

De Økonomiske Råd   
Formandskabet

**ECONOMY AND  
ENVIRONMENT, 2022  
SUMMARY AND  
RECOMMENDATIONS**

## SUMMARY AND RECOMMENDATIONS

Chapter I first reports the Chairmanship's economic assessments and recommendations for the current environmental policy. Next, an assessment of the concluded agreement on green tax reform for industry is presented as well as updated estimates of the costs of achieving the national objectives for greenhouse gas reductions by 2030. Finally, the magnitude of the labour market adjustment costs that result from the green transition are discussed.

Chapter II illustrates the possibilities for imposing a CO<sub>2</sub>e tax on agricultural greenhouse gas emissions based on climate accounts calculated at the farm level, and it outlines the principles on which such accounts should be based. Estimates in the chapter indicate that, with the current knowledge, there is a basis for setting up detailed models for the major share of agricultural emissions.

Chapter III documents that Danish manufacturing firms have adapted to changing energy prices over the past two decades. This confirms the presence of the core mechanisms that ensure that a CO<sub>2</sub> tax leads to emission reductions.

## SUMMARY AND RECOMMENDATIONS

### The report examines Danish climate policy up to 2030

This report examines several aspects of relevance for the design of Danish climate policy to meet the Climate Law's reduction target for 2030. The green transition requires adjustments across the Danish economy, and these adjustments require that businesses and consumers are given the necessary incentives, as set out in the climate policy. The report illustrates how the incentive for change can be achieved in agriculture and in Danish manufacturing firms. The report also contains an economic assessment of current environmental issues, including updated assessments of the adjustments that are still pending as part of the green tax reform for industry agreement that was concluded in June 2022, and a brief discussion of the magnitude of the expected labour market adjustment costs.

### Previous reports have analysed climate policy

In several previous reports, the Chairmanship has analysed the required future reductions in greenhouse gas emissions. *Økonomi og Miljø, 2020* (Economy and Environment, 2020) analysed the expected costs of meeting the target to reduce emissions of greenhouse gasses by 70 percent by 2030. The estimates showed, among other things, that deviating from uniform taxation of greenhouse gas emissions will be associated with a significant economic loss. In March 2022, the Chairmanship updated the estimates and, on this basis, assessed that a uniform CO<sub>2e</sub> tax of approximately DKK 1,000 (2016 prices) per tonne of CO<sub>2e</sub> would ensure cost-effective achievement of the Climate Law's reduction targets. *Økonomi og Miljø 2021* supplemented the Chairmanship's recommendations by, among other things, analysing the employment changes that are expected as a result of uniform greenhouse gas taxation.

### Chapter I Current environmental policy, achievement of 2030 goals, and the adjustment costs thereof

The first chapter in the report contains three sections. First, the Chairmanship's economic assessments and recommendations for the current environment policy are reported. Particular comments are made on climate and energy policy, management of nature and regulation of road transport. Next, an assessment of the recent green tax reform for industry is presented along with updated estimates of the costs of achieving the national targets for greenhouse gas reductions by 2030. Finally, the chapter discusses the magnitude of the labour market adjustment costs that result from the green transition, including what can be done politically to address these costs.

**Chapter II  
Farm-based climate  
accounts in  
agriculture**

In order for the agricultural sector to make the necessary adjustments that ensure lower emissions of greenhouse gases in a cost-effective manner, accurate calculations of total emissions from individual farms via farm-based climate accounts are required. The report's second chapter sheds light on the possibilities for these, and outlines the principles that such accounts should be based on.

**Chapter III  
Adjustments by  
manufacturing firms  
to rising energy  
prices**

A CO<sub>2</sub> tax affects manufacturing firms' energy prices, among other things. Firms can adapt by changing their production, being more energy efficient and passing on increased costs to sales prices and ultimately to consumer prices. These adjustment options are crucial prerequisites for a CO<sub>2</sub> tax to effectively reduce emissions. The results in the report's third chapter show that manufacturing firms have adapted to changing energy prices over the past two decades. The adjustments have been significant and have flowed through all the channels mentioned. Thus, the results show that higher energy prices have historically led to the type of adjustments that are crucial for a CO<sub>2</sub> tax to have the expected effects on emissions.

