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The Danish Climate Policy Plan

Towards a low carbon society

August 2013

The Danish Government

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Towards a low carbon society

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Foreword

Anthropogenic climate change is real, it is happening and must be taken seriously. The political rhetoric has to be followed up by real action if we are to reverse the current trend of increasing global greenhouse gas emissions. The Danish government wants Denmark to contribute actively to meeting the calls from scientists that significant reductions in greenhouse gas emissions are necessary. We also want Denmark to be the showcase to the rest of the world that the green transition can be reconciled with economic growth.

Science recommends that developed countries reduce their total greenhouse gas emissions by 80%-95% by 2050 compared with 1990, as part of an overall 50% reduction in global greenhouse gas emissions. The EU has adopted this target. And Denmark must make its contribution to reach this target. This means that we will have to significantly reorganise our economy.

Progress in global efforts to combat climate change has so far been far too modest. Setting a good example shall be Denmark´s way to encourage the rest of the world to join global efforts to combat climate change. Denmark is a wealthy country and therefore can afford to take the lead. The effort needed is ambitious. Hence, it has to be carried out in a way that it does not pose unreasonable burdens on Danish citizens and businesses in case international efforts remain timid. Furthermore, the rate of transition must be tailored so that it does not become too costly.

The Danish government's strategy to put Denmark on track for the 2050 target includes an interim target of a 40% reduction by 2020 in all Danish greenhouse gas emissions. Opting for this target means that Denmark will live up to the scientist recommendations for wealthy countries with high emissions of greenhouse gases and that the transition necessary will be initiated in all relevant sectors. The Climate Policy Plan calls for a broad dialogue with all relevant players on future action. In addition to starting this dialogue, the Danish government will present a Climate Change Act in the forthcoming parliamentary year. This Climate Change Act will establish a framework for the work on the green transition and it will secure progress in reduction efforts so that Denmark can meet the emission reduction targets.

There are two basic elements to the Danish government's strategy: national efforts and European efforts. An ambitious Danish climate policy is highly dependent on developments in the EU, and therefore the Danish government will work actively for more ambitious climate policies at European level. It is crucial that the EU takes the lead in international climate negotiations and thereby puts pressure on other countries to set ambitious emission reduction targets. At the same time almost half of Danish emissions are covered by the EU's common emissions trading system. In this context the price of allowances is a vital incentive for reduction initiatives in the enterprises affected. Common EU policies could also make important contributions to reducing emissions from cars, industrial gases and agriculture. In addition, more intense climate efforts in the other EU countries could entail more uniform conditions for Danish and other European businesses.

The energy sector is crucial to realising climate targets. The Danish government's ambitious energy policy is a good foundation for climate policy. The broad energy agreement in spring 2012 is a significant step forward to meeting both the energy policy goals and the target to reduce greenhouse gas emissions by 40% by 2020. In the future too, energy policy will provide a vital contribution to climate policy. The Danish government's goal is that already by 2035 Danish electricity and heating supply will be completely based on renewable energy. The goal for 2050 is that all energy consumption, including the transport sector, will be based on renewables.

However, an ambitious energy policy cannot stand on its own. There is a need for an active climate policy that secures greenhouse gas emission reductions in all relevant areas. In addition to the energy sector, this is primarily within the transport, agriculture, waste and environment sectors. There are reduction potentials in all of these sectors

to reduce greenhouse gas emissions considerably. In a number of areas there can be socio-economic benefits in reducing emissions, as other positive environmental side-effects will often come into play.

The Danish government will be following a sensible, pragmatic climate policy. This means that climate change issues will be integrated into other sector policies. In so doing, climate change will be a natural part of transport policy, agricultural policy etc. Policy integration and synergy effects will be crucial to meet both the 2020 target, and the long-term green and structural transition towards 2050.

Climate mitigation efforts must be designed cost efficiently so that they do not entail unnecessary costs for society. However, when choosing between different reduction options other factors must be taken into account: The distribution of the burden between sectors of society, the need for economic growth, competitiveness, employment and environmental side-effects. Furthermore, it is also important that the initiatives launched before 2020 support the long-term transition. Another vital factor is to draw up specific proposals for financing the initiatives to realise the target of a 40% greenhouse gas reduction. In this context, there must be room for prudent changes to the tax system. Still, the Danish government will not impose new general tax increases on the business community.

The Danish government intends to demonstrate that an ambitious climate policy can be reconciled with economic growth and good framework conditions for the business community. This is the only way that our ambitious reduction commitment will inspire others. It is also the reason that the Danish government will not impose new general tax increases on the business community.

The Climate Policy Plan is not a cure-all-now solution for how reduction efforts are to be organised or what specific measures are to be initiated and when. There is considerable uncertainty regarding the size of the shortfall to the 40% target, including the extent to which common EU measures will contribute. Thus the scope of the additional national efforts needed is so far unknown, and specific measures are best decided for in on-going dialogue with both the business community and players in civil society. The Climate Policy Plan can inform and inspire this dialogue.

In publishing this Climate Policy Plan, the Danish government engages in a dialogue with the business community and the civil society on climate mitigation efforts. This dialogue also builds on a large number of useful contributions already made by the business community and the civil society during the preparation of the Climate Policy Plan. With this plan the Danish government intends to continue the existing successful and broad collaboration on Danish climate policy.

Danish government, August 2013

The Danish government's Climate Policy Plan in brief

What is the target?

- The Danish government's target is to reduce total Danish greenhouse gas emissions by 40% by 2020 compared with the 1990 level.
- This is ambitious, but necessary in order to put developments on track towards the long-term EU target of a 80%-95% reduction by 2050 in line with recommendations from climate scientists.

How useful is this target, given that there is no international agreement on global reduction efforts?

- The ambitious Danish efforts will demonstrate to other countries that it is possible to reduce emissions significantly.
- Furthermore Denmark will show that this can be reconciled with continued growth and welfare.

Can Denmark achieve this target?

- Projections indicate that without new initiatives Denmark will emit about 4 mill tonnes more than the 40% reduction target in 2020. This is a lot, but it is not insurmountable.
- Calculations also show that developments in prices in the European emission trading system, as well as economic growth, are decisive for Danish emissions. All else being equal, a higher allowance price could significantly reduce the shortfall.
- There are reduction potentials in all sectors, but current estimates indicate that realising the 40% target in 2020 will not be without cost.

How can we achieve the reduction target most efficiently?

- Some mitigation initiatives can be implemented with subsequent economic benefits, while others can only be implemented at considerable socio-economic costs.
- Generally, the most socio-economically beneficial reductions can be achieved with mitigation measures that have synergy effects with other policy goals and priorities. Therefore, it is generally most cost effective to integrate climate change mitigation across other policy areas.
- The world is not static. Technologies, the economic framework, and knowledge about mitigation opportunities are developing all the time. Consequently, constant follow-up on efforts to reduce emissions and assessment of the specific measures are crucial in reaching the 40% target.
- A well-functioning European emission trading system, and consequential higher allowances prices, could contribute considerably to meeting the national target. And, just as importantly, it could ensure reduces emissions in the rest of Europe. Tightening the EU CO2 requirements for cars and the reform of the EU Common Agricultural Policy could also entail important reductions.
- The Danish government's climate policy therefore has two strings; national and international.

What is the next step?

- The Danish government will ensure that the necessary initiatives are taken in the future by integrating climate change mitigation measures into different sector policies.
- For example, there will be follow up in agriculture, amongst other things on the basis of recommendations from the Nature and Agriculture Commission, which has carried out an extensive review of the agricultural sector and proposed recommendations on nature, environment and climate related policies in the agricultural sector.
- The Danish government will also present a Climate Change Act at the next session of the Danish Parliament (the Folketing). The Act will form the framework for the future climate policy.
- In the EU the Danish government will strive for agreement on initiatives for structural improvements of the European emission trading system and thus a better and more effective climate policy at EU level. Similarly, the Danish government will work for tighter EU CO_2 requirements for cars and vans and for a greening of the EU Common Agricultural Policy.

1
Denmark's long-term climate challenge

Climate change is a global challenge to be taken seriously. Science has said that global emissions of greenhouse gases must peak as soon as possible, and by no later than 2020, if temperatures are not to rise by more than two degrees compared with pre-industrial levels. By 2050, emissions from the developed countries must be reduced by 80%-95% compared with 1990: a target the EU has adopted as part of a joint global climate change mitigation efforts.

The 2050 target is ambitious and realising it will also demand considerable efforts in Denmark. With its ambitious energy policy, Denmark has laid an important stepping stone to securing this transition. With the highest greenhouse gas emissions of all sectors, the energy sector is pivotal for climate policy in both the short and long term. The broad energy policy agreement in 2012 gave real impetus to the transition towards a long-term sustainable and low carbon energy sector. However, despite significant results and goals for energy, there is a need for additional mitigation efforts in all sectors.

The Danish government's climate and energy policy goals

- The overall climate target set in the Danish government platform is a total reduction in Danish greenhouse gas emissions of 40% by 2020, compared to the 1990 level.
- The Danish government wants all sectors, including non-ETS sectors, to contribute with concrete and documented reductions up to 2020 and beyond.
- The long-term benchmark is that Denmark is to contribute to the EU target to reduce greenhouse gas emissions by 80%-95% up to 2050, compared with 1990, as part of joint global mitigation efforts.
- Within the EU, Denmark has an obligation to reduce non-ETS emissions in the period 2013-2020, increasing to a total reduction of 20% in 2020 compared with 2005.
- All of Denmark's energy supply, including transport energy consumption, shall be based on renewable energy by 2050.
- As part of this, oil for heating purposes and coal are to be phased out by 2030, and electricity and heating supply is to be 100% covered by renewable energy by 2035.

Having all of Denmark's energy supply from renewables by 2050 will result in fossil fuels being phased out. This also implies that energy consumption by the entire transport sector will be covered by renewable energy by 2050. Emissions from agriculture and other sectors must be reduced gradually up to 2050, if Denmark is to be able to contribute to the EU target of an 80%-95% greenhouse gas reduction compared with 1990. If reductions are to approach the upper level of this span, i.e. 95%, significant reductions in agriculture and other sectors will be required.

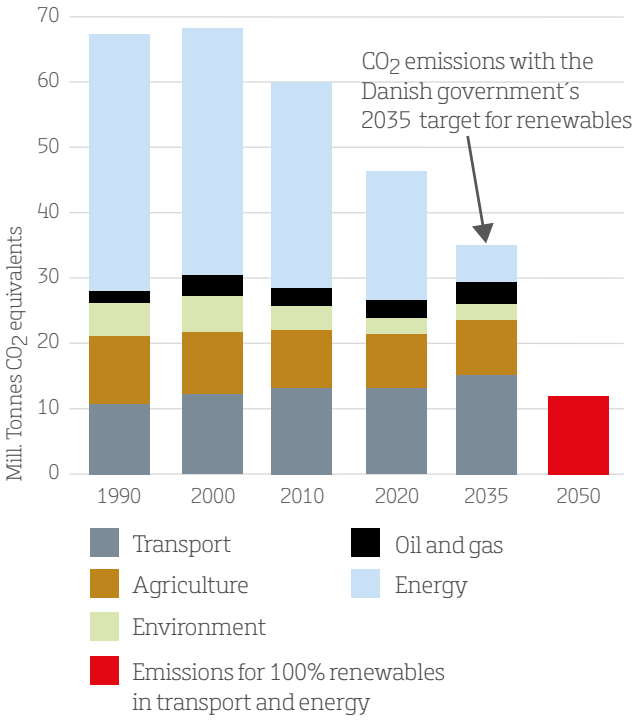

Figure 1. Historical and projected Danish greenhouse gas emissions without policy changes up to 2020 (Source: Danish Centre for Environment and Energy and the Danish Energy Agency)

Note: It is assumed that new policies will be implemented to reach the Danish government's 2035 goals for renewables.

Realising the Danish government's energy policy goal of full conversion of electricity and heating supply to renewable energy means that emissions from the energy sector will have to be further reduced up to 2035, see figure 3. This requires new initiatives for the period after 2020. If this energy policy goal is realised, total Danish greenhouse gas emissions in 2035 will have been reduced by around 50% compared with 1990. In this case transport and agriculture will account for almost 70% of the remaining emissions in 2035, unless further policies are implemented to underpin the structural reorganisation of these sectors to lower the emissions. Up to 2050, realisation of the goal of full conversion from fossil fuels to renewable energy will remove almost all emissions from transport and energy.[1] However, reducing emissions with around 80%-95%, as stated in the EU reduction target, will require further mitigation efforts, including efforts in the agricultural sector.

The Danish government's target to reduce Danish greenhouse gas emissions by 40% by 2020 compared with 1990 is ambitious, but not too ambitious.

A 40% reduction in 2020 is a natural stepping stone towards a long-term reduction in greenhouse gas emissions in accordance with the EU's 2050 target of 80%-95%, see figure 1.

1. However, there may be methane/nitrous oxide emissions from utilisation of biogas and, depending on how they are accounted for, also emissions from biofuels. So emissions from energy and transport will not entirely disappear by 2050.

