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Report of the in-depth review of the fifth national communication of Canada

Parties included in Annex I to the Convention are requested, in accordance with decision 10/CP.13, to submit a fifth national communication to the secretariat by 1 January 2010. In accordance with decision 8/CMP.3, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their fifth national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This report presents the results of the in-depth review of the fifth national communication of Canada conducted by an expert review team in accordance with the relevant provisions of the Convention and Article 8 of the Kyoto Protocol.

Contents

I. Introduction and summary

A. Introduction

1. For Canada, the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Under the Kyoto Protocol, Canada committed itself to reducing its greenhouse gas (GHG) emissions by 6 per cent compared with the base year[1] level during the first commitment period from 2008 to 2012.

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of Canada, coordinated by the UNFCCC secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 16 to 21 of May 2011 in Ottawa, Canada, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Amit Garg (India), Mr. Niklas Höhne (Germany), Ms. Suvi Monni (Finland) and Mr. Eric Mugurusi (United Republic of Tanzania). Mr. Garg and Mr. Höhne were the lead reviewers. The review was coordinated by Ms. Barbara Muik (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each section of the NC5. The ERT also evaluated the supplementary information provided by Canada as a part of the NC5 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by Canada in its 2010 annual submission and elaborated on further in its 2011 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

4. In accordance with decision 22/CMP.1, a draft version of this report was communicated to the Government of Canada, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Summary

5. The ERT noted that Canada's NC5 complies in general with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines). As required by decision 15/CMP.1, supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol[2] is provided in the NC5. Canada considered most recommendations provided in the review report of the fourth national communication of Canada.[3] The ERT commended Canada for its improved reporting in many sections.

6. The supplementary information on the minimization of adverse impacts referred to in paragraph 3 above was generally complete and broadly transparent and was provided on time. During the review, Canada provided further relevant information.

[1] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

[2] Decision 15/CMP.1, annex, chapter II.

[3] FCCC/IDR.4/CAN.

1. Completeness

7. The NC5 covers all sections required by the UNFCCC reporting guidelines, and most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol, except for information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 (see para. 90); information on its domestic and regional legislative arrangements and enforcement and administrative procedures established pursuant to the implementation of the Kyoto Protocol (see para. 32); and a description of legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, also contribute to the conservation of biodiversity and the sustainable use of natural resources (see para. 19). The NC5 does not include some information required by the UNFCCC reporting guidelines on national circumstances for the agriculture and forestry sectors (see para. 11); on policies and measures (PaMs) in tabular format by gas; PaMs in agriculture, forestry and waste sectors both in textual and tabular formats (see para. 26); information on how Canada believes its PaMs are modifying longer term trends in anthropogenic GHG emissions (see para. 27); projections on a sectoral and gas-by-gas basis; relevant information on factors and activities by sector for the years 1990–2020 (see para. 75); and a clear distinction between activities related to technology transfer undertaken by the public sector and those undertaken by the private sector (see para. 105). Further relevant information on these elements was provided by Canada during the review. The ERT recommends that Canada enhance the completeness of its reporting by providing this information in its next national communication.

2. Transparency

8. The ERT acknowledged that Canada's NC5, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol is broadly transparent. The NC5, together with the additional information and documents provided during the review, provide clear information on most aspects of the implementation of the Convention and its Kyoto Protocol. The ERT noted that the NC5 is structured following the outline contained in the annex to the UNFCCC reporting guidelines and supplementary information submitted under Article 7, paragraph 2, of the Kyoto Protocol is identifiable. In the course of the review, the ERT formulated a number of recommendations that could help Canada to further increase the transparency of its reporting with regard to PaMs (see para. 28), projections and total effects of PaMs (see para. 85), and financial resources and technology transfer (see para. 105).

3. Timeliness

9. The NC5 was submitted on 12 February 2010, after the deadline of 1 January 2010 mandated by decision 10/CP.13. Canada informed the secretariat about its difficulties with the timeliness of its national communication submission in accordance with decision 22/CMP.1, paragraph 139. The ERT noted with concern the delay in the submission of the NC5.

II. Technical assessment of the reviewed elements

A. National circumstances relevant to greenhouse gas emissions and removals, including legislative arrangements and administrative procedures

10. In its NC5, Canada has provided a concise description of its national circumstances, and has elaborated on the framework legislations and key policy documents on climate change. The NC5 also referred to the description of a national system provided in the national inventory report of the 2009 annual submission. Further technical assessment of the institutional and legislative arrangements for the coordination and implementation of PaMs are provided in chapter II.B.I of this report.

1. National circumstances

11. In its NC5, Canada has provided a description of its national circumstances, and information on how these national circumstances affect GHG emissions in Canada and how changes in national circumstances affect GHG emissions over time. However, the ERT noted that Canada did not provide the following reporting elements required by UNFCCC reporting guidelines: a description of its national circumstances for the agriculture and forestry sectors, how these national circumstances affect GHG emissions and removals in Canada, and how national circumstances and changes in national circumstances affect GHG removals over time. Information on these areas was provided by Canada during the review. The ERT recommends that Canada elaborate further on its national circumstances by including the above mentioned sectoral information in its next national communication.

12. The ERT notes that historically the main drivers of emission trends in Canada include population increase mainly due to immigration, a strong growth in energy production for exports, including the upstream oil and gas industry (mainly oil from oil sands, the production of which is more energy intensive than that from conventional sources) and heavy oil and bitumen upgrading and increasing road transport levels. In addition, annual variations in precipitation and temperature affected emission levels. The economy of Canada is dominated by primary industry, for example, mining, and energy intensive industrial sectors. Also, Canada is a major exporter of energy, mainly to the United States of America. Altogether, this leads to very high per capita emissions, albeit 78 per cent of Canada's electricity is produced by non-GHG emitting sources, and on this indicator, Canada ranks among the top of industrialized countries.

13. To explain how its national circumstances are relevant to factors affecting GHG emissions, the ERT encourages Canada to report in more detail on per capita trends such as energy consumption and production, electricity consumption, GHG emissions and gross domestic product (GDP); and on energy intensity of the economy (i.e. total primary energy supply (TPES) per GDP) and the GHG intensity of TPES. The ERT also encourages Canada to provide a comparison with disaggregated indicators of other Parties with similar national circumstances to improve the transparency of reporting and to enhance understanding of the impacts of Canada's national circumstances on its GHG emissions. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

14. Canada is a parliamentary democracy with a federal structure, consisting of provinces and territories. The Constitution Act of 1867 sets out federal and provincial legislative authorities. The Federal Government may legislate and regulate with respect to the environment, including climate change issues, but it must be linked to an appropriate constitutional federal head of power. The overall responsibility for climate change

policymaking lies with Environment Canada and a number of ministries and national institutions are involved in the implementation of the climate policy. The Kyoto Protocol Implementation Act (KPIA) expresses the will of the Parliament in 2007 that the Government proceed to implement the Kyoto Protocol. Federal, provincial and municipal levels share jurisdiction for implementing a significant part of the PaMs. Further legislative arrangements and administrative procedures, including those for the national system and the national registry are presented in chapters II.A.2, II.A.3 and II.B.

15. Canada has provided a summary of information on GHG emission trends for the period 1990–2007. This information is consistent with the 2009 national GHG inventory submission. Summary tables, including trend tables for emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) (given in the common reporting format), are also provided in an annex to the NC5 as required by the UNFCCC reporting guidelines with the exception of that for CO_2 eq. During the review, the ERT assessed the emissions data from the Party's recently submitted 2011 annual submission and has reflected the findings in this report.

Table 1
Indicators relevant to greenhouse gas emissions and removals for Canada

	1990	*1995*	*2000*	*2005*	*2008*	*Change 1990–2000 (%)*	*Change 2000–2008 (%)*	*Change 1990–2008 (%)*
Population (million)	27.69	29.30	30.69	32.25	33.33	10.8	8.6	20.4
GDP (USD 2 000 billion using PPP)	655.51	713.88	874.08	991.07	1 049.49	33.3	20.1	60.1
TPES (Mtoe)	208.68	230.91	251.44	272.34	267.24	20.5	6.3	28.1
GDP per capita (USD 2 000 thousand using PPP)	23.67	24.36	28.48	30.73	31.49	20.3	10.6	33.0
TPES per capita (toe)	7.54	7.88	8.19	8.44	8.02	8.6	–2.1	6.4
GHG emissions without LULUCF (Tg CO_2 eq)	590.42	639.61	716.09	731.44	731.73	21.3	2.2	23.9
GHG emissions with LULUCF (Tg CO_2 eq)	522.93	825.58	653.98	784.97	714.78	25.1	9.3	36.7
CO_2 emissions per capita (Mg)	16.56	16.76	18.34	17.78	17.32	10.7	–5.6	4.6
CO_2 emissions per GDP unit (kg per USD 2 000 using PPP)	0.70	0.69	0.64	0.58	0.55	–8.6	–14.1	–21.4
GHG emissions per capita (Mg CO_2 eq)	21.32	21.83	23.33	22.68	21.95	9.4	–5.9	3.0
GHG emissions per GDP unit (kg CO_2 eq per USD 2 000 using PPP)	0.90	0.90	0.82	0.74	0.70	–8.9	–14.6	–22.2

Sources: (1) GHG emissions data: Canada's 2011 greenhouse gas inventory submission; (2) Population, GDP and TPES data: International Energy Agency.

Note: 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.

Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

16. Total GHG emissions excluding emissions and removals from land use, land-use change and forestry (LULUCF) increased by 16.9 per cent between the base year and 2009, whereas total GHG emissions including net emissions or removals from LULUCF increased by 29.6 per cent over this period. This was attributed mainly to CO_2 emissions,

which had increased by 18.2 per cent. Emissions of CH_4 also increased by 26.6 per cent, while emissions of N_2O decreased by 3.8 per cent. Emissions of fluorinated gases accounted for about 1.8 per cent of total GHG emissions in 1990 and 1.4 per cent in 2009. Trends of total GHG emissions were mostly underpinned by GHG emission trends in fossil fuel industries (coal-mining and the production, transmission, processing, refining and distribution of all oil and gas products, in particular oil sands mining, extraction and upgrading activities) (+55 Tg) and in road transportation (in particular light-duty gasoline trucks) (+35 Tg). Analysis of drivers for GHG emission trends in each sector is provided in chapter II.B. Table 2 provides an overview of GHG emissions by sector from the base year to 2009.

Table 2
Greenhouse gas emissions by sector in Canada, 1990–2009

	GHG emissions (Tg CO_2 eq)						*Change (%)*		*Shares[a] by sector (%)*	
Sector	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*	*1990–2009*	*2008–2009*	*1990*	*2009*
1. Energy	467.51	507.73	586.41	594.81	597.11	566.01	21.1	–5.2	79.2	82.0
A1. Energy industries	143.03	150.07	193.45	189.18	185.35	161.47	12.9	–12.9	24.2	23.4
A2. Manufacturing industries and construction	64.53	65.53	69.47	68.78	72.61	74.95	16.1	3.2	10.9	10.9
A3. Transport	146.12	160.16	179.86	192.99	196.10	190.06	30.1	–3.1	24.7	27.5
A4.–A5. Other	71.75	76.33	80.62	80.72	80.76	78.84	9.9	–2.4	12.2	11.4
B. Fugitive emissions	42.08	55.63	63.02	63.13	62.29	60.70	44.2	–2.6	7.1	8.8
2. Industrial processes	56.75	58.86	53.50	57.21	54.51	46.31	–18.4	–15.0	9.6	6.7
3. Solvent and other product use	0.18	0.21	0.25	0.18	0.34	0.26	45.8	–23.6	0.0	0.0
4. Agriculture	46.87	52.71	55.47	57.93	58.38	55.86	19.2	–4.3	7.9	8.1
5. LULUCF	–67.48	185.97	–62.11	53.53	–16.95	–12.10	–82.1	–28.6	–11.4	–1.8
6. Waste	19.11	20.09	20.46	21.30	21.39	21.61	13.1	1.0	3.2	3.1
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GHG total with LULUCF	**522.93**	**825.58**	**653.98**	**784.97**	**714.78**	**677.95**	**29.6**	**–5.2**	**NA**	**NA**
GHG total without LULUCF	**590.42**	**639.61**	**716.09**	**731.44**	**731.73**	**690.05**	**16.9**	**–5.7**	**100.0**	**100.0**

Note: 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.

