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**Report of the centralized in-depth review of  
the fourth national communication of Denmark**

*According to decision 4/CP.8, Parties included in Annex I to the Convention are requested to submit to the secretariat, in accordance with Article 12, paragraphs 1 and 2, of the Convention, a fourth national communication by 1 January 2006. This report reflects the results of the in-depth review of the fourth national communication of Denmark conducted by an expert review team in accordance with the relevant provisions of the Convention and Article 8 of the Kyoto Protocol.*

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## I. Introduction and summary

### A. Introduction

1. Denmark has been a Party to the UNFCCC since 1993 and to its Kyoto Protocol since 2002.<sup>1</sup> Within the “burden-sharing” agreement of the European Union (EU) for the Kyoto Protocol, Denmark committed itself to reducing its greenhouse gas (GHG) emissions by 21.0 per cent compared to the base year<sup>2</sup> (1990) level during the first commitment period from 2008 to 2012.

2. This report covers the centralized in-depth review (IDR) of the fourth national communication (NC4) of Denmark, coordinated by the UNFCCC secretariat, in accordance with decision 7/CP.11. The review took place from 16 to 21 October 2006 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Gonçalo Cavalheiro (Portugal), Mr. Arthur Wellington Rolle (the Bahamas), Mr. Seppo Oikarinen (Finland), Ms. Helena Princova (Slovakia), Mr. Jigme (Bhutan) and Mr. Philip C. Acquah (Ghana). Mr. Cavalheiro and Mr. Rolle were the lead reviewers. The review was coordinated by Mr. Sergey Kononov (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each part of the NC4. The ERT also evaluated the information contained in Denmark’s report demonstrating progress (RDP) in achieving its commitments under the Kyoto Protocol, and the supplementary information provided by Denmark under Article 7, paragraph 2, of the Kyoto Protocol.

4. In accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1), a draft version of this report was communicated to the Government of Denmark, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

### A. Summary

5. The ERT noted that Denmark’s NC4 complies in general with the UNFCCC reporting guidelines.<sup>3</sup> As required by decision 25/CP.8, the RDP provides clear and detailed information on the progress made by Denmark in achieving its commitments under the Kyoto Protocol. Supplementary information under Article 7, paragraph 2, of the Kyoto Protocol<sup>4</sup> is provided as required by the guidelines. The ERT commended Denmark for its coherent and consistent reporting.

#### 1. Completeness

6. The ERT noted that the NC4 covers all sections required by the UNFCCC reporting guidelines. The ERT also noted that Denmark’s RDP contains all parts stipulated by decisions 22/CP.7 and 25/CP.8. Furthermore, the ERT noted that Denmark has provided the supplementary information required under Article 7, paragraph 2.

#### 2. Timeliness

7. The NC4 and the RDP were submitted on 30 December 2005. Decision 4/CP.8 requested the submission of the NC4 by 1 January 2006, and decision 22/CP.7 set the same date for Parties to submit their RDPs.

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<sup>1</sup> In its ratification of the Kyoto Protocol, the Kingdom of Denmark made a territorial reservation with respect to the Faroe Islands.

<sup>2</sup> The base year for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O is 1990; for HFCs, PFCs and SF<sub>6</sub> Denmark has chosen, in accordance with the Kyoto Protocol, 1995 as the base year.

<sup>3</sup> “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications.” Document FCCC/CP/1999/7, pages 80–100.

<sup>4</sup> Decision 15/CMP.1, annex, chapter II (FCCC/KP/CMP/2005/8/Add.2).

### 3. Transparency

8. The ERT acknowledged that Denmark's NC4 is comprehensive and transparent. In the course of the review, the ERT formulated a number of recommendations that could help Denmark to further increase the transparency of its reporting, such as a recommendation to provide more information on how its policies and measures are modifying longer-term trends in anthropogenic GHG emissions and removals consistent with the objective of the Convention. The review team noted that the information contained in the NC4 and the RDP is generally consistent.

## II. Technical assessment of the reviewed elements

### A. National circumstances relevant to greenhouse gas emissions and removals

9. In its NC4, Denmark has provided a comprehensive description of its national circumstances affecting GHG emissions and removals. This description covers the form of government and structure of the administration, population, geography, climate, the economy, energy, the domestic sector, transport, the business sector, waste, buildings and urban structure, agriculture and forestry. The circumstances are described specifically for Denmark, Greenland and the Faroe Islands. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

**Table 1. Indicators relevant to greenhouse gas emissions and removals for Denmark**

	1990	1995	2000	2004	Change 1990–2000 (%)	Change 2000–2004 (%)	Change 1990–2004 (%)
Population (million)	5.14	5.23	5.34	5.40	3.9	1.2	5.1
GDP (billion USD 2000 PPP)	119	134	154	160	29.2	3.9	34.3
TPES (Mtoe)	17.9	20.0	19.3	20.1	8.1	3.8	12.2
GDP per capita (thousand USD 2000 PPP)	23.2	25.5	28.8	29.6	24.4	2.7	27.8
TPES per capita (toe)	3.5	3.8	3.6	3.7	4.0	2.6	6.7
GHG emissions without LULUCF (Tg CO <sub>2</sub> eq)	70.4	77.4	69.6	69.6	-1.2	0.1	-1.1
GHG emissions with LULUCF (Tg CO <sub>2</sub> eq)	71.0	75.8	71.2	67.3	0.4	-5.5	-5.1
CO <sub>2</sub> emissions per capita (Mg)	10.5	11.8	10.2	10.3	-3.0	0.6	-2.5
CO <sub>2</sub> emissions per GDP unit (kg per USD 2000 PPP)	0.45	0.46	0.35	0.35	-22.1	-2.1	-23.7
GHG emissions per capita (Mg CO <sub>2</sub> eq)	13.7	14.8	13.0	12.9	-4.8	-1.2	-5.9
GHG emissions per GDP unit (kg CO <sub>2</sub> eq per USD 2000 PPP)	0.59	0.58	0.45	0.44	-23.5	-3.7	-26.4

*Sources:* GHG emissions data are from Denmark's 2006 inventory submission; the numbers shown relate to the Kingdom of Denmark, i.e. Denmark, Greenland and the Faroe Islands. Population, GDP and TPES data are from the IEA; the IEA data do not include Greenland and the Faroe Islands.

*Note 1:* The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

*Note 2:* For the abbreviations used, see annex II.

10. The NC4 contains summary information on GHG emission trends for the period 1990–2003. This information is consistent with the information provided by Denmark in its GHG inventory submitted in 2005, but not fully consistent with the latest available version of the 2006 submission of the national GHG inventory. However, the differences are small (mostly less than 1 per cent of total GHG emissions) and they could be a result of inventory recalculations in 2006. The inventory-related information in the NC4 is consistent with that given in the RDP. Summary tables, including trend tables for emissions (given in the common reporting format (CRF)), are provided in an annex to the NC4.

11. Total GHG emissions excluding emissions and removals from land use, land-use change and forestry (LULUCF) decreased by 1.1 per cent between 1990 and 2004, whereas total GHG emissions including net emissions/removals from LULUCF decreased by 5.1 per cent over the same period (see table 2). The decrease can be attributed mainly to a decline in N<sub>2</sub>O emissions by 28.1 per cent over this period. Emissions of CO<sub>2</sub> and CH<sub>4</sub> have increased by 2.5 and 1.5 per cent, respectively. Emissions of fluorinated gases (HFCs, PFCs and SF<sub>6</sub> taken together) increased considerably from 1990 to 2004, from 0.044 to 0.803 Tg CO<sub>2</sub> equivalent, but these emissions accounted for only 0.1 per cent of total GHG

emissions in 1990 and 1.2 per cent in 2004. Table 2 provides an overview of GHG emissions by sector from 1990 to 2004 (see also the discussion of sectoral trends in section II.B).