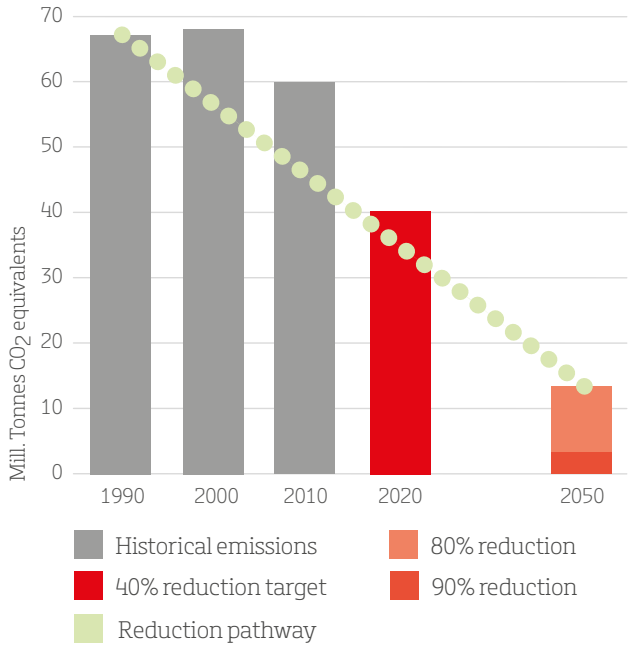

Figure 2. Historical greenhouse gas emissions as well as future targets (Source: Danish Centre for Environment and Energy and the Danish Energy Agency)

Prompt and well organised mitigation efforts could turn out to be the cheapest in the long run. A large proportion of future greenhouse gas emissions will be determined by the technologies we choose today, because many technologies often have long lifetimes. So, in order for climate policy to be cost effective climate mitigation measures should be taken into consideration, when infrastructure with a very long lifetime is to be replaced, updated or renovated. This will avoid unnecessary scrapping of capital stock. However, it should also be taken into consideration that later efforts may turn out to be cheaper, as technological developments may bring down prices in some areas.

Early efforts may promote development of new reduction technologies and make these cheaper. This may help convince people in wealthy as well as poorer countries that the climate can be saved without inhibiting economic growth. Efforts should also be balanced so that they are not unnecessarily costly for people and businesses. Popular support may wane, if it is not possible to reconcile the green transition with a healthy economy.

Finally, the Danish government's 40% target is in line with the EU ambition to take the lead in combating climate change: Together with other ambitious Member States, Denmark is showing that an ambitious target in the short term will lead towards the long-term transition up to 2050. However, as national efforts and EU efforts are inextricably entwined, the Danish government is working to stabilise the EU emission trading system in the short term and to tighten the EU's 2020 climate target. Furthermore, the Danish government considers it necessary to set subsequent and more ambitious post-2020 EU targets for energy efficiency and renewable energy. This may in part pave the way for a new international climate change agreement, and in part get the entire EU to contribute to ambitious mitigation efforts. The more ambitious EU countries, including Denmark, cannot meet the 2050 target without concerted action from the entire EU. It is a matter of fact that the rate of climate change depends on the accumulated concentration of greenhouse gases in the atmosphere. Emissions accumulate in the atmosphere year after year. Consequently, early and permanent international mitigation efforts will have a greater effect than later efforts.

A world-class target

The Danish greenhouse gas reduction target for 2020 is one of the most ambitious in the world. However, this does not mean that Denmark stands alone. Other progressive countries are moving in the same direction and have taken on national greenhouse gas reduction targets that go beyond their international obligations.

Examples include:

- Germany is aiming to reduce greenhouse gas emissions by 40% by 2020 compared with 1990 and at the same time Germany is starting to phase out nuclear power.
- Norway is aiming to become greenhouse gas neutral by 2050 (partly by buying climate credits from abroad). This target will be brought forward to 2030, if there is an international agreement.
- Sweden is aiming to reduce greenhouse gas emissions in the non-ETS sector by 40% by 2020 compared with 1990.
- The UK is aiming to reduce greenhouse gas emissions by 34% by 2020 nationally, without buying climate credits from abroad. In 2008 the UK adopted a Climate Change Act under which national reduction targets in terms of carbon budgets are adopted. Under the Climate Change Act the UK has adopted a conditional target to reduce emissions by around 50% by 2027 on the condition that the EU adopts common reduction targets post 2020.

However, the countries all have different points of departure, requirements and strongholds, and they have chosen different strategies to achieve their national climate and energy targets, making it difficult to directly compare the targets. For example, Norway and Sweden already have a high share of renewable energy and for Sweden also nuclear power. Both countries are also focusing on climate projects in developing countries and use of climate credits from high carbon uptake in soil and forests. The UK and Germany are focusing on converting their energy systems and on reducing national emissions. Finally, there are differences in the scale of reductions countries have already achieved from 1990 onwards, as the countries had different reduction targets under the Kyoto Protocol.

2. Trends in Danish emissions – an overview

Danish emissions arise from use of fossil fuels by the energy sector and the transport sector, emissions from agriculture, as well as the environment. The latter category in this context includes emissions from industrial processes, industrial gases, wastewater and waste. Figure 3 illustrates how these sectors are expected to contribute to emissions in 2020, including only agreed initiatives from the energy agreement. The energy agreement will lead to a significant fall in emissions in the energy sector and thus a fall in total Danish emissions. In 2020 the energy sector is expected to account for more than 40% of total emissions, while transport will account for almost 30% and agriculture almost 20% (see projections from the Danish Centre for Environment and Energy and the Danish Energy Agency). However, with regard to both transport and agriculture, only moderate reductions are likely up to 2020, unless new policies are implemented.

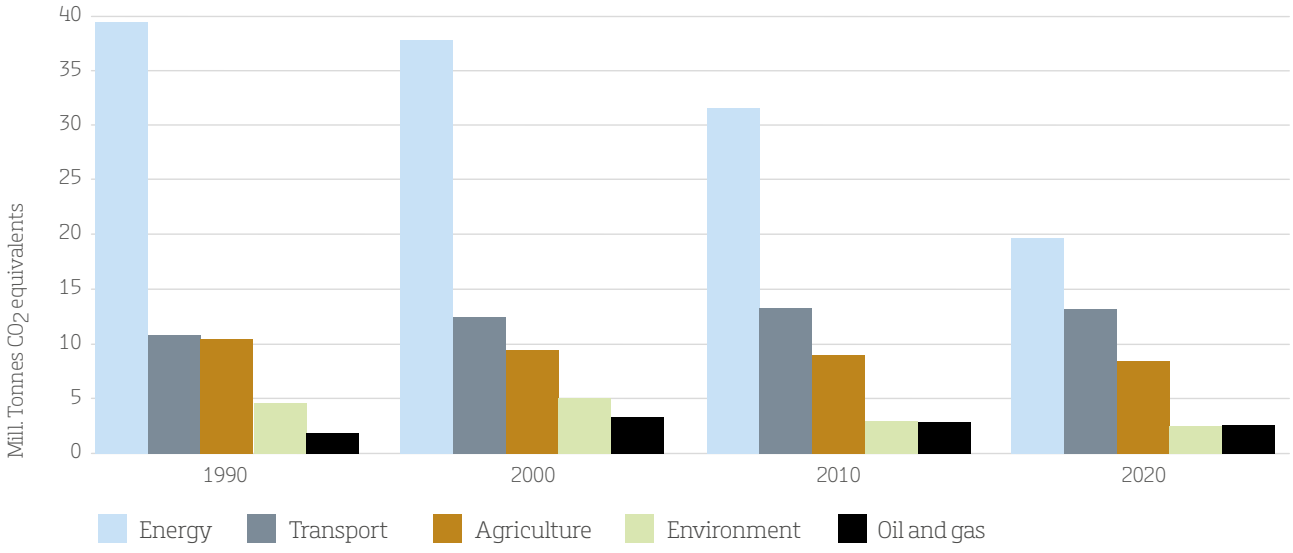

Figure 3. Historical and projected Danish greenhouse gas emissions for 1990 to 2020 (Source: Danish Centre for Environment and Energy and the Danish Energy Agency)

Note: In addition to emissions from the five sectors, there are about 0.5 mill. tonnes CO_2 equivalents in 1990, falling to 0.3 mill. tonnes CO_2 equivalents in 2020 arising from other sources than transport, agriculture, the environment and energy. This is not included in this figure, but is included in the total emissions.

Update of greenhouse-gas projections from the Danish Energy Agency

The projection of future greenhouse gas emissions was updated in connection with this Climate Policy Plan taking into consideration a number of developments that have taken place since the last baseline projection in September 2012. These developments include the change in the electric heating tariff in the 2013 Finance Act, the solar panel agreement in autumn 2012, as well as the effects of the Growth Plan DK. The projection has also been adjusted for a significant drop in the price of CO_2 allowances on the European emission trading market. The significant drop in the price of allowances has led to adjustment of the allowance price estimate from EUR 22/allowance , as assumed in the baseline projection, down to EUR 9.6 in 2020.[2,3] All else being equal, this will increase emissions from Danish electricity production. The basis for projections of greenhouse gas emissions are existing regulations and policies already adopted. It has also been assumed that there will be no changes in behaviour. These elements are collectively called "business-as-usual".

The projection includes the effect of agreed political initiatives such as agreements on new offshore wind farms. On the other hand, political agreements and initiatives where the implementing instruments have not been decided on are not included.

The projection is based on a number of overall economic assumptions about economic growth, private consumption, business production, fuel prices, emissions prices, tax rates, subsidies etc. and a number of technology-specific assumptions regarding the price of different types of installation, their efficiency etc. Finally, there are assumptions regarding energy-market player behaviour under pure market conditions.

The results of the projections are very dependent on these assumptions. The assessment of the effect of specific political initiatives also influences the result. For example: Planning aspects regarding expansion of wind power or biogas or assessments of the impact of energy savings initiatives.

The projection goes up to 2035, and its findings are obviously very uncertain.

New emission factors from the UN Inter governmental Panel on Climate Change (IPCC)

In preparation of this Climate Policy Plan, historical and future emissions have been recalculated in accordance with the new IPCC guidelines for calculating greenhouse gas emissions. The new guidelines mean that methane and nitrous oxide emissions from agriculture in 2010 are calculated to be lower compared to calculations with old guidelines; 8.9 mill. tonnes CO_2 equivalents compared with the previous 9.5 mill. tonnes CO_2 equivalents. In accordance with normal practice under the Climate Convention, the historical emissions have been recalculated using the new guidelines. Total emissions of methane and nitrous oxide in the 1990 baseline year have been calculated using the new guidelines at about 10.4 mill. tonnes CO_2 equivalents, against the previous 12.5 mill. tonnes CO_2 equivalents. With regard to total Danish emissions, the new IPCC guidelines mean that total emissions in the 1990/95 baseline year are now estimated at 67.2 mill. tonnes CO_2 equivalents against the 69.3 mill. tonnes CO_2 equivalents previously recognised as Denmark's baseline-year emissions.

2. The prices have been converted from DKK. The exchange rate used is EUR 1 = DKK 7.5.
3. The market price for allowances is currently even less than the 2020 estimate.

The following gives a brief overview by sector of how emissions have developed historically, and how they are expected to develop in the future on the basis of already agreed policies.

Energy sector emissions

Historically, traditional energy consumption (households, businesses as well as electricity and heat production) has accounted for most of the Danish greenhouse gas emissions. In 1990, emissions from these sources totalled more than half of all Danish emissions, and this has basically continued ever since. The supply sector, i.e. electricity and district heating production, accounts for most of the emissions, followed by individual use of fossil fuels for industrial processing and heating buildings.

Around 70% of emissions from the energy sector (excl. transport) are subject to the EU emission trading scheme (ETS), while about 30% are not subject to the scheme (non-ETS). Non-ETS emissions from the energy sector arise primarily from individual use of gas and oil in businesses and households as well as small district heating plants.

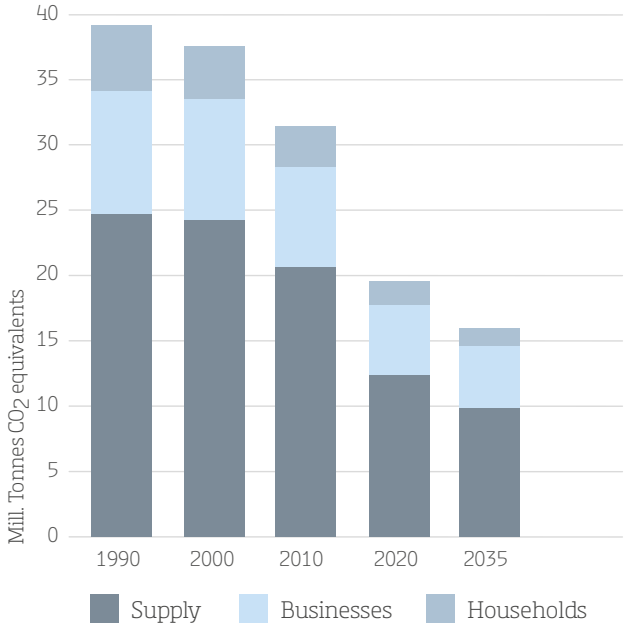

Figure 4. Energy sector emissions

Transport sector emissions

Carbon emissions from the transport sector rose up to 2007, after which they fell until 2010. So far, developments after 2010 look more or less stable. The drop was due to many factors, for example the economic crisis which has depressed growth in transportation, as well as a number of initiatives to reduce CO_2 emissions per km. driven. These initiatives include i.a. reform of car taxation to favour more environmentally friendly and energy-efficient cars, minimum requirements for biofuels, and the technological development of cars to comply with stricter CO_2-EU regulations.

