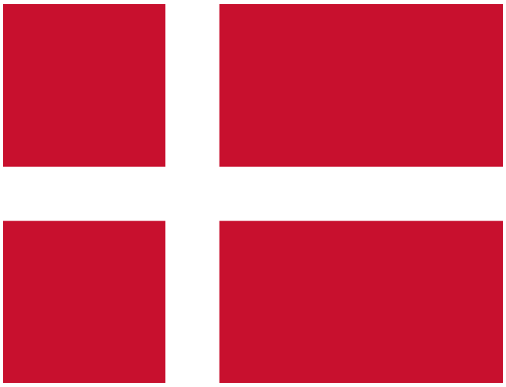
EU-MORE

EUropean MOtor REnovation initiative



# Denmark

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

**EU-MORE**

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EU-MORE is an acronym for
EUropean MOtor
REnovation initiative

# 1. 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.[1]

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 future[2].

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 NECP[3].

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

[1] https://www.iea.org/countries/denmark
[2] https://www.devex.com/organizations/ministry-of-climate-energy-and-utilities-denmark-141050#:~:text=The%20Danish%20Ministry%20of%20Climate,by%2070%20percent%20by%202030.
[3] https://energy.ec.europa.eu/topics/energy-strategy/national-energy-and-climate-plans_en

renovations and providing financial aid based on energy savings, Denmark seeks to maximize the potential for energy efficiency in private buildings.

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.[4]

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.[5]

**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.

[4] https://climate-laws.org/document/denmarks-integrated-national-energy-and-climate-plan_9ed8
[5] https://ens.dk/en/our-responsibilities/energy-savings/energy-audits-large-enterprises

## 1.1 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 |

### 1.1.1 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.[6]

| | 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 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. |

[6] https://energy.ec.europa.eu/system/files/2014-11/2014_neeap_en_denmark_0.pdf

### 1.1.2 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.[7]

In 2020 and 2021, almost 2,100 and 1,100 companies were required to carry out mandatory energy audits, respectively.[8,9]

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 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.[10]

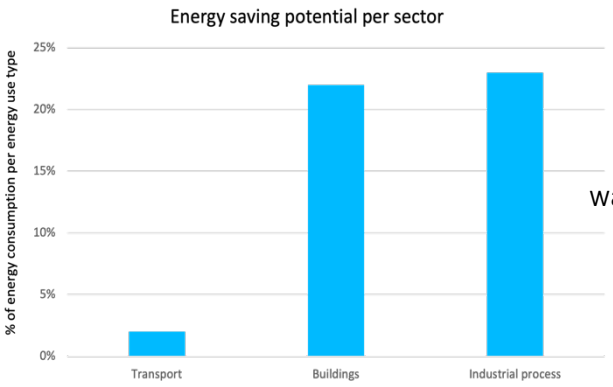
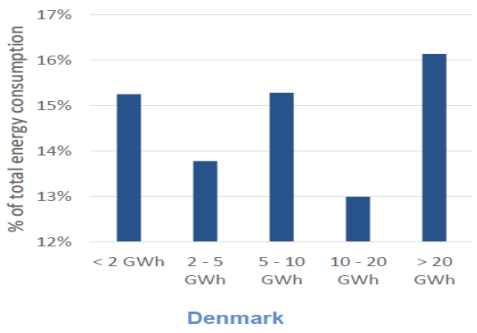



Figure 1 - Energy saving potential per sector.

In general, the audit data indicates that there is a potential for energy savings of approximately 14% in relation to the total energy consumption.




[7] https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf
[8] https://kefm.dk/Media/637898535646182290/Energi%20og%20forsyningspolitisk%20redeg%C3%B8relse.pdf
[9] https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf
[10] https://energy.ec.europa.eu/system/files/2018-10/final_report_-_development_of_guidelines_and_recommendations_on_the_impl_0.pdf

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.