**Table 2. Greenhouse gas emissions by sector for Denmark, 1990–2004**

	GHG emissions (Tg CO <sub>2</sub> equivalent)					Change (%)		Shares <sup>a</sup> by sector (%)	
	1990	1995	2000	2003	2004	1990–2004	2003–2004	1990	2004
1. Energy	52.1	60.0	52.6	59.2	53.5	2.7	–9.6	74.0	76.9
A1. Energy industries	26.3	32.3	25.6	31.9	25.9	–1.7	–18.9	37.4	37.2
A2. Manufacturing industries and construction	5.49	6.05	6.04	5.78	5.93	8.0	2.5	7.8	8.5
A3. Transport	10.5	12.0	12.4	13.1	13.3	26.8	2.0	15.0	19.2
A4–5. Other	9.48	9.20	7.86	7.79	7.67	–19.1	–1.6	13.5	11.0
B. Fugitive emissions	0.30	0.43	0.68	0.64	0.71	134.3	12.0	0.4	1.0
2. Industrial processes	2.19	2.68	3.37	3.21	3.06	39.8	–4.8	3.1	4.4
3. Solvents and other product use	0.14	0.12	0.12	0.11	0.11	–17.1	5.8	0.2	0.2
4. Agriculture	13.0	12.0	10.6	10.0	10.0	–23.4	–0.3	18.5	14.4
5. LULUCF	0.55	–1.66	1.64	–1.94	–2.28	–513.2	17.5	0.8	–3.3
6. Waste	1.55	1.55	1.48	1.52	1.39	–9.9	–8.0	2.2	2.0
7. Other	1.37	1.11	1.41	1.48	1.53	11.2	3.5	2.0	2.2
GHG total with LULUCF	71.0	75.8	71.2	73.6	67.3	–5.1	–8.5	–	–
GHG total without LULUCF	70.4	77.4	69.6	75.5	69.6	–1.1	–7.8	–	–

<sup>a</sup> The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions which was offset by GHG removals through LULUCF.

*Note 1:* The changes in emissions and the shares by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

*Note 2:* For the abbreviations used, see annex II.

12. As table 2 shows, between 1990 and 2004 GHG emissions increased in the energy sector and in industrial processes but decreased in the other sectors. Within the energy sector, the ERT noted the high growth of emissions in transport where, in 2004, GHG emissions were 26.8 per cent above the 1990 level. The ERT also noted relatively high annual fluctuations in total GHG emissions (such as a 15 per cent increase in 1991 or a 17 per cent increase in 1996, followed by a decline in subsequent years), which are specific for Denmark and relate to the fluctuations in electricity generation by fossil fuel plants in Denmark, which in turn depend on the demand for electricity exports to neighbouring countries where domestic generation is highly dependent on the availability of hydropower.

## B. Policies and measures

13. As required by the UNFCCC reporting guidelines, Denmark has provided in its NC4 comprehensive information on its package of policies and measures implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. Each sector has its own textual description of the principal policies and measures, supplemented by summary tables on policies and measures by sector. Table 3 provides a summary of the information reported on policies and measures.

14. Denmark has also provided some information on how it believes its policies and measures are modifying longer-term trends in anthropogenic GHG emissions and removals consistent with the objective of the Convention. However, despite the information provided, the expected impact of policies and measures on the long-term GHG trends was not fully clear to the ERT, especially in view of such specific national circumstances of Denmark as the high annual fluctuations in emissions driven by the production of electricity for export to neighbouring countries. In future, Denmark may wish to consider providing more specific information under this item of the reporting guidelines, for example by referring to measures to alleviate the growth in emissions in years when electricity production for export increases.<sup>5</sup>

<sup>5</sup> The ERT acknowledges the information provided by the Party that emissions from the electricity generation sector are included and capped under the EU ETS and are, therefore, under a binding restrictive regulatory framework.

15. The ERT recognized the wealth of information on policies and measures provided by Denmark in its NC4. Nonetheless, the ERT noted that the structure of the information provided does not always follow the UNFCCC reporting guidelines. The textual description of the policies and measures in the main body of the NC4, divided by generic headings, does not include a reference to the exact names of the policies and measures included in the summary tables in the annex, rendering it sometimes difficult to match up the measures included in both parts of the national communication. The ERT therefore recommends that Denmark adhere more closely to the UNFCCC reporting guidelines, for example by including under each generic heading a list of the relevant policies and measures with their exact titles.

**Table 3. Summary information on policies and measures**

<b>Major policies and measures</b>	<b>Examples / comments</b>
<b>Framework policies and cross-sectoral measures</b>	
Integrated climate programme	Denmark's Climate Strategy (2003), which complements about 20 other policy plans, including the Energy Strategy 2025 (2005)
Energy/electricity/emissions taxation	CO <sub>2</sub> tax, and several taxes on energy products and services, including those linked to high GHG emissions
Emissions trading	EU ETS, which has replaced the Danish Allowance Scheme (2005)
Support of research and development	The High Technology Foundation
<b>Energy sector</b>	
Energy sector liberalization	Fully liberalized: Nordic countries and North German markets
Combined heat and power generation	Priority for electricity from CHP and other mainly fiscal measures to promote CHP
Renewable energy sources	Support for environmentally friendly electricity
Energy efficiency improvements	Energy Saving Action Plan and Political Agreement on Energy-Saving Efforts
<b>Transport</b>	
Vehicle and fuel taxes	Higher fuel taxes (1.2 Tg CO <sub>2</sub> )
Agreements/partnerships	Agreement with the European, Japanese and Korean motor industries
Integrated transport planning	Reduced travel times for public transport
<b>Industry</b>	
Pollution prevention and control	IPPC Directive of the EC; EU emissions trading; EU Directive on F-gases; GWP-based taxes on fluorocarbons; ban on fluorocarbon use in certain products and production
Agreements/partnerships	Climate Change Agreements
<b>Agriculture</b>	
	Common Agricultural Policy of the EC; EU Water Framework Directive; prescriptions for environmentally sensitive areas; Action Plans for Aquatic Environment I & II; Action Plan for Sustainable Agriculture (2.2 Tg CO <sub>2</sub> ); Action Plan for the Aquatic Environment III (0.2 Tg CO <sub>2</sub> ); Energy Policy Agreement for Biogas (0.5 Tg CO <sub>2</sub> ); EU Directive on fertilizers
<b>Waste management</b>	
	Waste 21: Waste Strategy 2005–2008; Obligation for incineration of combustible waste; waste-related taxes; EU Packaging Directive; methane recovery according to the Landfill Directive of the EC
<b>Forestry</b>	
	National Forest Programme with the goal to double forested area; private afforestation subsidy programme; public afforestation programme

Note 1: The GHG reduction estimates, given for some measures (in parentheses), are reductions in CO<sub>2</sub> or CO<sub>2</sub> equivalent for the year 2010.

Note 2: For the abbreviations used, see annex II.

16. The ERT noted that Denmark has included information on the expected impact on GHG emissions for only a very limited number of individual policies and measures. The ERT recommends that, when available, this information be included in the main text of Denmark's future national communications and in the summary tables, instead of in an annex that is not provided for in the UNFCCC reporting guidelines. The expansion of the information included in the summary table does not promote comparability of the information and the ERT therefore recommends closer adherence to the proposed structure of the summary tables. Furthermore, the ERT recommends that Denmark clearly distinguish between policies and measures implemented or planned and those no longer in place, bearing in mind that the effects of the latter might outlive the period of implementation of the policy or measure itself.

### 1. Policy framework and cross-sectoral measures

17. Denmark's climate policy has been evolving over the years since the publication of the Brundtland Report (1987). The Climate Committee, established as a standing body to follow up regularly on the compliance deficit regarding the Kyoto Protocol target, and to ensure cost-effective implementation of the policy, oversees climate change policy. It is composed of several ministries,

including those of Finance; the Economy; Food, Agriculture and Fisheries; Foreign Affairs; Taxation; Transport and Energy; and the Environment. The Environmental Protection Agency (EPA) chairs the committee. The Danish Energy Authority, the EPA, the Ministry of Taxation and county and municipal authorities play an important role in implementing the climate policy.

