United Nations

Framework Convention on Climate Change

FCCC/TRR.4/CAN

Distr.: General
14 August 2020

English only

Report on the technical review of the fourth biennial report of Canada

Developed country Parties were requested by decision 2/CP.17 to submit their fourth biennial report to the secretariat by 1 January 2020. This report presents the results of the technical review of the fourth biennial report of Canada, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention". The review took place from 27 April to 1 May 2020 remotely.

GE.20-10697(E)

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Contents

Abbreviations and acronyms

AR	Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CAD	Canadian dollar(s)
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
CTF	common tabular format
DAC	Development Assistance Committee
EDC	Export Development Canada
ERT	expert review team
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
ITMO	internationally transferred mitigation outcome
LULUCF	land use, land-use change and forestry
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
N_2O	nitrous oxide
OECD	Organisation for Economic Co-operation and Development
PaMs	policies and measures
PCF	Pan-Canadian Framework on Clean Growth and Climate Change
PFC	perfluorocarbon
SF_6	sulfur hexafluoride
UNFCCC reporting guidelines on BRs	"UNFCCC biennial reporting guidelines for developed country Parties"
UNFCCC reporting guidelines on NCs	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications"
WAM	'with additional measures'
WCI	Western Climate Initiative
WEM	'with measures'
WOM	'without measures'

I. Introduction and summary

A. Introduction

1. This is a report on the centralized technical review of the BR4[1] of Canada. The review was organized by the secretariat in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention", particularly "Part IV: UNFCCC guidelines for the technical review of biennial reports from Parties included in Annex I to the Convention" (annex to decision 13/CP.20).

2. In accordance with the same decision, a draft version of this report was transmitted to the Government of Canada, which provided comments that were considered and incorporated, as appropriate, with revisions into this final version of the report.

3. The review was conducted together with the review of one other Party included in Annex I to the Convention from 27 April to 1 May 2020 remotely[2] by the following team of nominated experts from the UNFCCC roster of experts: Beausic Chongo (Zambia), Xiang Gao (China), Zeljko Juric (Croatia), Keddy Mbindo (Zambia), Malik Mechhoud (Algeria), Takashi Morimoto (Japan), Gherghita Nicodim (Romania) and Yang Xiu (China). Mr. Gao and Ms. Nicodim were the lead reviewers. The review was coordinated by Jamie Howland and Anna Sikharulidze (secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the BR4 of Canada in accordance with the UNFCCC reporting guidelines on BRs (annex I to decision 2/CP.17).

1. Timeliness

5. The BR4 was submitted on 31 December 2019, before the deadline of 1 January 2020 mandated by decision 2/CP.17. The CTF tables were also submitted on 31 December 2019. The BR4 was resubmitted on 13 February 2020. Unless otherwise specified, the information and values from the latest submission are used in this report.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

6. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by Canada in its BR4 mostly adheres to the UNFCCC reporting guidelines on BRs.

Table 1
Summary of completeness and transparency of mandatory information reported by Canada in its fourth biennial report

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendation(s)*
GHG emissions and removals	Complete	Transparent	–
Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies	Complete	Mostly transparent	Issue 1 in table 3

[1] The BR submission comprises the text of the report and the CTF tables, which are both subject to the technical review.

[2] Owing to the circumstances related to the coronavirus disease 2019, the technical review of the BR submitted by Canada had to be conducted remotely.

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendation(s)*
Progress in achievement of targets	Mostly complete	Partially transparent	Issue 1 in table 5 Issues 1–2 in table 7 Issues 2–4 in table 11
Provision of support to developing country Parties	Mostly complete	Mostly transparent	Issues 1–2 in table 14

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chap. III below. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

II. Technical review of the information reported in the fourth biennial report

A. Information on greenhouse gas emissions and removals related to the quantified economy-wide emission reduction target

1. Technical assessment of the reported information

7. Total GHG emissions[3] excluding emissions and removals from LULUCF increased by 20.9 per cent between 1990 and 2018, whereas total GHG emissions including net emissions or removals from LULUCF increased by 31.8 per cent over the same period. Emissions reached the highest point in 2007 (742,313.66 kt CO_2 eq) and dropped significantly in 2008–2009, after which there was an increasing trend with emissions reaching the highest point of recent years in 2018 (729,349.27 kt CO_2 eq). The changes in total emissions were driven mainly by factors such as the increase in oil and gas extraction; the rise in the number of light-duty gasoline trucks and heavy-duty diesel vehicles in operation, resulting in higher fuel consumption in the transport sector; the increase in the production and consumption of HFCs, PFCs, SF_6 and NF_3; and the increase in the use of inorganic nitrogen fertilizers. These emission increases were partially offset by the emission decrease resulting from the reduced share of coal and oil use in electricity and heat generation.