Today, energy consumption by the transport sector accounts for 1/3 of the final energy consumption, and it is based almost exclusively on fossil fuels. This is directly reflected in the CO_2 emissions from the transport sector. Road transport is responsible for by far the largest component of transport energy consumption. Passenger cars today account for about 57% of CO_2 emissions from road transport, while vans and lorries account for around 37% and buses and motorcycles the final 6% (see fig. 5).

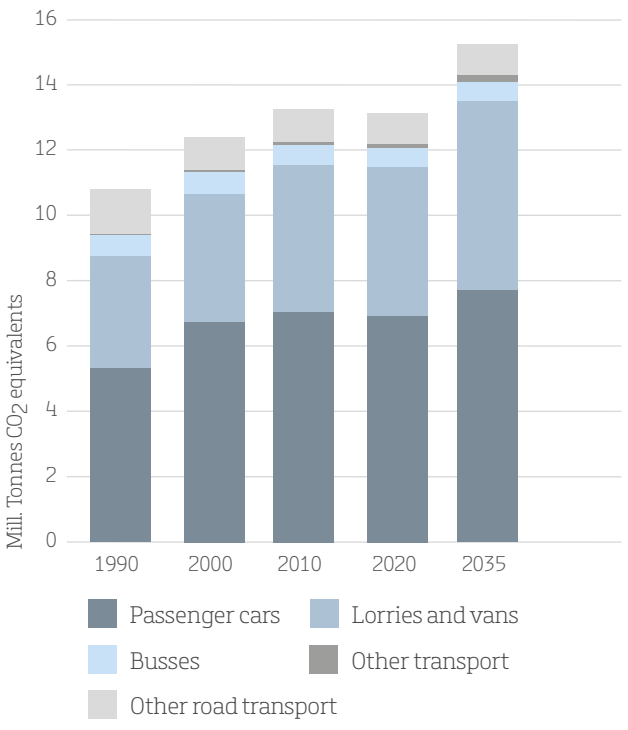

Figure 5. Transport sector emissions
Note: "Other transport emissions" include railways, and domestic shipping and aviation.

In 2010 the transport sector emitted about 13.2 mill. tonnes CO_2 equivalents, which are included in Denmark's carbon inventory. Of this figure, road transport was responsible for about 12.2 mill. tonnes CO_2 equivalents, while railways, domestic shipping and domestic aviation accounted for the rest.

From 2012 energy consumption for transport is expected to increase, despite ongoing energy-efficiency improvements in vehicles. This is primarily attributable to an increasing transport activity on the roads. Similarly, increasing air traffic will contribute to higher transport energy consumption.

The increases in energy consumption will not be fully reflected in carbon emissions. In the 2012 energy agreement it was agreed to mandate 10% biofuels in 2020 in order to meet the EU renewable energy target for transport. This means that transport sector emissions in 2020 are expected to be around 13 mill. tonnes CO_2 equivalents, corresponding to an increase of about 20% compared with the 1990 baseline year.

A projection of emissions from the transport sector towards 2020 and 2035 shows an increase in the sector's relative share of total Danish emissions. This is due to growth in transport activity[4] and mitigation policies adopted in other sectors.

Agricultural sector emissions

Methane and nitrous oxide emissions from agriculture are about 9 mill. tonnes CO_2 equivalents per year, or about 15% of total Danish emissions. In addition more than 3 mill. tonnes CO_2 equivalents are emitted from soil and pastures. According to the Kyoto Protocol rules the latter emissions are included in a separate inventory covering the carbon balance in soils and forestry. Consequently, the 3 mill. tonnes are not included in figure 6. For more details on inventory rules: See the box page 29: "Carbon storage and emissions from soils and forestry – LULUCF".

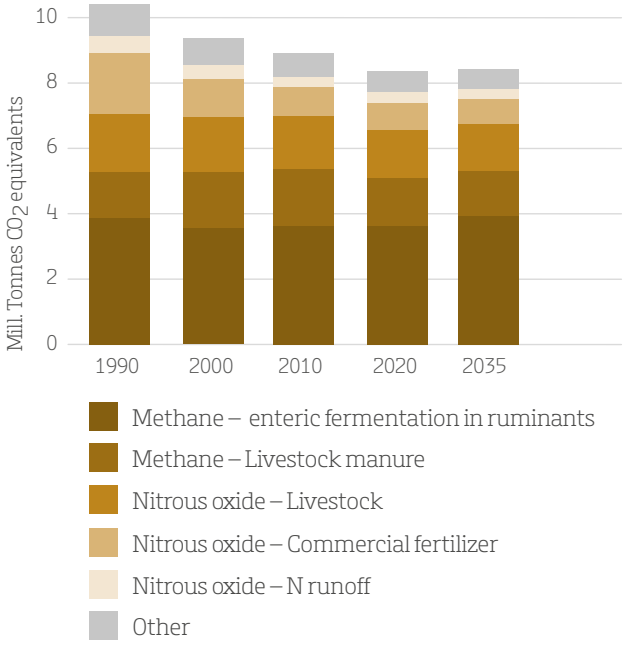

Figure 6. Non-energy-related emissions of methane and nitrous oxide from agriculture

Note: Calculated with new global warming potential (GWP), see the Catalogue of Climate Change Mitigation Measures.

Emissions from agriculture account for a relatively large proportion of total emissions in Denmark compared with other EU countries. This is primarily due to the large and intensive farming sector in Denmark.

On the basis of the current mitigation efforts within agriculture, the projection indicates only a modest decrease in emissions up to 2035. As total Danish emissions will be reduced in the same period in line with reductions in the energy sector, for example, emissions from agriculture will account for an increasing percentage of emissions of greenhouse gases – unless new initiatives are implemented.

Methane emissions arise in particular from enteric fermentation in ruminant livestock and, accounting for 3.6 mill. tonnes CO_2 equivalents, this is the largest single source of methane emissions in Denmark. Another important source of methane is livestock manure. Since 1990, methane emissions have been almost static.

4. In this context, transport activity is measured in person-km for passenger transport and tonne-km for freight transport, but it does not necessarily imply a growth in transportation measured in terms of number of km covered by vehicles, if the number of people in vehicles is increased.

Nitrous oxide (N20) mostly arises from the use of commercial fertilizers and livestock manure. In the period 1990 -2010 the Danish government have implemented three action plans for the aquatic environment that have resulted in reducing the amount of nitrogen used in agriculture with 40%-50%, thus contributing to reducing emissions of nitrous oxide from fields by 30% in the same period. This has so far been the largest contribution from agriculture in reducing emissions of greenhouse gases.

Carbon emissions from soil arise from the conversion of organic substances in agricultural soil, especially in connection with intensive cultivation of organogenic soils. Net carbon emissions fluctuate from year to year, depending on temperature, precipitation, size of harvest etc. There has been a drop in emissions from 1990 onwards because of a number of concrete initiatives, including a ban on straw burning, catch-crop requirements, abandonment of low-lying farmland, legislation on cultivation-free buffer zones, EU requirements for areas with permanent pasture etc.

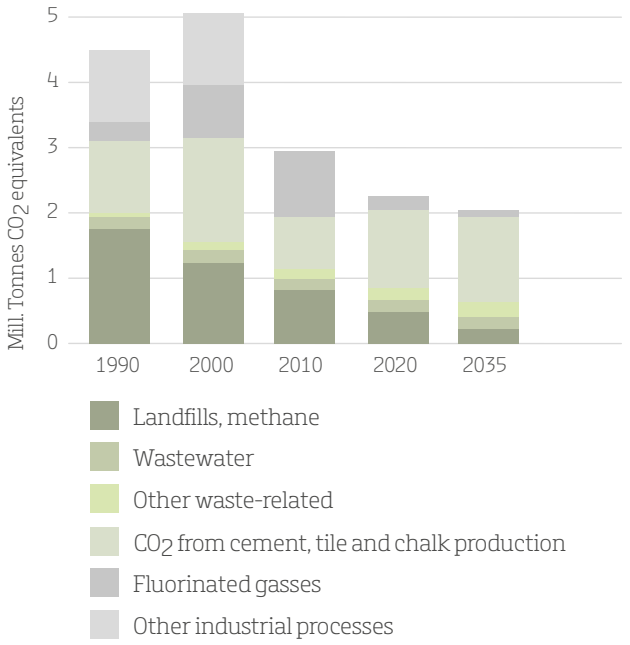

Figure 7. Emissions from waste, F gases, cement etc. and other industrial processes

Note: Emissions from the "other industrial processes" category arose from one particular chemicals production plant that was closed down between 2000 and 2010.

Emissions from industrial processes and waste

In addition to emissions from large sectors such as energy, transport and agriculture, there are a number of minor sources; all with relatively small contributions to the total emissions of greenhouse gases. These include landfills, wastewater, industrial processes and F gases (fluorinated greenhouse gases).

Emissions from landfills are primarily methane arising from fermentation of organic material at old waste sites.

Wastewater emits methane from fermentation of organic material, while the nitrogen, which is also found in wastewater, is converted to nitrous oxide.

In addition to carbon emissions from energy consumption, manufacture of cement, tiles and chalk burning also causes greenhouse gas emissions. When heating chalk in raw materials it releases CO_2.

Fluorinated gases have previously been used for many purposes, but they are now mostly used in cooling plants and appliances, as well as in electrical connection installations. Use of fluorinated gases increased significantly after 1990 because they were utilised to replace CFC gases. The CFC gases were phased out under the Montreal Protocol because they were depleting the ozone layer. Fluorinated gases are all relatively powerful greenhouse gases, although there are large differences between them.

In 1990 there were considerable emissions of nitrous oxide, corresponding to almost 1 mill. tonnes CO_2 equivalents, from production of chemical fertilisers, but this production has now ceased in Denmark.

3. Status in relation to the 40% target for 2020

The Energy Agreement has brought Denmark a long way towards realising the target of a 40% reduction by 2020 compared with 1990. This is illustrated in figure 8. However, significant additional efforts will be needed to reach the target. Furthermore the target should preferably contribute towards structural changes in 2035 and 2050.

The projection of total greenhouse gas emissions shows that, without further climate mitigation measures, emissions in 2020 are expected to be around 46.4 mill. tonnes CO_2 equivalents. Based on the central estimate for emissions in 2020, a reduction in the region of 4 mill. tonnes CO_2 equivalents annually will remain in 2020. However, the projection is sensitive to a number of parameters.

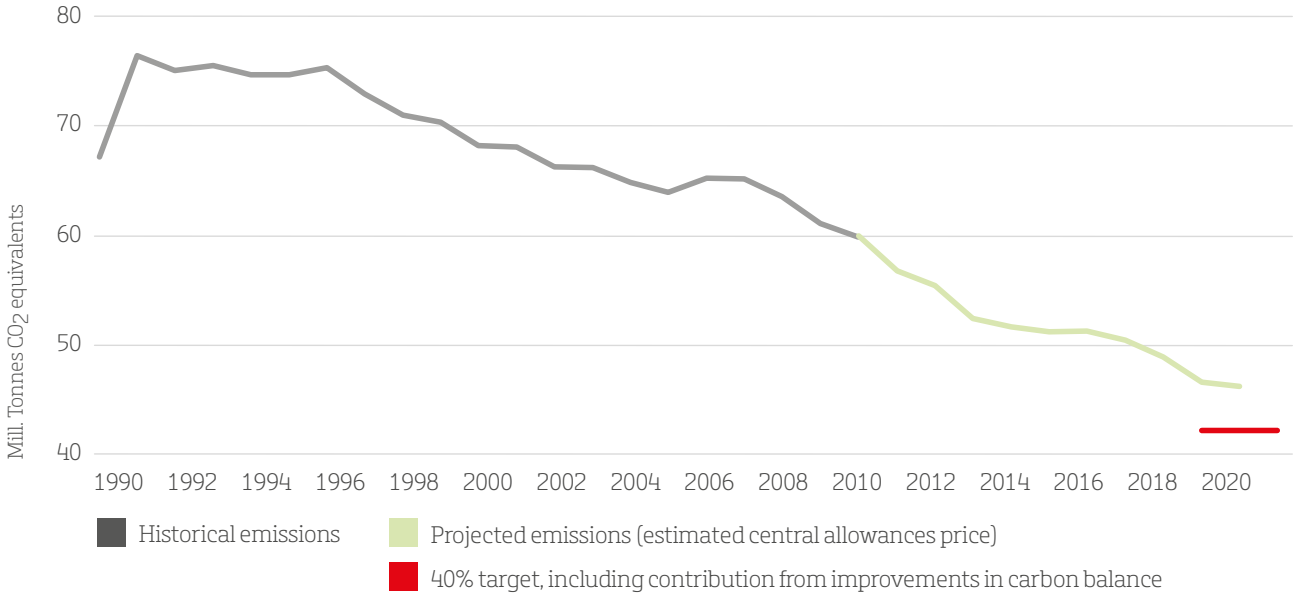

Figure 8. developments in emissions, 1990-2020 in relation to the 40% reduction target

The EU emission trading system

The EU Emission Trading System (ETS) commenced in 2005 and includes all large CO_2 emitters in the EU such as power plants, large industrial installations and platforms for oil and gas production. This means that almost one half of the total EU greenhouse gas emissions are covered by the system. The main principle in the system is that enterprises are to deliver allowances for every tonne of CO_2 they emit. These allowances have been allocated or can be purchased within an overall allowances cap. The allowances can be traded on a free market.