In summary, the smallest enterprises incur the highest relative audit costs compared to the energy-saving opportunities they identify.
Figure 3 illustrates this point by showing that Dani /h of energy annually would need to implement nearl recoup the audit expenses within the first year.[11]

**Figure 2 Identified energy savings potential by annual energy consumption level**

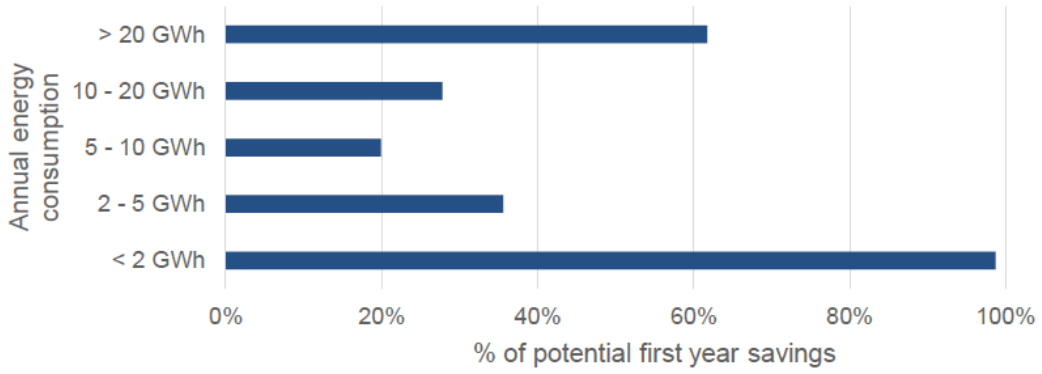



Figure 3 Cost of energy audit compared to potential 1st year savings

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.

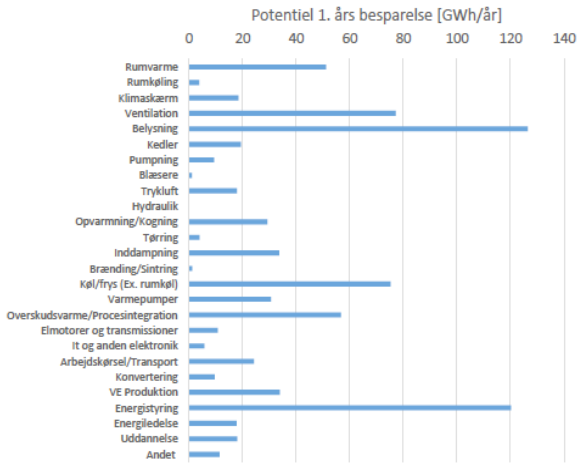



**Figure 4 Potential energy savings in different technologies**

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.

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.

[11] https://www.ca-eed.eu/ia_document/analysis-of-danish-energy-audits-denmark/

| | Impacts |
|---|---|
| **Case level impact** | High |
| **Policy level impact** | Medium |
| **Size** | Not available |
| **Energy saving** | 15 GWh/year |
| **Impact evaluation** | - In 2020 and 2021, almost 2,100 and 1,100 companies were required to carry out mandatory energy audits, respectively.<br>- 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

### 1.1.3 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 "Sparenergi.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/energisyn-i-store-virksomheder |
| **Reference(s)** | https://www.ca-eed.eu/ia_document/analysis-of-danish-energy-audits-denmark/<br>https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf<br>https://kefm.dk/Media/637898535646182290/Energi%20og%20forsyningspolitisk%20redeg%C3%B8relse.pdf<br>https://kefm.dk/Media/637552877538656277/Energipolitisk%20Redeg%C3%B8relse%202021a.pdf<br>https://energy.ec.europa.eu/system/files/2018-10/final_report_-_development_of_guidelines_and_recommendations_on_the_impl_0.pdf<br>https://energy.ec.europa.eu/system/files/2014-11/2014_neeap_en_denmark_0.pdf |
| **Other** | |
| **Thoughts, comments, considerations ...** | |

## 1.2 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/lta/2013/607 |

### 1.2.1 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** | EUR 500 million<br><br>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.<br><br>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. |
| **Financing of the measure** | National funds |
| **Policy focusses** | Physical intervention |
| **Intervention Type** | • Financial - Subsidies - Subsidies for energy audits/training/benchmarking activities<br>• 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** | |

### 1.2.2 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 $CO_2$ 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 $CO_2$ emissions: Compared to the emissions recorded in 1990, the initiative is projected to achieve a reduction of about 1.5% in $CO_2$ emissions. This reduction is equivalent to an impressive 1 million tonnes of $CO_2e$ ($CO_2$ 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.[12, 13]

| | 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. |

[12] https://commission.europa.eu/system/files/2023-07/DENMARK%20_%20DRAFT%20UPDATED%20NECP%202021%202030%20%287%29.pdf
[13] https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/measures/1083

| | |
|---|---|
| **Impact evaluation** | See above |

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

| |
|---|
| N/A |

### 1.2.3 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.<br><br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>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 ...** | |

