

De Økonomiske Råd   
Formandskabet

**ECONOMY AND  
ENVIRONMENT, 2020  
SUMMARY AND  
RECOMMENDATIONS**

## **SUMMARY AND RECOMMENDATIONS**

This report from the Chairmen of the Danish Economic Council of Environmental Economics contains an analysis of the economic consequences of implementing a uniform CO<sub>2</sub>e-tax on all emissions of greenhouse gasses, so the goal of 70 pct. reductions in 2030 is met.

The overall conclusion is that the negative impact are modest in terms of GDP loss, 0.15 percent in 2030. The level of the uniform CO<sub>2</sub>e-tax are estimated to a level around DKK 1,200 per tonne of CO<sub>2</sub>e.

The cost of meeting the target in 2030 increases if other tools than a uniform CO<sub>2</sub>e-tax are used. One example exemption of the agricultural sector means the loss in GDP is estimated to be around three times higher. And using subsidies instead of a tax can as shown in the report increase cost even further.

## SUMMARY AND RECOMMENDATIONS

### Consequences for the Danish economy in 2030 of the 70% target

The Danish Climate Act stipulates that greenhouse gas emissions must be reduced by 70 percent by 2030 compared to the 1990 level, and that Denmark must achieve full climate neutrality by 2050. In the absence of further political measures, net emissions in 2030 are only expected to have been reduced by a little under 50 percent. This leaves a required reduction of around 16 million tonnes of CO<sub>2</sub>e in 2030.<sup>1</sup> The chapter analyses how the Danish economy will be affected in 2030 by a restructuring that cost-effectively meets the 70 percent target.

### A uniform tax on greenhouse gas emissions ...

The 70 percent target would be achieved cost-effectively by replacing existing climate-related taxes and subsidies with a uniform tax on all types of greenhouse gas emissions. Such a uniform tax can be introduced gradually up to a level that ensures the 70 percent target is met in 2030, and it can continue to increase gradually up to a level that ensures climate neutrality by 2050.

### ... also includes negative emissions

Uniform taxation of greenhouse gases means that negative emissions of greenhouse gases are subsidised in parallel with the taxation of positive emissions. This ensures uniform taxation of net emissions, which means, among other things, that carbon capture and storage (CCS) is supported.

### Effective taxation of approximately DKK 1,200 per tonne of CO<sub>2</sub>e

Model simulations show that a uniform greenhouse gas tax that covers all net emissions in Denmark must increase to a level of around DKK 1,200 per tonne of CO<sub>2</sub>e in 2030 to ensure the 70 percent target is achieved.

### An estimated welfare loss of almost DKK 4 billion

Based on the modelling, it is estimated that cost-effective achievement of the 70 percent target would result in a welfare loss of almost DKK 4 billion, corresponding to approximately 0.15 percent of GDP in 2030. The primary cost to society arises because greenhouse gas taxation makes it more expensive to produce greenhouse gas-intensive goods

1) The calculations are based on a required reduction of DKK 16 million tonnes, which is based on the Danish Energy Agency's projection and the Government's assessments of the 'Climate agreement for energy and industry, etc. 2020', the 'Climate plan for a green waste sector and circular economy' and the cooperation agreement between the Danish Government and Aalborg Portland. However, the December 2020 'Green conversion of road transport' and 'green tax reform', on the other hand, are not included; therefore, the required reduction used here is approx. 2.5 million tonnes larger than in the Government's December 2020 climate action plan.

in Denmark. As a result, consumer prices rise and real household income falls compared to the scenario without an increase in greenhouse gas taxation.

**Consequences for agriculture and food industries, in particular**

Taxation has consequences for some industries, including the agriculture and the food industries, in particular. The agricultural sector currently accounts for more than 30 percent of total emissions and is exposed to international competition. The calculations suggest that, in 2030, employment in agriculture would be reduced by approximately 13,000-15,000 person-years relative to the scenario without the increased taxation. In the food industry, employment would be reduced by approximately 4,000 person-years. Total employment is not significantly affected, and the green transformation thus entails a shift in the structure of the business sector such that employment is increased in service industries and the less greenhouse gas-intensive parts of the economy.

**Uncertainty linked to, among other things, technological progress**

There is uncertainty associated with the estimates of the level of the greenhouse gas tax and the welfare loss. This uncertainty is not least related to technological progress up to 2030, including the development of CCS technology, and to the adaptation costs that must be expected. Achieving the 70 percent target will lead to improved quality of the air and water environments, and there is also uncertainty about the welfare effects of these improvements.

**BECCS is of great importance for attaining the 70 percent target**

Negative emissions via CCS linked to biomass burning, the so-called *bio-energy with carbon capture and storage* (BECCS), are expected to play a significant role in achieving the 70 percent target. According to the calculations, negative emissions through BECCS will contribute about one third of the total reductions by 2030, i.e., approximately 5 million tonnes of CO<sub>2</sub>. The potential for CCS is of great importance for the cost to society. If the potential is only half as large as assessed in this chapter, the costs would increase by more than DKK 1 billion, and the greenhouse gas tax would have to increase to DKK 2,000 per tonne of CO<sub>2</sub>e to achieve the 70 percent target.

