

# Status Outlook 2022

Denmark's national climate targets  
and international obligations

English summary



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### Introducing the Danish Council on Climate Change

The Danish Council on Climate Change is an independent body of experts who advise the Danish government on how to transition to a climate-neutral society, thereby ensuring that, in the future, we can live in a country with very low emissions of greenhouse gases while retaining our level of welfare and development. Each year, the Danish Council on Climate Change assesses whether the government's climate efforts have demonstrated that Danish climate targets are likely to be met. The Council also contributes to public debate and regularly prepares analyses and recommendations for climate efforts.

# 1

## Introduction, conclusions and recommendations

## 1. Introduction, conclusions and recommendations

The 2020 Danish Climate Act sets the annual climate policy cycle. The first event on the annual cycle is the status outlook prepared by the Danish Council on Climate Change (DCCC). The outlook centers on the Danish climate targets for 2025, 2030 and 2050. The DCCC makes an assessment regarding the likelihood of reaching the targets, focus on central areas for climate policy, and relevant political measures to bring Denmark closer to reaching its targets. A central element of the report is the DCCC's statutory assessment of whether the Danish government's climate efforts have demonstrated how to reach the target of a 70 percent reduction in greenhouse gas emissions by 2030. The Danish Minister for Climate, Energy and Utilities makes a similar assessment as part of the government's annual Climate Programme every September. An important element for debate is what Denmark should do to reach its climate targets. Therefore, the DCCC delves into the most current climate policy areas and sets the framework for efforts towards net-zero emissions by no later than 2050. Danish climate policy takes place on an international stage, where the EU in particular has an influence on the frameworks and options for Danish climate efforts. This report therefore focuses in particular on EU climate policy. The report also addresses global climate efforts, as the most recent climate conference, COP26, clearly showed that there is still a long way to go before reaching the goal in the Paris Agreement to limit global warming to 1.5 degrees.

### Main conclusions

#### *Assessment of the government's climate effort towards 2025 and 2030*

- Over the past two years, significant progress has been made towards achieving the 70 percent target for 2030. In total, the reduction gap for 2030 has been reduced by 10 million tonnes of CO<sub>2</sub>e. Since the DCCC's previous report in 2021, the Danish Parliament has agreed on mitigation measures in a policy agreement on agricultural emissions and in the Finance Act for 2022, and the Danish government has enhanced analyses of possible climate initiatives. Furthermore, the government has launched a number of significant enabling initiatives, for example a proposed subsidy scheme for Danish hydrogen production, and other initiatives within research.
- Despite significant progress, the DCCC assesses that, overall, the government's climate efforts have not yet demonstrated how to meet the target of a 70 percent reduction in emissions by 2030. Despite the previous year's climate policy agreements, there is still a reduction gap of 10 million tonnes of CO<sub>2</sub>e in 2030, and a lack of sufficient strategies or policy proposals to meet this gap. Moreover, the DCCC stresses that there is a high or moderate risk associated with a large proportion of the emission reductions included in the previous year's climate policy agreements.
- The government has presented a political roadmap for addressing the relevant greenhouse gas emitting sectors. It is possible that the government will be able to demonstrate how to meet the 2030 target as the roadmap comes into effect. However, the remaining reduction gap must to a significant extent be covered by policy measures, policy proposals or strategies based on low-risk technologies and tools.
- The DCCC estimates a reduction gap of approximately 1 million tonnes of CO<sub>2</sub>e in 2025 in order to reach the lower threshold of the reduction interval of 50-54 percent that constitutes the 2025 target. This figure is based on Denmark's Climate Status and Outlook report issued in April 2021, which takes into account the measures adopted during the previous year. However, adjustments in the Climate Status and Outlook report may change the overall picture once the report has been updated in 2022.

#### *The road towards net-zero emissions by 2050*

- A significant challenge towards achieving net-zero emissions by 2050 appears to be a shortage of carbon from biomass. There is a global shortage of sustainable biomass. Carbon from biomass is needed for storage to achieve negative emissions and for green fuels. Denmark should already now begin adapting its climate policy with an awareness of this shortage.

- Focusing solely on negative emissions should be avoided in order to limit the challenge of carbon shortage. As a consequence, Denmark should strive towards significantly reducing its remaining emissions. This particularly applies to the agricultural sector, which is likely to be the largest source of emissions in 2050.
- When planning climate efforts towards 2050, Denmark should take responsibility for international shipping and aviation from Danish ports and airports, as the competent UN bodies cannot set climate requirements for operators in these two sectors. Denmark should therefore include some consumption of carbon for CO<sub>2</sub> neutral fuels for international transport. This is particularly the case for aviation, as there is currently limited potential for carbon-free fuels in this area. This further increases the challenges related to scarce carbon resources.

### *Danish climate commitments as a member of the European Union*

- The Danish EU reduction obligations for 2030 in the non-ETS sector and the sector for forestry and land use are expected to increase as a consequence of the European Commission's proposed *Fit for 55*-package. If the proposal is adopted, Denmark can no longer expect to automatically meet its EU obligations by reaching its national target of a 70 percent reduction. This calls for a greater focus on reductions in sectors such as transport and agriculture and a rapid phase-in of reductions in Denmark, as Denmark's EU obligations will be calculated as total emissions in the years up to 2030.
- Future EU climate policy appears to reduce the risk that Danish emissions will move abroad in the event of an ambitious Danish climate policy with e.g. high taxes on emissions. Due to the EU's increased climate targets, all EU countries will have to do more to reduce their greenhouse gas emissions. This means that moving production and thereby also its emissions from Denmark to other EU countries will be difficult and thereby reducing the risk of carbon leakage. The European Commission has also proposed a Carbon Border Adjustment Mechanism targeting countries outside the EU without an ambitious climate policy.

### *Recommendations for climate policy measures in four key areas towards 2030 and 2050*

- A general tax on greenhouse gas emissions should constitute the basis of climate policy toward 2030 and beyond. The tax can be phased in via different trajectories across various sectors, but should aim at a uniform tax rate by 2030. The government should announce this now, including the expected level of taxation in 2030. The level of taxation will depend on whether the tax is supplemented by a basic tax deduction or a subsidy scheme, and on the expectations of crucial reduction technologies. However, the total incentive of the tax scheme to reduce emissions should be around DKK 1,500 per tonne CO<sub>2</sub>e.
- Emissions from the agricultural sector are barely regulated at the moment, but they should also be subject to a general tax on greenhouse gas emissions. Furthermore, climate efforts within the food and agricultural system should focus on shifting EU's common agricultural policy towards green initiatives, supporting research and development, and encouraging Danes to adopt a climate-friendly diet.
- DCCC analyses show that Denmark will need more green electricity than expected under the planned expansion of wind and solar power. The shortage of green electricity will increase if the Danish government aims at a high level of Power-to-X. Therefore, deployment of renewable energy should be increased and accelerated.
- Power-to-X can potentially replace fossil fuels and is particularly relevant for shipping and aviation, where direct electrification is difficult. However, the technology should be used with care. If green electricity production cannot keep up, there will be no climate benefit from using these fuels. In fact, emissions may actually increase due to the large energy losses incurred by the technology. Furthermore, Power-to-X that does not use carbon should be prioritised because sustainable carbon from biomass may be a scarce resource.

## 1.1 The global climate context

### **The IPCC has once again stressed the gravity of climate change**

The United Nations Intergovernmental Panel on Climate Change (IPCC) published the first part of its sixth assessment report in August 2021. The report describes and assesses the most recent knowledge on the climate system and climate change. The report reaffirms the same messages that the IPCC has been giving since the panel's first report was published in 1990. The IPCC concludes that human influence is causing climate change, and that continued emissions of greenhouse gases constitute a threat to both human and natural systems. The IPCC stresses that a reduction in greenhouse gas emissions is necessary to limit further warming.