## 1.3 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/<br>https://fm.dk/media/18517/aftale-om-groen-skattereform_a.pdf |

### 1.3.1 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 petrocoke 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** | 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.<br><br>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. |
| **Financing of the measure** | 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:<br>- $CO_2$ tax, incl. abolition of existing bottom deductions from the CO2 tax<br>- Reserve from North Sea Development Agreement (2017)<br>- Reserve from Green Tax Reform Agreement 2020<br>- Use of proceeds from debt agreement |

| | |
|---|---|
| | - Remaining funding<br><br>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. |
| **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** | |

### 1.3.2 Impacts

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

**Carbon emission impact**

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.

Table 1 appears to represent "Cumulative annual savings" for the years 2020 to 2030, with data presented in two columns: "PJ" and "kt CO2."

Table 1 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 CO2: | 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 1 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:

- $CO_2$ 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 $CO_2$ 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 2 Economic impacts of the agreement

| 2022 level / prices, DKK million | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2023-2030 | CO2, 2030 (2025) |
|---|---|---|---|---|---|---|---|---|---|---|
| CO2 tax1 | -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 | |
| Green Investment Window Reserve | | | | | | | | | -1.000 | |
| **Fund for green transition** | | | | | | | | | | |
| Readaptation aid for enterprises | | | -100 | -250 | -400 | -525 | -650 | | -1.950 | |
| Targeted support for fisheries | | | -100 | -100 | -50 | -50 | -50 | | -350 | |
| Targeted support for horticulture | | | -50 | -50 | -15 | -15 | -15 | | -150 | |
| Pool for catching and lagrind of CO2 (CCS) | | | | -150 | -300 | -300 | -1.125 | -1.100 | -2.975 | 1,8 |
| Green training and upskilling | | | -100 | -100 | | | | | -200 | |
| Reserve for tax exemption of biogas | | -100 | -100 | -100 | -100 | -100 | -100 | -100 | -700 | |
| Reserve2 | | | -200 | -150 | -175 | -25 | | -400 | -975 | |
| *Investments in green transition* | | *-100* | *-650* | *-900* | *-1.050* | *-1.025* | *-1.950* | *-1.600* | *-7.300* | |
| **Other** | | | | | | | | | | |
| Financing provided for *Denmark can do more II* | | -100 | -250 | -75 | -75 | -75 | -75 | 0 | -625 | |
| Pool for testing offshore wind turbines | | -100 | | | | | | | -100 | |
| Administrative costs in the Tax Administration | | -1 | -4 | -3 | -2 | -2 | -2 | -2 | -14 | |
| **Financing** | | | | | | | | | | |
| Reserve from *North Sea Development Agreement (2017)* | | | 75 | 75 | 225 | 225 | 225 | 225 | 1.050 | |
| Reserve from *Green Tax Reform Agreement 2020* | | | | 250 | 250 | 250 | 225 | 225 | 1.175 | |
| Proceeds from agreement on enhanced debt recovery | 450 | 450 | 475 | 25 | 50 | 50 | 50 | 50 | 1.625 | |
| Downgrading of the investment envelope | 800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 800 | |
| Green space | 0 | 875 | 775 | 775 | 75 | -175 | 825 | 750 | 3.875 | |
| Green space, incl. financing of green investment window | - | - | - | - | - | - | - | - | 4.875 | |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **4,3 (1,3)** |

| | Impacts |
|---|---|
| **Case level impact** | Medium |
| **Policy level impact** | High (>0.5%) |
| **Size** | Not available |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy** | 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 CO2: | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 4.8 | 4.8 | 4.8 | 4.8 | 9.6 | - |
| **Impact evaluation** | See section above | | | | | | | | | | | |