**The framework for climate policy is crucial**

Cost-effective achievement of the 70 percent target presupposes that households and businesses will invest in new technologies and that consumption patterns and production processes will be restructured. The sooner the climate policy framework is determined, the more gradual the transition can be - and the cheaper it will be.

**Uncertainty about climate policy increases costs**

The absence of a clear climate policy framework creates uncertainty, and this increases costs because businesses will tend to postpone investments and other climate-related adjustments. First, this can lead

to an increase in the adjustment costs when the necessary investments have to be made over a shorter period. Second, postponement of investments will lead to a period of less production capacity. Third, a process in which businesses postpone green investments risks increasing the pressure on policy makers to introduce new and costly instruments during the transition, which will make the transformation even more expensive.

**Prompt and credible announcement of a high and uniform greenhouse gas taxation is important**

In order to make climate policy credible, the Chairmanship recommends that the level of greenhouse gas taxation going towards 2030 be announced as soon as possible. This will reduce uncertainty and help businesses and consumers to make the necessary investments at a time that can minimise the cost. It is not necessary for high and uniform greenhouse gas taxation to be introduced immediately. As long as the announcement is credible, businesses have an incentive to respond before the actual introduction of the tax. The Chairmanship recommends that, as part of the harmonisation of taxation of greenhouse gases based on taxing all greenhouse gas emissions, a plan be announced for the phasing out of existing climate-related subsidies and energy taxes that are not targeted at other polluting emissions.

**When emissions are reduced in Denmark, they increase abroad**

When Denmark reduces greenhouse gas emissions as part of an ambitious climate policy, emissions abroad must be expected to increase. The calculations for achieving the 70 percent target via a uniform greenhouse gas tax show that the leakage rate is around 21 percent. This means that greenhouse gas emissions abroad increase by DKK 3.3 million tonnes of CO<sub>2</sub>e when Danish emissions are reduced by DKK 16 million tonnes. However, the estimate of the specific leakage rate is associated with considerable uncertainty, just as the leakage crucially depends on the evolution of greenhouse gas intensity and climate policies pursued abroad. If many countries pursue an ambitious climate policy with binding reduction targets, the leakage will be reduced. Therefore, it can be expected that leakage rates will fall over time if more and more countries set binding climate targets.

**A pioneering country also focuses on global emissions**

The background for an ambitious climate policy is, among other things, to be a pioneering country that can implement a cost-effective transformation as an inspiration for other countries. If Denmark achieves the reduction targets by moving significant amounts of greenhouse gas-intensive production abroad, the policy is not a model for climate change that the rest of the world can follow. It may, therefore, be relevant to deviate from the principle of uniform taxation of domestic greenhouse gas emissions in order to reduce leakage.

**Cost-effective leakage correction is theoretically possible ...**

In principle, leakage can be reduced cost-effectively by supplementing the uniform greenhouse gas tax with an output-based deduction in selected leakage-prone industries and introducing a corresponding tax on domestic use of the products in question (both Danish-produced and imported products). The purpose of the deduction and the imposition of the tax is to counteract leakage, and it should, therefore, be phased out as the outside world raises the level of ambition in climate policy. The calculations of the model confirm that this type of leakage correction cost-effectively contributes to reducing leakage so that further reductions in global emissions are achieved. However, the calculations also indicate that the potential for leakage reduction is limited.

**... but there are a number of practical challenges ...**

In practice, it can prove difficult to effectively correct leakage via output-based deductions and the imposition of taxes. The calculation of accurate tax and deduction rates is associated with considerable uncertainty, because there is not perfect information about the current industry-specific leakage rates. Likewise, the demarcation between industries with different rates is an administrative and control challenge that could reduce the effect of the system on global greenhouse gas emissions. The cost for society as well as the effect on the global emissions that could be expected in practice for different designs should be examined in more detail. It cannot be ruled out that such a trade-off would imply that this type of leakage correction is only undertaken in a few greenhouse gas-intensive industries that produce homogeneous and internationally traded products, such as electricity. However, this clarification should not stand in the way of the rapid adoption of a uniform greenhouse gas tax.

**... which should not stand in the way of the rapid adoption of uniform greenhouse gas taxation**

**Other measures for the benefit of the climate ...**

Additional global reductions can also be achieved through international cooperation, for example, under the auspices of the EU. Relevant areas to be addressed at the international level include the management of emissions in international transport, cooperation on research and development and the international conventions on biomass.

**... including a special focus on biomass**

Even without making changes to the international conventions, Denmark can, as part of its pioneering country strategy, choose not to treat the burning of biomass in Denmark as being climate-neutral. With a uniform greenhouse gas taxation, this could mean some taxation of biomass, which will give an incentive for a reduction in the consumption of biomass in Denmark.