There is fundamentally nothing new in the IPCC's overall conclusions. However, the report is based on a greater level of detail and certainty than previous reports, as researchers today have a better understanding of the climate system, have better climate models and have access to better data. Thus, the report gives the clearest and, hitherto, most comprehensive picture from the IPCC on how the climate system works and how human activities affect it. The IPCC underlines the necessity of increased ambitions and immediate action if the intentions and goals of the Paris Agreement are to remain within reach.

### **The world's climate targets require climate action – also in the short term**

In November 2021, most of the world's countries met in Glasgow for COP26, the 26th United Nations Climate Change conference. The summit brought the parties together to revise and raise their climate ambitions. More than 150 countries submitted new Nationally Determined Contributions (NDC). Many of the NDCs included more ambitious climate targets for 2030. If these targets are reached, the global temperature increase can be limited to approx. 2.4 degrees compared with pre-industrial levels. This is still above the Paris Agreement's goal to keep the temperature increase well below 2 degrees, with an aim of 1.5 degrees.

Many countries have set targets for net-zero emissions in addition to their NDCs. The aim is to reach these targets around the middle of this century. If all net-zero emission targets are met, global warming can be limited to approx. 1.8 degrees. This is the first time that the overall effect of the world's collective pledges has been estimated to limit the global temperature increase within the framework of the Paris Agreement's temperature target.

However, many net-zero targets are long-term, and only in a few cases are they underpinned by ambitious short-term climate policy. Long-term net-zero targets must be supplemented by ambitious sub-targets to ensure significant greenhouse gas emission reductions in the short term. This will require that countries reduce their emissions towards 2030 considerably more than what is expressed in current NDCs. Setting short-term targets will limit total greenhouse gas emissions and increase the likelihood that countries will achieve their net-zero targets. This is crucial to meet the temperature goal of the Paris Agreement.

→ *Read more about COP26 and the global climate perspectives in chapter 2.*

## 1.2 Net-zero emissions by 2050

### **Denmark aims at net-zero emissions**

The objective of net-zero emissions by no later than 2050 is a central target of Danish climate policy. The targets for 2025 and 2030 are important stepping stones along the way, as are future five-year targets. These targets will ensure that Denmark stays on course towards its long-term objective. The Climate Act mentions the target of climate neutrality by 2050. However, in reality, the goal is to offset remaining greenhouse gas emissions with negative emissions in the form of carbon sequestration, such that Danish net-emissions will be zero. Net-zero emissions is therefore a more precise way of describing the actual goal, rather than climate neutrality.

In accordance with the Climate Act, the DCCC shall assess whether the government's climate efforts demonstrate how to meet the net-zero target. It is, however, still too early to provide any form of meaningful answer to this question. Consequently, in this report, the DCCC will address the 2050 target by assessing the prospects for achieving the 2030 target. If we meet the 70 percent target in 2030, we will probably be well on the way to net-zero emissions by 2050. However, climate policy should already have an eye on 2050. This report therefore contains a discussion of the major challenges on the road towards net-zero emissions.

## **Net-zero emissions will require negative emissions**

It is unlikely that all emissions will be eliminated by 2050. We may be able to phase out almost all fossil fuels, but it will probably be impossible to eliminate other sources of emissions. This particularly applies for the agricultural sector, where it will be difficult to steer many biological processes in a completely climate-friendly direction.

In order to achieve net-zero emissions, negative emissions will be necessary to compensate for remaining emissions. Negative emissions require Carbon Capture and Storage (CCS). A well-tested method for this is planting forests to store CO<sub>2</sub> directly from the atmosphere. Two other methods are capturing CO<sub>2</sub> directly at point sources, e.g. chimneys at biomass-fueled combined heating and power plants, and then storing it underground, and pyrolysis, where biochar made from straw, for example, is ploughed into the soil so that the carbon can be stored for hundreds of years. Common for these three solutions is that they store carbon from biomass.

Direct Air Capture (DAC) is another method to achieve negative emissions and it does not require biomass. DAC extracts CO<sub>2</sub> directly from the atmosphere and permanently stores it deep underground. DAC can be an important step on the road towards net-zero emissions if the technology can be made affordable and if it can be scaled up to the necessary size. However, the technology is still under development and with current knowledge it requires very large volumes of renewable energy. We can still only guess what future technological developments will bring, but the DCCC believes that it is too early to plan for a future where a technology like DAC plays a significant role. This means that access to biomass is still an essential element in achieving negative emissions.

## **Carbon scarcity may become a significant challenge**

Biomass is a limited resource. Among other things, this scarcity is due to a lack of land. Land is used throughout the world for many purposes, and clearly there are limits to the size of areas that can be cultivated to harvest biomass for energy and storage purposes. Furthermore, biodiversity is under immense pressure, so there would be consequences to converting land for energy crops or industrial forestry. Finally, biomass will increasingly have to supply carbon for green fuels, e.g. for aviation, at least for a long transitional period. Thus, competition for biomass and available carbon will be intensified.

The scarcity of carbon from biomass is likely to be a significant hurdle on the road to achieving net-zero emissions. Today, Danish consumption of biomass per capita is much higher than the global average and it is also higher than what the DCCC considers sustainable for global levels in the long term. Denmark also imports large amounts of biomass, and it is difficult for Denmark to control the climate footprint of these imports. Denmark cannot store large amounts of CO<sub>2</sub> from biomass and use large amounts of carbon from biomass for green fuels while also reducing its consumption of biomass to a globally sustainable level.

Biomass provides negative emissions when carbon is stored because burning biomass is considered carbon-neutral. However, this is not always an accurate assumption. For example, a large amount of the biomass imported by Denmark comes from countries where it is uncertain whether forest harvesting is correctly reflected in their climate inventories or whether the countries have adequate and binding climate targets. If the imported biomass is not CO<sub>2</sub> neutral, or can only be considered neutral in a very long time perspective, the atmospheric effect of capturing and storing CO<sub>2</sub> from biomass will be reduced. Ultimately, this will further increase the need for biomass as it will be necessary to store even more CO<sub>2</sub>.

## **Residual emissions must be reduced**

Even though much can still happen before 2050, there are limits to the amount of negative emissions it will be possible to manage by 2050. Many of the necessary technologies are not yet mature, and the required biomass is scarce. Denmark and the rest of the world cannot avoid the fact that negative emissions will play an important role in stabilising and subsequently reducing the concentration of CO<sub>2</sub> in the atmosphere. Thus, there is a need to develop methods and technologies to store carbon. But it would hardly be wise to focus primarily on CO<sub>2</sub> storage as a solution to achieving net-zero emissions.

A solid path towards net-zero emissions by 2050 would be to significantly reduce remaining residual emissions, and to bring energy-efficiency improvements, behavioural change and new technologies into play. This would reduce our dependency on negative emissions, and make it easier to secure enough carbon for storage. The agricultural sector is likely to be responsible for the majority of residual emissions in 2050. To reduce dependency

on negative emissions, we should already be striving towards a far more climate-friendly food and agricultural system than at present. Encouraging the sector towards a green transition will require research into new production methods, and pairing initiatives and measures with the implementation of new regulation. It will also be necessary to change diets to reduce our consumption of food with a high carbon footprint.

Residual emissions should be reduced in a way that minimises the need for scarce carbon resources. This could entail replacing fossil fuels with direct electrification where technically possible, or with green fuels that do not contain carbon, e.g. hydrogen or ammonia.

### **Denmark should take more responsibility than required by the Climate Act**

Danish climate targets are territorially based, which applies for other countries as well. This means that only greenhouse gas emissions from Danish territory are included in the Danish target, and that emissions from foreign shipping and aviation that leave Danish ports and airports are excluded. However, someone has to take responsibility for these sectors if the world is to have control over all relevant emissions. On paper, this responsibility lies with the UN organisations for aviation and shipping, but in reality, these organisations cannot set climate requirements for operators in these two sectors.