**Analyses support  
previous climate  
policy  
recommendations**

The analyses in the report fundamentally support the Chairmanship's previous recommendations that a uniform greenhouse gas tax will be able to cost-effectively achieve the 2030 reduction target. At this stage, concrete measures for agriculture are mostly still pending, and estimates in the report indicate that the agreed tax of DKK 750 per tonne of CO<sub>2</sub> for industry is not sufficient to reach the reduction target by 2030, not even if it is extended to agriculture. The report also points out that it is important to get started on formulating farm-based climate accounts for agriculture, and that it is realistic to expect that these will form the basis for a tax on agricultural emissions. Analyses in the report also indicate that, as expected, higher taxes on CO<sub>2</sub> lead to reductions in emissions from manufacturing firms as a result of, among other things, higher consumer prices for the most greenhouse gas-intensive products.

## CHAPTER I CURRENT ENVIRONMENTAL ISSUES

### Current environment policy

The chapter contains three independent sections. The first section presents the Chairmanship's economic assessments and recommendations for the current environmental policies related to climate, energy supply, management of nature and road transport. Below are the main conclusions from this section.

### Certain parts of *Fit for 55* make the green transition more expensive

The EU Commission's *Fit for 55* package presents a range of proposals that will contribute to ensuring that the objectives in the European Climate Law are achieved. Some of the measures are expected to contribute to reducing the costs of climate policy. Other elements in the package, on the other hand, risk making the green transition more expensive and should, therefore, have the attention of the Danish government.

### The Green fund should only be used for investments that make economic sense

In June 2022, a number of parties in the Danish Parliament entered into an agreement to support the establishment of a green fund to be used for broad, but so far unspecified, investments in the green transition between now and 2040. There are no actual finances set aside for the fund; rather, there will be an advance of tax revenue. This will lead to a redistribution between generations, which corresponds to loan financing of the expenses. From a narrow efficiency point of view, the state should only make investments or subsidise private investments in cases of proven market failures that cause the social returns on an investment to exceed the private economic returns. In addition, private investment should only be subsidised if a subsidy is the most effective instrument for addressing the market failure. This will be the case, for example, if there are positive spillover effects from the investments, or if the subsidies are paid out for negative emissions as part of a uniform CO<sub>2</sub>e tax.

### Initiatives should be subject to socio-economic analysis

The June 2022 green tax reform included an agreement to further expand green electricity and heating. The aim of the agreement is to increase the speed of the green transition and thus contribute to Denmark becoming independent of Russian gas as soon as possible. In a situation with high and volatile energy prices, it is no less important that socio-economic analyses of new projects be conducted prior to their implementation. This should be done to ensure that projects do not later prove to be a burden on consumers and the economy. The agreement contains several measures that compromise this requirement.

**Need for a comprehensive national plan to ensure biodiversity**

Denmark is a signatory to the UN Convention on Biodiversity, and is thus involved in the development of a new global agreement on biodiversity. Against this backdrop, a broad political agreement has been reached on a nature and biodiversity package that includes, among other things, the establishment of a Danish Biodiversity Council. The agreement will make a contribution to stopping the decline in biodiversity, but the agreement is hardly sufficient in itself. Therefore, there is a need for a comprehensive national plan for how the 2030 goal of securing biodiversity can be achieved.

**Road pricing for car transport is positive**

An agreement has been reached to change the taxation of heavy transport to a kilometre-based tax from 2025. The introduction of a differentiated tax is positive, as targeting taxation according to the negative externalities from the transport is associated with significant economic gains (see, among others, *Økonomi og Miljø, 2021*). However, the tax would be further targeted at the negative externalities of congestion and accidents if it were also differentiated according to the time of day, just as the economic benefits would be increased if the rates were raised so that they more closely reflected the actual costs. Therefore, it is also positive that pilot road pricing programs for private cars are being trialled, and plans are being made for even more differentiated charges.