**Distribution effects are relevant but not covered by this report**

Achieving the 70 percent target will affect households in different ways. The impact is most direct through price changes that affect population groups differently, but households can also be more indirectly affected through the potential need for government funding, which can lead to

increased taxes or lower public services, or income replacement benefits. Employees will also be affected by changes in the demand for labour, which will affect relative wages and temporarily lead to some groups experiencing shorter or longer periods of unemployment. The chapter's proposal for cost-effective achievement of the 70 percent target does not have unambiguous consequences for income distribution, as a number of factors pull in opposite directions. A study of these issues is relevant for the design of climate policy, but is beyond the scope of this report.

**The welfare loss increases by approximately DKK 9 billion if methane and nitrous oxide are not taxed**

Simulations of the model show that if greenhouse gases other than CO<sub>2</sub>, including methane and nitrous oxide, are exempt from taxation, the welfare loss associated with achieving the 70 percent target increases from almost DKK 4 billion to just over DKK 12 billion. In 2030, about a third of greenhouse gas emissions will come from methane and nitrous oxide, of which agriculture accounts for about 85 percent. When reduction measures in agriculture are not fully utilised, more expensive reduction measures must be implemented in other industries and in households, which is the reason for the higher costs for society. It is the Chairmanship's recommendation that taxation of greenhouse gas emissions is uniform and cover as large a proportion of total greenhouse gas emissions as possible, including agricultural emissions of methane and nitrous oxide.

**Proceeds should be used for reductions in distortive taxes**

There may be political sentiment for the revenue from taxing the business sector's greenhouse gas emissions to be returned to the sector. If the revenue are to be returned, it is the Chairmanship's recommendation that the revenue be used to reduce distortive taxes on the business community.

**Deductions for the greenhouse gas tax increase the welfare loss**

If there is political support for some of the revenue to be returned through a deduction for greenhouse gas taxation, it is the Chairmanship's recommendation that this be done independently of production, as this limits the costs resulting from the tax deduction. If all industries were allocated a production-dependent deduction for greenhouse gas taxation, the model shows that, for cost-effective achievement of the 70 percent target, the welfare loss in 2030 would increase from almost DKK 4 billion to almost DKK 8 billion. Furthermore, the reallocation of employment between industries, which cost effective achievement of the 70 percent target entails, would be hindered. The Chairmanship advises against giving production-dependent tax deductions unless this is done in connection with effective leakage correction, where the production-dependent deductions are supplemented by corresponding

consumption taxes on all use of the produced goods. Under all circumstances, it should be ensured that any deductions for greenhouse gas tax payments are phased out over the long term.

**A subsidy strategy is associated with significant additional costs ...**

Instead of a tax on greenhouse gas emissions, incentives could be given for the green transformation through subsidies for green technologies or measures such as decommissioning oil-fired boilers or installing heat pumps. Subsidies provide an incentive to implement the measures in question, but such incentives do not necessarily correspond to the greenhouse gas reduction that the measure leads to. The determination of subsidy rates presupposes knowledge of the costs and effects of the various measures, but, in practice, this knowledge is imperfect at best. Limited knowledge and uncertainty mean that it is difficult to set subsidy rates that provide the right incentives. Thus, subsidies are not likely to provide incentives for cost-effective reductions in the individual household or firm or for a cost-effective distribution of effort among businesses. Furthermore, subsidies do not impose a cost burden on the remaining greenhouse gas emissions of businesses; thereby, the reallocation towards a lower greenhouse gas-intensive-consumption composition and business structure is weakened. Finally, government funding will be needed to finance a subsidy strategy.

**... and should therefore be avoided**

The modelling confirms that the subsidy strategy provides significant additional costs and a significant need for government funding. The size of the additional cost to society depends on the structure of the various subsidies. In the model calculations, the subsidies are set such that the costs are minimised. Furthermore, the model does not include a number of significant additional costs arising, for example, from production conditions varying between firms within the same industry. The modelling shows an annual additional cost of around DKK 14 billion compared with a uniform greenhouse gas tax. In practice, the additional costs would most likely be greater. Therefore, it is the Chairmanship's strong recommendation that the subsidy strategy not be used to achieve the objectives of the Climate Act. Subsidies should only be considered when they can be justified by specific market failures other than those remedied by greenhouse gas taxation. Examples of this could be grants for research with a high impact potential and for charging stations for electric cars due to network effects.

**The EU should not impose cost-increasing energy saving targets**

There is a risk that the EU could, for example, set energy saving targets that would not be met by Denmark's own climate goals, and that such obligations would, therefore, require supplementary regulations. Supplementary targets for energy savings are not well-founded when targeted regulation of greenhouse gas emissions is carried out, and they would, therefore, add additional costs to the climate efforts. Denmark



should work to ensure that the EU does not impose additional expenses associated with supplementary targets on the member states, which are not directly justified by specific market failures.