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

N/A

### 1.3.3 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** | - The main takeaway message from Denmark's green tax reform is that ambitious climate action is possible through well-designed carbon pricing policies.<br>- By increasing carbon taxes on companies and offering incentives for clean technologies, Denmark aims to substantially reduce greenhouse gas emissions.<br>- it emphasizes the importance of decarbonizing heavy industries and stimulating innovation through economic incentives. |
| **Recommendations** | - 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.<br>- 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.<br>- 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.<br>- Engage in International Cooperation: Climate change is a global challenge that requires collective efforts. Denmark should actively engage in international 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.<br>- 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.<br>- 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.<br>- 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<br>https://kefm.dk/Media/6/B/Udspil%20til%20gr%C3%B8n%20skattereform.pdf<br>https://www.cepweb.org/denmarks-green-tax-reform-g20-countries-should-take-notice/<br>https://www.oecd.org/env/cc/2956442.pdf<br>https://commission.europa.eu/projects/green-tax-reform-emission-taxes-industries_en<br>https://www.skm.dk/aktuelt/groen-vaekst/politiske-aftaler-for-den-groenne-omstilling/<br>https://www.elibrary.imf.org/view/journals/001/2020/235/article-A001-en.xml<br>https://kefm.dk/Media/6/B/Udspil%20til%20gr%C3%B8n%20skattereform.pdf<br>https://www.regeringen.dk/media/11211/groen-skattereform.pdf |
| **Other** | |
| **Thoughts, comments, considerations …** | |

## 1.4 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 |

### 1.4.1 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.[14]

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[14] 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** | |

### 1.4.2 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 3 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 3 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 4 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 4 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 5 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 5 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 5 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.

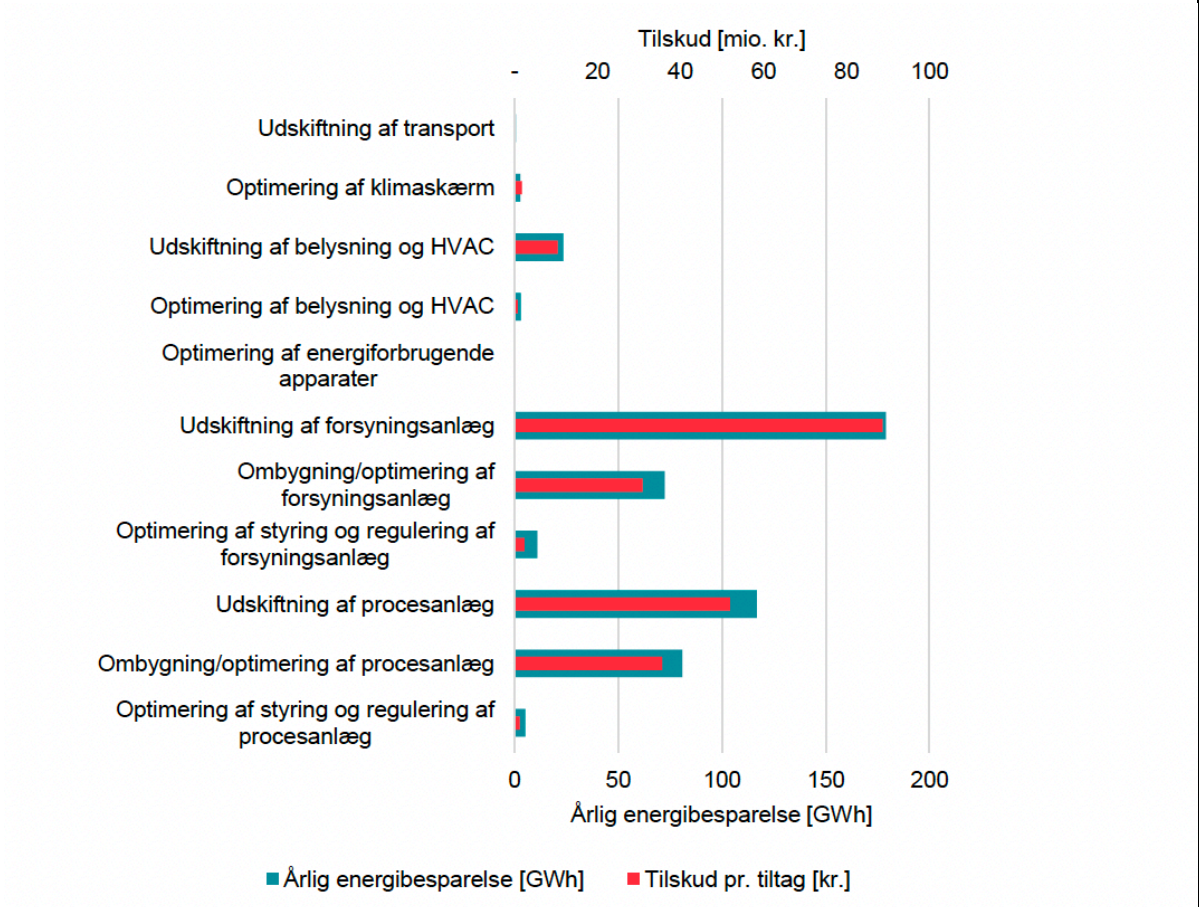


Figure 5 Applications committed by action categories

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 6.