**The estimates of required reductions and effects are uncertain**

**Greenhouse gas taxation in 2030**

According to the Government, there is a shortfall in reductions of approximately 5 million tonnes of CO<sub>2</sub>e required to achieve the 70 percent target by 2030. The figure for the required reductions is based on, among other things, the Government's estimate that the agreement on green tax reform for industry will reduce emissions by 4.3 million tonnes of CO<sub>2</sub>e by 2030. An assessment undertaken using the Chairmanship's model indicates that the agreement may only reduce emissions by approximately 3 million tonnes of CO<sub>2</sub>e by 2030. Smaller reductions resulting from this or other agreements already concluded will mean that the shortfall in the reductions required to reach the 70 percent target will be greater than estimated by the Government. Other circumstances, which are not covered in this section, can of course pull in the opposite direction.

**Green tax reform agreement for industry does not involve uniform greenhouse gas taxation**

The Chairmanship's estimates show that, by 2030, the agreement on green tax reform for industry will involve additional economic costs of approximately DKK 0.8 billion annually compared to a uniform CO<sub>2</sub> tax that achieves the same reductions. The additional costs are due to, among other things, the fact that the tax rate for the cement and other

such industries in the agreement is reduced, and that subsidies for carbon capture and storage and negative emissions are higher than they would be with uniform taxation.

**Achieving the 2030 targets requires a tax on agriculture of more than DKK 750 per tonne of CO<sub>2</sub>e**

Under the given assumptions, the estimates show that a uniform greenhouse gas tax of approximately DKK 1,100 (2022 prices) per tonne of CO<sub>2</sub>e is sufficient to reach the 70 percent target. The required tax rate, which also covers agriculture, is thus estimated to be higher than the DKK 750 set in the agreement on green tax reform for industry in the non-quota sector. The estimates also show that achieving the sector-specific target for agriculture and forestry requires a tax on agriculture's non-energy-related emissions that is higher than DKK 750 per tonne of CO<sub>2</sub>e.

**Labour market adjustment costs**

### **Adjustment costs of climate policy**

The goal for the reduction in emissions of greenhouse gases for 2030 and further towards climate neutrality in 2050 will require a significant restructuring of the Danish economy. Such a change will entail economic costs in the short term as well as in the long term. The third section of the chapter focuses on the short-term labour market costs that arise during an adjustment period when capital, labour and land are channelled into new production processes.

**Adjustment costs do not change the recommendations for climate policy ...**

In this section, a simulation is presented that sheds light on the order of magnitude of the labour market adjustment costs under two climate policy scenarios. Overall, the figures show that adjustment costs can be significant for the people affected, while on an economy-wide level they are of a limited magnitude compared to the overall socio-economic effects of the climate policy. Therefore, inclusion of the labour market adjustment costs in the estimates of the climate policy does not change the Chairmanship's recommendation for uniform greenhouse gas taxation.

**... but can justify prioritising education and training for the unemployed**

However, there may be groups in the labour market that are affected by significant losses in the form of lost wages and other personal losses. The section discusses how these losses can be reduced by using targeted measures in the active labour market policy. Any adjustments in the labour market policy should have a temporary effect. Such temporary adjustments, e.g., a temporary boost in public funding to the area, should aim to reduce unemployment among the affected people. It is argued that it may become relevant to temporarily prioritise education and training activities for those affected by, e.g., job losses during the transition period.