If Denmark is to achieve net-zero emissions, we should account for ships and aircrafts transporting goods and passengers to and from Denmark. If the Danish share of emissions from these two sectors were to be included, as they are in the UK, the Danish need for carbon for fuel or negative emissions would increase. The demand for fuel by foreign shipping and aviation may be significant, and currently it seems unlikely that the aviation sector in particular will be able to do without carbon fuels. It is therefore crucial to include this demand in planning and strategies up to 2050. Finally, the climate impact of aircraft contrails should also be included when calculating the total climate impact of Denmark.

→ *Read more about the net-zero target for 2050 in chapter 3.*

## 1.3 The European Union climate policy

### **The EU sets the framework for Danish climate policy**

Danish climate policy does not stop at Denmark's borders. Denmark can positively impact the world as a front-runner, but the impact could also be negative if Danish climate policy causes emissions to move abroad or increases Denmark's climate footprint in other countries. Similarly, Denmark is impacted by the rest of the world, particularly by the EU, which sets the framework and creates opportunities for Danish climate policy.

European climate targets have been raised. The EU target is now a 55 percent reduction in emissions compared to 1990 levels by the year 2030. The previous target was 40 percent. Additionally, Member States adopted a goal of net-zero emissions by 2050 for the entire Union. In July 2021, the European Commission published its proposal for a climate and energy package; the *Fit for 55*-package. The proposal includes a large number of legislative revisions and new legislation to help the EU to reach its new objective. The package contains proposals for new and more stringent climate obligations for Member States, amongst other things.

It is highly relevant to take a closer look at the package and the consequences it will have for Denmark, even though the *Fit for 55*-package is currently merely a proposal. Not only because Denmark can still influence the final content of the package, but also because, in doing so, Denmark can adapt its national climate policy based on the expected new and more stringent EU climate policy. In the context of the former 40 percent target, almost all of Denmark's current EU obligations are likely to be fulfilled by 2030 without requiring additional measures so long as Denmark fulfills its own national climate targets. However, this will not necessarily apply if more stringent obligations from the *Fit for 55*-package are adopted. On the other hand, new EU regulations and more stringent obligations for all Member States will help Denmark conduct an ambitious climate policy without a large increase in the risk of Danish emissions moving to other countries, so called carbon leakage.

### **Danish efforts in the non-Emission Trading System sector may be necessary**

Common EU climate policy already requires that Member States reduce emissions in the parts of their economy located outside the traditional ETS sector, i.e. the non-ETS sector. This primarily concerns transport, agriculture, domestic heating and small industry sectors. There is also a proposal for more stringent emission rules for the



sector for Land Use, Land Use change and Forestry (LULUCF). The two obligations are linked, as over-delivery of one obligation can be used to meet shortfalls in others to a certain extent.

So far, Denmark has not had to think about non-ETS and LULUCF obligations. However, under the European Commission's new proposal, Denmark's obligations are expected to significantly increase, which means that just focusing on the national target will not necessarily mean that obligations will be met. Several of the roads towards a 70 percent reduction that the government has suggested will not be enough to fulfill the expected and more stringent EU obligations. Denmark may therefore be forced to adjust its climate policy towards 2030 to focus on certain sectors such as agriculture, transport and land use. The government should begin taking the expected more stringent EU obligations into account immediately, even though the final obligations have yet to be finalised, and even though the estimates and projections for the LULUCF sector emissions are very uncertain. In general, there should be focus on reducing the uncertainty connected with the estimates and projections for the LULUCF sector.

Early intervention in the non-ETS and LULUCF sectors will increase the probability of Denmark fulfilling the proposed obligations as the obligations cover total emissions in the period up to 2030 and not just emissions in 2030. If the reductions in emissions needed for the national 2030 target materialize late in the period, it will be difficult to meet the EU obligations for the non-ETS and LULUCF sectors.

### **A Danish tax on greenhouse gas emissions will be positively impacted by a more stringent EU policy**

An important discussion in Danish climate policy focuses on the possibility of introducing a general tax on greenhouse gas emissions. One concern is that if the price per tonne CO<sub>2</sub>e emitted in Denmark is significantly higher than in other European countries then this may be an incentive to move production and emissions abroad. A more stringent EU climate policy in three areas in particular would limit this risk.

Firstly, the EU emissions trading system plays an important role. The price of allowances has increased considerably in recent years and more stringent EU climate targets are likely to increase the price even further. High allowance prices will reduce the difference between the necessary cost of greenhouse gas emissions in Denmark in order to meet the 70 percent target and the allowance price. This will help maintain the competitiveness of Danish companies.

Secondly, all EU countries are expected to be imposed with more stringent climate obligations outside the non-ETS sector, particularly with regard to emissions from agriculture, transport and buildings. More stringent obligations will make it more difficult for Danish production and its associated emissions to move to other EU countries. And should that happen, those countries would need to reduce emissions elsewhere to meet their country's climate obligations.

Thirdly, the European Commission has proposed that certain products imported to the EU must pay a carbon tax. The tax must be paid if the exporting country does not have a carbon tax that corresponds to the tax in the EU. This proposal will also improve the option of a high Danish tax, as it would protect Danish companies on the European market from competition from countries outside the EU. Overall, the *Fit for 55*-package makes it easier for Denmark to reach its own climate targets by the use of a national carbon tax.

### **More stringent EU regulation for aviation and shipping**

Greenhouse gas emissions from international aviation and shipping are only to some extent regulated by the EU today. This changes with the *Fit for 55*-package where the European Commission proposes new regulations. The European Commission has proposed the introduction of a minimum tax on fuel, similar to the system of minimum taxes on land-based transport we have today, a blending mandate for sustainable aviation fuels and a greenhouse gas emission reduction obligation for shipping. Finally, shipping will also be covered by the EU Emissions Trading System, as is already the case for aviation within the EU. The new regulations will increase the demand for green fuels, e.g. electrofuels produced using electricity as the primary energy through Power-to-X.

Emissions from international aviation and shipping are not included in the official Danish greenhouse gas inventories. Nevertheless, Denmark has a responsibility to take the transition of these sectors into account when planning long-term climate efforts. However, going forward, Denmark will have limited room to adopt additional measures for aviation and shipping due to international agreements, EU regulation and the risk that shipping in

particular will avoid Danish ports. For example, the European Commission has proposed a uniform biofuel blending requirement for aviation across all EU countries. If the proposal is adopted, Denmark would be unable to set a higher blending mandate. A Danish passenger tax on airline tickets is one of the remaining available measures, which neighboring countries have already implemented. The passenger tax would be a good way of reducing demand. The price of air travel would then approach the real cost to society. Such an initiative would limit air travel, but it would not help aircrafts transition towards more climate-friendly fuels. It is therefore important that passenger taxes are combined with other initiatives such as biofuel blending mandates, CO<sub>2</sub> allowances and energy taxes, all of which are included in current or proposed EU regulation.

### **Agriculture is exempt from EU climate regulation**

Currently, there is no common climate regulation of the agricultural sector in the EU. The agricultural and LULUCF sectors are covered by national obligations that apply to total emissions by the non-ETS sectors. However, it is up to the countries themselves to determine the degree to which the agricultural sector should contribute to fulfilling these obligations and what political tools should be applied to do so. Towards 2030, the *Fit for 55*-package will keep regulation as it is, with the agricultural sector only being regulated via national obligations for non-ETS sectors.

The agricultural sector accounts for a significant portion of the Danish greenhouse gas inventory, and for this reason it is important to highlight the absence of common EU policy tools to reduce this sector's emissions. This means that, particularly within the agricultural sector, Denmark must introduce national measures to reduce emissions. Historically, introducing more stringent national environmental requirements for the agricultural sector has proven difficult due to the fear of reducing competitiveness. Therefore, common EU policy tools could level the playing field and create a greater demand for new reduction technologies, and this in turn would encourage technological development.

→ Read more about the EU's climate policy and its significance for Denmark in chapter 4.