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] 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 that was offset by GHG removals through LULUCF.

17. Canada's GHG emissions rose steadily during 1990–2004, they declined marginally during 2004–2006, but increased again during 2006–2007. Since 2007, emissions have been declining mainly due to the global financial and economic crisis and its impact on Canada. Emissions from transport, the largest contributor to Canada's GHG emissions, have been increasing continuously since 1990, except for a decrease in 2008 and 2009, when emissions from both heavy-duty diesel on-road vehicles (for shipping), and off-road vehicles (for industry) fell, primarily as a result of reduced economic activity. The largest emission increase in transport can be observed in light-duty gasoline trucks or sport utility vehicles (SUVs) (21.05 Tg or a 104 per cent increase from the base year). Also, as presented by the Party during the review, GHG emissions from oil sand exploration mainly

for export, another strong contributor to Canada's GHG emission trend, has been increasing continuously (29 Tg or a 180 per cent increase from the base year). Together with emission increases from industries with intensive energy use these factors outweighed the decrease in other sectors and by far outweighed the effects of PaMs targeting energy efficiency and renewable energy.

2. National system

18. In accordance with decision 15/CMP.1, Canada provided in its NC5 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1 (decision 19/CMP.1). The Party also provided a reference to the 2009 annual submission, which contains a more detailed description of the national system. The description includes all the elements as required in decision 15/CMP.1.

19. In the NC5, Canada did not report on national legislative arrangements and administrative procedures that seek to ensure that implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contribute to the conservation of biodiversity and the sustainable use of natural resources. During the review, Canada presented information on such arrangements: the Greencover Canada Program and the Prairie Shelterbelt Program include incentives for conserving or enhancing the protection of biodiversity at the farm level; and the Canadian Boreal Initiative and the Federal Government's Habitat Conservation Program strategy contribute to the conservation of biodiversity in the forestry sector. The ERT recommends that Canada report information on the conservation of biodiversity and the sustainable use of natural resources in relation to activities under Article 3, paragraphs 3 and 4, in the next national communication.

20. During the review, Canada provided additional information on the national system, elaborating on institutional and legislative arrangements and administrative procedures for GHG inventory planning, preparation and management.

21. The ERT took note of the recommendations of the report of the individual review of the 2010 annual submission of Canada.[4] The ERT concluded that the national system continued to perform its required functions as set out in decision 19/CMP.1.

3. National registry

22. In its NC5, Canada has provided information on the national registry, including a description of how its national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and how it complies with the requirements of the technical standard for data exchange between registry systems.

23. During the review, Canada provided additional information on the measures put in place to safeguard, maintain and recover registry data, the security measures employed in the registry to prevent unauthorized manipulations, the measures put in place to protect the registry against security compromises, the test procedures related to performance of the current version of the national registry and on the recording of the changes, operational plan and administrative guide. In response to the questions raised by the ERT, Canada provided documents demonstrating how it records the changes related to the national registry and how it maintains these records. The questions posed during the review were answered directly and succinctly by Canada. The ERT noted that updates of databases and applications, implemented security measures and changes to the national registry software are documented on a regular basis by nominated responsible staff.

[4] FCCC/ARR/2010/CAN. Available at <http://unfccc.int/resource/docs/2011/arr/can.pdf>.

24. The ERT took note of the conclusion of the standard independent assessment report (SIAR) that Canada has acted on the recommendations of the previous ERT and that no further problems were identified in the SIAR.

25. The ERT concluded that Canada's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1.

B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

26. As required by the UNFCCC reporting guidelines, Canada has provided in its NC5 information on its package of PaMs implemented and adopted in order to fulfil its commitments under the Convention and its Kyoto Protocol, even though the text of the NC5 did not refer explicitly to commitments under the Kyoto Protocol. Energy and transport sectors had their own textual descriptions of the principal PaMs, whereas agriculture, forestry and waste were presented in one section together. These policy descriptions were not supplemented by summary tables on PaMs. Such a table was provided in an annex to the NC5, but was not divided by sector or by gas, and was not referred to in the main text of the NC5.

27. The ERT noted that Canada did not provide the following reporting elements required by the UNFCCC reporting guidelines: information on how it believes its PaMs are modifying longer term trends in anthropogenic GHG emissions and removals, consistent with the objective of the Convention. During the review, Canada indicated that PaMs which improve the energy efficiency of buildings have a long-term impact on GHG emissions. Some of the recommendations from the previous review were taken into consideration to improve reporting in the NC5, including recommendations to organize the chapter on PaMs along the main sectors, and to provide quantitative estimates of the effects of federal PaMs. The ERT recommends that Canada also include information on longer term trends, provide the information on PaMs by sector and gas and include sectoral tables of PaMs in accordance with the UNFCCC reporting guidelines.

28. The ERT recommends that the Party improve transparency by reporting on the PaMs promoting transportation biofuels in the transport sector rather than in the energy sector and that Canada improve completeness by reporting on PaMs in agriculture, forestry and waste sectors both in textual and tabular formats.

29. Canada provided information on PaMs at national, provincial and territorial levels. The ERT noted that the set of PaMs reported in the NC5 was significantly different from that reported in the fourth national communication (NC4), which reflects the changes in policy framework between 2006 and 2009 from a regulatory framework to a cap and trade system. In the NC4, Canada reported on the Clean Air Act (tabled in Parliament in October 2006), which represented a significant shift from the previous voluntary approach to a regulatory one by setting new regulations on all major sectors. The Clean Air Act was expected to contribute significantly to long-term reductions of air pollutants and GHG emissions in several sectors. In the NC5, Canada reported on the Turning the Corner Regulatory Framework from 2007 for industrial GHG emissions. The proposed regulations were based on emission intensity targets covering major industrial sectors, and also included an offset system and credit for early action. In 2011, the policy framework shifted again to a regulatory approach due to economic circumstances and policy developments in the United States, Canada's largest trading partner.

30. During the review, Canada explained that as a consequence of the financial and economic crisis of 2008/2009, and also due to a new administration in the United States in the same period, the Government reassessed the regulatory framework, and decided to align its approach with that of the United States where possible. As noted in the NC5, in 2008, Canada announced its commitment to develop and implement a North America-wide cap and trade system. When it became apparent in 2009–2010 that the United States would not set up such a system, the direction of climate policy in Canada changed again. Currently, the Canadian climate policy is based on a sector-by-sector regulatory approach, aligned with the approach of the United States, given the highly integrated nature of the North American economy. The ERT noted that these changes in the policy framework have slowed down the mitigation action in Canada considerably as they did not create a stable framework for mitigation action by relevant stakeholders, in particular by business. Also, earlier planned PaMs (e.g the regulatory regime for GHGs from major industrial emission sources) have not yet been fully replaced by others, thus equivalent emission reductions have not been achieved.

31. Currently, Canada's national PaMs rely largely on economic incentives for renewable energy and energy efficiency, and to some extent, on regulations for emissions from transportation and the energy efficiency requirements of products and appliances.

32. In the NC5, Canada did not report explicitly on its domestic and regional legislative arrangements and on its enforcement and administrative procedures established pursuant to the implementation of the Kyoto Protocol, in particular with regard to national strategies to meet its Kyoto Protocol target of –6 per cent compared with the base year level. During the review, the Party provided information on the KPIA. The purpose of the KPIA is to ensure that Canada meets its global climate change obligations under the Kyoto Protocol. It requires the Minister of the Environment to establish an annual Climate Change Plan for the Purposes of the Kyoto Protocol Implementation Act (Climate Change Plan) and states that the Governor in Council may make regulations regarding greenhouse gas emissions. The KPIA also requires the Commissioner of the Environment and Sustainable Development to submit to the Speaker of the House of Commons in Canada a report on progress in the implementation of the plans (see para. 40 below). The KPIA includes descriptions of the measures to be taken to ensure that Canada meet its obligations under Article 3, paragraph 1, of the Kyoto Protocol.

33. In the annex to its NC5, Canada provided a table of federal, and provincial and territorial PaMs, including estimates of the effects of federal PaMs for 2008–2012 that were based on the 2009 version of the Climate Change Plan. During the review, Canada presented estimates of the actual emission reductions for 2008 and the updated estimates for 2009–2012, based on the Climate Change Plan 2010. The ERT noted that only the effects of federal PaMs are quantified in the climate change plans under the KPIA, but according to the Party, provincial and territorial PaMs contribute equally to expected emission reductions (see para. 41). Considering the importance of provincial and territorial PaMs, the ERT encourages Canada to report on the mitigation effects of the most important provincial and territorial PaMs in addition to the federal PaMs in the next national communication, and to discuss the synergies and overlap between different federal, and provincial and territorial PaMs.

Table 3
Summary of information on policies and measures

Major policies and measures	*Examples/comments*
Policy framework and cross-sectoral measures	
Kyoto Protocol Implementation Act 2007	Legislative framework to ensure that Canada meets its commitments under the Kyoto Protocol
Clean Air and Climate Change Trust Fund	Fund trough which the Federal Government supported major mitigation projects in provinces and territories
Policies and measures by sector	
Energy	
ecoENERGY for Renewable Power (2007–2011)	Incentives for the supply of electricity from renewable sources (4.7 Mt)
ecoENERGY Retrofit (2007–2011)	Incentives for the addition of energy efficiency improvements to homes and small- to medium-sized organizations (1.72 Mt)
ecoENERGY for Buildings and Houses (2007–2011)	Construction and operation of more energy efficient buildings and houses, encouraged through for example, the adoption of more stringent building energy codes, a home energy rating system and the provision of training (1.26 Mt)
Energy efficiency standards and labelling	Energy efficiency standards in place for 44 products, those for another 11 products are imminent; 55 voluntary Energy Star high performance specifications; and 8 products subject to mandatory EnerGuide comparative labelling
Transport	
ecoFREIGHT Programme (2007–2011)	Cost shared funding and support provided to the freight industry to reduce the emissions from the freight transportation sector by reducing barriers to freight technology market penetration (1.12 Mt)
Green levy	CAD 1,000–4,000 levy applies to passenger vehicles with an average fuel consumption ≥13 L per 100 km. Payable by the manufacturer/or the importer of a new vehicle, and the importer of a used vehicle (0.17 Mt)
Fuel economy standards	Adoption of GHG standards for cars and light trucks starting from the year of manufacture 2011 in line with United States' regulations
Renewable fuels regulations	Inclusion of 5 per cent renewable fuels in gasoline (since December 2010) and 2 per cent renewable fuels in diesel and heating oil (implemented in July 2011) (0.19 Mt)
Agriculture	
Beneficial management practices	Federal and provincial funding provided incentives to farmers to adopt beneficial management practices, which, among other benefits, decrease GHG emissions and enhance soil carbon sink
Forestry	
Sustainable management practices	Mitigation is a major consideration in initiatives related to the sustainable management of forests
Zero Net Deforestation (British Columbia)	British Columbia has set a target of zero net deforestation by 2015

Major policies and measures	*Examples/comments*
Waste	
Landfill gas recovery	Provincial regulations and incentives promote the collection of landfill gas and in some cases its use for energy

Note: The greenhouse gas reduction estimates, given for some measures (in parentheses), are reductions in CO_2 or CO_2 eq for the year 2010, based on the information in the NC5 and on updated information provided during the review.