## CHAPTER II CLIMATE ACCOUNTING IN AGRICULTURE

**Politically set target for agriculture to reduce emissions by 6 to 8 million tonnes**

In the agreement on the green transition of the agricultural sector, a goal has been set for agriculture to reduce its greenhouse gas emissions by 55 - 65 percent by 2030 compared to 1990. This corresponds to 6 to 8 million tonnes of CO<sub>2</sub>e. In order to achieve this reduction target cost-effectively, the Chairmanship has previously recommended a CO<sub>2</sub>e tax.

**Climate accounting is a prerequisite for tax regulation**

In order to introduce a CO<sub>2</sub>e tax on agricultural emissions, it is necessary that each farm's total greenhouse gas emissions can be calculated via individual farm-based climate accounts. In combination with a tax, such accounts must give the farmer an incentive to take cost-effective reduction measures. No countries currently tax methane and nitrous oxide emissions from agriculture, but the New Zealand Government has decided to introduce a tax on these emissions from 1 January 2025. In Denmark, several climate accounts have already been prepared that aim to give the individual farmers insights into their farm's emissions and various options for changing behaviours and methods and reducing their emissions.

**Climate accounts must ensure incentives for reductions**

The chapter discusses the structure and properties that climate accounts should have in order to ensure they give the farmer the correct incentives. Climate accounts should encourage the individual farmer to change behaviour with the aim of reducing agricultural greenhouse gas emissions. The costs of agricultural production should, to a greater extent, reflect the economic costs that agricultural production entails, so that both consumers and producers can change their behaviour on the basis of prices that also reflect climate costs.

**A simple and a detailed climate account**

The Chairmanship recommends introducing the tax on the basis of farm-based climate accounts with a choice of two types of accounts that measure the total emissions from a farm: A simple climate account and a detailed one. This dichotomy is inspired by a proposal from New Zealand. Each farmer should be able to choose whether they want to use the simple or the detailed account, as this ensures a balance between administrative costs and precise statements. The simple model can be based on national emission factors divided by the number of animals of different types and breeds as well as agricultural area divided by crop types, while the detailed model should calculate the emissions as precisely as possible on the basis of farm-specific conditions and the existing knowledge of emission factors etc. The climate-efficient farm should have an incentive to choose the detailed climate account over the simple one.

**Uncertainty in agriculture is higher compared to industry**

The chapter discusses the uncertainty of calculating emissions at the farm level. The uncertainty in calculating agricultural emissions is greater compared to industry, for which the introduction of a CO<sub>2</sub> tax has already been agreed, i.e., in the agreement on green tax reform for industry. In a simulation in the chapter, however, it appears that up to 85 percent of the total emissions from a typical dairy farm can be accurately estimated with the knowledge we have today. That the calculations are accurate is crucial so that the incentives from the CO<sub>2</sub>e tax to change behaviours are correct. The remaining emissions are primarily emissions that occur in the field, and there is currently greater uncertainty about these emissions. This suggests that these emissions should initially be calculated according to the principles of the simple model, i.e., based solely on area and crop selection.

**Introduce tax based on simple calculation as soon as possible**

Formulating a simple as well as a detailed climate account requires thorough ground work, and it is important to initiate this work as soon as possible. The Chairmanship of the Economic Council recommends that a tax based on a simple climate account should come into effect quickly at a low rate to start with. At the same time, the progression of future increases in the tax rate up to 2030 should be announced. The details of how the emissions are calculated can be worked out afterwards, and they should be continually re-examined so that the climate account reflects the most up-to-date knowledge at any given time. The financial incentive that is embodied in a tax will help to increase research by agricultural organisations into accounting methods and the effect of various instruments that could be included in the accounts. Thus, the announcement of a high tax in the lead up to 2030 will help to improve how the climate accounts are calculated and reduce uncertainty.

### **CHAPTER III MANUFACTURING FIRMS AND ENERGY PRICES**

**The green transition requires incentives to adapt**

The green transition and achieving the Climate Law's reduction targets require adjustments across the Danish economy. The reduction of greenhouse gas emissions can either be done through adjustments within the individual firms, e.g., by the introduction of new technology, or by firms with lower emissions making up a larger share of the market. The adjustments require that the necessary incentives are created. A uniform CO<sub>2</sub> tax will ensure this and is the most cost-effective option.