## 1.4 Status on Denmark's short-term climate targets

### **The task of the DCCC is to assess the status of meeting the 2025 and 2030 targets**

In accordance with the Climate Act, the DCCC must assess whether the government's climate efforts demonstrate how to meet the Danish 2030 target. By 2030, Denmark has to reduce its greenhouse gas emissions by 70 percent compared to 1990 levels. The assessment is not intended as a rating of the government on a grading scale. Rather, it is an assessment of whether Denmark is likely to reach its climate targets as stated in the Climate Act with the government's adopted measures, proposed measures and measures at a strategy level. On the basis of the assessment by the DCCC and the Danish Energy Agency's Energy and Climate Outlook published in April, the government will follow up on target achievements and present its plans for climate efforts in the Annual Climate Programme in September and then in its climate report to the Danish Parliament in December. The Annual Climate Programme also includes an assessment by the Minister for Climate, Energy and Utilities of whether the government has demonstrated how to meet the 2030 target. If this is deemed unlikely, the programme will have to be expanded with new initiatives to pave the way towards meeting the target. Ultimately, the Danish Parliament will assess whether the so-called *duty to act* comes into force.

The 50-54 percent reduction target in 2025 as set by the Climate Act has a different position than the Act's 2030 target. If it seems unlikely that the 2025 target will be reached, the Minister for Climate, Energy and Utilities is not subject to the same duty to act under the Climate Act. Neither is the DCCC required to directly assess whether the government has demonstrated how to meet the 2025 target. On the other hand, the DCCC is required to provide a status update on meeting the target. However, it would be appropriate to use the same analytical method to assess both targets, which is what the DCCC does in this report.

### **The DCCC has noted significant progress towards the 70 percent target in 2030**

Since the Climate Act was adopted in 2020, significant progress has been made towards achieving the 70 percent target in 2030. Since the DCCC's Status Outlook in 2021, the Danish Parliament has agreed on mitigation initiatives in the Finance Act for 2022 and in a policy agreement on agricultural emissions. The agreement on agriculture means that Denmark now has a national climate change policy in place for all significant emission

areas. In the two years since the agreement on a 70 percent reduction target, we have seen the adoption of policy measures that will halve the 2030 reduction gap compared to the 20 million tonnes reduction gap inventoried in CO<sub>2</sub>e. Furthermore, the government has improved its climate efforts by prioritising its analytical work and submitting considerably larger technical reduction potentials than last year. Finally, a number of significant enabling initiatives have been launched, such as the government's proposed subsidy for Danish hydrogen production and a significant governmental contribution to green research and development.

In 2021, the government significantly improved its planning of climate efforts towards 2030. The government presented its roadmap for these efforts in the 2021 Climate Programme. The roadmap proposes revisiting political agreements and presents the government's ambition that all necessary decisions on meeting the 70 percent target in 2030 be made by no later than 2025. The roadmap makes it possible to regularly specify the climate change policy and to exploit any new opportunities in light of technological progress. In its climate programme, the government has applied methodologies included in the conceptual framework applied by the DCCC. The DCCC welcomes the development of a common language for assessing progress in climate efforts and believes that a common language can help support dialogue regarding the assessments.

### **Achieving the 2030 target requires specific climate policy with low risk**

The DCCC's overall assessment that progress is being made does not necessarily mean that overall climate efforts demonstrate how to meet the 2030 target. The assessment of whether Denmark is on the right path towards 2030 follows a systematic and transparent methodological approach. It takes its point of departure in the Danish Energy Agency's most recent Energy and Climate Outlook from April 2021. The outlook estimates emissions in 2030 on the basis of current policy, and the outlook then calculates the reduction gap between those emissions and the 70 percent target. Overall climate efforts consist of the initiatives described in the government's Climate Programme in September, the climate report to the Danish Parliament in December and the political climate agreements adopted since the DCCC's previous status outlook.

There is no unequivocal way of determining whether the government's climate efforts demonstrate how to meet the emission reduction targets, and thus no indisputable answer to the question raised by the Climate Act. Due to this, the DCCC's assessment is a holistic assessment based on a systematic review and analysis of the climate efforts. The DCCC has developed a methodology for analysing climate efforts in order to ensure the holistic assessment is as transparent and objective as possible, and efforts can be compared from one year to the next. The methodology is based on a number of parameters.

One important parameter in the methodology is the degree of concretisation of climate efforts. Each initiative is evaluated on a scale from A to E based on an assessment of its specific reduction potential. A means that the Danish Parliament has adopted the specific measure, B is used when the government has presented a proposal that has not yet been adopted, C indicates an official government strategy for realising a reduction potential, D are analyses of measures, which are often antecedent to an actual strategy, although the government has not yet decided whether and how it will meet the analysed potential, and finally E indicates that the government has identified a technical reduction potential without indicating how the government intends to realize the potential financially or practically.

Another important parameter is risk. Risk refers to the DCCC's assessment of the likelihood that a reduction potential can be realised by no later than 2030. For example, there may be a high risk if the reduction potential is based on immature technologies, or if it remains uncertain whether the incentives in an initiative are strong enough.

### **The 2030 reduction gap is 10 million tonnes of CO<sub>2</sub>e**

The DCCC's review of the government's climate efforts towards 2030 is summarised in figure 1.1. The Energy and Climate Outlook from June 2020 estimated that Denmark will emit approximately 43 million tonnes of CO<sub>2</sub>e in 2030 without new policies. This left a reduction gap of 20 million tonnes of CO<sub>2</sub>e in order to reach the 70 percent target. Subsequently, the Energy and Climate Outlook from April 2021 showed that this reduction gap has been reduced by slightly more than 7 million tonnes of CO<sub>2</sub>e, which corresponds to emissions of almost 36 million tonnes of CO<sub>2</sub>e. The DCCC has made a minor correction of the outlook. This leaves a reduction gap of approx. 12 million tonnes CO<sub>2</sub>e in order to reach the 2030 target. Based on this, figure 1.1 illustrates the expected emission

reductions of climate policy agreements as well as other initiatives included in the government's climate programme. The reductions are illustrated by downward, coloured bars in the figure and are grouped according to concretisation and risk. The DCCC has used the government's own estimates of emission reductions and technical reduction potentials. However, the Council has adjusted these estimates in cases where the potentials of the government's climate programme overlap each other. The figure also indicates when the government uses both a high and a low estimate of technical reduction potentials. In those cases, the extra potential in the high assessment is marked separately by a dashed box.