34. The ERT noted that in the NC5, the single most effective instrument was estimated to be the Clean Air and Climate Change Trust Fund, through which the Federal Government supported major projects that were expected to result in GHG emission and air pollutant reductions in the provinces and territories. The effect of this instrument was estimated to be 16 Mt CO_2 eq reductions annually in 2008–2012. During the review, the ERT noted from the Climate Change Plan 2010, that the Party considered this estimate to be unreliable. Therefore, Canada no longer estimates the effect of the fund in the same way as it was done in NC5, but instead it estimates the effects of selected individual actions supported through the fund at provincial level. However, the ERT noted that the estimates of the effects of these actions are not available for all provinces.

35. In its NC5, Canada reported the budget allocated to several PaMs, for example, the ecoENERGY for Renewable Power Program is investing CAD 1.46 billion to provide incentives to increase Canada's supply of green electricity from renewable energy sources (RES). The ERT commends Canada for this transparent approach. The ERT encourages Canada to consider further improving the completeness of its reporting by reporting additional information on the costs of the different policies, in particular of those for which budget information is not reported.

36. In its NC5 and during the review, Canada has not reported on PaMs that could potentially increase emissions. However, in its NC5, the Party reported that the 2007 budget included the phasing out of the accelerated capital cost allowance for general investment in the oil sands by 2015. The ERT considers that this capital cost allowance could be an example of such a policy as emissions from extraction of oil from non-conventional sources have increased considerably in recent years and are expected to increase in the future. The ERT reiterates the encouragement of the previous review that Canada reports on actions taken to identify and periodically update its own policies and practices, which encourage activities that lead to greater levels of anthropogenic GHG emissions than would otherwise occur, and that it provides the rationale for such actions in the next national communication. Table 3 provides a summary of the reported information on the PaMs of Canada.

1. Policy framework and cross-sectoral measures

37. Environment Canada is in charge of national and international climate policies. Several other departments are also involved in the planning and implementation of the policies in their respective fields, for example, Transport Canada is responsible for development and implementation of environmental policies in the aviation, marine and rail sectors.

38. According to the information provided by the Party during the review, provinces and territories are often better placed to take certain action on climate change due to their jurisdiction over energy and natural resources. However, the Federal Government can also pass legislation on GHG emission limitations, as the environment is a matter of shared jurisdiction. The Canadian Council of the Ministers of the Environment (CCME), which is comprised of the environment ministers in federal, provincial and territorial governments,

meets at least once a year to discuss national environmental priorities and to determine work to be carried out under the auspices of the CCME.

39. Ministers set the strategic direction for the council, and the senior officials establish working groups of experts from the federal, provincial, and territorial environmental ministries to accomplish specific goals. Based on the decisions, each of the member governments develops and implements the policies, programmes and measures. Also, other federal, territorial and provincial ministers (for example, energy and forestry ministers) have such councils.

40. Concerning the monitoring and evaluation of PaMs, during the review, the Party explained that effects of climate policies are monitored and evaluated under the KPIA through the annual Climate Change Plan, by the analysis of the climate change plans by the National Round Table on the Environment and the Economy, and at least every two years by the report of the Commissioner of the Environment and Sustainable Development. PaMs are also monitored and evaluated under departmental reporting and evaluation requirements.

41. In the NC5, provincial climate plans and policies are introduced. During the review, the ERT learned that all provinces and territories in Canada have their own climate change plans, but the degree and field of action varies between provinces and territories. During the review, the Party provided examples of effective provincial climate policies, such as the revenue-neutral carbon tax on fossil fuels in British Columbia implemented in 2008; Alberta's Industrial Regulatory System for CO_2 implemented in 2007; Ontario's feed-in tariff for RES in order to increase the RES share and to phase out coal by 2014, implemented in 2009; Quebec's carbon levy on gasoline, diesel and fossil fuels distributed or produced in the province, implemented in 2007; and Nova Scotia's GHG cap for the electricity sector implemented in 2010. According to Environment Canada, modelling of currently announced and/or implemented PaMs of provincial action will account for roughly half of Canada's projected emission reductions up to 2020.

42. The ERT noted that there are a number of effective policies at the provincial and territorial level in place, but the effort or mechanisms to coordinate these policies and/or take stock of the lessons learned from their implementation seem to be lacking, which eventually will lead to fragmentation and reduced efficiency of Canada's climate change policy.

43. Due to the high importance of provincial action, the ERT encourages Canada to improve the transparency of its reporting by providing, in the next NC, more specific information on the competence of provincial/territorial and federal governments in matters related to climate change and on institutions and mechanisms put in place to share experience and practices from the implementation of policies at the provincial/territorial level. The ERT also encourages Canada to structure its reporting of provincial PaMs by sector rather than by province and to highlight which are the most important provincial/territorial PaMs in terms of emission reduction effects.

44. In the NC5, Canada mentioned its GHG reduction target of 20 per cent below 2006 levels by 2020. During the review, the ERT learned that Canada focuses currently on its target under the Copenhagen Accord, a 17 per cent reduction by 2020 compared with the 2005 level. The ERT noted that this target is less stringent than the earlier target and implies an increase of emissions compared with the Kyoto Protocol target. The ERT also noted that Canada did not demonstrate how the combined effect of current or planned measures would lead to reaching the target (see also para. 84).

2. Policies and measures in the energy sector

45. Between 1990 and 2009, GHG emissions from the energy sector increased by 21.1 per cent (98.50 Tg CO_2 eq), mainly driven by fossil fuel industries due to increased production of unconventional crude oil and natural gas, increased transportation activities, and strong economic activity growth in the commercial and institutional sector. Emissions from fossil fuel industries increased by 51 per cent from 1990 to 2009, due to increased production levels. This includes increased production of oil from oil sands, which requires much more energy than conventional oil production. Even though the GHG intensity of oil production from oil sands has decreased considerably, the energy required is still 1.6 times that of conventional oil production.

46. Emissions from road transport increased by 36.0 per cent between 1990 and 2009. Emissions from light-duty gasoline trucks more than doubled in the same period, whereas emissions from gasoline-fuelled cars decreased. This reflects the trend towards the increasing use of SUVs, minivans and pick-up trucks for personal transportation. The increasing horsepower for all classes of passenger vehicle has in part offset the energy efficiency improvements in internal combustion engines in cars. The emissions from heavy-duty trucks also increased due to the deregulation of the haulage industry and the increased quantity shipped by road as a result of customer requirements for just-in-time delivery and increased cross-border freight. Between 1990 and 2009, emissions from electricity and heat generation increased by 6.9 per cent, emissions from manufacturing industries, construction and mining increased by 16.1 per cent and emissions from commercial and institutional subsector increased by 40.2 per cent. The emissions from the residential sector fluctuated during the same period following the fluctuating heating demand due to heating degree days.

47. ***Energy supply***. In the public electricity and heat production sector, electricity generation has increased by 27.0 per cent from 1990 to 2009. The GHG emissions have increased to a lesser extent in the same period, 6.9 per cent, due to the increased utilization of hydro and nuclear sources to produce energy, and a shift from refined petroleum products (such as heavy fuel oil or diesel) to natural gas for heat and electricity production. The use of coal is responsible for 77.0 per cent of GHG emissions from electricity generation in Canada and was roughly at the same level in 2009 as in 1990. The share of biomass and other renewables (wave and wind) in electricity generation has increased rapidly, but they still accounted for only 0.4 per cent and 1.2 per cent respectively of electricity generation in 2009.

48. During the review, the Party explained that in June 2010, the Government announced a proposed regulation for coal-fired electricity generation. The Party explained after the review week that draft regulations were released in August 2011. As a large share of current coal-fired plants are coming to the end of their life cycles, the proposed regulation will allow moving to low- or non-emitting electricity production through tight CO_2 regulations for new coal-burning power plants. The proposed regulation will include performance standards set at the emission intensity of natural gas combined cycle and incentives for carbon capture and storage, and is expected to come into effect in July 2015. It is expected to reduce emissions from coal-fired electricity generation by about 45 per cent between 2005 and 2020, whereas emissions from the electricity sector as a whole are projected to decrease by about 29 per cent during the same period.

49. ***Renewable energy sources***. Canada has set a national target to produce 90 per cent of electricity from GHG-free sources by 2020, compared with the share of 63 per cent in 2009. According to the NC5, the most important federal renewable energy PaM is the ecoENERGY for Renewable Power Program, which provides an incentive of CAD 0.01 kWh^{-1} for up to 10 years to qualifying projects to produce electricity from wind, biomass, low impact hydropower, geothermal, solar photovoltaic or ocean energy. During

the review, the Party explained that in 2008, the emission reduction effect of the programme was 1.35 Mt CO_2 eq, which is less than the expected effect reported in the NC5 of 2.2 Mt CO_2 eq. During the review, the Party informed the ERT about the expected emission reduction in 2012 of 6.0 Mt CO_2 eq.

50. The ecoENERGY for the Renewable Heat Program invests CAD 36 million over four years in incentives and industry development to support the adoption of renewable thermal technologies such as solar heating. The emission reduction effect in 2008 was projected at 0.005 Mt CO_2 eq, and during the review, the Party explained that the actual effect was 0.003 Mt CO_2 eq in 2008. The estimated emission reduction effect is 0.025 Mt CO_2 eq in 2012. Canada also supports the research, development and demonstration of clean energy technologies through the ecoENERGY Technology Initiative, and provides an accelerated capital cost allowance for equipment used to generate clean, renewable energy, fuels from waste and fossil fuels in an efficient manner.

51. At the provincial level, several PaMs are in place to promote RES, such as the feed-in tariff in Ontario, the carbon tax in British Columbia and the GHG cap for the electricity sector in Nova Scotia (see para. 41). In addition, Saskatchewan provides low interest loans to install geothermal, solar and small scale wind power electricity generating devices.

52. ***Energy efficiency***. A regulatory agenda under the Energy Efficiency Act, introduces new and tightened energy efficiency standards and the labelling of electrical appliances, which account for 80 per cent of energy use in homes and businesses in Canada. According to the Climate Change Plan 2010, the GHG reduction effect in 2008 was 0.09 Mt CO_2 eq, as estimated at the time of preparation of NC5. The updated expected reduction effect in 2012 has been reassessed from 3.55 Mt CO_2 eq to 2.99 Mt CO_2 eq in the Climate Change Plan 2010. In addition, Canada promotes energy efficiency through financial investments in buildings, transportation and industry (see below). During the review, Canada also presented education and public awareness measures that were put in place to promote energy saving.