The overall allowances cap for the first two trading periods 2005-07 and 2008-12 was determined by each Member State preparing an allocation plan with proposals for a total number of allowances for the country's enterprises. The European Commission had to approve these plans and the sum of the allowances in the approved plans then made up the total emissions allowed. The idea has been to reduce emissions by setting a total number of allowances corresponding to the EU's climate targets, i.e. lower than the previous and expected emissions. If there is a shortage of allowances, there will be a price on them.

From the very start, the emission trading system has seen significant price fluctuations, see the graph below. This is because, on several occasions, emissions from ETS companies have been below the emissions caps. If there is no shortage of allowances, the price will fall. For the 2005-07 period, the allowances cap was significantly above the actual emissions, partly because of a lack of knowledge about the actual emissions in the ETS sector when the first national allocation plans were drawn up. When this surplus became clear, the price of allowances fell to almost zero. For the period 2008-2012, the allowances cap was set at slightly less than the total 2005 emissions in the ETS sector, but the economic crisis since 2007 has led to a very significant drop in production by the ETS companies and therefore their carbon emissions. Amongst other things, this means that the price has fallen to less than EUR 4 per allowance. The fall in price is also because the ETS companies got access to use large amounts of cheap climate credits, subsidies for renewable energy, and energy savings have reduced carbon emissions and therefore demand for allowances.

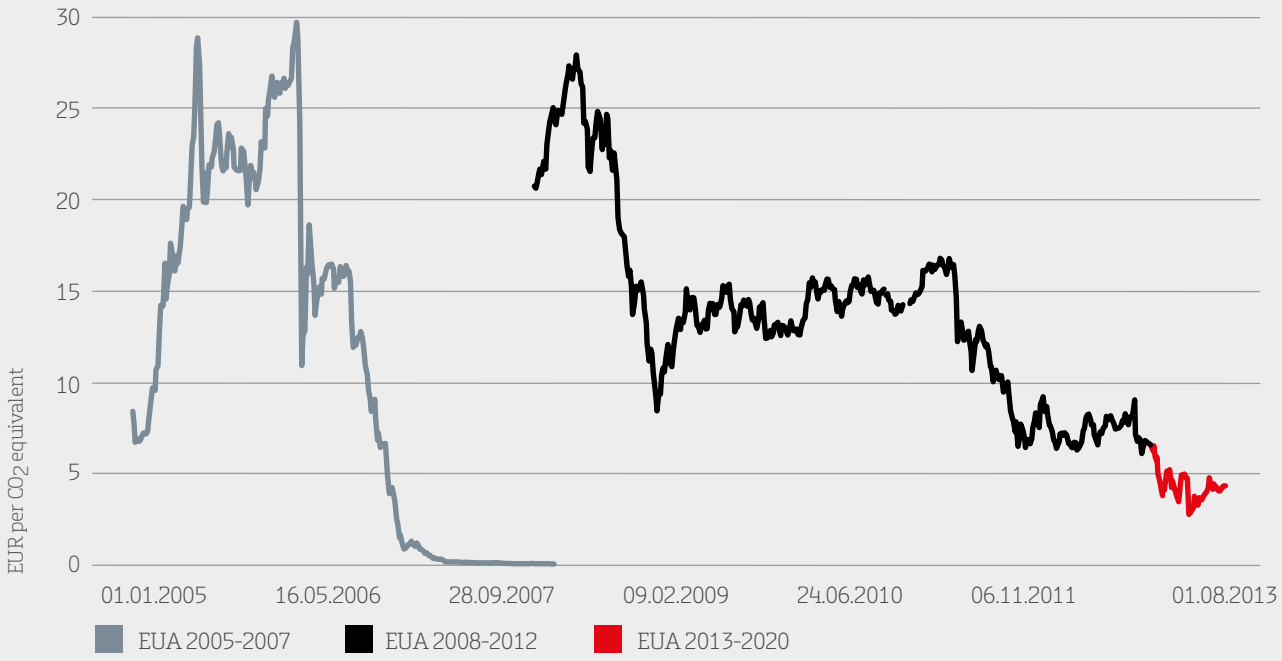

Figure 9. Developments in the price of allowances in the EU ETS

The energy area is particularly sensitive to changes in prices of allowances. The central estimate for emissions in 2020 has therefore been calculated assuming an allowances price of EUR 9.6 per tonne. Sensitivity analysis of the allowances price indicate that if the allowances price doubles in 2020 to EUR 19.2 per tonne, Danish emissions will fall about 1.2 mill. tonnes. An allowances price of EUR 19.2 per tonne or more is not unrealistic, provided it is possible to gather support for a tightening of the European emission trading system. For example, the allowances price in 2008 was EUR 30 per tonne.

On the other hand a further drop in the price cannot be ruled out, if the problems with the emission trading system are not resolved. Therefore, a sensitivity calculation with an allowances price of EUR 0 per tonne has been made. This calculation shows that emissions could increase by about 0.2 mill tonnes compared with the central estimate.[5]

The calculations show that a higher allowance price will reduce Danish emissions significantly, while a lower allowance price will only increase emissions slightly.[6] This is illustrated in figure 10 that shows the historical emissions from 1990 and expected emissions in 2020 with three different assumed allowances prices, and figure 11 that shows the shortfall to the 40% reduction target on the basis of three different assumed allowances prices.

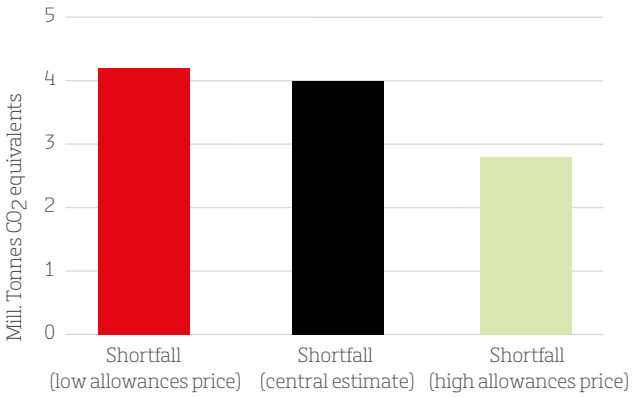

Figure 10. Shortfall to the 40% target with different assumed allowances prices

Emissions in baseline year 1990[1]	Target for emissions in 2020 with 40% reduction	Expected contribution from CO_2 uptake in soil and forests[2]	Maximum emis-sions in 2020 including expected uptake in soil and forests	Expected emissions in 2020[2] for low, middle and high allowances price[1]		Shortfall including contribution from CO_2 uptake in soil and forests for low, middle & high allowances price[3]
				Allowances price 2020	Emissions	
Mill. tonnes CO_2 equivalents	Mill. tonnes CO_2 equivalents	Mill. tonnes CO_2 equivalents	Mill. tonnes CO_2 equivalents	EUR	Mill. tonnes CO_2 equivalents	Mill. tonnes CO^2 equivalents
67.2	40.3	about 1.9	about 42.2	0	46.4	4.2
				9.6	46.2	4.0
				19.2	45.0	2.8

Table 1. Shortfall to meeting the Danish government's target of a 40% reduction by 2020 compared with 1990

Note 1: Historical and future emissions have been updated for this Climate Policy Plan, see box "Update of the greenhouse-gas projections from the Danish Energy Agency" on page 20.
Note 2: Uptake in soil and forests, assuming no new initiatives. See box on CO_2 uptake from soil and forests (LULUCF) page 29.
Note 3. When calculating whether the 40% target has been met, emissions will be adjusted for electricity trading.

5. This asymmetric effect of changes in allowances prices is because the assumed price of EUR 9.6 per tonne in 2020 is so low that use of biomass in electricity and district heating production can more or less only be expected if this gives tax advantages for heating production, although there may still be some biomass use for electricity production. Note that the sensitivity assumes otherwise unchanged fuel prices and that it will be possible to observe similar effects for variations in fuel prices, especially in the relative prices between coal and biomass.
6. Within the EU ETS area, carbon emissions are determined by the total allowance allocation. A higher or lower allowance price will therefore not affect the total carbon emissions at EU level.

In addition to the great uncertainty regarding the size of the shortfall, especially in relation to the allowances price and general economic trends, there is also uncertainty regarding future energy prices, technological developments, changes in the carbon balance in the soil and forests, future consumer behaviour, the effect of initiatives or targets already decided, as well as the effect of submitted but not yet adopted proposals in the EU etc. The overall effect of these uncertainties could pull both towards and away from meeting the target. Thus it is uncertain in which direction some of the parameters will develop.

Carbon sequestration or emissions from soil and forests – LULUCF

In Denmark there is continuous sequestration and emission of greenhouse gases, including CO_2, methane and nitrous oxide, from the soil and forests. Part of the sequestration and emissions is a result of working agricultural soils. Another part is from forestry when new forests are planted and in environmentally friendly forest management.

As stated in table 1, not only emissions of greenhouse gases are important for the overall greenhouse gas inventory. Large amounts of CO_2 are stored in the soil, biomass and forests. Sequestration or emissions of CO_2 from these stores are extremely significant for global greenhouse gas emissions (described under the UNFCCC as the LULUCF sector (Land Use, Land-Use Change and Forestry). Therefore it has been decided to set off changes in the Danish carbon balance against emissions from other sectors when calculating overall fulfilment of the 2020 40% reduction target. This complies with guidelines from the UN. Set-off calculation will follow the LULUCF regulations under the Kyoto Protocol. There is especially high uncertainty regarding changes in the carbon balance (before new initiatives), which can fluctuate considerably from year to year. The expected contribution from improvements in the carbon balance (before new initiatives) is 1.9 mill. tonnes, corresponding to the average for the current projection of changes in the carbon balance for 2013-19.

The LULUCF accounting is very uncertain because of the dependence on meteorological data and a significant degree of data and methodological uncertainty. Hence there may be large fluctuations in the annual inventories – from large uptakes in a specific category in the one year to large emissions in the next. Inventories and projections of carbon sequestration and emissions from the LULUCF sector are based on models and statistical calculations. Therefore they are quality-assured by international experts, who are also responsible for final approval.

4. Strong Danish efforts for an ambitious European climate policy

Danish climate policy is based on two pillars – the European and the national. As a small country with an open economy, it is clear that the more Denmark can implement climate policy with common European solutions, the better the total effect of climate policy and the easier it will be to maintain Danish competitiveness in relation to trading partners in the EU.

The EU is also a crucial player in international climate negotiations. An ambitious international climate agreement requires an ambitious common EU approach for the period after 2020. The need for a common EU approach was highlighted by the European Council in May 2013.

The European Council has asked the European Commission to draw up specific proposals for a framework for EU climate and energy policy in 2030. In light of this, the Commission is currently considering new and more ambitious climate and energy targets for the period after 2020. This will follow up on the EU's 2008 Climate and Energy Package that established EU targets for 2020 of a 20% reduction in greenhouse gases compared with 1990, 20% renewable energy and 20% energy-efficiency improvements.

The Danish government's ambition is before 2015 to have a decision on new and more ambitious EU climate and energy targets for 2020 and beyond. The EU should move towards the target adopted by the European Council for a reduction in EU greenhouse gas emissions by 2050 of 80%-95% compared with 1990 levels. Long-term targets are particularly important for the energy sector due to its long investment horizons.

In light of this, the Danish government welcomes the indicative targets in the Commission's 2030 green paper for a reduction in the EU's internal greenhouse gas emissions of 40% by 2030 compared with 1990 as well as a target for renewable energy of 30% by 2030. Furthermore, the Danish government supports a binding energy efficiency target for 2030, the size of which is to be assessed on the basis of the evaluation of the Energy Efficiency Directive in 2014. The final Danish government position will be set once economic impact assessments for Denmark have been completed. Amongst other things, the Danish government calls for the Commission to examine the advantages and disadvantages of changing the basis of allocation and/or the architecture for EU climate regulation. This includes the possibility of transferring all the current non-ETS energy consumption (e.g. energy consumption by transport and to heat individual buildings) into the EU emission trading scheme (ETS). In a new commitment period, fair burden sharing must be ensured taking into account countries which, like Denmark, undertakes massive expansion of renewable energy.

The transition will come at a cost. More ambitious EU targets will increase costs for European citizens and companies. At the same time, higher targets will also lead to greater demand for new renewable technologies. This may in turn lead to these technologies becoming cheaper and thus make it easier to realise the Danish government's goal of a fossil-fuel-free energy supply by 2050. Tightening the EU's climate and energy policy may generally contribute to enhancing the EU's green growth potential in areas where Danish companies have strongholds, e.g. energy technology. The majority of Danish exports of climate and energy technologies go to EU countries.

The Danish government will continue actively to support and promote an ambitious green climate and energy policy in the EU as a crucial component of Danish climate policy. Not only because this will mean the EU can play a positive role at the global level, but also because the EU's climate and energy policy is vital to being able to realise domestic targets. At the same time, greater climate efforts by the other EU countries entail European and Danish enterprises being subject to uniform conditions, and this will favour growth and competition conditions for Danish enterprises.