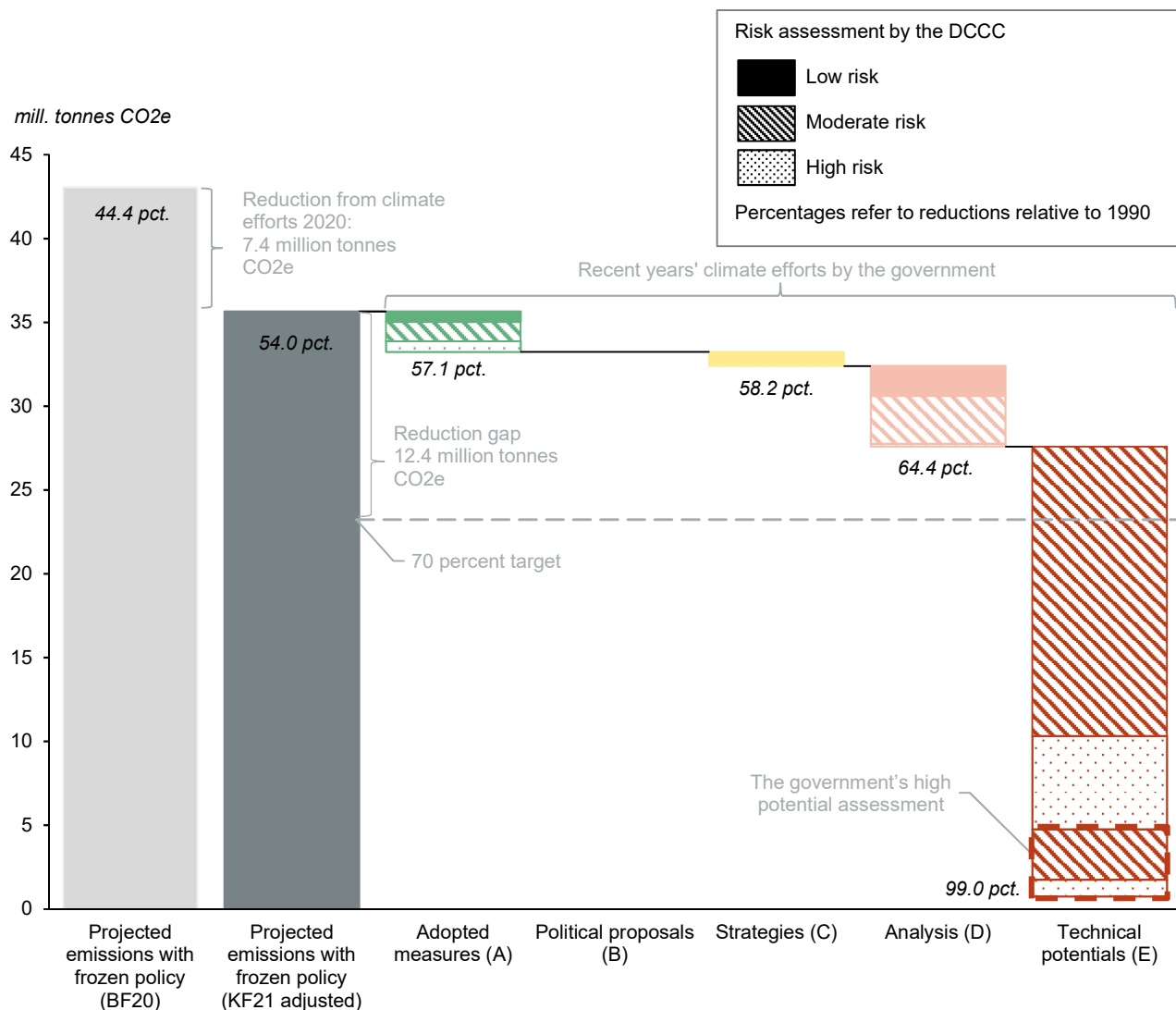


Figure 1.1 Assessment of the government's initiatives in relation to reduction effect, stage of concretisation and risk in 2030

Source: The DCCC

Political agreements adopted during the previous year will reduce emissions by 2.4 mill. tonnes of CO<sub>2</sub>e in 2030. This is illustrated by level A in figure 1.1. The political agreement on agriculture will contribute to a 1.9 mill. tonnes reduction of CO<sub>2</sub>e while the remaining reductions will primarily stem from the Finance Act's subsidy scheme for negative emissions. This will reduce the reduction gap from 12 to 10 mill. tonnes of CO<sub>2</sub>e. The DCCC assesses that 1.8 mill. tonnes of the 2.4 mill. tonnes of CO<sub>2</sub>e reduction are associated with moderate to high risk.

## **Government strategies lack essential elements**

The methodology of the DCCC states when emissions reductions of an initiative from the government can be categorised at level C. According to the methodology, a strategy identifies a reduction potential relevant to Danish emissions reduction targets, which the government then commits to. Furthermore, the government must declare the type of instruments it intends to use and their expected emissions reductions, specify the timing and stakeholder responsibilities, and how it expects to manage the most significant barriers and risks. A reduction effect will therefore not necessarily be placed at level C, even though it is part of an initiative that the government refers to as a strategy.

In 2021, the government presented strategies for a number of areas. These include a strategy for Power-to-X and one for CCS. The first strategy focuses on promoting production of green fuels, but does not consider in depth how to encourage domestic transport and industry to consume these fuels. This could possibly lead to the fuels being sold abroad. Only once green fuels substitute fossil fuels in Denmark will they contribute to reaching our emissions reduction targets, and the strategy does not account for this. The DCCC's summary of climate efforts therefore only categorises the reduction effects from Power-to-X mentioned in the government's strategy at level E, technical reduction potentials. The second strategy on CCS primarily focuses on allocating funds for emission reductions that are already accounted for and emission reductions included in the 2022 Finance Act. The CCS strategy also presents new enabling initiatives for capturing and storing CO<sub>2</sub> emissions in Denmark. Neither the government's climate programme nor its subsequent strategies concretise these reduction efforts beyond level E, although they contain significant and enabling elements.

With the climate programme and strategies, the government has identified technical reduction potentials that far exceed what is necessary to achieve the 70 percent reduction. This indicates that the 70 percent target is technically within reach. However, finances, available land areas and other possible limitations have not been taken into account. The technical reduction potentials within Power-to-X, CCS and agriculture derive from new technologies, increasing the risk that technical, operational or administrative complications will decrease the likelihood that reductions are realised by 2030.

## **Government climate efforts have not yet demonstrated how to meet the 2030 target**

Despite significant progress in climate policy, the DCCC concludes that the government's climate efforts have not yet demonstrated how to meet the 2030 target. This holistic assessment is particularly based on the fact that the past year's climate agreements still leave a reduction gap of 10 mill. tonnes of CO<sub>2</sub>e in 2030 and the government has not presented strategies or proposals for policy measures to ensure that the reduction gap is addressed. Moreover, a great deal of the emission reductions from the previous year's political agreements are associated with moderate to high risk that they will not be fully realised. With only eight years left until 2030, the government still needs to provide a clear path towards achieving the remaining 10 mill. tonnes of CO<sub>2</sub>e needed to meet the 70 percent reduction target. The fact that the government has already come a long way does not mean that it has demonstrated how the remaining reductions will be achieved.

Although climate efforts have not yet ensured that Denmark will reach the 2030 target, the Danish government's analytical basis is far more solid this year than last year. Policy measures that bring Denmark closer to the target have also been adopted. The DCCC acknowledges that the government has dealt with many of the issues that the Council underlined in its 2021 Status Outlook. For instance, the government has adopted new policy measures and presented a political roadmap for addressing the relevant greenhouse gas emitting sectors. Demonstrating the 2030 target requires adoption of further climate-policy measures with significant emission reductions, e.g. a carbon tax reform, as well as initiatives and strategies to manage reduction potentials. It is possible that the government will be able to demonstrate how to meet the 2030 target as the roadmap comes into effect.

## **Small gap in meeting the 50 percent threshold in the 2025 target**

The emission reduction target for 2025 of a 50-54 percent reduction was included in the Danish Climate Act in December 2021. The reduction gap has been estimated to 2.8 and 5.9 million tonnes of CO<sub>2</sub>e to meet the lower and upper thresholds of the target. These figures are based on the most recent Energy and Climate Outlook, which the DCCC has subsequently adjusted to account for higher levels of methane emissions from biogas plants than those applied in the Energy and Climate Outlook. The reduction gap decreases to between 1.1 and 4.2 million tonnes of

CO<sub>2</sub>e after including the previous year's adopted political agreements on agriculture and the Finance Act for 2022. Figure 1.2 illustrates how the government's climate efforts have been mapped according to the DCCC methodology.

There is some uncertainty regarding the extent of the reduction gap needed to meet the 2025 target. Since the most recent Energy and Climate Outlook dated April 2021, expected price increases in the EU emissions trading allowance price have been raised significantly. Moreover, an entirely new and more optimistic projection of carbon sequestration in Danish forests has been published by the Danish authorities. These elements point towards a decrease in the reduction gap, but there may be new elements that increase the reduction gap. Therefore, when these new elements are included in the upcoming Energy and Climate Outlook for 2022, the reduction gap may change.