18. Denmark clearly distinguishes between national measures and measures transposed to national law from EU legislation. Of the latter measures, the most relevant is the EU emissions trading scheme (ETS), which in its first period covers 377 Danish installations, accounting for nearly 50 per cent of Denmark's emissions. The allocation plan foresees a reduction of 6 Tg CO<sub>2</sub> per year in 2005–2007, representing a cut of 15 per cent in the sectors covered compared to the baseline projection. If emissions in the other sectors remain constant, the EU ETS will provide for a reduction of about 7.4 per cent of total national emissions.

19. Denmark has presented extensive information on other cross-sectoral policies and measures, mainly of a fiscal nature, including the CO<sub>2</sub> tax introduced in 1992. The rate of the CO<sub>2</sub> tax is currently fixed at 90 Danish kroner (DKK) per tonne (*c.* 12 euros (EUR) at the exchange rate of 17 October 2006). Other taxes include the tax on mineral oil, the tax on natural gas and town gas, and the tax on coal. Most revenues from these taxes go to the general state budget.

20. Under the EU burden-sharing agreement, Denmark committed itself to a reduction target of –21 per cent, resulting in a target emissions level of 55.0 Tg CO<sub>2</sub> equivalent per year in the first commitment period 2008–2012.<sup>6</sup> In order to enhance its capacity to move towards compliance with its target, Denmark has already allocated funds sufficient for the expected annual acquisition of 4.5 Tg CO<sub>2</sub> equivalent, at a target price of DKK 50 per tonne (*c.* EUR 6.7). Denmark provides very detailed information on its planned use of the flexibility mechanisms under the Kyoto Protocol, including a description of the main joint implementation (JI) and clean development mechanism (CDM) projects currently under way, amounting to a total investment of DKK 1,130 million (*c.* EUR 150 million).

21. The ERT recognized that Denmark has conducted extensive studies on the costs of implementation of measures to reduce GHG emissions. The ERT also recognized the conclusion reached by Denmark that its domestic cost-effective options are very limited owing to a long-standing progressive climate policy, which includes an already very high level of CO<sub>2</sub> and energy-related taxes. The ERT noted that Denmark refers to the political statement of the European Environment Council and the European Commission on the basis of Denmark's legal commitment under the EU burden-sharing agreement as an important element in the definition of the country's base year and, consequently, in the contribution its policies and measures can make to the achievement of its commitments.<sup>7</sup>

22. The ERT noted that Denmark's approach to policies and measures, which is heavily reliant on tax measures, provides for effective emission reductions across different activity sectors in most circumstances. The ERT suggests that in its future national communications Denmark provide aggregate figures for both the amount of funds raised through taxation and the total emission reductions (in addition to the estimates of reductions from particular taxes) achieved or expected through taxation.

## 2. Policies and measures in the energy sector

23. Between the base year (1990) and 2004, GHG emissions from energy industries decreased by 1.7 per cent (–0.4 Tg CO<sub>2</sub> equivalent), mainly driven by a change in fuel mix from coal to natural gas and

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<sup>6</sup> On the basis of the recalculated base year emissions in the inventory submission of April 2006, Denmark's target emissions level under the burden-sharing agreement of the EU amounts to 54.8 Tg CO<sub>2</sub> equivalent per year in the first commitment period 2008–2012.

<sup>7</sup> The statement made a reference to the calculation of the assigned amount for Denmark taking into account Denmark's 1998 statement in connection with the EU burden-sharing agreement, in which Denmark stated that its emissions reductions should be seen in relation to the adjusted 1990 level.

by the increasing penetration of renewable energy sources. There are large annual fluctuations in these emissions, mostly due to the trade in electricity with other countries, such as an 18.9 per cent decrease in emissions between 2003 and 2004. GHG emissions from transport increased notably (by 26.8 per cent, or 2.8 Tg CO<sub>2</sub> equivalent, between 1990 and 2004). On the other hand, emissions from energy use in other sectors (mostly in the residential and commercial sectors) decreased by 19.1 per cent, or 1.8 Tg CO<sub>2</sub> equivalent, mainly driven by the introduction of energy and CO<sub>2</sub> taxes.

24. Besides the EU ETS (which has replaced the national allowance scheme) and the different taxes referred to in the section on cross-sectoral measures above, which have a great impact on the energy sector, Denmark has described in its NC4 an extensive set of specific policies and measures in the energy sector which are aimed at reducing GHG emissions.

25. Regarding combined heat and power generation (CHP), Denmark reports that, as a result of the measures that were specifically aimed at promoting the consumption of CHP-generated electricity, more than half of the domestic electricity consumption is co-generated at CHP plants. These measures are, however, no longer in place. They have been replaced by a measure aimed at promoting all environmentally friendly electricity. The share of electricity consumption generated from renewable sources in Denmark was 23.9 per cent in 2003. In this situation, Denmark foresees that the scope for CHP delivering further emission reductions is limited, and the same applies to the replacement of coal by natural gas for energy production, given that the natural gas market is, for the short term, considered to be fully developed. For the longer term, natural gas is still expected to play an increasing role in electricity generation.

26. For the transport sector, in the light of the high tax burden already in place, Denmark recognizes that the implementation of measures will not be considered cost-effective unless other benefits are taken into account. Denmark has set a target of a 0 per cent share of biofuels in vehicle fuels (although the EU-wide target is 5.75 per cent) because the consumption of biofuels in other sectors is, as reported, high.<sup>8</sup> A number of policies and measures for the transport sector, including higher fuel taxes (emission reductions of 1.2 Tg CO<sub>2</sub> per year), energy-efficient driving techniques and the enforcement of speed limits are projected to provide a total reduction of 1.8 Tg CO<sub>2</sub> per year by 2010.

27. For the business sector, including industry, building and construction, trade and private service, the “green” tax package led to an increase of the CO<sub>2</sub> tax and the establishment of agreements for energy efficiency with high-energy consumers, who are then granted a tax rebate. The EU ETS is another important measure for this sector. A number of measures to promote the conservation of energy in the public sector have been implemented, including a circular on energy efficiency in state institutions and an awareness-raising campaign aimed at promoting “green” procurement.

### 3. Policies and measures in other sectors

28. Between the base year (1990) and 2004, GHG emissions from all non-energy sectors taken together (excluding LULUCF) decreased by 13.4 per cent (by 2.4 Tg CO<sub>2</sub> equivalent), mainly driven by measures in agriculture. GHG emissions from agriculture were 23.4 per cent (3.0 Tg CO<sub>2</sub> equivalent) lower in 2004 than in the base year. GHG emissions from industrial processes showed a notable increase till 2000, but have been constantly declining since and were, in 2004, still 39.8 per cent (0.9 Tg CO<sub>2</sub> equivalent) higher than in 1990.