These are some of the reasons why the Danish government has also decided to support a number of proposals from the European Commission, which can contribute to limiting Danish emissions. The Commission has presented proposals to tighten the CO_2 requirements for cars and vans, and it has been assessed that this will limit emissions from the Danish transport sector. Similarly, the Danish government has been striving to make EU agricultural policy greener, and this may lead to a small, but as yet unquantified, reduction in greenhouse gas emissions from agriculture. The Danish government is also supporting proposals to revise the Energy Tax Directive to improve cohesion between the ETS and non-ETS areas and to increase minimum tax levels. Finally, there is ongoing support for new proposed energy efficiency standards under the Eco-Design Directive.

Allowances prices are decisive in promoting climate-friendly investments in the EU, including in Denmark. Therefore, allowances prices are also linked to reaching the national 40% target by 2020. The current low allowances price makes it more difficult to initiate the necessary transition and green investments.

Developments in allowances prices have particular significance for Danish emissions and they affect the need to initiate other, new mitigation initiatives. The low allowances price makes the situation relatively more expensive for countries like Denmark, who want to take the lead. Therefore, efforts to increase the level of ambition in EU climate policy are key in the Danish government's climate change policy to achieve the national target.

Since 2010, the European Commission has published several ideas for structural changes, which could correct the emission trading system. For example a reduction in the number of allowances may push the allowances price to a level which will improve the support for investments in low-emissions technologies. Denmark supports tightening EU reduction targets in 2020 from 20% to 30% compared with 1990, with the associated considerable reduction in total emissions rights.

Most recently, the Danish government has decided to support a specific proposal from the European Commission to amend the ETS Directive by postponing auctions of allowances in order to stabilise the allowances price through temporary "back loading". The Danish support is contingent on a timetable for a structural reform of the EU ETS. In July 2013 the European Parliament voted to support the proposal, which is now to be negotiated between the Council and the European Parliament.

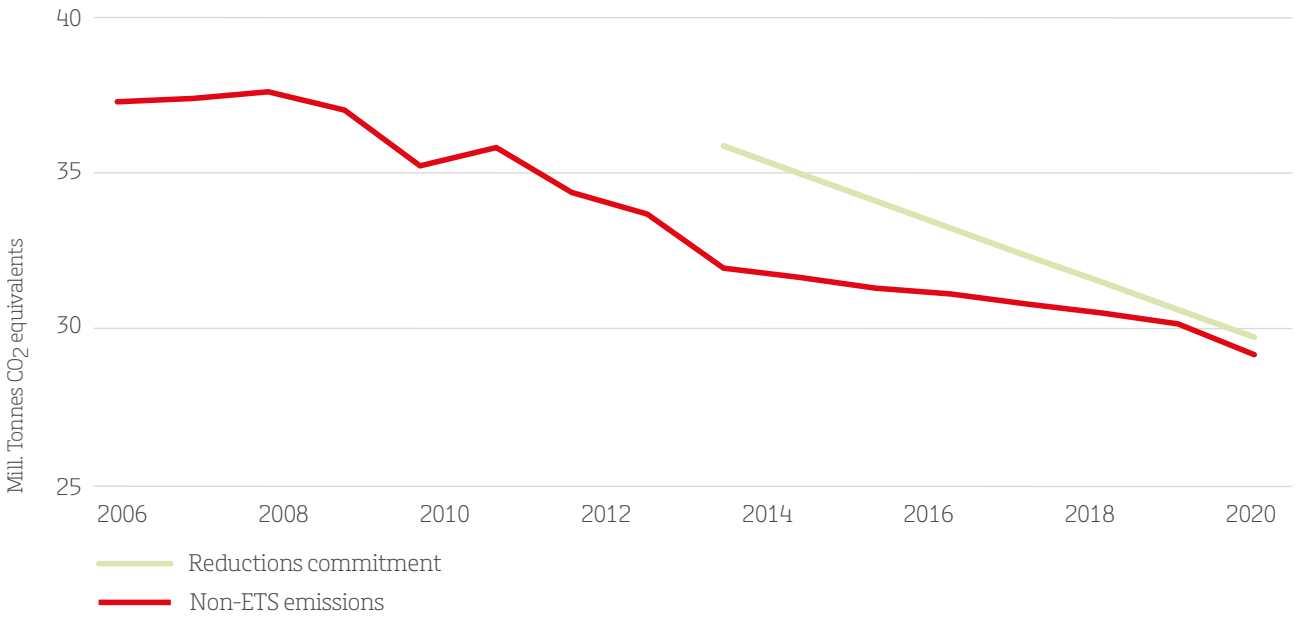

Figure 11. Non-ETS emissions and EU reduction commitment

Note: Because of limitations in the data, the figure is based on the IPCC 1996 calculation guidelines, while other figures in this Climate Policy Plan are based on the IPCC 2006 and 2007 calculation guidelines.

Meeting Danish reduction targets regarding the non-ETS sectors

According to the EU Climate and Energy Package, Denmark is obliged to reduce emissions of greenhouse gases from the non-ETS sectors by 20% in 2020 compared with the 2005 level. As an effect of the Energy Agreement Denmark expects to fulfil the EU target for 2013-2020 for non-ETS emissions, see figure 12. The EU commitment for the period 2013-2020 is annual, and surpluses/deficits can be transferred between years. The implication is that emissions in 2020 do not necessarily have to be 20% less than the 2005 level to fulfil the obligation. Overall, Denmark expects to exceed the EU commitment for the non-ETS sectors.

Setting a national target for the non-ETS sector has been considered. However, it has been deemed important that the policy decisions made for 2020 are cost-effective and pave the way to initiating reductions in all sectors. Therefore the Danish government wants all sectors to deliver reductions before 2020, even though realising the 40% target for 2020 will come at a cost. Economically sound climate mitigation efforts in the different sectors up to 2020 must underpin and contribute to the long-term structural conversion moving forward to the 2050 target.

5. Foundation for an ambitious national climate policy

Prudent climate policy is not limited to pursue an ambitious European climate policy. It also involves pursuing a national policy in which climate change concerns are integrated into the actions and initiatives implemented in all sectors emitting greenhouse gases, i.e. energy, transport, agriculture and the environment.

It is about organising climate policy so that climate change mitigation concerns are integrated in solutions to achieve other high priority goals such as growth, private job creation, resource efficiency, natural values, or security of energy supply. This entails integrating climate change mitigation measures into policies implemented for nature, agricultural revenues, mobility, etc. Fortunately there is great synergy in a large number of areas between what is required to reduce greenhouse gases and what is required to realise sector goals. For example, exploitation of biogas can reduce odour nuisances from spreading slurry on fields, reduce nitrogen loads on nature, increase the production of renewable energy, improve security of supply, and reduce greenhouse gas emissions from agriculture.

Figure 12 illustrates a number of these synergies. The following section describes in more detail the possibilities to achieve reductions and pursue synergies in the energy, transport, agriculture and environment sectors, respectively.

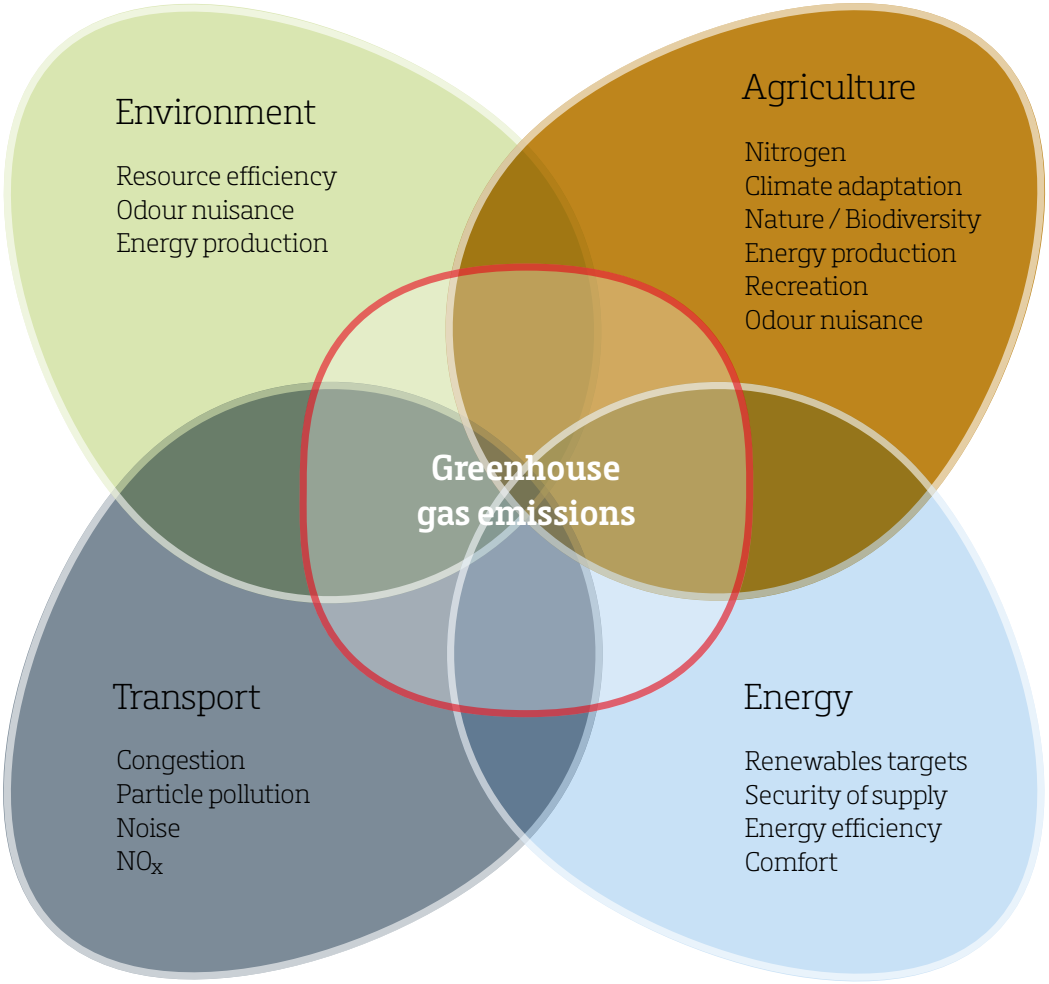

Figure 12. Synergies in climate policy

Integration of climate change mitigation in energy policies

The energy sector is subject to extensive regulation both nationally and in the EU. All Danish internal energy consumption is subject to energy and CO_2 taxes or covered by the EU ETS , which sets a price on CO_2 emissions. Significant energy and CO_2 taxes as well as the ETS have contributed to reducing energy consumption and thus reducing carbon emissions. In addition, standards have been set for maximum energy consumption in buildings and a number of appliances. In energy supply, a number of subsidy schemes to promote renewable energy and heating supply is subject to municipal heat-planning.

The 2012 energy agreement contains specific measures, which are expected to reduce emissions from the energy sector considerably up to 2020. In 2020 energy use (excl. transport) is expected to account for about 40% of total Danish emissions.

The Danish government has ambitious goals to phase out fossil fuels. In 2030 the Danish government's goal is that all use of coal will have been phased out, while electricity and heat production is to be 100% covered by renewables by 2035. Fulfilling these goals will also eliminate CO_2 emissions from this part of the energy sector.

The energy agreement contains a number of steps to stimulate the conversion to renewable energy, including massive expansion of wind power and intensified energy-efficiency improvements. The energy agreement also focus on conversion to renewables of industrial energy consumption. This is achieved through a large subsidy scheme for investments in renewable energy in industry and possibilities for support to use biogas in production processes.

Even after full phasing in of the initiatives in the energy agreement, significant challenges will remain before the long-term transformation of the energy system can be completed. Without new initiatives, in 2035 there will still be a significant consumption of fossil fuels for electricity and heat production, including individual heat production in households.

The energy agreement of 22 March 2012 in brief

The Energy Agreement secured broad political commitment to an ambitious green transition plan that focuses on energy savings throughout society, and promotion of renewable energy through more wind turbines, more biogas and more biomass. Thus the agreement is an important milestone on the road to converting Denmark's entire energy supply to renewable energy in 2050. The agreement includes a series of energy policy initiatives for the period 2012-2020, and the political parties involved will take stock of the developments regularly. Before the end of 2018, further initiatives for the period following 2020 will be discussed.

Energy efficiency improvements are crucial to increasing the share of renewable energy in total energy consumption. The agreement includes that the energy saving obligations on energy companies are to be intensified significantly, and that an overall strategy for energy renovation of Danish buildings is to be prepared. The minimum requirements for building elements in the building regulations will reflect future challenges and future energy prices.

The agreement is expected to ensure a wind-power share of around 50 % of electricity consumption by 2020. This will be secured through a significant expansion of wind power up to 2020, with plans for 1000 MW offshore wind turbines, 500 MW near-shore wind turbines and additional 500 MW net onshore wind turbines, after accounting for decommissioning old wind turbines.

The energy agreement has earmarked a total of EUR 13.3 mill. over the next four years to support development and use of new renewable energy technologies for electricity production (solar, wave etc.). EUR 3.3 mill. will be used for wave power as well as a pool of EUR 4.7 mill. to promote new renewable technologies for heating, e.g. geothermal energy and large heat pumps. In 2012-2015 a pool of EUR 5.6 mill. has been earmarked to bolster the conversion from oil- and gas-fired boilers in existing buildings to renewable energy. Businesses must also be involved in the conversion to a greener energy system. As a consequence the agreement includes subsidies to promote energy-efficient use of renewable energy in industrial production processes.