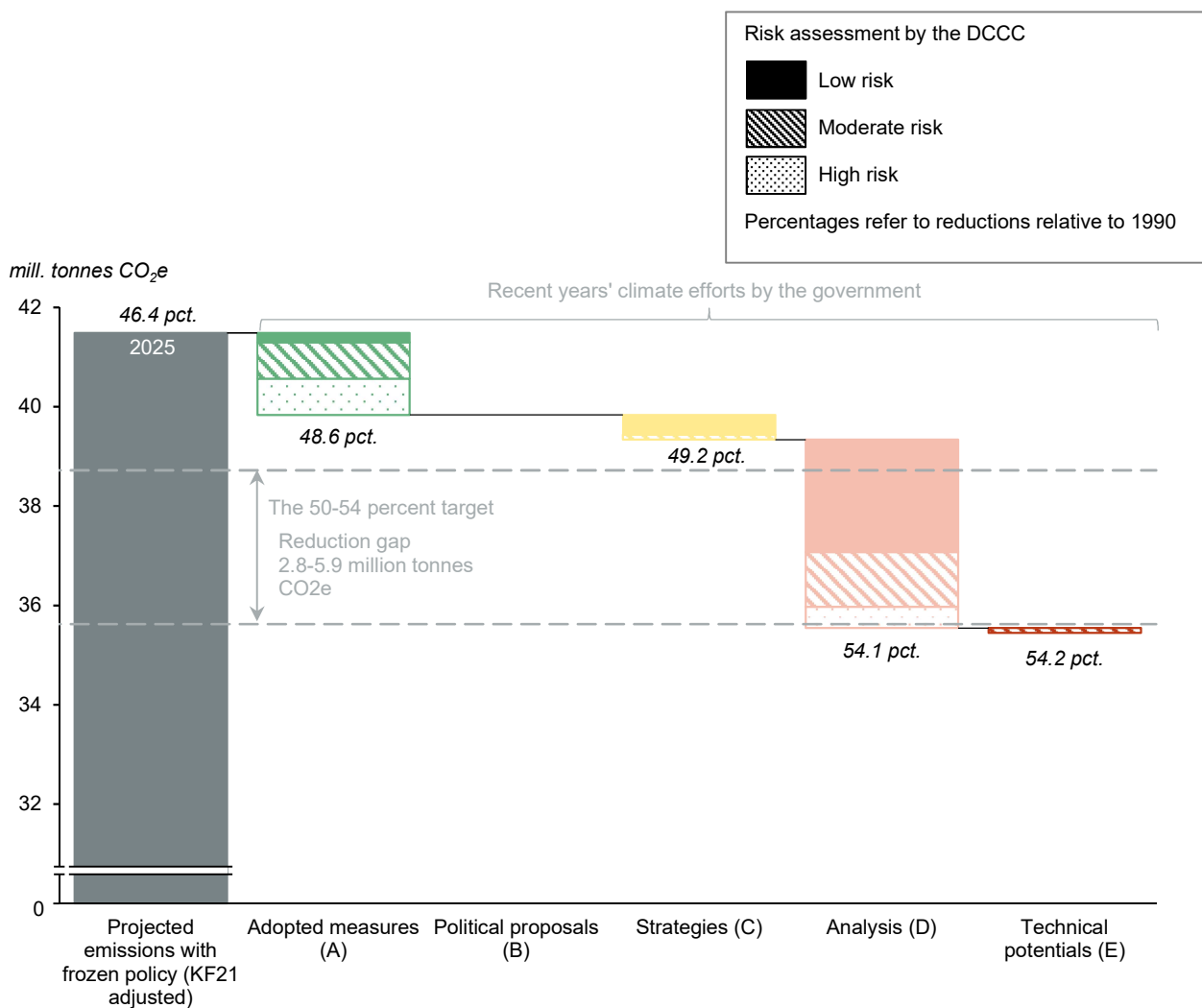


Figure 1.2 Assessment of the government's initiatives in relation to reduction effect, stage of concretisation and risk in 2025

Source: The DCCC

→ Read more about the status on meeting the emission reduction targets in 2025 and 2030 in chapter 5.

## 1.5 Recommendations for future climate efforts

### **This report focuses on four current and central policy areas**

Climate policy must be developed continuously. This report shows that there is a need for additional climate policy measures to meet the climate targets in 2025 and 2030, to begin the journey towards net-zero emissions by 2050, and to live up to the Danish EU obligations.

According to the Danish Climate Act, the DCCC must provide climate policy recommendations. The Council does so in its annual status outlook and in analyses throughout the year. This report looks at four areas central to climate efforts, which are also relevant in the current climate debate. The four central focus areas should be considered in the context of previous recommendations from the DCCC. The report analyses and discusses a general tax on greenhouse gases, transition of the food and agricultural system, production of green electricity and Power-to-X. If Denmark succeeds in implementing an ambitious climate policy in these four areas, we will have taken a crucial step towards meeting our climate targets for 2030. One deciding factor will be the level of ambition of a future tax reform. An ambitious policy in these four areas will also set a reasonable course towards the 2050 target. Moreover, we will be able to influence emissions outside Denmark. In each policy area, recommendations from the DCCC provide a direction and concrete initiatives, even though these recommendations have to be finalised before they can be implemented. The recommendations are summarised in the box at the end of this chapter.

In contrast to the 2030 target, the 2025 target is just around the corner. If implemented in due time, a future tax reform can help find the reductions needed to meet the 2025 target. However, there may be a need for further and more concrete initiatives. The DCCC has previously pointed to accelerating the phase-out of coal at Nordjyllandsværket power station and increasing the re-wetting of peat soils as a supplement to the tax instrument to achieve the 2025 target.<sup>1</sup>

### **A general tax on greenhouse gas emissions should be the flagship of climate policy**

On several occasions, the DCCC has recommended a general tax on greenhouse gas emissions. In 2020, a majority of the parties in the Danish Parliament agreed on an ambition to introduce a general tax on greenhouse gas emissions, but the details of the tax are still outstanding. A general tax on greenhouse gas emissions is the most cost-effective means to achieving the Danish climate targets. This is because a tax will provide a uniform incentive to reduce emissions across businesses and sectors. A tax will thereby help society as a whole to implement the cheapest reductions. Deviating from this uniform tax will increase the costs of achieving the climate targets, and the socio-economic basis for taking other considerations into account will be poorer.

The government should announce a target for the tax rate in 2030 as soon as possible, so it can serve as a joint indicator across all sectors. This will provide clarity for businesses and citizens. However, a uniform tax does not necessarily need to be introduced at the same time in all parts of society. Practical implementation will be more challenging in some sectors than in others, and the tax can be introduced in parallel trajectories independently of each other. Challenges in one trajectory should not delay introduction in others, and tax increases can be introduced at different speeds across different trajectories.

It is not easy to say how high the tax on greenhouse gas emissions should be in 2030. It depends on whether the tax is to account for the entire path towards the 70 percent target or only parts of it. If, due to political considerations, there is a desire for the incentive to reduce emissions to be provided as a combination of taxes and subsidies, the tax does not have to be quite as high. The tax rate also depends on expectations for the latest and crucial reduction technologies. There are many indications that immature technologies such as pyrolysis and CCS will play a crucial role. However, there is considerable uncertainty about the extent of economic incentives required to attract the necessary investments in these initiatives. In 2020, the DCCC suggested that the required tax could be around DKK 1,500 per tonne CO<sub>2</sub>e in combination with a basic tax deduction for sectors facing particularly strong international competition.<sup>2</sup> Since then, new climate policy measures have been adopted and updated assessments of the new technologies have become available. In its first sub-report dated February 2022, the green tax reform expert group assessed that it will be necessary to introduce measures costing up to DKK 1,450 per tonne of reduced CO<sub>2</sub>e in order to meet the 70 percent target. On this basis, the DCCC assesses that DKK 1,500 is still a reasonable indicator for the incentive necessary to reduce emissions.