29. **Industrial processes.** With a share of less than 5 per cent in total national GHG emissions, industrial processes are a minor source of emissions in Denmark. The mineral and construction (cement, chalk, brick and glass) industries and the chemical industry are the major emitters of GHGs. The mineral

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<sup>8</sup> In November 2005 the Danish government decided to change the target on share of biofuels from 0 to 0.1 per cent. To support the achievement of this target, DKK 60 million have been allocated for a pilot phase with the use of biofuels in special vehicle fleets in the period 2006–2008.



industry is the biggest source of CO<sub>2</sub> emissions and the chemical industry the biggest source of N<sub>2</sub>O emissions. Most N<sub>2</sub>O emissions come from fertilizer production in a single plant. Production was terminated in 2004, so that from 2005 these emissions will no longer exist. Comprehensive statistics on HFCs, PFCs and SF<sub>6</sub> has been available from 1994 on, showing a slight increase in these emissions. Taxes and agreements on energy efficiency are the main policy tools for cutting emissions. Up to the end of 2004 the cement industry's energy consumption was subject to a "green tax" for the business sector. Following the start of the EU ETS, from January 2005 all CO<sub>2</sub> emissions from cement production have been subject to caps under the EU ETS. Two policy measures are being used to cut down emissions of HFCs, PFCs and SF<sub>6</sub>: these gases are subject to a consumer tax based on the global warming potential (GWP) value of the gas and a CO<sub>2</sub> tax of DKK 100 per tonne of CO<sub>2</sub> equivalent (limited to DKK 400 per kg CO<sub>2</sub> equivalent) and in addition, there is a total ban on the use of these gases in a number of new facilities and products. Denmark is also subject to the EU legislation on F-gases.

30. **Agriculture.** In 1990, agriculture was responsible for 18.5 per cent of total GHG emissions in Denmark. CH<sub>4</sub> and N<sub>2</sub>O accounted for almost 90 per cent of emissions from the sector. The largest contribution to CH<sub>4</sub> emissions comes from dairy cattle and the largest contribution to N<sub>2</sub>O emissions comes from manure stores and fertilizer use. By 2004 emissions from agriculture had decreased by about 3.0 Tg CO<sub>2</sub> equivalent compared to 1990, with the largest contribution coming from a decrease in N<sub>2</sub>O emissions. Since 1987 two action plans consisting of regulations and financial subsidies have been implemented, which has helped to cut emissions, especially those of N<sub>2</sub>O (by 2.2 Tg CO<sub>2</sub> equivalent). The third plan started in 2004. A special Energy Policy Agreement was concluded in 2004 to support economically viable electricity production in small plants using biogas from farmhouses.

31. **Forestry.** According to the NC4, Danish forests and grasslands have been a net sink since 1990, but emissions from croplands have outweighed that sink. Between 1990 and 2004, Denmark succeeded in decreasing the emissions from croplands (by 66 per cent compared to 1990) and increasing the sinks in forests. As early as 1991 this led to a situation where land management changed from a net source to a net sink. The NC4 emphasizes the difficulty of estimating the uptake of CO<sub>2</sub> in existing forests. The Danish government aims to double the forest area in Denmark within the coming 100 years. The NC4 mentions two types of measures to achieve this goal: a subsidy programme to encourage private farmers to afforest their agricultural land; and public activities by the state, counties and municipalities. All these activities and private afforestation without subsidies (implemented as private initiatives) are expected to increase the net sink.

32. **Waste.** Waste is a minor source of GHG emissions in Denmark (it accounted for about 2 per cent of total emissions in 2004), mainly because municipal waste is commonly incinerated; the energy from incineration is used for electricity generation and heating. Landfill sites are the largest source of CH<sub>4</sub> emissions. Eighty per cent of CH<sub>4</sub> originates from landfill sites and 20 per cent from sewage water treatment. Danish governments have run successful programmes to minimize the amount of waste going to landfills. The most rigorous measure has been the legislation by which the municipalities are obliged to send the combustible component of waste to incineration. According to the NC4, 66 per cent of the country's waste is recycled, 26 per cent incinerated and 8 per cent sent to landfill sites. The implementation of the EU Landfill Directive is expected to lead to a further reduction in CH<sub>4</sub> emissions from the existing landfill sites.

## C. Projections and the total effect of policies and measures

### 1. Projections

33. Denmark has provided in the NC4 a "with measures" scenario until 2030, presented relative to actual inventory data. The projections are presented on a sectoral basis for the energy sector, transport, industrial processes, agriculture, LULUCF and waste. The ERT noted that this structure is not fully consistent with that used in the policies and measures section of the NC4. The projections are also

presented on a gas-by-gas basis for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, HFCs and SF<sub>6</sub>. In addition, the projections are provided in an aggregated format for each sector as well as for a national total, using GWP values. Emission projections relating to fuel sold for use in ships and aircraft engaged in international transport have been reported. A sensitivity analysis to estimate the impact of external parameters and measures implemented on GHG emissions has been conducted. The GHG projections presented in the NC4 and in the RDP are consistent. Table 4 and figure 1 provide a summary of the GHG projections for Denmark.

**Table 4. Summary of greenhouse gas emission projections for Denmark**

	GHG emissions (Tg CO <sub>2</sub> equivalent per year)	Changes compared to base year level (%)
Inventory data 1990 <sup>a</sup>	70.4	not applicable
Inventory data 2004 <sup>a</sup>	69.6	-1.1
Kyoto Protocol base year <sup>b, d</sup>	70.4	not applicable
Kyoto Protocol target <sup>d</sup>	55.6	-21.0
“Without measures” projections for 2010 <sup>b</sup>	95.6 <sup>c</sup>	35.8
“With measures” projections for 2010 <sup>b</sup>	72.5	3.0

<sup>a</sup> Source: Denmark’s 2006 GHG inventory submission; the emissions are without LULUCF.

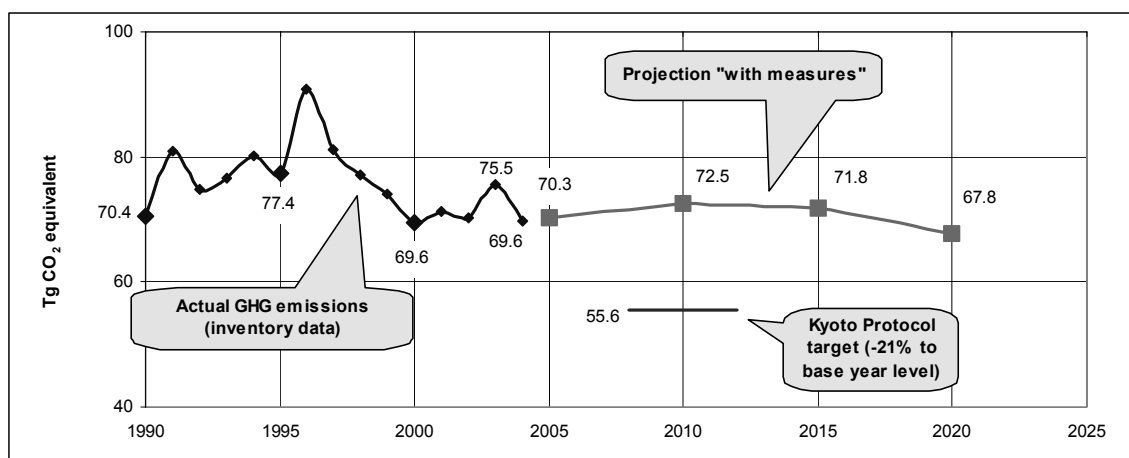
<sup>b</sup> Source: Denmark’s NC4; the projections are for GHG emissions without LULUCF.

<sup>c</sup> Source: The Effort Analysis (as referenced in the NC4).

<sup>d</sup> The most recent values for Denmark’s base year and the Kyoto Protocol target as given in the Denmark’s initial report under the Kyoto Protocol are: 70.0 Tg CO<sub>2</sub> equivalent for the base year level (consisting of 69.3 Tg for mainland Denmark and 0.7 Tg for Greenland) and 55.4 Tg CO<sub>2</sub> equivalent for the target (assuming -21 per cent, or 54.8 Tg for mainland Denmark under the EU burden-sharing agreement and -8 per cent, or 0.6 Tg for Greenland).

Note: For the abbreviations used, see annex II.

**Figure 1. Greenhouse gas emission projections for Denmark**



Source: Denmark’s NC4; the projections are for GHG emissions without LULUCF.