The 2013 pool of EUR 33.3 million will be increased to EUR 66.7 mill. in 2014 and continue at EUR 60 mill. per year from 2015 to 2020. Ambitious biogas expansion will also be completed. This will be through financial support – including new ways to use biogas in the natural gas grid, in industrial processes and in the transport sector.

The existing subsidies and tariffs system will be reviewed with a view to assessing the need for adjustments so that in a socio-economic context it provides appropriate incentives to convert to a green and flexible energy system.

By converting the remaining parts of the electricity and heating supply system by 2035, the remaining emissions from energy supply in 2035 (excl. transport) will be limited to emissions from fossil energy consumption by industry, corresponding to less than 10% of total Danish emissions in 2035.

Conversion of energy supply to renewables will entail costs. To a large extent the cheapest method of limiting fossil energy use is to limit the total energy service needs through efficiency improvements in all parts of the energy system. In the consumption phase, the quantities of energy required to satisfy a given energy service can be reduced through better insulated thermal envelopes in buildings or energy-efficient appliances and lighting, for example. In other cases the transfer to new technology in itself will minimise the need for primary energy.

When setting priorities for short-term efforts, it is important to note that due to long life-times much energy equipment will only be put in place or replaced once before 2050. As a general rule there will be considerable additional costs in changing technologies before they are obsolete. Hence, conversion to low emission technologies should preferably be undertaken, when there is to be investment in the energy system in any case (e.g. new electricity production technology, building renovation etc.).

Transforming the current energy system to a system without fossil fuels remains a great challenge. But the energy system is expected to undergo extensive changes at all events in the decades to come. It will be possible to convert the energy system within a time horizon of 40 years without premature scrapping of the energy system.

If the goal of electricity and heat production based on 100% renewables in 2035 is to be met without premature scrapping, no more electricity generation installations based on fossil fuels should be established in Denmark.

Another example is reducing the need for heating in buildings. Different analyses indicate that major energy retrofits are only profitable when carried out in connection with renovation projects undertaken for other reasons (e.g. replacing a roof). This means that the savings potential, which is not realised along with other renovations today, will retain high electricity or district heating consumption in 2050.

Use of fossil fuels and thereby greenhouse gas emissions can be reduced considerably through energy-efficiency improvements. However, in order to phase out fossil fuel use entirely it is necessary to replace technologies which use fossil fuels with technologies using renewable energy resources.

Conversion of the energy sector to 100% renewables through intensive energy savings and conversion to renewable sources will both contribute to climate change mitigation and improve security of energy supply.

Improvements in the energy efficiency of the existing building stock

- Major renovations of building components are usually only made at intervals of 30-40 years. As a result there is usually only one chance to make energy improvements along with renovation projects, which are to be completed in any case.
- Stand-alone energy retrofits will be expensive. If energy improvements are not made in connection with other building renovation, costs will increase significantly.
- The potential not realised today along with other renovations will lead to high electricity and dis-trict heating consumption continuing to 2035, where the goal is that both electricity and heating should be based on renewable energy. All else being equal, it seems as if this will increase the overall cost of conversion to an energy system without fossil fuels.

Integration of climate change mitigation in transport policies

The transport sector is generally characterised by significant energy taxes on fuels as well as NO_x and CO_2 taxes and car taxes. High taxes have helped stem the increase in emissions from the transport sector. Furthermore there are continuous investments in infrastructure as well as diverse demonstration and test schemes to promote new technology. These initiatives are being promoted through earlier political agreements.

In 2009 "A Green Transport Policy" agreement was put in place agreeing on a number of specific initiatives, including the "Drive Green" campaign, energy labelling of vans, certification for municipal and corporate green transport, recommendations for green procurement, green taxies, continuation of tests on module trains, trials for energy-efficient transport solutions etc. The agreement also includes significant investment in expanding the railway system. This will provide greater capacity and make public transport more attractive, along with other initiatives to enhance bus and cycle conditions. Initiatives like these generate synergies by reducing congestion and climate impacts at the same time as maintaining mobility.

Initiatives adopted for transport

The Danish government has in its government platform and subsequent political agreements made decisions that will contribute to the green transition of the transport sector up to 2020 and beyond.

Tax exemptions for electric and hydrogen cars: The Danish government has extended the tax-exemption period for electric and hydrogen cars to the end of 2015.

Promotion of cycling: An important priority for the Danish government is to promote cycling. Between 2009 and 2014, EUR 133.3 mill. has been earmarked to enhance cycling and make it a more attractive, safe and widespread mode of transport.

Transport initiatives in the energy agreement:

- Strategy for energy-efficient vehicles with a pool of EUR 9.3 mill. for infrastructure for electric, hydrogen and gas for heavy transport. The strategy has provided infrastructure funding through partnerships in which players contribute the necessary knowledge and resources.
- Electric car pilot scheme continued with EUR 2 mill. in total for 2013 to 2015. The pool is an extension of the pilot scheme in operation from 2008 to 2012, which has contributed with concrete experience with electric cars.
- The Biofuel Act is to be amended in order to secure mixes with 10% biofuels by 2020. Implementation is awaiting an analysis of alternative methods of meeting the renewable energy target for transport, see the energy agreement.
- In the period 2013 to 2015 a total of EUR 1.25 mill. has been earmarked to analyse the climate and energy aspects of using alternative fuels. This analysis will at teh same time develop the Danish Energy Agency's model for alternative fuels, which indicates future technology paths for transport.

Electrification of railways: In February 2012, the political parties behind the "A Green Transport Policy" agreement agreed on electrification of the track between Esbjerg and Lunderskov. This will make it possible to go from Copenhagen to Esbjerg by electric train in 2015. The parties behind the June 2012 "Better and Cheaper Public Transport" agreement decided on procurement of 15 new electric trains for inter-regional transport. A total of EUR 86.7 mill. was earmarked in the agreement on the 2013 budget for electrification of the track between Køge and Næstved.

Train Fund DK: The Danish government has launched a proposal, which reserves EUR 3.7 bn. from a newly established oil revenue fund for an historic improvement of the Danish railway system. Train Fund DK will be utilised to realise the "hour model" so that travelling time between Copenhagen and Odense, Odense and Aarhus as well as Aarhus and Aalborg is reduced by one hour for each stretch. It has also been proposed that all mainline routes in Denmark be electrified.

Cheaper public transport : In June 2012, the parties behind the "Better and Cheaper Public Transport" agreement established an agreement on a number of initiatives to secure better and cheaper public transport. The agreement implements annual fare reductions of DKK 662 mill. from 2013 and a total of EUR 347 mill. will be invested in better public transport.

The Danish government coalition agreement states that it is necessary to bring down pollution from the transport sector. In this context it is also important that lower carbon emissions from the sector contribute significantly to meeting climate objectives.

The Danish government's goal that all energy supply for transport is to come from renewables by 2050 means that the transport sector will have to undergo a sweeping green transition in future decades. This must be reconciled with other transport policy goals such as ensuring mobility and reducing congestion.

Conversion to renewable energy in the transport sector is a special challenge, partly because the transition in Denmark depends on international technology development. A number of energy-efficiency options, for example for conventional vehicles, will probably involve no or very slight additional costs, while other green technologies in the near future may carry significant additional costs. In this context it is vital that the rate of conversion is tempered so that it does not become too expensive.

Opportunities to reduce emissions from transport can roughly be divided into four categories:

- Efforts to reduce carbon emissions by using fuels with low carbon emissions per energy unit. E.g. electric cars, biogas or biofuels.
- Efforts which decouple growth in demand for transport from economic growth. This aspect can be influenced through taxes on buying, owning and using cars, as well as through spatial planning.
- Efforts which make transport systems more efficient so that more is transported per km covered by a vehicle. E.g. transferring passenger transport from cars to public transport or increasing the amount of goods on an individual vehicle.
- Efforts which reduce energy consumption per km covered. E.g. technology improvements or changes in behaviour.

Primarily it is important to ensure continued improvement in energy efficiency in the transport sector in a cost-effectively way. This generates fuel savings and in the long term reduces the need for renewable energy resources for the transport sector.

Improvements in the energy efficiency of cars

In addition to the initiatives already adopted and the possible new initiatives, two other initiatives will in general contribute to promoting energy efficient vehicles, with a derived climate effect.

CO_2 regulations for cars and vans

In 2009, the EU introduced performance standards for cars, such that new cars sold from 2015 may not emit more than 130 gram CO_2/km on average. There is also a goal for average CO_2 emissions from new cars to be 95 gram CO_2/km from 2020. Denmark already met the 2015 requirement in 2011.

In 2011 a corresponding regulation for vans was introduced so that on average vans may not emit more than 175 gram CO_2/km from 2017. In addition there is a preliminary objective for average CO_2 emissions from vans to be at 147 gram CO_2/km from 2020.

In June 2012 the European Commission tabled a proposal to change the two regulations. The proposed amendments establish the necessary mechanisms and initiatives to ensure an average emission ceiling of 95 gram CO_2/km for cars and 147 gram CO_2/km for vans in 2020.

Assessments show that if the proposal is implemented, it will in a Danish context provide CO_2 reductions of 210,000-350,000 tonnes in 2020. The proposals follow the normal Union legislation procedure.

Revenue-neutral reform for taxes on cars

Furthermore the Danish government will implement a revenue-neutral reform of taxes on cars which promotes environment-friendly and climate-friendly cars. This underpins the goal in this Climate Policy Plan for a more energy-efficient transport sector. The reduction potential depends on the actual reform, and the reform will also underpin the EU regulations for carbon emissions from cars and vans.

In the long-term transition, electric transport is expected to play an important role, especially for passenger transport. In the short term, biogas and biofuels may contribute to meeting the goal to increase use of renewable energy in the transport sector. Where 1st generation biofuels contribute to this, it is important to secure sustainability. In the longer term, 2nd generation biofuels based on waste and residues could play an important role, especially for heavy transport such as transport of goods and aviation, for which electric power will probably not be possible. However, this requires cheaper production of 2nd generation biofuels than at present. In order to promote sustainable 2nd generation biofuels, the Danish government is working in the EU to enhance the Commission's proposal to change the regulations for biofuels in the Fuel Quality Directive and the Renewables Directive. New regulations will help bolster the sustainability of biofuels used in the transport sector.

In order to achieve a transport sector supplied 100% from renewables, taking into account the requirement for mobility and the growing transport services needed, it will be necessary to reduce drastically energy consumption by the transport sector. This will require technological developments. There is also potential to increase the rate of capacity utilisation for freight and passenger transport and to promote more energy-efficient means of transport.

A number of initiatives have already been planned and adopted to reduce emissions from the transport sector through energy-efficiency improvements and conversion to renewable energy. In the future, decisions will be necessary on other contributions to green conversion of the transport sector. At the same time, climate change mitigation concerns must be incorporated in transport policy so that carbon emissions are reduced and mobility increased, while congestion and air pollution are kept to a minimum. It is also clear that, in addition to considering the climate issue, proposals must always be assessed in the context of the current economic situation, the need for mobility, the flexible labour market, etc.

Moreover, in recent years the Congestion Committee has presented proposals for how congestion and pollution can be reduced in the Copenhagen area.

Integration of climate change mitigation in agriculture policies

Environment, nature and climate impacts from agriculture are primarily regulated through national implementation of EU directives and through subsidy schemes as part of i.a. the European Agricultural Fund for Rural Development. The agricultural sector is not subject to the ETS or taxation based on methane and nitrous oxide emissions from agriculture. These emissions are however affected by other regulation, e.g. nitrogen standards for agriculture.

In general, experience shows that agricultural and forestry policies can simultaneously contribute to meeting nature, environment and greenhouse reduction goals. For example, afforestation contributes to greenhouse gas emissions reductions, nature creation and groundwater protection, while efforts to improve the aquatic environment and nature have led to a dramatic reduction in greenhouse gas emissions from agriculture since the 1990s. Therefore, reduction efforts in agriculture should largely be considered in the context of opportunities to meet goals for both the aquatic environment and nature. This will achieve the largest possible synergy effects, and it will provide Danish agriculture with opportunities to prosper. There is also a potential to develop new sustainable agricultural methods and technologies that reduce environmental and climate impacts while also improving productivity and competitiveness and opening for new export opportunities.

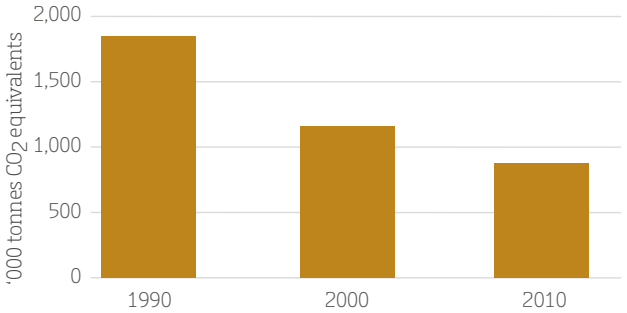

Figure 13. Agricultural emissions of greenhouse gases from mineral fertiliser

Regulations on the aquatic environment in particular have had positive effects on greenhouse gas emissions from agriculture. From 1990 to 2010 the consumption of commercial fertilisers has been reduced by around 50%, and this has resulted in a corresponding reduction in emissions of nitrous oxide from commercial fertiliser, which is no longer applied to fields. Therefore there is a synergy here between reducing impacts on the aquatic environment, nature and the climate.

