/Home.mvc?ResourceId=199720
Other	-
Thoughts, comments, considerations ...	Case studies https://www.energimyndigheten.se/arkiv-for-resultat/Resultat/hoganas-minskade-koldioxidutslappen-med-300-ton-per-ar/ https://www.energimyndigheten.se/arkiv-for-resultat/Resultat/ar-packaging-flexibles-halverade-sin-energianvandning/ https://www.energimyndigheten.se/nyhetsarkiv/2021/energieffektiv-belysning-for-en-hallbar-industri/
Related Characteristics	