34. In addition to the “with measures” scenario, Denmark presents in annex B2 to the NC4 the results of projections of GHG emissions in the period 2008–2012 from the Effort Analysis study (2005). These projections were prepared in such a way as to exclude the impact of policies and measures implemented from 1990 to 2001. The results show that emissions during the period 2008–2012 would be about 15.6 Tg greater than under a scenario with these measures. However, the scenarios in the Effort Analysis are not fully comparable with the projections data in the NC4.

35. The NC4 contains consistent and comprehensive information on the projection methodologies, which are presented separately for each sector. There is continuity between Denmark’s third national communication (NC3) and its NC4 in the modelling for the energy sector as a combination of the EMMA macroeconomic model (a top-down model for calculating final energy consumption in the business and domestic sectors except for transport) with sub-models such as RAMSES (a technical/economic optimization model for projections of electricity and heat consumption in the end-user sectors) and

ADAM (for the business sector). Projections in the transport sector have been made both for traffic development and for changes in energy consumption and emission factors. The methods applied for projections in the agriculture, waste and LULUCF sectors are the same as the methods used for the national inventories; in the industry sector the emissions are projected based on emission factors and activity data assumptions and, where relevant, changes in technology. Information on key assumptions and parameters, including macroeconomic, price and demographic indicators, is presented comprehensively.

36. The NC4 “with measures” projection for the period 2008–2012 is lower by more than 7 Tg CO<sub>2</sub> than the earlier projection developed within the framework of the Climate Strategy (2003). The decrease is mainly due to the continuing shift towards higher use of natural gas and renewable energy sources (RES), a reduction in the export of electricity, lower emissions related to extraction in the North Sea and the termination of nitric acid production at the Kemira plant.

37. Figure 1 shows that there is still a considerable reduction deficit to be made up before Denmark can meet its Kyoto target commitment. The Danish government intends to make up this deficit by a complex package consisting of domestic measures, the EU ETS in its second phase<sup>9</sup> and the use of the flexibility mechanisms of the Kyoto Protocol (up to 4.5 Tg CO<sub>2</sub>). The projected gap between Denmark’s emissions and its Kyoto Protocol target, according to the NC4 projections, is 16.9 Tg CO<sub>2</sub> equivalent in 2010 (see figure 1) or, if credits from the Kyoto Protocol mechanisms are included, 12.4 Tg CO<sub>2</sub> equivalent.<sup>10</sup>

38. Emissions in the energy sector are projected to increase up to 2010, and then start to decrease. This trend is closely linked to the projected changes in final energy consumption, with a recognizable impact of the increasing use of RES on emissions. Emissions in the transport sector are projected to grow during the whole projection period, mainly due to high growth in CO<sub>2</sub> emissions. The sensitivity analysis shows that sizeable additional reductions in CO<sub>2</sub> emissions can be stimulated only with relatively high prices for oil, gas, coal and CO<sub>2</sub> allowances.

39. Total emissions of CO<sub>2</sub> are projected to grow up to 2015 following the increases in the energy sector and industrial processes. Total CH<sub>4</sub> and N<sub>2</sub>O emissions are expected to decrease, with greater reductions for N<sub>2</sub>O (by 35 per cent in 2010 compared to the 1990 level) than for CH<sub>4</sub> (by 7 per cent). Emissions of F-gases from industrial processes will decrease from 2005 to 2020 by about 80 per cent as a result of stricter regulations on their use.

40. The ERT encourages Denmark to develop, for its next national communication, projections under the scenario “with additional measures” as this will help to identify the contribution additional policies and measures could make to filling in the estimated gap between emissions and the Kyoto Protocol target.

## 2. Total effect of policies and measures

41. Denmark has described its policies and measures very comprehensively in the NC4, but the ERT believes that quantitative estimates of the effects of policies and measures on emissions could be presented in a more transparent way. Table 5 provides an overview on the total effect of policies and measures as estimated in the Effort Analysis study and reported by Denmark in the NC4.

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<sup>9</sup> The anticipated reduction potential for the first phase is about 6 Tg CO<sub>2</sub>; estimates for the second phase are not available yet.

<sup>10</sup> As it did in its NC3, Denmark explains in the NC4 that it is seeking, within the EU, a correction of its reduction target for 2008–2012 by the amount corresponding to CO<sub>2</sub> emissions relating to electricity imports in 1990 (with an effect on the target of 5 Tg CO<sub>2</sub> per year in 2008–2012); with this correction, the gap between Denmark’s emissions and its Kyoto Protocol target would be 7.8 Tg CO<sub>2</sub>.

**Table 5. Projected effects of implemented and adopted policies and measures in 2010**

	Effect of main policies and measures implemented in the period 1990–2001 (Tg CO <sub>2</sub> equivalent)	Relative value (% of base year emissions as reported in the NC4)
Energy	11.0 / 16.0 <sup>a</sup>	15.8 / 23.0
Transport	1.7	2.4
Industry	0.4	0.6
Agriculture	1.9	2.7
Waste	0.5	0.7
Total	15.6 / 20.6 <sup>b</sup>	22.4 / 29.6

<sup>a</sup> The 16.0 Tg CO<sub>2</sub> equivalent per year reflect full effects, i.e., they include the emission reductions abroad resulting from domestic action.

<sup>b</sup> For the energy sector measures, the full reduction is specified. The Danish Energy Authority estimates that approximately 5.0 of the 20.6 Tg CO<sub>2</sub> equivalent per year will be offset by increased electricity exports based on the calculation assumptions of the climate strategy.

42. The ERT noted that projected effects of policies and measures are provided both in the policies and measures section of the NC4 and in the summary tables in the NC4 prepared as required by the UNFCCC reporting guidelines; these two sources do not appear to be fully consistent.

43. The ERT encouraged Denmark to pay particular attention to increasing the transparency of the estimates of the effects of policies and measures, and to consistency in the estimates of such effects between the section on policies and measures and the section on projections. The preparation of complete scenarios “with additional measures” and “without measures” could help considerably in estimating the effects of policies and measures in a robust manner.

#### D. Vulnerability assessment, climate change impacts and adaptation measures

44. In its NC4, Denmark provides the required information on expected impacts of climate change in the country and on adaptation options. Denmark has applied the results from regional and global calculations generated by the Danish Meteorological Institute (DMI), the Hadley Centre for Climate Prediction and Research, and the Max Planck Institute for Meteorology in Hamburg to assess its climate change impacts. The climate scenarios are the same as those used in the NC3. However, the new model studies show that climate sensitivity could be considerably greater than previously assumed. Socio-economic analyses to evaluate the impact of climate change were conducted by the National Environmental Research Institute (NERI). Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC4.

**Table 6. Summary information on vulnerability and adaptation to climate change**

Vulnerable area	Examples / comments / adaptation measures reported
Agriculture	<b>Vulnerability:</b> Agriculture can be affected by climate change; increased precipitation and higher soil temperatures in winter will lead to nutrient leaching and run-off but there are opportunities to minimize negative impacts through changes in agricultural practices <b>Adaptation:</b> Changes in cultivation practices can be implemented at short notice
Biodiversity and natural ecosystems	<b>Vulnerability:</b> Habitats and species are expected to move northwards <b>Adaptation:</b> Protection and management of Sites of Special Scientific Interest; support to agri-environmental schemes
Coastal zones	<b>Vulnerability:</b> Flooding is likely to increase as a result of rising sea levels, more intense rainfall and possibly increased incidence of storms <b>Adaptation:</b> Flood defence measures, land-use planning
Drought	<b>Vulnerability:</b> Rural areas will experience longer periods without precipitation <b>Adaptation:</b> Increased irrigation
Marine ecosystems	<b>Vulnerability:</b> Changes in wind and decrease in nutrients due to run-off will deplete commercial fish stocks
Forests	<b>Vulnerability:</b> Some benefit from increased CO <sub>2</sub> concentration, but a negative effect of wind, fire, pests and diseases
Human health	<b>Vulnerability:</b> Possible increase in heat-related deaths
Water resources	<b>Vulnerability:</b> Increased and more intense rainfall, and changes in the seasonal distribution of rainfall are likely <b>Adaptation:</b> Water resource management, efficient use of water

45. The most recent Danish Environmental Protection Agency (EPA) report further supports the information given in the NC3 that climate impacts in Denmark are expected to be moderate and could be

countered by suitable ongoing adaptation. However, forest trees and the flora and fauna show only limited ability to adapt to changes in temperature, precipitation and wind effects. Norway spruce, which makes up approximately 28 per cent of the area covered by vegetation, also has difficulty in adapting in periods of warmer winters and increased precipitation. A large interdisciplinary research project is now being funded by the Danish government to assess the impact of climate change on both freshwater and marine ecosystems. Higher temperatures could also increase the risks of pests.