**Manufacturing firms' adjustments to incentives is examined**

A CO<sub>2</sub> tax will increase the prices of energy proportionally to the emissions of the energy sources and, thereby, ensure incentives for firms to switch to other energy sources, reduce energy consumption and pass the tax on to consumers by increasing the prices of their products. The chapter examines whether such adjustments have taken place when Danish manufacturing firms have experienced rising energy prices. The chapter documents that the mechanisms that are crucial for a CO<sub>2</sub> tax to reduce emissions have indeed worked as expected among manufacturing firms over the past two decades.

**Adjustments within individual firms are of great importance**

The chapter's analyses show that adjustments within the individual firms had a major impact on the reductions in greenhouse gas emissions over the period 2001 to 2018. Thus, approximately two-thirds of the fall in the aggregate emission intensity was due to the existing firms having made adjustments. The adjustments in the individual firms include, among other things, energy savings, changes in energy sources, the introduction of new technology and organisational changes, including offshoring. Changes in the composition of manufacturing firms as well as the entry and exit of firms has also contributed to the emission reductions, but to a lesser extent.

**Rising energy prices have strengthened the adjustment**

The analyses show that the internal adjustments of the individual firms are, to a large extent, due to rising energy prices. The firms thus adjust their production when energy prices change. A good third of the emission reductions that occur because of adjustments by the individual firm are due to rising energy prices.

**If the energy price rises by 1 percent, emissions fall by 2 percent**

The period covered in the analyses is characterised by the fact that energy sources with high CO<sub>2</sub> emissions became relatively more expensive, which gave firms the incentive to switch to energy sources with lower emissions. Specifically, the analyses show that when a firm's average energy price rises by 1 percent, its emissions fall by 2 percent. One third of the decrease in emissions is due to increased energy efficiency and two thirds to changes in energy sources due to changed relative prices. The adjustment is thus of a significant size, and the results emphasise that firms are largely able to adjust their production when energy prices rise.

**The core mechanisms behind a CO<sub>2</sub> tax work**

A CO<sub>2</sub> tax will affect both absolute and relative energy prices. All CO<sub>2</sub>-emitting energy sources will become more expensive, but energy sources with relatively high emissions will become relatively more expensive. The chapter's results indicate that both of these effects will give rise to significant reductions. This confirms the presence of the core mechanisms that ensure that a CO<sub>2</sub> tax leads to emission reductions.

**Even in the short term, a significant share of rising energy costs is passed on**

In addition to the firms' adjustments in the form of improved energy efficiency and changes in energy sources, another effect of rising energy prices is that firms can pass on rising energy prices to consumers. Therefore, the chapter contains an additional analysis of the extent to which this has happened historically. The analysis is the first of its kind for Denmark and models the firms' production functions at the product-group level using register data. The results show that, within the same year, firms have passed on 84 percent of the rising costs that result from rising energy prices. Thus, product prices rise when energy costs rise. In the longer term, there is reason to expect that the extent of cost pass-through will be even higher.

**Analyses of climate policy are associated with uncertainty**

The chapter's analysis of cost pass-through is based on the specific market conditions in Denmark and in the export markets as well as the development in energy prices over the period of the analyses. In the longer term, the pass-through may turn out to be greater, just as bigger changes in prices can conceivably give rise to bigger reactions. If energy-cost increases do not prove to be fully passed on to the prices firms charge for their products in the long term, then, all else equal, previous estimates of the CO<sub>2</sub> tax's effect on emissions are overestimated, as they assume full cost pass-through in the long term. This, together with other circumstances that change between now and 2030, may mean that it will be necessary to adjust the size of the CO<sub>2</sub> tax in order to reach the reduction target set in the Climate Law for 2030.