Emissions of methane were relatively constant from 1990 to 2010. However there has been a shift in the sources of emissions, for example the stock of milking cows fell over the period. At the same time there was a significant increase in productivity within milk production. Methane emissions from cows express a loss of feed energy, and they should be limited as much as possible in order to save feed costs as well as spare the climate. Emissions could possibly be reduced by changing the feed given to cattle and by developing low-emission cows, which emit less methane. Methane from livestock manure can be reduced by treatment in a biogas plant, cooling slurry in sheds, and covering slurry tanks. A side-effect of biogas production is that more plant-accessible nitrogen is formed in the slurry, which benefits farmers. Secondly, the biogas produced can be used in combined heat and power production, thereby displacing use of fossil fuels.

There are good examples of synergies between good farming practices and increased carbon sequestration in the soil. For example, the ban on burning straw on fields has reduced the loss of carbon from agricultural soil. There are also farms which apply conservation tillage practices to ensure better soil fertility and to increase the carbon content. The loss of carbon from the soil can be curbed in many ways, or reversed to an overall net carbon uptake, if cultivation and tillage is optimised and if there is more use of perennial crops. There are a number of measures, which increase carbon sequestration e.g. pastures suitable for carbon storage and perennial energy crops, such as energy willow. Afforestation can also contribute to increased carbon sequestration. Restoration of wetlands in low-lying areas is also an effective way of increasing carbon sequestration with positive derived effects for nature and the aquatic environment. Several of these tools are already well known from

Recommendations from the Nature and Agriculture Commission

In spring 2013, the Nature and Agriculture Commission established by the Danish government in 2012 presented its recommendations for how to create growth and development in agriculture, and for how the agricultural industry can contribute to climate mitigation efforts and to improve nature and the environment. The Commission recommends significant changes in the way in which agriculture is regulated in the future. Furthermore, it highlights that agriculture can contribute to reducing Denmark's climate impact.

The Commission points out that agricultural mitigation efforts could benefit from being coupled with future nature and environment efforts, so that climate change mitigation concerns are included in the decisions on initiatives in the aquatic and nature areas. The Commission recommends several initiatives to reduce climate impacts from agriculture, e.g. set-aside of farmland for nature, adoption of a new emissions-based environmental regulation, subsidies for establishing new biogas plant and subsidies for climate projects at the farm level.

The Commission also points out that sustainable use of agricultural biomass resources will both underpin growth and employment in the industry as well as benefit nature, the environment and the climate.

subsidy schemes under the Danish part of the European Agricultural Fund for Rural Development and other EU environment support schemes such as the LIFE schemes.

Moving forward there are also possibilities for synergy between protection of the aquatic environment through lower nitrogen emissions and reductions in greenhouse gas emissions. Emissions of nitrous oxide arise from losses of nitrogen applied to fertilise fields. Nitrous oxide emissions can be reduced by continuing to increase the efficiency of livestock manure application so that a larger proportion of the nutrients are exploited to promote crop growth. This could be achieved either by biogasification or acidification of the livestock manure.

In following up on the recommendations from the Nature and Agriculture Commission (See box) the Danish government has initiated a number of studies. These studies will form the basis of the formulation of new aquatic and nature policies from 2016 to 2021 and at the same time integrate climate change mitigation concerns as was recommended by the Nature and Agriculture Commission.

Integration of climate change mitigation in environment policies

There are a number of significant emission sources within industrial processes and waste. These are waste landfills, wastewater and emissions from certain industrial processes.

Landfills are regulated by both national and EU regulations. The EU Waste Framework Directive has led to requirements regarding recycling of paper, for example, and mandatory recovery of methane from landfills. Furthermore, in 1997 a national ban was introduced on landfilling waste suitable for incineration. The ban includes most organic waste. These regulations have led to an estimated halving of emissions from landfills from 1990 to the present day. Therefore, in general only older landfills today contribute to methane emissions, and these are gradually being phased out.

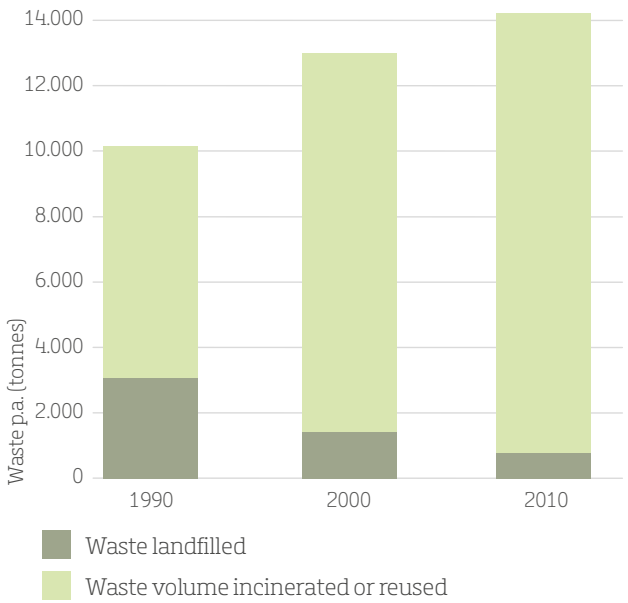

Figure 14. Waste volumes for incineration and landfill

The ban on landfilling waste suitable for incineration has led to the current situation where more or less all combustible waste is incinerated at waste incineration plants. Waste incineration plants transform considerable amounts of waste, composed of organic waste and plastics, to electricity and heating. This displaces the use of both biomass and fossil fuels for electricity and heat production. Plastic is manufactured on the basis of mineral oil and incineration of plastic causes emissions of fossil CO_2. Still, waste incineration as a strategy has led to significant net reductions in greenhouse gas emissions compared with continued landfilling.

In addition to the climate mitigation effect from the landfill ban, other synergies with environment policies are seen, e.g. Denmark has not had to establish new landfills with the consequential environmental problems caused by these.

Despite considerable reductions in methane emissions from landfills since 1990, it is still possible to technically reduce emissions further. This may be achieved by establishing bio-covers at landfills that convert the remaining low levels of methane emissions to CO_2. Moreover, emissions of fossil CO_2 from incinerating waste can be reduced, if plastic is separated before incineration. How waste is used and exploited will be part of the Danish government's forthcoming resources strategy for waste management.

Methane emissions from waste water will become a less significant issue as emissions mainly come from septic tanks, which are currently being demolished and replaced with sewerage systems and other modern treatment solutions due to implementation of plans for the aquatic environment (the Water Framework Directive). Emissions of nitrous oxide primarily come from larger wastewater treatment plants and in general they amount to a very small percentage of total emissions of greenhouse gases. The potential for reductions in emissions of nitrous oxide from wastewater is somewhat uncertain. Specific initiatives will require further research and studies of calculation methods as well as knowledge about specific reduction technologies.

Industrial emissions from cement, lime and tile production is inextricably linked to use of lime as a raw material. Since 2005, almost all energy and process-related carbon emissions from cement production etc. have been subject to the EU Emission Trading System and allowances have to be returned for all CO_2 emitted. This puts a price on the emissions and provides an incentive for manufacturers to reduce emissions and consumers to limit use.

6. Reduction potentials and costs in Denmark

In spring 2012, the Danish government set up an inter-ministerial working group in order to provide a very wide range of potential climate change mitigation measures and associated costs, which may contribute to achieving the Danish government's 40% reductions target in 2020. This inter-ministerial working group has drawn up a catalogue of mitigation measures, and the catalogue is being published in parallel with this Climate Policy Plan. The working group has made quantitative analyses of 54 measures, and furthermore it has performed qualitative analyses of 31 initiatives, since there is not sufficient quantitative data available for quantitative analysis of these initiatives. The measures analysed quantitatively cover the sectors that are relevant for reducing greenhouse gas emissions further, moving forward to 2020. The inter-ministerial working group has focussed on the non-ETS sectors and on making calculations on a number of measures in the energy area as a supplement to the 2012 energy agreement.

The inter-ministerial working group was asked to analyse possible mitigation measures in a wide context within a given time horizon. The list of measures addressed by the working group is not exhaustive. Yet, they are examples of a range of possible mitigation measures, which can inspire policy decisions on climate efforts up to 2020. Not all the measures in the catalogue reconcile with Danish government policy in general, see part 7. Still, the analyses were carried out to give an overview of the reduction potentials.

The CO_2 shadow price is an important concept in the catalogue drawn up by the inter-ministerial working group. The main assumptions made by the working group to calculate shadow prices, impacts and economic aspects, as well as conclusions, are described in the catalogue.

CO_2 shadow prices in brief

The CO_2 shadow price is an expression of the socio-economic cost for a reduction in greenhouse gas emissions of one tonne CO_2 equivalents for a specific mitigation measure. The socio-economic cost is calculated by totalling all the benefits and costs for society, which have proven possible to quantify. The benefits of the CO_2 reduction are not set off, though, as otherwise they would be included in the calculation twice. These costs and benefits for society, e.g. the costs of a wind turbine, the benefits of electricity production and reduced air pollution are added together, and the result is divided by the CO_2 reduction in tonnes. This provides a measure of the costs to society in DKK per tonne of CO_2 equivalents, i.e. the CO_2 shadow price.

Comparing shadow prices for the specific mitigation measures provides an oversight of which measures are the most cost-effective in a socio-economic context. If the shadow price is negative, there will be a socio-economic gain in implementing the initiative. This may be the case, if the socio-economic value of fuel savings or the value of side-effects such as improved aquatic environment exceeds the costs of the initiative. The catalogue of mitigation measures also includes the shadow price without side-effects.

The graph below shows the marginal reduction cost per tonne CO_2 equivalents for all the mitigation measures analysed quantitatively by the inter-ministerial working group. The measures have been included with their respective reduction potential in 2020 and the socio-economic shadow price. The measures have been ranked according to the size of the shadow price. Not surprisingly therefore, the graph illustrates that the greater the reductions, the more expensive the initiatives required. The shadow prices of the calculated measures range over a very large interval: From shadow prices of less than zero, which generally also have very low potential, up to several thousand DKK per tonne of CO_2 equivalents.

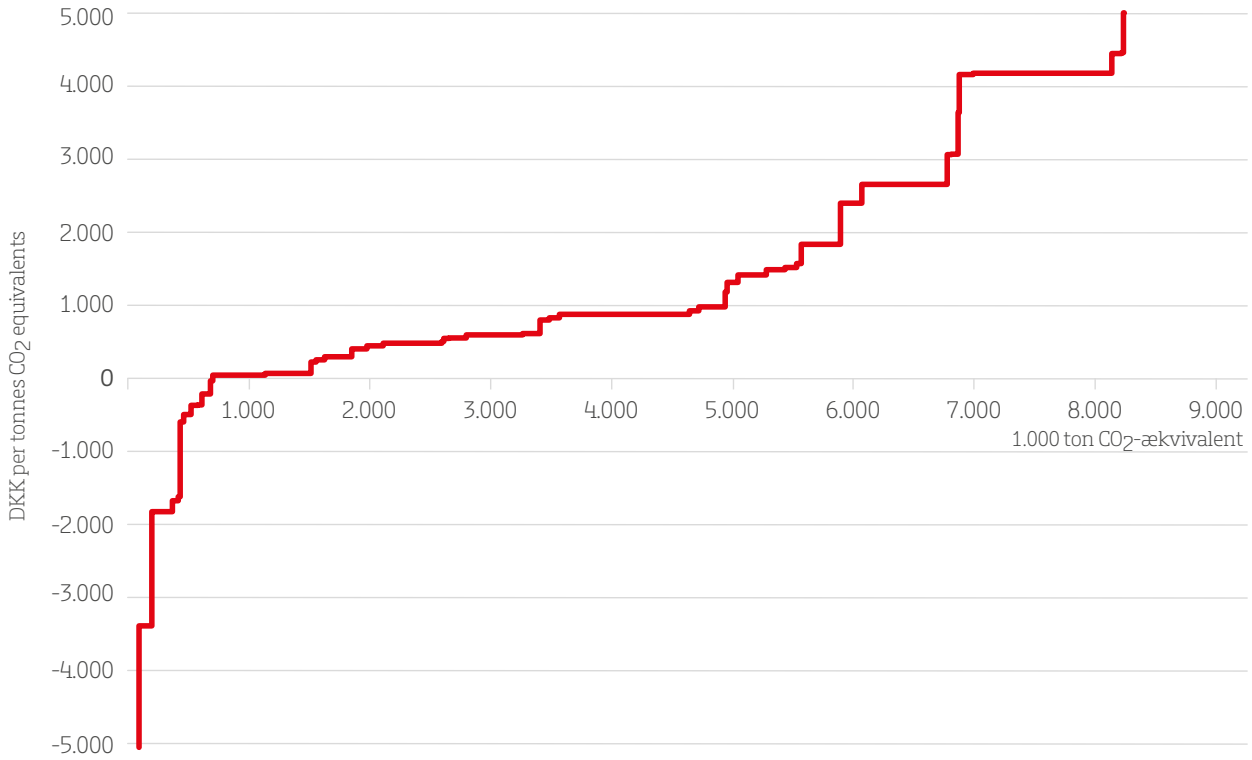

Figure 15. Potential curve with marginal reduction costs

Note: The graph shows the reduction potentials on the x axis and the associated socio-economic costs on the y axis. The graph only includes measures, which can be realised technically and will have an impact before 2020. Measures analysed qualitatively by the inter-ministerial working group have also been excluded from the graph. These include certain EU initiatives decided independently of national climate policy. The graph takes account of the overlap between different mitigation measures , as the effect of various energy savings measures aimed at the same energy consumption, for example, cannot be aggregated.