53. ***Residential and commercial sectors***. Floor space of residential buildings has increased by 45 per cent from 1990 to 2008. At the same time, the switch by domestic and commercial users from heavy fuel oil to natural gas and improved energy efficiency has offset the emission increase due to floor space expansion. Annual variation in the heating demand (heating degree days) causes fluctuations in the emissions trend. According to the national inventory report (NIR) 2011, energy efficiency measures in new residential buildings have been encouraged through programmes such as the R-2000 Initiative and residential home improvement incentive programmes such as the EnerGuide for Homes (replaced by the ecoENERGY Retrofit Initiative in 2007, see para. 55 below). These programmes have been estimated to have led to significant reductions in GHG emissions. In total, emissions from the residential sector have decreased from 1990 to 2009 when adjusted for temperature variations. Emissions from the commercial and institutional subsector increased by 40 per cent between 1990 and 2009 due to strong economic activity growth increasing demand for energy services.

54. The ecoENERGY for Buildings and Houses Program invests CAD 60 million over four years to encourage the construction and operation of more energy efficient buildings and houses. According to the additional information provided during the review, the programme contributed to emission reductions of 0.58 Mt CO_2 eq in 2008, more than estimated in the NC5 (0.32 Mt CO_2 eq). During the review, the Party informed the ERT about the expected emission reduction in 2012 of 1.81 Mt CO_2 eq.

55. The ecoENERGY Retrofit Initiative provides incentives for energy efficiency improvements in homes and in small and medium-sized organizations in the institutional, commercial and industrial sectors. The total budget was CAD 805 million over 5 years, and

it yielded emission reductions of 0.39 Mt CO_2 eq in 2008, less than estimated in NC5 (0.46 Mt CO_2 eq). During the review, the Party informed the ERT about the expected emission reduction in 2012 of 1.94 Mt CO_2 eq.

56. ***Transport sector***. A regulation to establish a minimum average renewable fuel content level of 5 per cent in the gasoline pool came into effect on 15 December 2010, and a 2 per cent average renewable fuel content in the diesel pool came into effect 1 July 2011. During the review, the Party explained that the use of biofuels in transportation is also promoted by supporting the expansion of the Canadian production of renewable fuels (ecoENERGY for Biofuels Program) and by accelerating the commercialization of new technologies (Sustainable Development Technology Canada Next-Gen Biofuels Fund). During the review, the Party explained that this PaM is expected to reduce GHG emissions by 2.01 Mt CO_2 eq in 2012. A green levy is imposed on passenger vehicles with an average fuel consumption rating greater than or equal to 13 L per 100 km. The estimated emission reduction effect is, according to the NC5, 0.23 Mt CO_2 eq in 2012. There are also other PaMs, including information measures (ecoENERGY for Personal Vehicles); and investment programmes targeted at reducing emissions from urban transportation (ecoMOBILITY) and measures to promote the scrappage of old vehicles and the purchase of energy efficient passenger cars. In 2011, Canada implemented new GHG emission standards for passenger cars and light-duty trucks, that align with the United States' Department of Transportation fuel-economy standards for 2011 model years and align with the United States' Environmental Protection Agency GHG performance standards for 2012 and later model years. New, more stringent standards are planned for post-2016 model years. Canada is also developing common North American standards for heavy-duty vehicle GHG emissions. Another investment programme is the EcoFREIGHT Program which aims to reduce the GHG emissions from freight transport through improved technology. The estimated GHG reduction effect in 2012 is 1.4 Mt CO_2 eq according to NC5.

57. Canada reports on how it promotes the decisions of the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) to reduce GHG emissions. To reduce emissions from aviation, in 2005, Canada negotiated with its domestic air carriers a memorandum of understanding, in which the air carriers committed to achieve a 24 per cent cumulative improvement in fuel efficiency between 1990 and 2012. During the review, the Party explained that this target had already been achieved: fuel efficiency in the domestic aviation industry improved by 29 per cent in 2008 compared with 1990 levels.

58. ***Industrial sector***. Emissions from manufacturing industries and construction, including mining, increased by 16.1 per cent between 1990 and 2009. In particular, emissions from mining increased by 371 per cent due to a large increase in unconventional oil extraction, for example oil sands mining.

59. According to the review report of the NC4, Canada had planned a comprehensive regulatory regime for GHGs from major industrial emission sources. The preliminary estimate of the expected emission reduction effect was 46.6 Mt CO_2 eq in 2010. During the review, Canada explained that the plan was not implemented due to the change in policy direction (see paras. 29 and 30).

60. Energy efficiency in the industry sector is promoted by the ecoENERGY for Industry Program, which invests CAD 18 million over four years to accelerate energy saving investments and the exchange of best practice information. During the review, the Party explained that the emission reduction effect was 0.64 Mt CO_2 in 2008, notably more than estimated in NC5 (0.17 Mt), and that the expected emission reduction effect is 1.54 Mt CO_2 eq in 2012. The Pulp and Paper Green Transformation Program was announced in June 2009, and was therefore not included in the NC5. The programme has a CAD 1 billion

budget for approved capital projects at Canadian pulp and paper mills for areas such as renewable energy and energy efficiency. The Party explained during the review that although the programme was not designed to reduce GHG emissions specifically, it is expected to reduce emissions by 1.09 Mt CO_2 in 2012.

61. The ERT noted that the estimated GHG reduction effect of current policies are considerably smaller than those estimated previously for the industrial regulations that were considered in the calculations but eventually did not enter into force. During the review, the Party explained that the Government is considering new measures to address emissions from key industrial sectors, including the oil and gas sector. In this sector, GHG emissions are forecast to increase due to the increased use of oil sands and the Government plans to consider performance standards to address these emissions.

62. The ERT noted during the review that all ecoENERGY programmes were on hold since March 2011. After the review week, the Party explained that the programmes were renewed in the most recent federal budget.

3. Policies and measures in other sectors

63. Between 1990 and 2009, GHG emissions from industrial processes (including solvent and other product use), agriculture and waste increased by a total of 0.9 per cent (1.14 Tg), driven mainly by a decrease in the industrial processes sector (18.4 per cent or 10.44 Tg), compensated by an increase in the agriculture sector (19.2 per cent or 8.99 Tg).

64. ***Industrial processes***. Between 1990 and 2009, GHG emissions from the industrial processes sector decreased by 18.4 per cent (10.44 Tg), driven mainly by the decrease in metal production. CO_2 emissions from iron and steel production decreased, despite increases in steel production, due to an increased use of recycled steel. Aluminium production almost doubled but emissions declined by 22.3 per cent due to emission controls applied to electrolytic production processes and to the prevention of anode effects. Emissions from chemical industries decreased due to the introduction of N_2O abatement technologies in an adipic acid plant, and due to its closure in 2009. During the review, the Party explained that these emission reductions were due to economic drivers rather than PaMs. These emission reductions were offset partly by the increasing emissions from production and consumption of halocarbons. The ERT noted that Canada does not have PaMs in place in the industrial processes sector, but the Party has indicated that they are moving forward to develop regulatory measures for major-emitting industrial sectors.

65. ***Agriculture***. Between 1990 and 2009, GHG emissions from the agriculture sector increased by 19.2 per cent (9.0 Tg), driven mainly by growing numbers of beef cattle, swine and poultry, and increases in the application of nitrogen fertilizers in prairies. During the review, the Party explained that increased use of nitrogen fertilization was due to the reduction in the practice of summer fallow in the prairie region. As summer fallow area declined, the area of crops produced under reduced tillage systems increased reduced tillage and summer fallow. Less summer fallow and more crop production using reduced tillage, These practices at the same time increased nitrogen fertilizer use and, have enhanced the soil carbon sink of agricultural land. The Party explained during the review that net emissions from agriculture in Canada, including both emissions in the agriculture sector (see para. 66) and soil carbon of agricultural land reported in the LULUCF sector (see para. 67), decreased by 16 per cent from 1990 to 2009.

66. In its NC4, Canada reported on its GHG reductions and the enhancement of removals in the agriculture sector as part of the Government's Action Plan 2000, which was a package of measures to reduce GHG emissions in all sectors. In the NC5, Canada reported on PaMs to promote production of transportation biofuels and other bioproducts, but it did not report on any policies that had been put in place to address emissions caused

by animal husbandry or cultivation. During the review, Canada explained that the overall PaMs have not changed since NC4. The Party also explained that through development and adoption of new management practices, the GHG intensity of agriculture was reduced considerably. About 77,000 farmers in Canada have prepared environmental farm plans, and provinces provide incentives for farmers to adopt beneficial management practices.

67. ***LULUCF***. The LULUCF sector was a net sink of 12.10 Tg CO_2 eq in Canada in 2009 and net GHG removals decreased by 82.1 per cent since 1990. Natural disturbances cause significant variability in the trend of emissions and removals from the LULUCF sector, which is a net sink for 11 of the 20 years in the time series, and a source in the remaining years. The underlying trend in forest land was driven mainly by increased harvesting in forest-land up to 2004/2005. Since then, harvests have decreased due to restructuring of the Canadian forestry sector. Croplands have turned from a 11.3 Tg CO_2 eq source in 1990 to a sink of 6.9 Tg in 2009 due to a change in agricultural land management practices in western Canada (see para. 66 above). GHG emissions from conversion of forest-land into other land uses have decreased by 30.8 per cent from 1990 to 2009 due to a decline in deforestation for agricultural land. This trend is offset partly by the increased conversion of forest-land into land for oil and gas extraction, for which emissions have doubled from 1990 to 2009. Natural disturbances caused significant variability in the trend of emissions and removals from the LULUCF sector.

68. In its NC5, Canada noted that the Canadian Council for Forest Ministers developed a framework for forest management offset protocols. However, the ERT learned during the review that this initiative did not progress due to the change in policy direction that occurred. Canada explained that mitigation is a major consideration in initiatives related to the sustainable management of forest resources. The Party further explained that forest conversion is best addressed by regional PaMs. For example, British Columbia has a goal of achieving zero net deforestation by 2015. Some provinces, for instance Alberta, are developing offset protocols, and there are also plans to include forestry in the planned carbon trading schemes.

69. ***Waste management***. Between 1990 and 2009, GHG emissions from the waste sector increased by 13.1 per cent (2.5 Tg), driven mainly by increasing emissions from landfills. However, the emissions have increased at a lower rate than the population. In its NC5, Canada has not reported on federal PaMs to mitigate emissions from the waste sector, but some provinces were reported to have instigated PaMs to regulate landfill gas (British Columbia, Ontario); and to produce biomethane by processing residual biomass and reducing biogas from landfills (Quebec). During the review, the Party explained that currently, 6.9 Mt of landfill gas is recovered in Canada, based on a mix of provincial regulations and incentives. Existing provincial measures are expected to result in the recovery of an additional 2 Mt landfill gas by 2020.

70. In order to increase the transparency of the reporting of PaMs in its next national communication, the ERT encourages Canada to indicate clearly its national and international GHG reduction targets; to note which PaMs presented in previous NCs are no longer in place, and to provide a clear reference to previous NCs in cases where PaMs have been maintained over time and are thoroughly described in a previous NC; to report quantitative emission reduction estimates for all PaMs including the agriculture, forestry and waste sectors; to follow the UNFCCC reporting guidelines more closely and to give priority in reporting PaMs, or combinations of PaMs, which have the most significant effect on GHG emissions and removals; to indicate those PaMs which are innovative and/or effectively replicable by other Parties; as well as to include information on PaMs that address domestic aviation and navigation in the transport sector instead of in the chapter on supporting action by the ICAO/IMO.

71. The ERT further encourages Canada to improve transparency by using the same name for the same policy across the national communication and to refer in the main text to tables in the annexes. The ERT noted that Canada presented, in its NIR, illustrative information on different factors having an impact on, for example, trends in energy consumption of buildings, including changes in floor space, fuel switch and energy efficiency. The ERT encourages Canada to include such information in its next national communication.