A Danish tax on greenhouse gas emissions should be coordinated with the EU ETS. The DCCC recommends that the tax system support a uniform total price per CO<sub>2</sub>e for all emission sources. Such an approach will mean that Denmark implements the cheapest climate initiatives from a European and global perspective. In the ETS sectors, the total price per CO<sub>2</sub>e is composed of the payment for allowances plus the Danish tax. Therefore, ETS businesses should be given a reduction corresponding to the allowance price in the general tax rate imposed on other parts of the economy, so that the total expense is the same for all businesses, irrespective of whether they are inside or outside the ETS sector. The Danish Ministry of Finance assesses that the allowance price will increase to DKK 750 per tonne CO<sub>2</sub>e by 2030, and the tax in the ETS sector will thus have to be DKK 750 if the general tax rate is DKK 1,500.

In sectors with a high level of competition, a high tax may cause production and emissions to move abroad. This would offset the effect on the global climate. If the goal is to prevent this carbon leakage, the tax should be accompanied by supplementary regulation, for example an activity-based tax deduction encouraging businesses to keep production in Denmark. An alternative solution is subsidies to selected technologies, thereby reducing the general tax rate. The green tax reform expert group has recommended that the tax model be supplemented by a subsidy pool for CCS. Such a system is easier to manage than a tax deduction scheme, but has the disadvantage that it overlooks other potential technologies than CCS. A subsidy pool should therefore include as many relevant technologies as possible. In general, it should be noted that leakage regulation through tax deduction or subsidies will increase the costs of meeting the climate targets. So, avoiding carbon leakage comes at a price.

### **More climate policy initiatives needed for the agricultural and food system sector**

Food production has a significant impact on the climate system. The most recent Energy and Climate Outlook showed that emissions in 2019 from the agricultural sector and its land use alone amounted to around 16 million tonnes CO<sub>2</sub>e, corresponding to about one-third of total Danish emissions. Since then, the Danish Parliament has adopted an agreement on agricultural emissions which is expected to reduce emissions by around 2 million tonnes CO<sub>2</sub>e towards 2030 through specific initiatives. But even when these reductions are included, agriculture's share of Danish emissions is likely to increase to approximately 40% by 2030. The agricultural sector will thus still be the biggest source of emissions in Denmark in 2030. Current regulation on agricultural emissions is modest. However, many of the cheapest reduction potentials are within the agricultural sector. This calls for significant climate policy focus on this sector, both with regard to specific reduction initiatives and the development of new technological tools. The latter requires stronger research and development initiatives in the agricultural sector.

Emissions from the agricultural sector should be subject to a general tax on greenhouse gas emissions. However, a tax on agricultural emissions is difficult in practice, because it is not possible to measure emissions directly from an individual cow or a slurry tank. Moreover, other environmental considerations must be taken into account. However, a tax base can be based on observable and unambiguously measurable indicators for greenhouse gas emissions. Naturally, it is important to ensure that the tax base also reflects the farmers' options to shift production in a climate-friendly direction. Administratively, a tax on agricultural emissions is no simple matter, and the difficulties will be larger for some emission sources than for others. Therefore, the tax can be rolled out gradually, starting where taxes are easiest to impose. Finally, additional regulation can supplement the tax if there is a political desire to take specific interest into account. This may be to prevent relocation of production that leads to increased emissions in other countries, or to compensate for the financial consequences of the tax for particularly vulnerable farms. Again, it is important to note that this can make the transition more expensive.

Danish regulation of agriculture should be considered in a European context. The EU does not have common regulation of agricultural emissions and land use, and this makes it difficult for individual Member States to introduce more stringent regulation in these sectors, for example due to competition. The government should work to ensure common EU regulation of agricultural emissions. This will make it easier for Denmark to reduce emissions and reduce the risk of carbon leakage, decreases in production and job losses. Furthermore, the EU has adopted a reform of the Common Agricultural Policy (CAP), which gives Denmark a greater opportunity to exploit the subsidy funds for green initiatives. The government's official plan for implementing the agricultural reform shows that it has not fully exploited the possibilities inherent in the CAP reform of promoting climate-friendly initiatives. For example, more could be done to encourage rewetting of peat soils. Clearly, Denmark should get as much green transition of the agricultural sector as possible out of EU subsidies.



In addition to production, transforming the food system is also about food consumption. In December 2021, the DCCC published an analysis on climate-friendly diet and consumer behaviour.<sup>3</sup> The analysis found a critical need to normalise climate-friendly diets, if the aim is to change food consumption. In this context, public kitchens can be a catalyst, and the central government, regions and municipalities should establish objectives for serving climate-friendly meals. The DCCC recommends that the objective of climate-friendly food in public kitchens should be based on the Danish dietary guidelines, because they are a good indicator for a climate-friendly diet towards 2030. The DCCC has also pointed to other initiatives to encourage a change of Danes' eating habits, for example the development of a certified climate database with information about the climate footprint of foods and the establishment of two certified climate labels to inform consumers. More climate-friendly food consumption in Denmark will only contribute to achieving the Danish climate targets to the extent that this brings about changes in Danish food production. However, in any case, new dietary habits will reduce the global climate footprint of the Danish diet.

### **Denmark may lack green electricity**

Danish electricity consumption has been relatively stable for several years. However, in the years to come, we will use considerably more electricity than we do today. This is partly because an increasing share of our energy consumption will be electrified either through direct electrification of electric cars and heat pumps, or indirectly through green fuels from Power-to-X. On top of this, more data centres are expected to increase Danish electricity consumption. If electrification is to have a climate effect, it is crucial that we have sufficient amounts of green electricity.

If Denmark is to be a climate front-runner, Denmark should be able to produce enough electricity to cover its national consumption on a yearly basis. This is a reasonable target, considering the large wind resource potential in Denmark. In the long term, it may even be relevant to aim at becoming a net exporter of electricity and possibly also a net exporter of Power-to-X products. The specific level of net exports should take into account the socio-economic cost and benefits along with other political objectives. The DCCC is of the opinion that the financial risk for Denmark linked to producing electricity for net export is relatively low compared with the negative climate impacts caused by a lack of green electricity.

The DCCC's analysis shows that there will be a shortage of electricity from renewable energy sources in the years leading up to 2030 if Denmark is to avoid net imports of electricity. This indicates that we need more onshore wind and solar power, as these types of projects can be established relatively quickly. If possible, we should also consider speeding up the establishment of planned offshore wind projects.

The government's new Power-to-X strategy requires large amounts of electricity. The planned expansion of renewable energy can cover electricity consumption from Power-to-X corresponding to an electrolysis capacity of approximately 1 GW by 2030. However, the government has set a Power-to-X target of 4-6 GW. If this expansion is to be green, it is necessary to produce significantly more green electricity than currently planned. If deployment of renewable energy is not increased, there will be a shortage of green electricity until the energy island in the North Sea produces enough electricity to meet consumption for Power-to-X. For a period, this could mean that large-scale Power-to-X production will be based on imported electricity, a significant amount of which could be based on fossil fuels.

### **Targeted and prudent use of Power-to-X**

Power-to-X is an overall term for the production of fuels, materials and chemicals using electricity. This technology has been the subject of much political attention in recent years, and many consider Power-to-X to be a cornerstone of the green transition. There are many indicators that fuels produced using Power-to-X will become an important tool in eliminating the consumption of fossil fuels by ships and aircraft. As mentioned earlier, the government's aim in its strategy for the area is to establish an electrolysis capacity of 4-6 GW by 2030. This electrolysis capacity will be used to produce the hydrogen that constitutes the energy in the fuels.