The shadow prices in the graph contain the socio-economic value of the nitrogen reductions until a reduction of 22,700 tonnes has been achieved (measured at the root zone). Beyond this level the shadow prices are stated without a value of nitrogen reductions. This is a technical calculation assumption based on nitrogen reduction targets adopted by the previous Danish government. The present Danish government has not taken a position on new targets for nitrogen-reduction. This will be outlined in inter-ministerial work on follow-up to the recommendations from the Nature and Agriculture Commission and future aquatic environment and nature efforts.

The graph is purely illustrative. This is because the calculations are based on an incomplete list of mitigation measures. Secondly, not all the measures included in the catalogue are in accordance with the Danish government's policies in general. And thirdly, in practice other considerations come into play which are not reflected in the shadow prices.

Three important conclusions can be drawn from the calculations presented in the working group's catalogue of mitigation measures:

- It is possible to reduce Denmark's emissions of greenhouse gases significantly, and it is technically and physically possible to meet the target of a 40% reduction by 2020 compared with 1990. In principle, the initiatives in the catalogue could reduce emissions by an estimated 8.5 mill. tonnes CO_2 equivalents in 2020. With a total reduction potential which exceeds by far the shortfall in 2020, it is possible to make a carefully considered selection of the most appropriate measures. The catalogue also shows that costs rise with increases in the size of efforts required.
- A number of mitigation measures in agriculture, transport and the environmental area could lead to reductions in greenhouse gas emissions. A significant part of the challenge in meeting the 2020 reduction target of 40% could therefore be resolved in line with implementation of measures in these areas. Thus it is possible to create synergy between climate policy and other policy areas.
- The catalogue of mitigation measures indicates that there are possible mitigation measures in all sectors, which can contribute to the long-term structural transition towards the 2050 objective. This is in line with the Danish government's wish that all sectors are to deliver reductions before 2020 in order to underpin the long-term transition.

Furthermore, the catalogue of mitigation measures outlines some trends with respect to the measures at sector level. In the agricultural sector, a number of measures have been identified with low reduction costs and a considerable reduction potential. The challenge for these measures, however, is that they entail costs for the farmer and/or the state. The trend in the transport sector is that the initiatives with significant reductions have higher shadow prices. This should be considered in light of the limited technological options currently available, the high level of taxes on cars, as well as the energy consumption and CO_2 emissions in this sector. Furthermore, the high societal value of mobility also comes into play. Also in the transport sector, a number of initiatives to promote technological solutions have been analysed, which will not be able to deliver large reductions before 2020, but which could point towards structural changes for the sector with respect to the long-term transition. For the energy sector, the catalogue indicates that, despite the ambitious energy policy, there are still reduction potentials, which could come into play moving forward to 2020. Finally, there are also possible measures in the waste area to reduce greenhouse gas emissions.

The inter-ministerial working group's report is an important contribution to organising a sound greenhouse gas reduction policy, which will be implemented in the years to come. However, the catalogue does not cover all possible measures and therefore it is in no way an indication of the maximum reduction potential in society. In practice the potentials are considerably greater, but the socio-economic costs are most likely to increase for larger reductions to be retained.

The green transition will come at a cost. Implementation of specific measures will typically lead to budgetary costs for either the Danish government, the business community or households – even if the measures have negative socio-economic reduction costs. Both the size and distribution of the budgetary costs vary according to assumptions regarding which policy instrument to be used to implement the measure. For example, whether a mitigation measure is implemented through Danish government subsidies or statutory requirements will make a large budgetary difference for the Danish government and the agricultural sector, respectively. It is generally presupposed that it will not be possible for agriculture to pass on any cost increases in product prices, because agricultural products are sold on a very competitive market. These considerations must be taken into account in overall climate policy. The catalogue of mitigation measures include, for each measure, the policy instrument assumed in the calculations as well as the budgetary effect for the individual parties. These are preliminary calculations and will have to be developed further, before the Danish government can decide, whether to implement a given measure.

7. Principles in Danish climate policy

Integration of climate change mitigation in other policy areas

Integration of climate change mitigation in other policy areas is a fundamental principle in the Danish government's climate policy. In the energy area, considerations for greenhouse gas emission reductions are combined with security of supply issues etc. Integration of climate change mitigation is also apparent in other policy areas. A considerable number of the mitigation measures included in the working group's calculations could satisfy several different objectives at the same time. Specifically, this means that the value of the side-effects for some of the initiatives analysed result in considerable societal advantages. For example, the calculations show that a number of soil-related initiatives in agriculture also lead to reductions of nitrogen, making the initiatives advantageous in a socio-economic context. If a political decision is made to implement these measures, the primary considerations will be other than greenhouse gas mitigation. However, the climate mitigation impacts from the initiatives will be a benefit and therefore they also demonstrate integration of climate change mitigation into other policy areas.

The catalogue of mitigation measures prepared by the inter-ministerial working group exemplifies a range of possible measures, which can inspire political decisions within climate policy up to 2020. In order to meet the 40% target by 2020, the Danish government will seek to integrate specific climate change mitigation concerns in policy discussions and negotiations in the relevant policy areas such as agriculture, transport, and the environment. Up to 2020, and on the basis of this Climate Policy Plan and the upcoming Climate Change Act, the Danish government will work to integrate the right cost-effective climate change mitigation measures into decisions on policies in the relevant sectors.

In addition to the principle on integrating climate change mitigation into other policy areas, there are a number of other principles for Danish climate policy.

Combining an ambitious climate policy with growth and employment

The catalogue of mitigation measures from the working group describes a large number of measures to reduce greenhouse gas emissions. This is not an exhaustive list, but it is comprehensive, and it contains many different measures and specific instruments which, from a purely technical perspective, could be brought into use. Many of the specific instruments in the calculations are amendments to existing taxes and new taxes. There must be room for appropriate reorganisation of taxes and duties, but the Danish government will not impose new general tax increases on the business community.

The working group's catalogue also includes a number of measures, which are not deemed to be in harmony with the Danish government's policy to create jobs and growth. These include excise duties, withdrawal of transport to work related tax deductions, etc. However, in order to give a complete picture, these analyses have been prepared in order to illustrate the full reduction potential.

Other principles in Danish climate policy

Besides the principles described above, there are a number of other principles which will apply when the Danish government has to choose initiatives and expand the current calculations in the catalogue. These principles are:

Cost effectiveness

Both achievement of the 40% target and the long-term transition to a low-emissions society requires significant reductions in greenhouse gas emissions. In the long term this will entail a comprehensive reorganisation of society. Therefore, efforts must be organised cost-effectively, i.e. with as low socio-economic costs as possible. Determining the cost-effective options entails calculating the relevant side-effects and supporting objectives within the environment, agriculture and transport etc.

Timing and action under uncertainty

At a given time, the right timing for implementation of a measure must be weighed against the current knowledge about costs of reductions, technological possibilities, the investment horizon for capital stock etc.

Although on the current basis a measure is cost-effective, expectations of significant technological advances may mean that implementation should be postponed. On the other hand, other measures could come into consideration if implementation is significantly cheaper in connection with investments in replacement of obsolete capital stock or in connection with building renovation. Such considerations are particularly relevant for investment-intensive measures such as changes to buildings, choice of types of heating, and corporate investment in production equipment.

With this backdrop, it will not be possible and it will not make sense to organise the climate change mitigation efforts in detail right up to 2050. Instead, measures should be chosen observing the newest and most up-to-date knowledge about emissions, new technologies and other possible measures. This will increase the probability that the overall mitigation efforts will prove to be cost-effective, including in the longer term. An ongoing overview of possible measures is therefore necessary, so that the probability that objectives can be met is rendered a reasonable degree of certainty. Otherwise there will be a risk that towards the end of the period it may be necessary to implement initiatives, which have a rapid effect but which are less cost-effective than measures with more gradual effects.

Effective and cost-effective mitigation efforts can therefore not be assessed on the basis of a static perspective. Rather, they must be perceived as a dynamic planning process to be implemented under a considerable degree of uncertainty.

Competitiveness

Deciding on cost-effective climate change mitigation measures raises the issue of Danish competitiveness for enterprises exposed to competition and possible relocation of production. This will mean loss of Danish investment and jobs. There is also the issue of "CO_2 leakage", in which greenhouse gas emissions occur abroad instead of in Denmark. It is important to assess, whether the potential measures entail moving production and thereby lead to unintentional corresponding, or even larger, emissions in other countries.

Initiatives entailing a risk of CO_2 leakage cannot be avoided entirely. However, the effect on Danish competitiveness should be included in specific choices between measures, with particular focus on the impact on enterprises exposed to competition. Moreover, as mentioned above, the Danish government is working to establish an international climate agreement, which will attenuate the issue of CO_2 leakage.

Limited possibility for public financing

Danish climate change mitigation efforts are to be implemented within the framework of a sustainable economic policy. In the years to come possibilities for public financing will be extremely limited in light of the need to consolidate the public budget. The Danish government will examine and draw up specific proposals to finance the measures to realise the 40% target for reductions in greenhouse gases. In this context the Danish government will focus on the need to finance expected losses in tax revenues as a result of phasing out coal, oil and gas, reduced energy consumption etc.

The polluter pays

Reduction efforts must be based on the fundamental principle that the polluter pays. That is: As a general rule the individual player, citizen or company must pay the costs of the pollution, it causes. On the basis of this principle, and cost effectiveness, there should be endeavours for uniform pricing of all greenhouse gas emissions in all sectors. Pricing must be adjusted for externalities. A uniform price signal across all sectors will ensure that the cheapest reductions are implemented first. Furthermore, the price signal provides an important incentive to develop new emissions-limiting methodologies and products.

Support for a long-term transition

As mentioned above, the 40% target is a stepping stone towards a broader green transition and achievement of the EU's long-term climate policy target of a 80%-95% reduction by 2050. Therefore it is crucial that meeting the 40% target supports the long-term structural conversion. It is also vital that the decisions made up to 2020 are cost-effective, point forwards and pave the way for initiating reductions within all sectors. Of course this should take into account the technology options available and the possibilities to stimulate technological development within the individual sectors.

Consumer-related emissions

Targets, efforts and shortfalls are calculated as emissions emanating from Denmark, i.e. from fuel consumption, livestock, etc. This means that carbon emissions related to the production of goods in Denmark that are exported, are included in the Danish emissions inventory. On the other hand, Danish imports of goods and services produced abroad – and which may cause emissions in other countries – are not included. This method of calculation is in accordance with international guidelines, including that the individual country is responsible for the production, which takes place within its borders. The individual consumer can contribute to reducing climate impacts by making decisions which include the effect on emissions abroad.

8. The next steps

The publication of this Climate Policy Plan is the first step in an ongoing, forward moving process which in the years to come will establish the regulatory and political framework for meeting the 40% reduction target in 2020.

A central component in the follow-up of this Climate Policy Plan will be adoption of a Climate Change Act aiming at ensuring long-term monitoring and follow-up of reduction efforts across sectors. The Climate Act will secure monitoring of greenhouse gas emissions and regular status reports on climate change mitigation efforts to create transparency in climate policy. The Danish government will draw up a draft climate change law for submission in the 2013-14 parliamentary session.

In the years to come a number of political decisions will be made, which may be significant for reaching the target. These include political follow-up to the recommendations from the Nature and Agriculture Commission. Other work which may also prove to relate to climate change mitigation efforts includes the recommendations from the Transportation Congestion Committee as well as the resources strategy for waste management and prevention.

In parallel with this, the Danish government will continue work to implement relevant EU initiatives, which make up a crucial element in climate mitigation efforts, and which may help reduce Danish emissions and thereby limit the need for national mitigation measures.

In addition to work at EU level and state level, the Danish government will also work to secure better coordination and a structured interplay between municipal, regional and government efforts. Regional and municipal climate change mitigation plans and efforts can often be in their own interests. But they are also a good and necessary supplement to national efforts in the climate area, if planning and implementation are to be completed optimally. Therefore the Danish government will endeavour to establish a good foundation for regional and municipal planning through analyses, knowledge-sharing and specific tools. In addition, a process has been initiated to update the municipal CO_2 calculator. This in order to offer to municipalities a tool that can give a correct and fair statement and calculation of their greenhouse gas emissions. I.e. statements and calculation which ensure that the climate change mitigation measures have contributed to real improvements and reductions in CO_2 emissions. Finally, in collaboration with various municipalities the Danish government has prepared a catalogue with a number of examples of municipal efforts related to climate and energy-policy objectives; the municipal climate change mitigation guide.

Not only the public sector can take action and provide a good example; Danish consumers also play a crucial role in both national and international greenhouse gas emissions. Through their demands and choices, consumers can make an enormous difference to benefit the climate. Therefore the Danish government will focus on possible action by consumers through increased communication and advice for the public.

The Danish Climate Policy Plan

Towards a low carbon society

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Inquiries concerning the publication can be directed to

The Ministry of Climate, Energy and Building

Stormgade 12, DK-1220 Copenhagen K

Phone: (+45) 33 92 28 00

E-mail: kebmin@kebmin.dk

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