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.

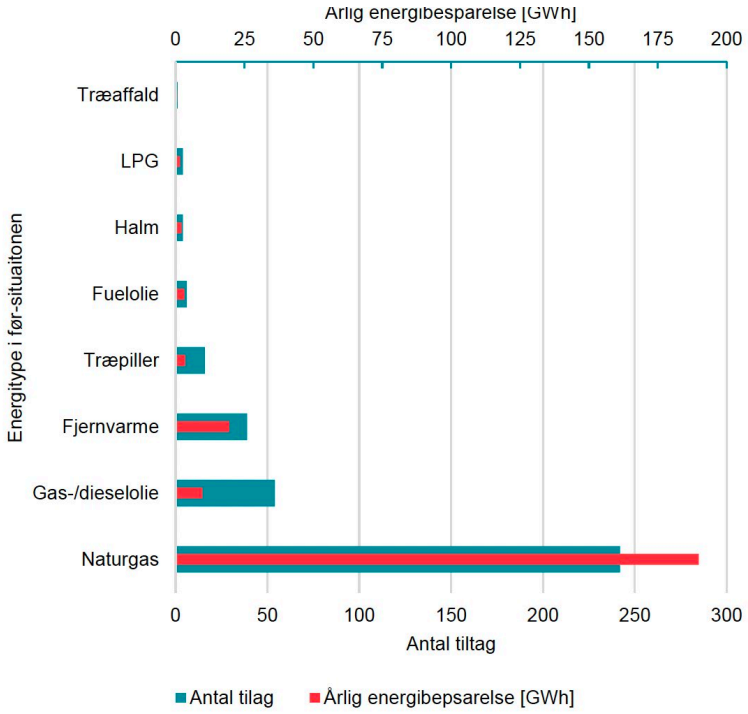


Figure 6 Committed measures with conversion to electricity

| | Impacts |
|---|---|
| **Case level impact** | High |
| **Policy level impact** | Medium |
| **Size** | N/A |
| **Energy** | See section above.<br><br>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 |

### 1.4.3 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.**

| |
|---|
| **N/A** |

| | **Lessons Learnt** |
|---|---|
| **Key takeaways** | |
| **Recommendations** | |
| **Linked measures** | |
| **Reference(s)** | https://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-denmark.pdf<br>https://www.lovtidende.dk/api/pdf/233421<br>https://ens.dk/ansvarsomraader/energibesparelser/virksomheder/erhvervstilskud-til-energieffektiviseringer<br>https://ens.dk/sites/ens.dk/files/Energibesparelser/Virksomheder/erhvervspuljen_-_statusrapport_2022.pdf |
| **Other** | |
| **Thoughts, comments, considerations …** | |

Table 6: National Policy Measure Overview - Denmark

| # | Measure Title | Short Description | Type of Measure | Start Year | End Year | Duration | Target Groups | Source link / Reference | Case Level Impact of the measure |
|---|---|---|---|---|---|---|---|---|---|
| **1** | Mandatory energy audit in large enterprises | Companies with over 250 employees or a turnover of at least 50 million euros must report the audit results to the Danish Energy Agency, implementation of energy-saving recommendations is not required. | Energy Audit | 2012 | Ongoing | Ongoing | Large Enterprises | link | High |
| **2** | Renewable energy for production processes | To incentivize the industry to adopt renewable energy in their production processes, a subsidy scheme was introduced. | Subsidy | 2013 | 2021(?) | 8 years | Industry | link | High |
| **3** | Increase in energy tax rates on business as part of Green Tax Reform – phase 1 | Phase 1 focuses on ambitious GHG tax reforms accelerating the transition towards sustainability. Phase 2 seeks to implement a uniform carbon tax across all sectors. | Tax Reform / Tax incentive / Carbon Tax | 2021 | 2030 | 9 years | Businesses | link | High |
| **4** | Competitive subsidy scheme related to private enterprises | Aimed to achieve energy savings in businesses, open to end user energy saving projects for all types of energy. | Subsidy | 2021 | 2029 | 8 years | Businesses | link | High |