4. Minimization of adverse effects in accordance with Article 2, paragraph 3, of the Kyoto Protocol

72. In its NC5, Canada reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social and environmental impacts, on other Parties, especially developing country Parties. Further information on how Canada strives to implement its commitments under Article 3, paragraph 1, in such a way as to minimize adverse social, environmental and economic impacts on the developing country Parties, as reported in the 2011 annual submission is presented in chapter II.I of this report.

73. The NC5 emphasizes strategic environmental assessments (SEAs), which are used to encourage Government departments and agencies to incorporate environmental considerations into the review process of policies, plans and programmes that, if approved, would lead to the development of public policy. SEAs include considerations of both economic and social analyses and consider the likely impact of any adverse environmental effects.

C. Projections and the total effect of policies and measures, and supplementarity relating to the Kyoto Protocol mechanisms

74. The NC5 contains projections and an estimate of the total effect of policies and measures based on Canada's Climate Change Plan 2009. The NC5 refers to the (then unpublished) 2010 version of the Climate Change Plan for further updated information. During the review, Canada provided updated projections based on Climate Change Plan 2010, which are considered in this review report along with projections reported in the NC5.

1. Projections overview, methodology and key assumptions

75. The GHG emission projections provided by Canada in the NC5 include a 'with measures' and a 'without measures' scenario until 2012. Projections are provided in an aggregate format for national total emissions, using global warming potential values. However, the ERT noted that Canada did not provide the following reporting elements required by the UNFCCC reporting guidelines: emission projections presented relative to actual inventory data for the preceding years; projections presented on a sectoral basis (to the greatest extent possible, using the same sectoral categories used in the PaMs section); projections presented on a gas-by-gas basis for the following GHGs: CO_2, CH_4, N_2O, perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (treating PFCs and HFCs collectively in each case); and emission projections related to fuel sold to ships and aircraft engaged in international transport. During the review, Canada provided further relevant information. The ERT reiterates the recommendation of the previous review, that Canada, to increase completeness, should follow the UNFCCC reporting guidelines more closely and should provide all these reporting elements in its next national communication.

76. The updated projections provided during the review included all mandatory elements, but did not include projections for LULUCF. The main two differences between the updated projections and those provided in the NC5 are that they now take into account the effects of the financial and economic crisis and no longer consider the effect of the regulatory regime for major industrial emission sources (see para. 59).

77. Canada provided a 'no government action' scenario for updated projections, which would be a 'without measures' scenario and a 'current action' scenario, which would be a 'with measures' scenario. The 'with measures' scenario assumes the full implementation of plans, measures and sectoral legislation that were adopted by 2010. The ERT noted that both scenarios start from the 2008 inventory data, which means that the 'without measures' scenario includes all implemented and adopted PaMs until 2008.

78. Emission projections were prepared using Environment Canada's integrated E3MC (Energy, Emissions and Economy Model for Canada). This model is being used for developing and assessing the proposed policies, programmes and targets for GHG emissions. It is a fully integrated energy, emissions and economy model. It explicitly models energy, emissions and production outputs for industrial, residential, commercial, transportation and other sectors. It ensures that the macroeconomic impacts of the proposed targets for GHG and air pollutant emissions are assessed in a consistent manner. NC4 projections were prepared using Maple-C, a similar model but operated by Natural Resources Canada.

79. Key assumptions for the updated projections include an annual GDP growth of 2–3 per cent after the financial and economic crisis; an annual population growth of 1 per cent; an after the financial crisis steadily increasing crude oil price peaking at USD 96/bbl in 2020; and a stabilization of the gas price at the pre-crisis level until 2020. Other main assumptions include a shift in oil production from conventional to unconventional methods (oil sands), mainly to meet the growing demand in the United States, and an increase of electricity production capacity by a third until 2020. In its NC5, Canada did not provide the relevant information on the factors and activities for each sector for the years 1990 to 2020. Although Canada did provide relevant information on some factors and activities during the review, data on energy supply and demand by sector was not provided.

80. The NC5 did not provide a sensitivity analysis, but a reference to the Climate Change Plan 2009 for sensitivity analysis was included. To test the sensitivity of the updated projections to underlying assumptions, Canada calculated two additional scenarios for updated projections: a high GDP/high oil price that assumes a national GDP that is 3 per cent higher than the standard case and an oil price of USD 186/bbl (compared with USD 96 in the reference case) leading to emissions of 839 Mt CO_2 eq in 2020, which is 7 per cent higher than in the standard case (785 Mt CO_2 eq); and a low GDP/low oil price that assumes a national GDP that is 2 per cent lower than the standard case and an oil price of USD 52/bbl leading to emissions of 747 Mt CO_2 eq (–5 per cent) in 2020.

2. Results of projections

81. The national communication includes projections until 2012 as a 'with measures' scenario and a 'without measures' scenario. In the NC5 projections, the overall GHG emissions of Canada were expected to decrease from 731 Mt CO_2 eq in 2005 to 691 Mt CO_2 eq in 2010 (–40 Mt CO_2 eq, or 6 per cent compared with 2005).

82. In the updated projections, the overall GHG emissions of Canada are expected to decrease from 731 Mt CO_2 eq in 2005 to 710 Mt CO_2 eq in 2010 (mostly due to the economic crisis) and then increase again to 785 Mt CO_2 eq in 2020 (+54 Mt CO_2 eq compared with 2005, or an annual average increase of 1 per cent after 2010) in the 'with measures' scenario. For the period 2005–2020, this scenario shows a decrease in emissions

from coal used for electricity production, due to phase out measures (–43 Mt CO_2 eq) and a decrease in emissions from conventional oil production (–9 Mt CO_2 eq). It does, however, show a strong increase in emissions from oil sand exploration (+62 Mt CO_2 eq), ground based freight transport (+18 Mt CO_2 eq), electricity production from natural gas (+15 Mt CO_2 eq), light manufacturing (+7 Mt CO_2 eq) and from solid waste disposal (+4 Mt CO_2 eq). Total emissions per gas are expected to increase until 2020 for all gases, except for CH_4. Fugitive CH_4 emissions from conventional oil production are expected to decline due to decreasing production as a result of depletion of reserves. A summary of the projections in the NC5 and updated projections provided during the review is given in table 4.

Table 4
Summary of greenhouse gas emission projections for Canada

	Greenhouse gas emissions (Tg CO_2 eq per year)	*Changes in relation to base year level (%)*	*Changes in relation to 1990 level (%)*
Inventory data 1990[a]	590.42	–0.6	0.0
Inventory data 2008[a]	731.73	23.2	23.9
Inventory data 2009[a]	690.05	16.2	16.9
Kyoto Protocol base year[b]	594.00	0.0	0.6
Kyoto Protocol target[b]	558.36	–6.0	–5.4
'Without measures' projections for 2010[c]	743.00	25.1	25.8
'With measures' projections for 2010[c]	691.00	16.3	17.0
Updated 'without measures' projections for 2010[d]	720.00	21.2	21.9
Updated 'with measures' projections for 2010[d]	710.00	19.5	20.3
Updated 'without measures' projections for 2020[d]	850.00	43.1	44.0
Updated 'with measures' projections for 2020[d]	785.00	32.2	33.0

Sources: [a] Canada's 2011 greenhouse gas (GHG) inventory submission; the emissions are without land use, land-use change and forestry (LULUCF);

[b] Based on the initial review report contained in document FCCC/IRR/2007/CAN;

[c] Canada's fifth national communication; the projections are for GHG emissions without LULUCF;

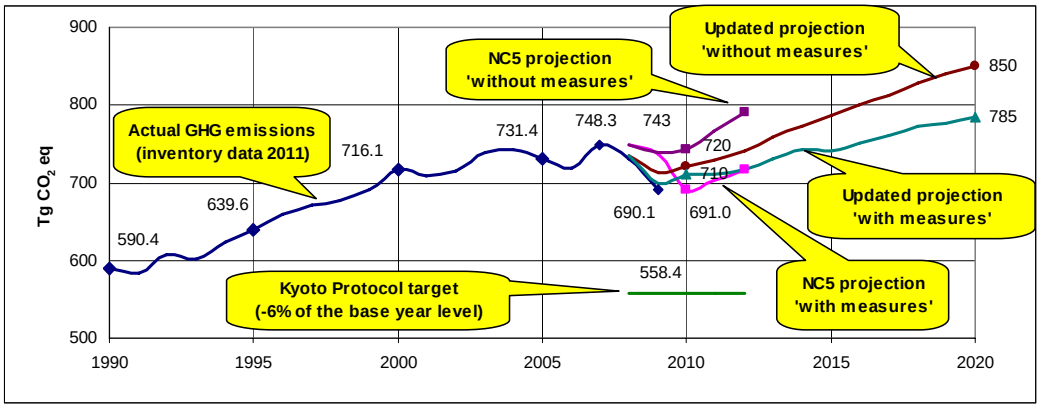
[d] Updated projections provided by the Party during the in-depth review; the projections are for GHG emissions without LULUCF.

83. The ERT noted that, in its NC5, Canada did not present its projections relative to its target for the first commitment period of the Kyoto Protocol (2008–2012). During the review, Canada informed the ERT that its total GHG emissions are expected to be well above that target. Emissions in 2010 according to the updated projections are projected to be 19.5 per cent above the base year emissions, whereas the target is 6 per cent below the base year. The gap to the Kyoto Protocol target according to the updated projections is even larger than that according to the NC5 projections. The ERT estimated that, according to the

2011 inventory report, LULUCF activities under Article 3, paragraph 3, and those elected under Article 3, paragraph 4, may contribute to meeting the target by 1 to 2 Mt CO_2 eq per year, which is less than 0.5 per cent of the base year emissions. Canada also informed the ERT that currently it is not contemplating use of the Kyoto mechanisms to meet its Kyoto Protocol target. Also, despite the request by the ERT, Canada did not present a comprehensive plan to close the gap to its Kyoto Protocol target. The ERT noted with strong concern that on the basis of the information provided in its NC5 and during the review, Canada could potentially become non-compliant with its commitments under Article 3, paragraph 1, of the Kyoto Protocol.

84. The ERT noted that Canada's emission reduction targets decreased in ambition over time. The Kyoto Protocol target amounts to 558 Mt CO_2 eq per year in 2008–2012. The NC5 states that Canada is committed to reducing GHG emissions by 20 per cent below 2006 levels by 2020, which corresponds to 575 Mt CO_2 eq (16 Mt CO_2 eq higher and 10 years later), if applied to emissions excluding LULUCF. During the review, Canada explained that this target is now replaced by its new Copenhagen Accord target, which is aligned with that of the United States, of reducing emissions by 17 per cent below 2005 in 2020, which would correspond to 607 Mt CO_2 eq (yet 32 Mt CO_2 eq higher), if applied to emissions excluding LULUCF. The latest projections indicate that this target will not be met with currently implemented PaMs. Canada has not yet provided a detailed plan on how to meet its Kyoto Protocol or its Copenhagen Accord target. The ERT took note of the recommendations in the review report of NC4 and reiterated the encouragement that Canada should further report on planned PaMs to reach its targets. The reporting guidelines include the option to provide a 'with additional measures' scenario for this purpose.

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2009: Canada's 2011 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry. (2) Data for the years 2008–2020: Canada's NC5 and updated projections provided by the Party during the in-depth review; the emissions are without land use, land-use change and forestry.