8. Table 2 illustrates the emission trends by sector and by gas for Canada. Note that information in this paragraph and table 2 is based on Canada's 2020 inventory submission, version 1, which has not yet been subject to review. All emission data in subsequent chapters are based on Canada's BR4 CTF tables unless otherwise noted. The emissions reported in the 2019 inventory submission are the same as reported in CTF table 1, but differ from the estimates reported in the 2020 inventory submission, which have since been recalculated. These recalculations resulted in the estimates of total GHG emissions being revised from 602,184.44 to 603,221.87 kt CO_2 eq for 1990 and from 715,749.23 to 713,838.21 kt CO_2 eq for 2017.

Table 2
Greenhouse gas emissions by sector and by gas for Canada for 1990–2018

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2017*	*2018*	*1990–2018*	*2017–2018*	*1990*	*2018*
Sector									
1. Energy	478 660.01	600 027.85	566 899.52	583 505.24	595 995.22	24.5	2.1	79.4	81.7
A1. Energy industries	147 087.82	207 802.34	195 257.75	196 974.43	192 321.35	30.8	–2.4	24.4	26.4
A2. Manufacturing industries and construction	71 334.80	72 537.03	60 375.92	61 155.72	63 925.09	–10.4	4.5	11.8	8.8
A3. Transport	124 333.67	151 472.25	166 321.95	178 878.96	186 713.48	50.2	4.4	20.6	25.6

[3] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF and indirect CO_2, unless otherwise specified.

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2017*	*2018*	*1990–2018*	*2017–2018*	*1990*	*2018*
A4. and A5. Other	86 948.29	98 790.39	90 312.98	91 152.40	97 570.15	12.2	7.0	14.4	13.4
B. Fugitive emissions from fuels	48 955.44	69 425.75	54 630.84	55 343.46	55 464.88	13.2	0.2	8.1	7.6
C. CO_2 transport and storage	NO, IE, NA	0.09	0.09	0.27	0.27	–	0.0	–	0.0
2. Industrial processes and product use	56 911.75	54 004.66	51 435.90	54 017.10	56 319.99	–1.0	4.3	9.4	7.7
3. Agriculture	46 939.07	57 021.47	55 035.30	58 382.05	59 381.63	26.5	1.7	7.8	8.1
4. LULUCF	–59 626.70	–31 791.23	–25 243.52	–16 413.71	–12 860.68	–78.4	–21.6	NA	NA
5. Waste	20 711.04	19 627.61	17 159.89	17 933.82	17 652.42	–14.8	–1.6	3.4	2.4
6. Other[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gas[b]									
CO_2	462 117.35	572 162.10	555 549.85	572 834.39	586 504.63	26.9	2.4	76.6	80.4
CH_4	90 484.95	112 024.26	91 559.36	91 893.04	91 424.11	1.0	–0.5	15.0	12.5
N_2O	38 864.88	35 852.67	33 391.61	36 556.53	37 944.54	–2.4	3.8	6.4	5.2
HFCs	970.54	2 754.84	7 729.05	11 528.09	12 545.43	1 192.6	8.8	0.2	1.7
PFCs	7 557.90	4 984.52	1 858.50	744.10	621.03	–91.8	–16.5	1.3	0.1
SF_6	3 225.92	2 902.96	442.09	281.95	309.40	–90.4	9.7	0.5	0.0
NF_3	0.32	0.24	0.15	0.12	0.12	–63.0	0.0	0.0	0.0
Total GHG emissions excluding LULUCF	**603 221.87**	**730 681.59**	**690 530.62**	**713 838.21**	**729 349.27**	**20.9**	**2.2**	**100.0**	**100.0**
Total GHG emissions including LULUCF	**543 595.16**	**698 890.37**	**665 287.10**	**697 424.49**	**716 488.59**	**31.8**	**2.7**	**NA**	**NA**
Total GHG emissions excluding LULUCF, including indirect CO_2	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total GHG emissions including LULUCF, including indirect CO_2	**544 381.33**	**699 780.73**	**665 870.96**	**697 938.97**	**716 978.37**	**31.7**	**2.7**	**NA**	**NA**

Source: GHG emission data: Canada's 2020 inventory submission, version 1.

[a] Emissions and removals reported under the sector other (sector 6) are not included in the total GHG emissions.

[b] Emissions by gas without LULUCF.

9. In brief, Canada's national inventory arrangements were established in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". There have been no changes in these arrangements since the BR3. Environment and Climate Change Canada is the single national entity responsible for preparing and submitting the national GHG inventory to the secretariat and managing the supporting processes and procedures. The institutional arrangements in place for preparing the inventory include formal agreements on data collection and emission estimation; a quality management plan, including an improvement plan; a process for identifying key categories and carrying out quantitative uncertainty analyses; a process for performing recalculations to take account of improvements; procedures for official approval of the GHG inventory; and a working archive system to facilitate third-party reviews.