46. According to the NC4, Denmark could also benefit from climate change. Higher CO<sub>2</sub> and longer growing seasons may increase forest increment; and higher temperatures may increase agricultural production, and lead to lower energy consumption. Increased wind speed will increase electricity generation by wind turbines and increased precipitation will help generate more hydroelectric energy in the neighbouring Nordic countries, possibly reducing the need to generate electricity in Denmark for export.

47. Adaptation for the forestry sector takes the form of continuous efforts to shift forests to their natural form and focus on genetic biodiversity in the selection of tree species and plant material. The ERT noted that the adaptation measure considered for coastal protection in the NC3 (dyke maintenance) is no longer a preferred one for Denmark. The long-term solution is to provide space for rivers to allow flood plains to flood regularly. This is supported through the EU agricultural subsidy schemes.

48. Denmark has used general evaluations to describe the impacts of climate change in Greenland and the Faroe Islands. The recent report<sup>11</sup> on the Arctic Climate Impact Assessment shows that climate changes in the Arctic will be more severe than anywhere else on earth. Snow cover is cited as extremely important for the general conditions of life for many plants and animals. Polar bears and Arctic birds will face extinction while more plants will grow in areas that were previously under permafrost. Melting glaciers could have a negative effect on tourism in Greenland but communication conditions would improve, enabling boats to call at many towns and settlements. In the Faroe Islands, warmer deep water could lead to the migration and death of many fish species.

### E. Financial resources and transfer of technologies

49. The chapter on the financial mechanisms and transfer of technology is comprehensive and generally in compliance with the UNFCCC reporting guidelines, and measures taken to give effect to the commitments under Article 4, paragraphs 3, 4 and 5, of the Convention are presented in sufficient detail. Table 7 contains summary information on the financial resources provided by Denmark.

**Table 7. Summary information on financial resources**

Official development assistance (ODA)	DKK 12 billion (0.84% of GNI) in 2004
Climate-related support programmes	Partnership Facility Programme; Danish sector programme support to the energy sector; South Pacific Regional Environment Programme
Contributions to GEF (USD million )	USD 109.36 million as of June 2004 (OECD)
Pledge for third GEF replenishment	USD 335.44 million as of June 2003 (OECD)
Jl and CDM under the Kyoto Protocol	Allocated DKK 1,130 million for purchasing CO <sub>2</sub> credits from Jl and CDM projects in 2003–2008
Other (bilateral/multilateral)	Separate budget item for special environmental assistance under section 06(3) of the Finance Act; contribution to Least Developed Countries Fund; assistance to small island developing States; Danish International Development Assistance Sector Programme

#### 1. Financial resources

50. Denmark has reported information on the assistance provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change towards meeting the costs of

<sup>11</sup> Available at <<http://www.acia.uaf.edu/>>.

adaptation.<sup>12</sup> For example, a grant of DKK 11 million to a regional project for 14 island States in the Pacific in 2003 and a financial contribution of DKK 11.4 million to the Least Developed Countries Fund (LDCF) are reported. Furthermore, Denmark has reported on other financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels for the period 2000–2004.

51. In the NC4, Denmark reports that in the year 2004 development assistance of about DKK 12 billion, corresponding to 0.84 per cent of gross national income (GNI), was provided with the overall goal of promoting sustainable development through economic growth oriented towards the eradication of poverty. Denmark emphasizes that development cooperation should contribute to meeting the Millennium Development Goals by 2015. Denmark has also reported that official development assistance (ODA) of at least 0.8 per cent of GNI would be granted for the years to come, which will make Denmark one of the few developed countries to attain the indicative United Nations ODA target of 0.7 per cent of GNI.

52. Denmark has included in the NC4 a chapter on new and additional assistance funds, which covers the funds made available for environmental action both from section 06(3) of the Finance Act and from a special Environment, Peace and Stability Fund (MIFRESTA) until 2003, and from 2004 onwards with a separate budget item for special environmental assistance under section 06(3) of the Finance Act. Nevertheless, Denmark has not provided its definition of “new and additional” funding, the reason being methodological problems in determining what is additional. While recognizing the methodological problems involved, the ERT recommends that Denmark provide this definition in its next national communication, as required by the UNFCCC reporting guidelines.

## 2. Transfer of technology

53. In the NC4, Denmark has reported on its support to technology transfer in relation to the implementation of a broad spectrum of activities, such as both “soft” and “hard” technology transfer. It also reports that to a considerable extent technology transfer cannot be separated from other development cooperation activities supported by Denmark. Denmark cites sector programme support to the energy sector in Mozambique, Burkina Faso, Egypt, Nepal and Malaysia as the most important examples of Danish-supported activities leading to the transfer of technology, and also reports that quite often there is no clear dividing line between soft and hard technology. The CDM has been identified as an efficient approach for developing, applying and disseminating environment-friendly technologies, know-how, and procedures and processes that can influence climate change.

54. The ERT noted with appreciation eight examples reported with respect to programmes/projects to advance and/or finance the transfer of technologies to other countries (annex F to the NC4). To further improve the quality of its reporting, the Party might also consider reporting specifically on success and failure stories in the same table (table 6 of the UNFCCC reporting guidelines).

55. Denmark has reported on a private-sector programme, an industrial fund for developing countries and partnership facility programme, and measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies through involvement of the private sector.

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<sup>12</sup> The ERT noted that section 7.5 of the NC4 makes a reference (see page 227) to section 7.1.1, which does not exist. During the in-depth review, Denmark clarified that the reference should read “7.2”. Denmark also clarified that the Danish Action Programme on Climate and Development, mentioned in the NC4, is the title of the Danish follow-up to the action plan to integrate climate issues into development cooperation adopted by the EU in 2004.

## **F. Research and systematic observation**

56. Denmark has provided information on its actions relating to research and systematic observation, and addressed both domestic and international activities, including the World Climate Programme, the Global Climate Observing System (GCOS), and the activities of the Intergovernmental Panel on Climate Change (IPCC). Denmark has several institutions involved in its activities relating to research and systematic observations, and participates actively in the work of the IPCC.

57. Under the World Meteorological Organization (WMO) programmes and sub-programmes the DMI carries out systematic atmospheric and oceanic observations through the operation of approximately 200 automatic measuring stations in Denmark, Greenland and the Faroe Islands. The NERI monitors the effect of climate change on nature and the environment. In 2001, Denmark provided DKK 114 million for climate-related research but has since reduced its funding.

58. The ERT noted numerous ongoing research activities in Denmark. The DMI is currently improving models for describing the thinning of the stratospheric layer and working on studies of the processes in the tropical tropopause that control water vapour entering the stratosphere, as well as on models for assessing the impact of aviation on climate. At Odense University, research is ongoing on the stability of the climate system, the role of the oceans in the climate system, and the chemical and biological development of the atmosphere and the oceans. The NERI is carrying out research studies on the effect of climate change in Greenland and on the effect of climate change on biodiversity and the functioning of the soil environment. Energy research and development are supported by Public Service Obligation (PSO) funds.