3. Total effect of policies and measures

85. In the NC5, Canada presents an estimate of the total effect of its PaMs, in accordance with the 'with measures' definition, compared with a situation without such PaMs. The ERT noted an inconsistency in the NC5 between the projections chapter, where the regulatory regime for major industrial emission sources was still included as major reduction measure, and the PaMs chapter, where this PaM was not mentioned as it eventually never entered into force. To increase transparency, the ERT recommends that

Canada ensures, in its next national communication, that the reported 'with measures' scenario encompasses currently implemented and adopted PaMs.

86. The ERT noted that Canada did not provide in its national communication the estimate of the total effect of its PaMs by gas. In response to a question raised by the ERT during the review, Canada presented for updated projections information in terms of GHG emissions avoided or sequestered, also by gas (on a CO_2 eq basis) following the reporting requirements of the UNFCCC reporting guidelines. The ERT noted that this updated information is consistent with the updated information on the policies.

87. Canada reported that the total estimated effect of adopted and implemented PaMs is 10 Mt CO_2 eq in 2010 and 65 Mt CO_2 eq in 2020. The total effect was calculated as the difference between the 'with measures' and the 'without measures' scenarios. The ERT noted that the 'without measures' scenario includes the effects of PaMs until 2008 (see para. 77), therefore, only effects after 2008 are shown and as a result the reported total effect might have been underestimated.

88. According to the information provided during the review, PaMs implemented in the electricity sector (due to the phase out of coal) will deliver the largest emission reductions, followed by the effect of PaMs implemented in the transportation sector. The most effective PaMs and drivers behind GHG emission reductions are described in chapter II.B.1 and II.B2. Table 5 provides an overview of the total effect of PaMs as reported by Canada.

Table 5
Projected effects of implemented and adopted policies and measures in 2010 and 2020

Sector	*Effect of implemented and adopted measures (Tg CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of implemented and adopted measures (Tg CO_2 eq)*	*Relative value (% of 1990 emissions)*
	2010		*2020*	
Buildings	1.00	0.2	2.00	0.3
Transportation	2.00	0.3	14.00	2.4
Electricity and heat production	7.00	1.2	48.00	8.0
Oil and gas	0.00	0.0	1.00	0.2
Emissions-intensive trade exposed industries	0.00	0.0	1.00	0.2
Agriculture	0.00	0.0	0.00	0.0
Waste and other	0.00	0.0	0.00	0.0
Total	**10.00**	**1.7**	**66.00**	**11.1**

Source: Information on updated projections provided by Canada during the review.

Note: The total effect of implemented and adopted policies and measures is defined as the difference between the 'without measures' and 'with measures' scenarios.

89. To increase transparency, the ERT encourages Canada to report its projections and the total effects of its policies and measures in the format requested by the UNFCCC reporting guidelines. It also encourages Canada to consider an earlier starting year for the 'without measures' scenario used for the evaluation of the effects of the measures, for

example 2000 or 2005, as Canada has started doing for its national reporting on its commitments under the Kyoto Protocol as of 2011.

4. Supplementarity relating to mechanisms pursuant to Articles 6, 12 and 17

90. Canada in its NC5 did not provide information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. In response to a question raised by the ERT during the review, Canada clarified that Canada is not currently contemplating significant use of the Kyoto mechanisms to meet its Kyoto Protocol target.

91. Also, in response to a question raised by the ERT during the review, Canada clarified that it had invested CAD 22.5 million from climate change funding under the previous Government (as provided for in Budget 2000 and Action Plan 2000) in the World Bank Carbon Funds. This investment was distributed as follows: the Prototype Carbon Fund (CAD 15 million), the Community Development Carbon Fund (CAD 3.4 million) and the BioCarbon Fund (CAD 4 million). As a result of this investment, Canada has received a share of carbon credits generated by these funds. To date, 265,077 certified emissions reductions (CERs) have been transferred from the clean development mechanism Registry to the Government of Canada's holding account in Canada's Kyoto Protocol Registry. The total amount of expected CERs by the end of 2012 is approximately 1 million. This represents an estimated value of less than 0.05 per cent of the Kyoto Protocol base year annually, if evenly distributed over the 5-year commitment period.

D. Vulnerability assessment, climate change impacts and adaptation measures

92. In its NC5, Canada has provided all the required information in accordance with the UNFCCC reporting guidelines, including information on the expected impacts of climate change and vulnerability on the country, as well as on adaptation options. Adverse impacts have been described with regard to their possible socio-economic consequences. Canada provided information on the actions taken to implement Article 4, paragraph 1(b) and (e), of the Convention to cooperate in preparing for adaptation to the impacts of climate change as required by the reporting guidelines. The NC5 presents observable and likely climate change impacts on agriculture; biodiversity and ecosystems; water resources; fisheries, oceans, and coastal zones; forestry; human health; infrastructure and economy; transportation; and tourism. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC5.

93. The ERT noted that significant progress has been made in Canadian scientific research and the understanding of the continuing impacts of climate change since Canada's NC4. The Government of Canada led a national scientific assessment of the country's vulnerabilities to climate change and current and possible future adaptation measures. Through a regional approach, the assessment examined the current and future risks and opportunities presented by climate change, with a focus on human and managed systems. The resulting report, From Impacts to Adaptation: Canada in a Changing Climate 2007, reflects the advances made in understanding Canada's vulnerability to climate change over the past decade and integrated both traditional knowledge and scientific information in its analysis. The primary focus has been to improve understanding and to integrate indigenous knowledge. Canada reports that climate change will exacerbate many current climate risks, and present new risks, with significant implications for communities, infrastructure and ecosystems. Climate change scenarios for the country project an increased risk of extreme weather and other climate-related events such as floods, drought, forest fires and heat-

waves. Air quality in many Canadian communities is likely to be affected by climate change through increased smog formation, wild-fires, pollen production, and greater emissions of air contaminants due to changing human behaviour.

Table 6
Summary of information on vulnerability and adaptation to climate change

Vulnerable area	*Examples/comments/adaptation measures reported*
Food supply (agriculture and fisheries)	*Vulnerability*: Increased insect infestations; decreased food production; heat stress in livestock; *Adaptation*: Crop insurance programmes; promotion of best management practices to reduce vulnerability to extreme climate events and to crop disease.
Biodiversity and natural ecosystems	*Vulnerability*: Droughts; floods; wild life disturbances; impact on reproduction and dormancy patterns of species; *Adaptation*: The establishment of networks of protected areas to ensure the continued provision of ecosystem services for adaptation, as well as biodiversity conservation.
Forests	*Vulnerability*: Species are expected to migrate northwards and to higher altitudes; more frequent droughts are anticipated; more frequent and intense natural disturbances such as forest fires and insect outbreaks are envisaged; *Adaptation*: Forest fire management strategies; action plan for Mountain Pine Beetle.
Human health	*Vulnerability*: Adverse impacts on vulnerable populations, for example, the elderly, children, the sick and the poor; and rural residents; *Adaptation*: Establishing effective health programmes; Heat and Infectious Disease Alert and Response system; clean air initiatives.
Infrastructure and economy	*Vulnerability*: Indigenous and other Arctic communities being vulnerable to the impacts of global warming: the melting and thawing of snow affects their infrastructure, their mobility and the wild life resources available to them; and increases the occurrence of heat stress; *Adaptation*: The introduction of emergency and disaster management planning; fiscal measures to advance the implementation of adaptation projects; infrastructure codes and standards; and building knowledge regarding these problems and therefore a capacity to deal with them.
Water resources	*Vulnerability*: Increased winter flows are expected in many regions, as are decreased summer flows, leading to a reduction in water quality, and floods; *Adaptation*: Implementation of efficient water resources management.
Transportation	*Vulnerability*: Most vulnerable are northern ice roads, Great Lakes shipping, coastal infrastructure and infrastructure situated on permafrost; *Adaptation*: Modification, reinforcement or relocation of existing public infrastructure.
Tourism and recreation	*Vulnerability*: Reduced quality of natural resources will impact on the length and quality of outdoor recreation seasons; reduce the accessibility to the public of known iconic natural attractions; and reduced natural snowfalls will lead to shorter winter seasons; *Adaptation*: Use of snow-making technology.

94. The impacts are particularly apparent in Canada's Arctic north, where pronounced temperature increases are already having significant impacts on northern ecosystems and biodiversity, and on the northern communities that rely on these resources. These effects include decreased access to traditional food supplies, which has been affected by changes in snow cover and sea-ice conditions; lowering of the availability, quality and accessibility of some species; and the melting of permafrost and coastal erosion that present challenges

to community infrastructure. The large social, cultural and economic implications associated with these impacts are slowly becoming better understood. Adaptation programmes and measures are taken at both Federal Government level as well as at the provincial and territorial jurisdiction levels. Many groups at all levels of government, industry partners, non-governmental organizations, and community organizations, are now making the transition from learning about climate impacts to developing actions and adaptation measures.

95. At the Federal Government level, Environment Canada leads horizontal adaptation policy, and coordinates the sharing of tools and best practices across the Federal Government; other relevant ministries are responsible for their sectoral competences. Federal programming is focused on building knowledge and capacity and preparing for action to protect ecosystems, human health, the landscape of Canada's north and its infrastructure, for example, Climate Change and Health Adaptation in Northern First Nation/Inuit Communities; Regional Adaptation Collaboratives; the Heat and Infection Disease Alert and Response System; and innovative risk management tools for adaptation. Canada has also increased its focus on the establishment and effective management of protected areas, particularly in northern Canada to provide natural buffers to the impacts of climate change, including extreme weather events, while also providing other benefits such as protecting biodiversity, supporting tourism and enhancing carbon stores. Provincial and territorial jurisdictions generally command full responsibility in addressing climate change impacts and adaptation in their areas of governance. According to the NC5, Quebec, for example, is proactive despite the uncertainties regarding the scope of climate change impacts that will affect its territory and has already begun implementing adaptation measures in order to minimize risks associated with these impacts, through, inter alia, the programme to reduce urban heat islands in Quebec's municipalities.

96. The NC5 also provides information on Canada's support for a wide range of initiatives on adaptation, including capacity-building activities in developing countries. Canada's cooperation with Parties not included in Annex I to the Convention includes Climate Change Adaptation in Africa, climate change and water, agriculture and food security, environmental economics in several developing countries, through the International Development Research Centre.

97. The ERT commends Canada for its well-organized and systematic approach to identifying climate change impacts and adaptation measures. Concerning reporting, the ERT noted that transparency could be enhanced in several areas by providing further information. For example, the vulnerability of hydropower generation to constraints on water supply, which was highlighted in the NC4, was not discussed in the NC5. During the review, the Party explained that climate change is expected to have significant impacts on hydroelectricity generation in Canada, although the magnitude and even the direction of impacts (positive or negative) varies across the country and in most areas considerable uncertainties remain. The ERT also noted the limited information reported in NC5 regarding integrated coastal zone management. To enhance transparency of reporting, the ERT encourages Canada to further elaborate on its vulnerabilities in all relevant areas and to reflect key adaptation measures by major players in its next national communication.

E. Financial resources and transfer of technology, including information under Articles 10 and 11, of the Kyoto Protocol

1. Provision of financial resources, including "new and additional" resources and resources under Article 11 of the Kyoto Protocol

98. In its NC5, Canada has provided all the required information in accordance with the UNFCCC reporting guidelines, including details of measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention and all information under Article 11 of the Kyoto Protocol, as required by the "Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Canada has further provided information on its financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels. Canada has indicated what "new and additional" financial resources it has provided pursuant to Article 4, paragraph 3, and provided clarification on its definition of the "new and additional" funding by explaining that its contributions to the Global Environment Facility (GEF) are additional to its ongoing development assistance.