Power-to-X is only as green as the electricity on which it is based. If fuels are produced using electricity with a high CO<sub>2</sub> intensity, CO<sub>2</sub> emissions could actually exceed emissions from the fossil fuels displaced. This is because the overall Power-to-X process is subject to considerable energy loss. This has two implications. Firstly, it is crucial that the expansion of Power-to-X is matched by new green electricity production. Otherwise we risk that a rapid

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Power-to-X expansion will increase emissions in the first years, because electrolysis plants can be established much faster than wind farms, for example. Secondly, direct electrification should be given priority over Power-to-X fuels where this is economically and practically feasible. For instance, in a previous analysis the DCCC demonstrated that having heavy road freight transport run on batteries rather than on electrofuels, where possible, results in higher energy efficiency and greater economic benefits.<sup>4</sup>

Power-to-X fuels can be pure hydrogen or hydrogen combined with other elements such as nitrogen or carbon. If electrofuels contain carbon, CO<sub>2</sub> is emitted when they are burned, just like fossil fuels. However, if the carbon comes from carbon capture from the atmosphere, the fuel is in fact carbon-neutral. Electrofuels based on carbon from biomass can also be carbon-neutral if their emissions are accounted elsewhere in the climate inventories. However, the DCCC's analysis suggests that there may be a shortage of available carbon in the future. It will be necessary to store carbon in forests and soils and as CO<sub>2</sub> in the subsurface to create negative emissions, and it will also be necessary to use carbon for materials. This means that plans and strategies for Power-to-X should largely give priority to carbon-free Power-to-X fuels where these can be used. For example, using nitrogen-based ammonia in ships instead of carbon-based methanol.

→ *Read more about recommendations from the DCCC for future climate efforts in chapter 6.*

## Climate-policy measures recommended by the Danish Council on Climate Change

### *General tax on greenhouse gas emissions*

- The DCCC recommends introducing a general and uniform tax on greenhouse gas emissions. The government should as soon as possible announce a target for the tax rate in 2030, which can serve as a joint indicator across all sectors. The tax rate should be set to ensure a uniform incentive to reduce emissions in all sectors, and to achieve the 70 percent reduction target. This principle should not be derogated from, even though a sector target has been set for agriculture. The target tax rate should also depend on the price towards 2030 of the technologies and tools required to achieve the final step towards the 70 percent target. In order to achieve the 70 percent target, the incentive in the tax system to convert to climate-friendly production will likely be around DKK 1,500 per tonne CO<sub>2</sub>e.
- The DCCC recommends that specific tax increases be adopted as soon as possible where relevant. The tax can then be introduced in different trajectories focusing on transport, agriculture, industry and negative emissions, for example. Implementation of the tax in the various trajectories can be done in parallel and independently of each other, and challenges in one trajectory should not delay implementation in another trajectory. However, all trajectories should aim towards the same common tax rate in 2030.
- The DCCC recommends a reduction in the national tax on ETS emissions from the energy and industry sectors corresponding to the allowance price. This will imply that the Danish tax is highest outside the ETS sector, and that the tax and allowance system together will ensure a uniform incentive to reduce emissions across sectors.
- The DCCC recommends that exposed industries be relieved from some of the tax, if avoiding carbon leakage is a priority. This could be through a subsidy or a basic tax deduction. Technology-specific subsidies for CCS, for example, involve a risk that reduction initiatives that are cheaper than CCS, but more expensive than the tax, will not be implemented. If subsidies are the solution adopted, the possibility of a subsidy model which includes, as far as possible, all technologies should be explored further. A tax deduction is generally technology-neutral, but can be associated with high administrative costs. Leakage regulation through subsidies or tax deductions will generally increase the costs of achieving the target, and gains in the form of less leakage, for example, should therefore be weighed against the additional costs. If the risk of leakage falls over time, any leakage regulation should be adjusted accordingly.

### *Transition of the food system*

- The DCCC recommends that a general tax on greenhouse gas emissions also covers greenhouse gas emissions by agriculture. The specific tax model for agricultural emissions can include the possibility of a basic tax deduction to limit production reductions as well as carbon leakage. The model will require thorough preparation, but the government should announce now that it is working to introduce a tax on all greenhouse gas emissions, and the tax rate it is aiming for. If desired at political level, in addition to the basic tax deduction, it will be possible to grant compensation to the farmers affected by, e.g., falling land prices.
- The DCCC recommends that a tax is initially introduced to cover agricultural emissions where this can be done relatively easily. Other emission sources should also be made subject to the tax as practical challenges are overcome.
- Furthermore, the DCCC recommends that the government also initiate efforts to design a model that best allows a consumption tax on foods with a high carbon footprint, so that the price reflects the climate impact of such foods. This could supplement a tax model with a tax deduction.
- The DCCC recommends that the government increases support to research and development of new reduction initiatives to reduce residual emissions from agriculture and land use. The initiatives can be supported through stronger economic incentives and increased investment in research and development.
- The DCCC recommends that the government work for ambitious and cost-effective common EU regulation of agricultural emissions and land use.

- The DCCC recommends that Denmark exploit opportunities to support climate initiatives through EU's common agricultural policy. For example, this may be relevant for re-wetting peat soil.
- The DCCC recommends implementing measures that help normalise climate-friendly diet, and that the state, regions and municipalities set a target for climate-friendly diet in public kitchens. The objective for climate-friendly diet in public kitchens should be based on the Danish dietary guidelines, because these are a good indicator for climate-friendly diet towards 2030.

### *Sufficient green electricity from wind and solar power*

- The DCCC recommends that the government increase the deployment of renewable energy that can be established relatively quickly. This includes utility scale and rooftop solar PVs, as well as onshore wind turbines. When designating areas, various priorities should be considered, including different types of externalities such as visual pollution. The projects should be established soon, as Denmark faces a lack of green electricity towards 2030 if net imports of electricity are to be avoided. Furthermore, the deployment of planned offshore wind projects should be accelerated if possible. This includes offshore wind farms agreed under the Finance Act for 2022 and the Bornholm Energy Island initiative.
- The DCCC recommends that the government deploy more offshore wind power than currently planned towards 2040 in order to supply future Power-to-X plants with green electricity produced in Denmark. Furthermore, the deployment of additional offshore wind power will enable net exports of electricity to countries neighbouring Denmark. The economic risk associated with this deployment is considered to be relatively low due to an increasing demand for green electricity alongside decreasing cost of offshore wind power. This high demand abroad is likely to result in electricity prices that will increase profits from net exports. In connection with the Finance Act for 2022, the government is considering establishing 1 GW in addition to existing plans. The DCCC recommends that more than 1 additional GW wind power be established as soon as possible. Among other things, this will serve to meet the electricity consumption required by the government's plans of 4-6 GW Power-to-X by 2030.
- The DCCC recommends that the government examine how to improve the design of future tenders for offshore wind. The design should ensure that electricity production is ahead of electricity consumption while also ensuring a high level of competition for bidders. For example, electricity production could stay ahead of consumption by preparing a large number of offshore wind farms, which subsequently can be carried out as tenders as we obtain more information about electricity consumption. Competitiveness can be ensured by raising the payment cap for the state or by involving alternative assessment criteria such as life cycle assessment or contributions to innovation.

### *Perspectives for Power-to-X*

- The DCCC recommends using the government's level of ambition for Power-to-X of 4-6 GW as an objective, provided that electricity consumption is matched by further deployment of renewable energy, so the production of Power-to-X is primarily based on green electricity. Without sufficient green electricity, there is a risk that Power-to-X will increase global emissions in the short term.
- The DCCC recommends that, in its future efforts and planning of Power-to-X, the government prioritise direct electrification over Power-to-X. When using Power-to-X fuels, the government should prioritise carbon-free fuels over carbon-based fuels where possible.
- The DCCC recommends that the government include in its plans for Power-to-X towards 2050 the expected need for green fuels for the transition of the Danish share of international maritime and air transport. Power-to-X fuels are likely to become a crucial element in the transition of these sectors.
- The DCCC recommends that the government work to locate Power-to-X plants appropriately according to the electricity grid. This can be facilitated by introducing flexible grid tariffs that differ in timing and geography. These cost-oriented tariffs should be introduced before the deployment of large scale Power-to-X.

## Notes

### Chapter 1

<sup>1</sup>The DCCC, *Commenting on the government's climate programme 2021*, 2021.

<sup>2</sup> Danish Council on Climate Change, *Known paths and new tracks to 70 percent reduction*, 2020.

<sup>3</sup> Danish Council on Climate Change, *Climate-friendly food and consumer behaviour*, 2021.

<sup>4</sup> Danish Council on Climate Change, *Paths to climate-neutral road freight transport*, 2021.