59. Denmark continues to contribute to a wide range of international projects such as Climate and Cryosphere (CliC), Climate Variability and Predictability (CLIVAR), the Global Energy and Water Cycle Experiment (GEWEX), Stratospheric Processes and their Role in Climate (SPARC) and the World Ocean Circulation Experiment (WOCE).

60. The NC4 also reflects action taken to support related capacity-building in developing countries. From 1997 to 2004, the DMI provided assistance to Ghana to re-establish a network of approximately 300 meteorological stations. Another project provided Ghana with the capacity to use climatic seasonal forecasts to improve cultivation strategies for crops in West Africa. The ERT noted that a project proposal by Niger on the use of satellite data and the preparation of seasonal forecasts could not be approved because of the lack of funds.

61. Denmark participates fully in the GCOS Surface Network (GSN) and the GCOS Upper Air Network (GUAN). The seven designated GSN stations in Denmark, Greenland and the Faroe Islands meet the standard for surface observations. The only GUAN station designated to Denmark is installed in Greenland.

62. While appreciating the amount and quality of the information reported, the ERT noted that this section of the national communication could be made more readable by better structuring, using the headings suggested in the UNFCCC reporting guidelines.

## **G. Education, training and public awareness**

63. In its NC4, Denmark has reported its actions relating to education, training and public awareness, as required by the UNFCCC reporting guidelines (paragraph 65), with the exception of reporting, where feasible, on the extent of public participation in the preparation or domestic review of the national communication. The ERT recommends that Denmark provide this information in its next national communication.

64. Denmark has reported that domestic education and training on climate change are taking place mainly through Internet websites with educational and training materials on the science of climate,

climate change and its related issues, and, in some cases, the environment in general. Those websites are primarily hosted by the Danish EPA and some other government agencies, and by non-governmental organizations (NGOs). The education and training programmes also include regular doctorate and master's level programmes in the Copenhagen Global Change Initiative and the University of Aarhus, respectively, which focus on climate change and its related issues. Denmark also educates and trains students through special science training programmes in the university holidays and essays on environmental issues, including the leaflet "Adapting to the Climate of the Future". The DMI/Danish Climate Centre disseminates information on climate to the general public through its website, public lectures and printed materials.

65. Denmark has reported on the initiatives it is carrying out or has carried out to promote environmentally sound practices in energy use in companies and households, which is linked to the climate change problem. Some of the programmes cited in the NC4 on public awareness are We Bicycle to Work, Green Transport Week, and Environmental Traffic Week. Denmark has also reported on its participation in international climate activities.

### **III. Evaluation of information contained in the report demonstrating progress and of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol**

#### **A. Information contained in the report demonstrating progress**

66. Denmark's RDP includes five chapters, based on the information provided in the NC4, which contain most of the information required by decisions 22/CP.7 and 25/CP.8. The ERT found the information contained in the RDP to be consistent with that provided in the NC4.

67. Denmark implemented various domestic policies and measures over the period 1990–2003 aimed to promote the transition to a low-carbon economy and a reduction in GHG emissions. These efforts included the switch from coal to natural gas at power plants, increased generation efficiency with CHP co-generation, and the use of subsidies as incentives to increase the share of biomass and other renewables in energy production (particularly wind power), the use of biodiesel and biogas capture. CO<sub>2</sub> emissions per capita have thus declined over the years, despite the growth in gross domestic product (GDP) – by over 30 per cent during the period 1990–2003. Denmark has supported most of its emission reduction programmes by various acts and regulations but predominantly through fiscal policies (taxes).

68. Denmark adopted a national Climate Strategy (2003) for the period 2003–2008, followed by sector-specific strategies with concrete measures such as the waste strategy (2003), the energy strategy 2025 (2005), and strengthened energy-saving efforts (2005). As part of the Climate Strategy the national Climate Committee was set up in 2005 to monitor progress towards meeting Denmark's commitment under the Kyoto Protocol. To support the implementation of the EU ETS and the Kyoto Protocol mechanisms, the Danish EPA has been appointed as the national allowances registry under the EU ETS, and will also act as the national registry under the Kyoto Protocol, while the Ministry of the Environment has responsibility for oversight of JI activities and the Ministry of Foreign Affairs has been selected as the coordinator of the CDM.

69. Denmark's quantified emissions reduction target under the EU burden-sharing agreement is 21 per cent (14.8 Tg CO<sub>2</sub> equivalent) below the base year (1990) level. The Party's analysis of emissions trends and its projections to measure progress indicate that under the "with measures" scenario the gap between emissions and the target during the commitment period is projected as 16.9 Tg CO<sub>2</sub> equivalent per year (without any adjustment of base year (1990) emissions to account for carbon-intensive electricity exports).



70. Denmark is optimistic that the use of the Kyoto Protocol mechanisms (the CDM and the JI) and of the EU ETS will provide more cost-effective options for GHG emission reductions than domestic action, and will enhance Denmark's chances of meeting its commitment. The expected emission reductions under the first phase of the EU ETS is 6 Tg CO<sub>2</sub> equivalent annually in 2005–2007, but the reductions during the commitment period would be assessed only in January 2007 as part of the second national allocation plan for the EU ETS. The purchase of emission reduction units from JI and CDM projects is estimated to provide 4.5 Tg CO<sub>2</sub> equivalent annually during the period 2008–2012.

71. Denmark intends to use removal units from the country's sink in the LULUCF sector to reduce the gap to the Kyoto Protocol target. Denmark's forests and sinks management is based on the country's declaration of intent in 1989 to double the forested areas within 100 years. Denmark has subsequently pursued policies and measures for afforestation and reforestation programmes, which have yielded about 12,000 hectares (on privately owned lands), 600 hectares of afforested land from unsubsidised private afforestation, and 6,400 hectares of public projects. The preliminary estimates of removals under Article 3, paragraph 3 of the Kyoto Protocol is 0.262 Tg CO<sub>2</sub> equivalent in 2010. The Danish Government has therefore elected to also account for forest management, cropland management and grazing land management activities under Article 3, paragraph 4, of the Kyoto Protocol. The contribution towards fulfilling its reduction commitment will be estimated in Denmark's second National Allocation Plan for the EU ETS, which is planned to be published in January 2007. Considering the size of the gap to the Kyoto Protocol target and the probable effects of the additional measures, meeting the Kyoto Protocol target may be a challenge for Denmark.

#### **B. Supplementary information under Article 7, paragraph 2, of the Kyoto Protocol**

72. Denmark has provided most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC4 and RDP. This information reflects the steps taken by Denmark to implement the relevant provisions of the Kyoto Protocol. The supplementary information is placed in different sections of the NC4 and the RDP. Table 8 provides a summary and references to the NC4 and RDP chapters in which supplementary information is provided.

73. The ERT noted that the national legislative arrangements and administrative procedures relating to the implementation of activities under Article 3, paragraph 3, of the Kyoto Protocol have not been fully described; this should be addressed in Denmark's next national communication.

74. Denmark has reported only limited information (see section 4.6.5 of the NC4) on what efforts it is making to implement policies and measures in such a way as to minimize adverse effects, including the effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT suggests that Denmark include more information on this in its next national communication.