99. However, to increase transparency, the ERT requested further clarification on how Canada has determined the "new and additional" financial resources it has provided pursuant to Article 4, paragraph 3, as being "new and additional". Canada explained that the commitment by developed countries, in the Copenhagen Accord, to provide new and additional financing over 2010–2012, provided Canada with an opportunity to strengthen the transparency of its reporting and to better track the international financing provided to developing countries to adapt to and mitigate against the impacts of climate change (see also para. 104 below). To increase transparency, the ERT encourages Canada to include such further information in its next national communication.

100. Canada has also provided detailed information on the assistance it has made available to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them meet the costs of adaptation to those adverse effects. Furthermore, Canada has provided information on financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels. In particular, it provided financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels, including the GEF. Table 7 summarizes the information on Canada's financial resources.

Table 7
Summary of information on financial resources for 2005–2010

	Years of disbursement				
Channel of financial resources	*2005/06*	*2006/07*	*2007/08*	*2008/09*	*2009/10*
World Bank (CAD million)	375.42		392.55	392.55	
International Finance Corporation (CAD million)	10.68		6.08	6.08	
African Development Bank (CAD million)	92.85	88.85	1.5	90.35	
Asian Development Bank (CAD million)	73.27	95.77	29.4	125.17	
European Bank for Reconstruction and Development (CAD million)	3.04		4.99	4.99	
Inter-American Development Bank (CAD million)	3.12		21.48	21.48	
UNDP (CAD million)	130.89		100.50	100.50	

Channel of financial resources	*Years of disbursement*				
	2005/06	*2006/07*	*2007/08*	*2008/09*	*2009/10*
UNEP (CAD million)	1.60	1.45		1.45	
UNFCCC (CAD million)	0.75				
GEF (CAD million)	70.32	9.15	36.27	36.27	
Bilateral – Adaptation	3.30[a]		9.70[b]		
Bilateral – Mitigation	4.80[c]	7.10[d]			15.00[e]
International Partnership – Adaption		15.00[f]			11.75[g]
International Partnership – Mitigation				12.90[h]	27.00[i]

Note: This table does not include Canada's 2010 Fast Start support.

Abbreviations: GEF = Global Environment Facility; UNDP = United Nations Development Programme; UNEP = United Nations Environment Programme.

[a] 2005–2009; [b] 2007–2012; [c] 2002–2010; [d] 2006–2009; [e] 2009–2012; [f] 2006–2012; [g] 2010–2015; [h] 2009–2011; [i] 2010–2015.

101. Canada's financial support to address climate change from 2006 to 2009 was primarily delivered through multilateral channels. Canada contributed with CAD 100 million to the World Bank's pilot programme for climate resilience (2008–2009). It also informed the ERT that it was the sixth largest donor to the fourth replenishment of the GEF (GEF-4), contributing CAD 158.9 million over four years (2006–2010), of which approximately one-third is allocated to climate change mitigation.

102. Canada provided information on its committed financial contributions to the fifth replenishment of the GEF (GEF-5) (2010–2014), of CAD 238.4 million of which CAD 18.45 million will be drawn from Canada's fast start funding in 2010. This contribution marks an increase of 50 per cent over Canada's contribution in GEF-4.

103. Canada also carried out significant bilateral activities and international partnerships across a range of adaptation and mitigation activities such as technology transfer, capacity-building, forestry, agriculture and other key sectors. Canada has contributed actively to the UNFCCC Nairobi work programme on impacts, vulnerability and adaptation to climate change, participated in and provided funding to the Least Developed Country Experts Group, and the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention, supports developing country participation in the Expert Group on Technology Transfer, and is financing the Building Climate Change Adaptive Capacity project in Western Africa, the Caribbean Disaster Risk Management Program and the Climate Change Adaptation in Africa Program.

104. During the review, Canada informed the ERT that in the context of the Copenhagen Accord, Canada provided, and disbursed CAD 400 million in new and additional fast track climate change finance in 2010/2011. Canada's pre-Copenhagen planned climate support was CAD 41 million for the fiscal year 2010/2011. This contribution to fast-track financing addresses both adaptation and mitigation and is directed at vulnerable countries. Among the projects that received funding are: (a) Adaptation – the Least Developed Countries Fund; Climate Change Adaptation in Africa Program; bilateral projects in Haiti, Ethiopia and Viet Nam; and (b) Mitigation – clean energy projects: delivered through the International Finance Corporation; the World Bank's Forest Carbon Partnership Facility's Readiness Fund; and the World Bank's BioCarbon + Fund. Canada focused on identifying activities that are consistent with Canada's vision for an effective long-term climate regime. Canada's priority areas were clean energy, forestry and agriculture, and adaptation. The ERT welcomed Canada's contribution to the fast start financing for 2010 and encourages its continuation.

2. Activities related to transfer of technology, including information under Article 10, of the Kyoto Protocol

105. In its NC5, Canada has provided most of the required information in accordance with the UNFCCC reporting guidelines, including details of measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies. However, the ERT noted that Canada did not provide a clear distinction between activities undertaken by the public sector and those undertaken by the private sector. This information was, however, provided to the ERT during the review and the ERT recommends that Canada enhance the completeness of its reporting by including this information in its next national communication. The ERT also recommends that Canada, to increase transparency of its reporting in the next national communication, further elaborate on the information on its activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies; and on information, in a textual format, on steps taken by governments to promote, facilitate and finance transfer of technology and to support development and enhancement of endogenous capacities and technologies of developing countries.

106. Canada engages bilaterally with both developed and developing country partners in sharing knowledge and fostering enabling environments in order to transfer technologies, and has taken steps to assist developing countries directly with their technology needs. For example, the Canadian International Development Agency has undertaken bilateral activities which have included technology transfer projects for climate change development with a capacity-building approach to contribute to sustainable development in developing countries and to help these countries to reduce their emissions of greenhouse gases.

107. The NC5 acknowledges that key challenges remain with respect to supporting technology development in developing countries. These included the need to develop long-term approaches to support technology activities and the need for greater attention to the appropriateness of technology selection, with input from developing countries themselves.

108. Canada's International Development and Research Centre funds the Climate Change Adaptation in Africa Program, which works to establish a self-sustained skilled body of expertise in Africa to enhance the ability of African countries to adapt to the adverse effects of climate change. Through this programme, Canada has been investing CAD 15 million between 2006 and 2012 to ensure that research institutions are better able to assess climate related vulnerability and to develop adaptation options.

109. Canada is a partner to the Asia–Pacific Partnership on Clean Development and Climate (APP), a public–private partnership initiative created to address the issues of sustainable development, clean energy and climate change through the development, deployment and diffusion of clean, efficient and climate-friendly technologies. The approach of the APP emphasizes practical actions in cooperation with the private sector. Canada has committed CAD 20 million to this initiative between 2007 and 2011.

110. Canada also makes use of other bilateral avenues to advance international collaboration, like bilateral science and technology agreements that it signed with several partner countries, including China, the European Union, France, Germany, India, Israel, Japan and the Republic of Korea. These agreements serve as the guidelines for business and government to effectively work with partner countries to increase international science and technology capacity.

F. Research and systematic observation

111. Canada has provided all the required information in accordance with the UNFCCC reporting guidelines including information on its actions relating to research and systematic observation, and addressed both domestic and international activities, its participation in the World Climate Research Programme, the Global Climate Observing System (GCOS) and the Intergovernmental Panel on Climate Change. The NC5 also reflects action taken to support related capacity-building in developing countries. Furthermore, Canada has provided a summary of information on GCOS activities.

112. In its NC5, Canada reports on a number of research activities on climate change impacts and adaptation, including its Research and Systematic Observations Program. However, the ERT noted that Canada did not include information on opportunities for and barriers to free and open international exchange of relevant data and information. During the review, this information was provided to the ERT. The ERT encourages Canada to include such information and to report on the action taken to overcome these barriers in its next national communication.

113. The key federal agencies involved in climate change-related sciences are Environment Canada, Fisheries and Oceans Canada, Natural Resources Canada, and Agriculture and Agri-Food Canada. Other federal departments, including Health Canada and Industry Canada, also contribute to the national knowledge base on climate change. Priorities for climate change research in Canada are determined largely by consultative processes between the above Federal Government departments and academia, with some input from industry and other stakeholder groups. These consultations have led to new funding initiatives and coordinated programmes that have contributed significantly to the systematic observations of the climate system and have helped to improve the scientific understanding of climate change since its NC4.

114. With regard to systematic observations, Canada maintains a national network of climate observing stations extending from coast to coast and into Canada's north. Data gathered at these stations include observations of atmospheric variables, lake and river conditions, ice and snow cover, and the background atmospheric concentrations of GHGs. The networks adhere to the standards set by the World Meteorological Organization and contribute to global observation networks such as GCOS. Canada is a significant contributor to GCOS, the Global Ocean Observing System and the Global Terrestrial Observing System. Contributions include systematic observations, measurements, derived products and data management related to essential climate variables, technical and scientific expertise, and to a lesser extent, financial support.

115. The Canadian Group on Earth Observations, established in 2005, has identified several specific national priorities for such observations, including: soil moisture monitoring, climate modelling and forecasts; integrated planning of monitoring networks and environmental data/products access; and sustained Arctic monitoring programmes. GCOS contributes the climate component to the Global Earth Observation System of Systems. The Meteorological Service of Canada (a division of Environment Canada) is responsible for the national coordination of GCOS activities.

G. Education, training and public awareness

116. In the NC5, Canada has provided information on its actions relating to education, training and public awareness on the national level. The ERT encourages Canada to report further information on formal education, international activities and public participation in the preparation of the communication in its next NC. Canada could focus on the highlights

of its most promising, successful, significant or replicable activities, rather than being comprehensive on all activities.

117. Canada reported that education is the responsibility of the provincial and territorial governments and therefore national activities can only support the different educational curricula. From additional information provided during the review, the ERT noted that provincial climate plans include various education, training and public awareness activities. The Northwest Territories have included climate change in all school-based science curricula, and Ontario, British Columbia and Prince Edward Island plan to do so. Many universities have environmental programmes that include focused climate change courses and/or integrate climate change into environmental management courses, for example, University of Sherbrooke in Quebec and Simon Fraser University in British Columbia.

118. In contrast to the NC4, the Government of Canada now pursues the raising of public awareness that is locally driven and relevant to the area where the target audience lives. The federal programmes reported in the NC4 (the Climate Change Action Fund and the One-Tonne Challenge) were no longer reported in NC5. Instead, the focus of reporting was on several activities by Environment Canada and Natural Resources Canada.

119. Environment Canada reported, for example, on its environmental museum 'Biosphere', which provides comprehensive activities on site but also off site on climate change. It developed unique and innovative educational programmes on climate change and clean air, extreme weather, and sustainable transportation. Natural Resources Canada reported on its comprehensive energy efficiency information activities, which include public awareness campaigns, the labelling of electrical appliances, information pooling, training tools for the public and engagement programmes with provincial and territorial partners. Also, several new GHG certification programmes have been developed (e.g. by the Environmental Careers Organization Canada) to develop the competencies of professionals to measure and verify GHG emissions of different entities (prepared mostly for voluntary reporting).

H. Evaluation of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

120. Canada has provided most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC5. The supplementary information is placed in different sections of the NC5. Table 8 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol as well as references to the NC5 chapters in which this information is provided.