**Table 8. Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol**

Supplementary Information	Reference	Reported activities
National systems under Article 5, paragraph 1	NC4, pp. 79–82	National systems for GHG inventories described; detailed information is also provided in the 2006 NIR
National registry	RDP, p. 23; NC4, p. 157, NC4, annex D2	National allowances registry established pursuant to the CO <sub>2</sub> Allowances Act, no. 493 of 9 June 2004, under the EU ETS; and Statutory Order no. 1305, December 2004, appoints Danish EPA to act as the national registry under the EU ETS and the Kyoto Protocol. The United Kingdom's GRETA system adopted for EU allowances and international emissions trading under the Kyoto Protocol
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	NC4, p. 158; RDP, p. 23; NC4, annex C	Participation in EU ETS; use of Kyoto mechanisms (JI, CDM) as the most cost-effective options relative to benchmarks of domestic action; resources allocated to finance JI and CDM projects
Article 3, paragraphs 3 and 4	NC4, p. 242; RDP, pp. 34–35	NERI and Forest and Landscape Denmark are responsible for quantifying how forestry and changes in land use in relation to forests affect the forest ecosystems' carbon sinks; Denmark reports emissions under Article 3, paragraph 3, in the national GHG inventory but has not indicated its election or not of activities under Article 3, paragraph 4
Policies and measures in accordance with Article 2	RDP, pp. 25-39; NC4, pp. 109–147; NC4, annex B1 and B2	Evaluation of actual and projected emission reductions by measures (in energy supply, transport, business sector, fisheries, domestic, LULUCF, waste and waste water)
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	NC4, annex B1; NC4, pp. 24–25; RDP, pp. 30–34	Summary national instruments (regulatory, fiscal (taxes), economic, and negotiated agreements, rules, bans, directives, obligations); CO <sub>2</sub> Allowances Act under the EU ETS and Statutory Order No. 1305, December 2004
Information under Article 10	NC4, pp. 231–248, 251–254; RDP, p. 69 RDP, annex G, H	Scientific and technical cooperation, participation in the United Nations global observing systems, capacity-building, and contribution to adaptation in developing countries, information, awareness raising, and education
Information under Article 11	RDP, p. 69; NC4, pp. 78–82; NC4, annex F	Financial assistance and technology transfer to developing countries

## IV. Conclusions

75. The Kingdom of Denmark, which comprises Denmark, Greenland and the Faroe Islands, is a constitutional monarchy within which Greenland and the Faroe Islands are self-governing. Denmark has a population of 5.4 million and a total area of 43,000 km<sup>2</sup>. More than 66 per cent of the area is used for agricultural purposes, 11 per cent is forested, 10 per cent is occupied by towns, roads, and scattered houses, and the remaining 13 per cent consists of natural areas (lakes, marshes, bogs, dunes, beaches, moors and streams). Denmark has a temperate marine climate with mild, damp winters and cool, unsettled summers, and precipitation is evenly distributed over the year. The economy has been growing since 1993 at a rate of 2.7 per cent per year. In 2003, Denmark's GDP was DKK 1,400 billion, corresponding to DKK 260,000 per capita. The economy is open and sensitive to exports, which account for a substantial share of GDP.

76. Denmark has a national climate policy and it has put in place a comprehensive package of policies and measures to mitigate GHG emissions. Among the domestic measures, taxation plays a particularly important role; among the EU-wide measures, the implementation of the EU ETS is most prominent in terms of the projected impact on GHG emissions. As a result of extensive cost studies, Denmark has come to the conclusion that its domestic cost-effective options for emission reductions are limited at present.

77. In 2004, GHG emissions in Denmark (excluding LULUCF) were about 1.1 per cent below the 1990 level. In the NC4 and its RDP, Denmark presents GHG projections for the period 2004–2030. Only a “with measures” scenario (including the effect of currently implemented and adopted policies and measures) has been modelled. The projected GHG emissions under that scenario in 2010 are 3.0 per cent above the base year level, whereas, under the EU burden-sharing agreement for the Kyoto Protocol,

Denmark's target is a 21.0 per cent reduction. The gap between emissions and the target during the first commitment period is projected as 16.9 Tg CO<sub>2</sub> equivalent per year. This indicates that meeting the Kyoto Protocol target may be a challenge for Denmark, and measures to meet the target may need to be strengthened. Currently, Denmark considers the EU ETS in the second phase and the use of the flexibility mechanisms under the Kyoto Protocol (about 4.5 Tg CO<sub>2</sub> equivalent per year) as the most important additional measures to close the gap.

78. In the course of the IDR, the ERT formulated a number of recommendations relating to the completeness and transparency of Denmark's reporting under the UNFCCC and the Kyoto Protocol. The key recommendations<sup>13</sup> are that Denmark, in its next national communication:

- Provide more information on how its policies and measures are modifying longer-term trends in anthropogenic GHG emissions and removals consistent with the objective of the Convention;
- Adhere more closely to the UNFCCC reporting guidelines when reporting on policies and measures;
- Pay particular attention to the selection of those policies and measures for which the mitigation effect should be analysed in detail, so that the only the most significant ones would be evaluated;
- Give a full description of its national legislative arrangements and administrative procedures relating to the implementation of activities under Article 3, paragraph 3, of the Kyoto Protocol.

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<sup>13</sup> For a complete list of recommendations, the relevant sections of this report should be consulted.

Annex I

**Documents and information used during the review**

**A. Reference documents**

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UNFCCC. Report on the in-depth review of the third national communication of Denmark. FCCC/IDR.3/DNK. Available at <<http://unfccc.int/resource/docs/idr/dnk03.pdf>>.

UNFCCC. Synthesis of reports demonstrating progress in accordance with Article 3, paragraph 2, of the Kyoto Protocol. FCCC/SBI/2006/INF.2. Available at <<http://unfccc.int/resource/docs/2006/sbi/eng/inf02.pdf>>.

UNFCCC. Report of the individual review of the greenhouse gas inventory of Denmark submitted in the year 2005. FCCC/ARR/2005/GBR. Available at <<http://unfccc.int/resource/docs/2006/arr/dnk.pdf>>.

Danish Ministry of the Environment, Environmental Protection Agency. Denmark's Fourth National Communication under the United Nations Framework Convention on Climate Change. Available at <<http://unfccc.int/resource/docs/natc/dennc4.pdf>>.

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The 2006 GHG inventory submission of Denmark. Available at <[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/3734.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php)>.

**B. Additional information provided by the Party**

Responses to questions during the review were received from Mr. Erik Rasmussen, Senior Advisor, Danish Environmental Protection Agency, Danish Ministry of the Environment.

Annex II**Acronyms and abbreviations**

CDM	clean development mechanism	kg	kilogram (1 kg = 1 thousand grams)
CH <sub>4</sub>	methane	kWh	kilowatt hour
CHP	combined heat and power	JI	joint implementation
CO <sub>2</sub>	carbon dioxide	LULUCF	land use, land-use change and forestry
CO <sub>2</sub> eq	carbon dioxide equivalent	Mg	megagram (1 Mg = 1 tonne)
CRF	common reporting format	mg	milligram (1000 mg = 1 gram)
DKK	Danish krone/kroner	Mtoe	millions of tonnes of oil equivalent
DMI	Danish Meteorological Institute	N <sub>2</sub> O	nitrous oxide
EC	European Community	NC3	third national communication
EPA	Environmental Protection Agency	NC4	fourth national communication
ERT	expert review team	NERI	National Environmental Research Institute
ETS	emissions trading scheme	NGO	non-governmental organization
EU	European Union	NIR	national inventory report
EUR	euro (€)	ODA	official development assistance
F-gas	fluorinated gas	OECD	Organisation for Economic Co-operation and Development
GCOS	Global Climate Observing System	PFCs	perfluorocarbons
GDP	gross domestic product	PPP	purchasing power parities
GEF	Global Environment Facility	RDP	Report demonstrating progress under the Kyoto Protocol
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the weighted sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF	RES	renewable energy sources
GNI	gross national income	SF <sub>6</sub>	sulphur hexafluoride
GWP	global warming potential	SO <sub>2</sub>	sulphur dioxide
HFCs	hydrofluorocarbons	Tg	teragram (1 Tg = 1 million tonnes)
IDR	in-depth review	toe	tonnes of oil equivalent
IEA	International Energy Agency	TPES	total primary energy supply
IPCC	Intergovernmental Panel on Climate Change	UNFCCC	United Nations Framework Convention on Climate Change
IPPC	Integrated Pollution Prevention and Control	USD	United States dollar
ISO	International Organization for Standardization		

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