121. Canada has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17; explicit information on its domestic and regional legislative arrangements and enforcement and administrative procedures that the Party has in place to meet its commitments under the Kyoto Protocol; and a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contribute to conservation of biodiversity and sustainable use of natural resources. During the review, Canada provided further relevant information. The ERT recommends that Canada include these reporting elements in its next national communication. The technical assessment of the information reported under Article 7, paragraph 2, is contained in the relevant sections of this report.

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

Supplementary information	*Reference*
National registry	NC5, chapter 3.6
National system	NC5, chapter 3.5
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Provided during the review
Policies and measures in accordance with Article 2	NC5, chapter 4.7 and 4.8
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Provided during the review
Information under Article 10	NC5, chapter 7
Financial resources	NC5, chapter 7

I. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

122. Canada reported the information requested in section H. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the annex to decision 15/CMP.1 as part of its 2010 annual submission and further elaborated on it in its 2011 annual submission. It has not reported, however, how it gives priority to the actions taken, in implementing its commitments under Article 3, paragraph 14. During the in-country review, Canada provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the reported information to be broadly transparent and generally complete. The ERT recommends that Canada report on how it gives priority to the actions taken, in implementing its commitments under Article 3, paragraph 14. The ERT also encourages Canada to continue exploring and reporting on the adverse impacts of the response measures.

123. In the annual submissions of 2010 and 2011 and with the additional information provided during the review, the Party explained that Canada, a net exporter of energy, is a trade-dependent economy strongly supportive of open, transparent and rule-based international markets, and has lobbied against possible trade measures that are related to climate change that could affect countries that produce, process and export fossil fuels. The Party also explained that Canada's international support to developing countries through technology transfer and financing for low-carbon growth also reduces vulnerability to the potential adverse economic and social impacts of climate change PaMs by helping developing countries to reduce their dependence on fuel imports and therefore their vulnerability to potential increases in fossil fuel energy import costs due to climate change PaMs.

III. Conclusions and recommendations

124. The ERT concludes that the NC5 generally provides a good overview of the national climate policy of Canada. The information provided in the NC5 includes most mandatory

information required by the UNFCCC reporting guidelines and most elements of the supplementary information under Article 7 of the Kyoto Protocol. During the review, Canada provided additional information on all requested areas so that all mandatory elements were fulfilled.

125. Canada's emissions for 2009 were estimated to be 16.9 per cent above its 1990 level excluding LULUCF and 29.6 per cent above including LULUCF. Emission increases were driven by strong population and economic growth; increasing energy production mostly for exports, mainly unconventional oil (oil sands); the continued reliance on fossil fuels for primary energy supply; and an increase in transport due to freight transport and SUVs. These factors outweighed the decrease in other sectors and by far outweighed the effects of PaMs targeting energy efficiency and renewable energy. The ERT also noted that Canada elaborated on how national circumstances underpin its responses to climate change.

126. In the NC5, Canada presents GHG projections of a 'without measures' and a 'with measures' scenario for the period from 2008 to 2012 that resulted in emission levels in 2010 of 25.1 per cent and 16.3 per cent above base year level respectively. During the review, Canada presented updated projections for these scenarios until 2020. The projected GHG emission levels for the updated projections in 2010 under the 'without measures' scenario and under the 'with measures' scenario are 21.2 per cent and 19.5 per cent above the base year level respectively. Thus, the projections indicate that Canada cannot meet its Kyoto Protocol target (6 per cent reduction relative to base year level) with current implemented domestic actions. LULUCF activities under Article 3, paragraph 3, and those elected under Article 3, paragraph 4, as well as the use of the Kyoto mechanisms are not expected to contribute significantly to meeting the Kyoto Protocol target and plans for further reductions were not reported. The ERT noted with strong concern that on the basis of information provided in its NC5 and during the review, Canada could potentially become non-compliant with its commitments under Article 3, paragraph 1, of the Kyoto Protocol.

127. The NC5 does not contain information on how Canada's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. During the review, Canada clarified that it is not planning to make significant use of the Kyoto Protocol mechanisms to meet its target under the first commitment period of the Kyoto Protocol.

128. The ERT noted that changes in the policy framework have slowed down the mitigation action in Canada considerably and that some earlier planned PaMs were never implemented and have not yet been fully replaced by other PaMs to achieve equivalent emission reductions. A comprehensive plan from 2007 (Turning the Corner) was replaced in 2009 to align targets and action with the United States for a joint emission trading system, which again was replaced in 2010 for a sectoral regulatory approach, because of the lack of agreement on the emission trading system in the United States. Parallel to these changes, the emission reduction targets decreased in ambition. The target under the Copenhagen Accord, a 17 per cent reduction by 2020 compared with the 2005 level, is less stringent than earlier targets and implies an increase in emissions when compared with the Kyoto Protocol target.

129. Canadian jurisdictions have implemented a number of effective policies at the provincial/territorial level, but the mechanisms to coordinate these policies and/or take stock of the lessons learned from their implementation are not fully explored, which eventually lead to fragmentation and reduced efficiency of the climate change policy. Overall, the PaMs package of Canada was not sufficient to bring its GHG emissions in line with its Kyoto Protocol target. Also, Canada has not demonstrated that implemented or planned measures would be sufficient to reach its Copenhagen Accord target.

130. Canada's financial support for developing countries to address climate change from 2006 to 2009 was delivered primarily through multilateral channels, including contributions of CAD 100 million to the World Bank's pilot programme for climate resilience (2008–2009) and CAD 158.9 million to the GEF-4 (2006–2010). Canada committed CAD 238.4 million to the GEF-5 (2010–2014), marking an increase of 50 per cent over the GEF-4. The ERT welcomed the disbursed CAD 400 million as part of the 2010 fast start financing by Canada and encouraged its continuation. Canada engages bilaterally with both developed and developing country partners in sharing knowledge and fostering enabling environments in order to transfer technologies, and has taken steps to assist developing countries directly with their technology needs.

131. Canada is affected by the impacts of climate change, especially in the Arctic north, and is moving fast towards implementation of adaptation activities. Adaptation programmes and measures are taken at both the federal and the provincial/territorial jurisdiction. Canada also supports a wide range of initiatives on adaptation, including capacity-building activities in developing countries.

132. The ERT noted significant progress in the scientific understanding of climate change since the NC4 and notes the active participation of Canada in the global research activities on climate change. It acknowledges the efforts made by Canada to enhance education, training, public awareness and research and systematic observation.

133. The ERT concluded that Canada's national system continues to perform its required functions as set out in decision 19/CMP.1; that the national registry continues to perform the functions set out in decision 13/CMP.1 and decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. The ERT noted that updates of database and applications, implemented security measures and changes to the national registry software are documented on a regular basis by nominated responsible persons.

134. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol provided by the Party in its 2010 and 2011 annual submissions is generally complete and broadly transparent.

135. In the course of the IDR, the ERT formulated several recommendations relating to the completeness and transparency of Canada's reporting under the Convention and its Kyoto Protocol. The key recommendations[5] are that Canada:

(a) Improve completeness of reporting by including in the next national communication the following information:

(i) National circumstances for the agriculture and forestry sectors;

(ii) PaMs in tabular format by gas, and for all sectors, including agriculture, forestry and waste sectors;

(iii) Information on how Canada believes its PaMs are modifying longer term trends in anthropogenic GHG emissions;

(iv) Emission projections presented relative to actual inventory data for the preceding years, and on a sectoral and gas-by-gas basis;

(v) Relevant factors and information on activities by sector for the years 1990–2020 relevant for projections;

[5] The recommendations are given in full in the relevant sections of this report.

(vi) A clear distinction between activities related to technology transfer undertaken by the public sector and those undertaken by the private sector;

(vii) Information on domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures established pursuant to the implementation of the Kyoto Protocol, including a description of how implementation of activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, also contribute to the conservation of biodiversity and sustainable use of natural resources;

(viii) Information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17;

(ix) Information on how it gives priority to the actions taken in implementing its commitments under Article 3, paragraph 14, of the Kyoto Protocol;

(b) Improve the transparency of reporting by:

(i) Ensuring that PaMs are reported under the respective sectors;

(ii) Ensuring that the reported 'with measures' scenario encompasses currently implemented and adopted PaMs;

(iii) Elaborating further on its activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies and on steps taken to promote, facilitate and finance the transfer of technology, and to support the development and enhancement of the endogenous capacities and technologies of developing countries.

136. The ERT encourages Canada to undertake a number of improvements regarding transparency and completeness of reporting by moving beyond the bare minimum required by the guidelines; the most important of these are that the Party:

(a) Provide a comparison with disaggregated indicators of other Parties with similar national circumstances to enhance understanding of how national circumstances are relevant to factors affecting GHG emissions;

(b) Clearly indicate its GHG reduction targets;

(c) Indicate which PaMs presented in the previous NC are no longer in place, and refer to the previous NC in case the PaM has remained unchanged since then;

(d) Highlight those PaMs that are innovative and/or effectively replicable by other Parties;

(e) Report on the planned PaMs which will enable Canada to reach its targets using a 'with additional measures' scenario;

(f) Further clarify how the "new and additional" financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention, were determined to be "new and additional".

IV. Questions of implementation

137. During the review, the ERT assessed the NC5, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol and reviewed information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, with regard to timeliness, completeness and transparency. No question of implementation was raised by the ERT during the review.

Annex

Documents and information used during the review

A. Reference documents

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

FCCC/SBI/2011/INF.1. Compilation and synthesis of fifth national communications. Available at < http://unfccc.int/resource/docs/2011/sbi/eng/inf01.pdf>.

FCCC/SBI/2011/INF.1/Add.1. Compilation and synthesis of fifth national communications, Add.1: Policies, measures, and past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a01.pdf>.

FCCC/SBI/2011/INF.1/Add.2. Compilation and synthesis of fifth national communications, Add.2: Financial resources, technology transfer, vulnerability, adaptation and other issues relating to the implementation of the Convention. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a02.pdf>.

FCCC/SBI/2011/INF.2. Compilation and synthesis of supplementary information incorporated in fifth national communications submitted in accordance with Article 7, paragraph 2, of the Kyoto Protocol. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf02.pdf>.

FCCC/ARR/2009/CAN. Report of the individual review of the annual submission of Canada submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/arr/can.pdf>.

FCCC/IRR/2007/CAN. Report of the review of the initial report of Canada. Available at <http://unfccc.int/resource/docs/2008/irr/can.pdf>.

FCCC/IDR.4/CAN. Report on the in-depth review of the fourth national communication of Canada. Available at <http://unfccc.int/resource/docs/2009/idr/can04.pdf>.

Canada's fourth national report on climate change. Available at <http://unfccc.int/resource/docs/natc/cannc4.pdf>.

2009 GHG inventory submission of Canada. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php>.

2010 GHG inventory submission of Canada. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Sally Garden and Ms. Judith Gelbman (Environment Canada), including additional material on updated policies and measures, GHG projections, the national registry and recent climate policy developments in Canada. The following documents[1] were also provided by Canada:

Environment Canada. 2001. *A Climate Change Plan for the Purposes of the Kyoto Protocol Implementation Act*. Ottawa.

Indian and Northern Affairs Canada. 2010. *Sharing Knowledge for a Better Future. Adaptation and clean energy experiences in a changing climate*. Ottawa.

Natural Resources Canada. 2011. *Energy use, data handbook*. Ottawa.

Natural Resources Canada. 2010. *Improving Energy Performance in Canada. Report to the Parliament under the energy efficiency act for the fiscal year 2008-2009*. Ottawa.

[1] Reproduced as received from the Party.