2. Assessment of adherence to the reporting guidelines

10. The ERT assessed the information reported in the BR4 of Canada and recognized that the reporting is complete, transparent and thus adhering to the UNFCCC reporting guidelines on BRs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

B. Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies

1. Technical assessment of the reported information

11. For Canada the Convention entered into force on 21 March 1994. Under the Convention Canada committed to reducing its total GHG emissions without LULUCF by 17 per cent below the 2005 level by 2020. The target includes all GHGs included in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", namely CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3. It also includes all IPCC sources and sectors included in the annual GHG inventory. The GWP values used are from the AR4. In absolute terms this means that under the Convention Canada has to reduce its total emissions without LULUCF from 730,349.48 kt CO_2 eq (in 2005[4]) to 606,190.07[5] kt CO_2 eq by 2020.

12. Although emissions and removals from LULUCF are not reflected in the calculation of the target, which is based on national totals excluding LULUCF, Canada reported that it intends to use the LULUCF contribution towards reaching the target. The LULUCF contribution is accounted using a national approach. In the BR4 Canada reported that, since the BR3, it had analysed the LULUCF sector and established accounting approaches for each of the LULUCF subsectors. For almost all subsectors, the respective accounting approach involves comparing net emissions in a given year with net emissions in the base year, but a reference-level approach is used for forest land remaining forest land and the associated harvested wood products. Canada reported that it is still considering whether and how to use market-based mechanisms to help it meet its national climate targets, including the 2030 target and its objective to achieve net zero emissions by 2050.

13. Canada provided information on its 2030 target in the BR4. Under the Paris Agreement, Canada has committed to reducing its GHG emissions by 30 per cent below the 2005 level by 2030, as set out in its nationally determined contribution submitted in May 2017.

14. Canada also submitted its mid-century long-term low GHG development strategy under the Paris Agreement, which sets a net emission reduction target of 80 per cent by 2050 compared with the 2005 level. In the BR4, Canada reported that, in December 2019, the Government committed to achieving net zero emissions by 2050. During the review, Canada clarified that the Government is in the process of developing a national plan for achieving net zero emissions by 2050, including by setting legally binding five-year emission reduction milestones derived from expert advice and consultation with citizens. Later in 2020, the Government of Canada plans to outline timelines for advancing this work, taking into account the impacts of the coronavirus disease 2019, the context of economic regrowth and the transition to a sustainable, low-carbon economy.

2. Assessment of adherence to the reporting guidelines

15. The ERT assessed the information reported in the BR4 of Canada and identified an issue relating to transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table 3.

Table 3
Findings on the assumptions, conditions and methodologies related to the quantified economy-wide emission reduction target from the review of the fourth biennial report of Canada

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 5	According to the UNFCCC reporting guidelines on BRs, information on the use of international market-based mechanisms is to be reported in the description of the economy-wide emission reduction target. Canada did not report this information in

[4] The emission level in 2005 was calculated on the basis of CTF table 1.
[5] As calculated by the ERT.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
	Issue type: transparency Assessment: recommendation	CTF tables 2(e–f); however, it provided a footnote to CTF table 2(f) explaining that it is still examining its approach to using ITMOs. Further, the Party included the projected purchases of allowances under the WCI in the WAM scenario, totalling 8,000 kt CO_2 eq in 2020 and 13,000 kt CO_2 eq in 2030. The Party reported that it could not complete CTF tables 2(e–f) since the WCI is still finalizing its approach to accounting for emission flows in different jurisdictions. During the review Canada explained that it was still considering whether and how to use ITMOs to help it meet its national climate targets, including the 2030 target and the objective to achieve net zero emissions by 2050. It also explained that it will report on the progress towards its 2020 target in its BR5 by the end of 2022 using the inventory results for 2020, which will be published in its 2022 national inventory report. The ERT acknowledges that there is an ongoing process in Canada to develop an approach to using ITMOs and that transparency cannot be improved until this process has been concluded, which is expected by 2022. Therefore, the ERT recommends that Canada provide a transparent description of the outcome of its process of considering the use of market-based mechanisms in its next BR, including the expected scale of contribution of each source of international unit and/or allowance from market-based mechanisms used in attaining its economy-wide target.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on BRs.

C. Progress made towards achievement of the quantified economy-wide emission reduction target

1. Mitigation actions and their effects

(a) Technical assessment of the reported information

16. Canada provided information on its package of PaMs implemented, adopted and planned, by sector and by gas, in order to fulfil its commitments under the Convention. Canada reported on its policy context and legal and institutional arrangements in place for implementing its commitments and monitoring and evaluating the effectiveness of its PaMs.

17. Canada provided information on a set of PaMs similar to those previously reported, with the exception of the introduction of some new PaMs, as described below. Canada also provided information on changes since its previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its target. Canada reported that some changes had been made to its domestic compliance arrangements (see para. 19 below). The new PaMs introduced include the federal GHG offset system, a carbon offset and reduction scheme for international aviation and the agricultural clean technology programme, while the Greenhouse Gas Pollution Pricing Act received Royal Assent for implementation following the submission of the BR3.

18. In its reporting on its PaMs, Canada provided the estimated emission reduction impacts for about one third of its PaMs. Where estimated impacts were not provided, the Party supplied explanations, for example that a policy was not expected to be in place in a certain year, the mitigation impact had been aggregated with that of another overarching measure, the impact in a certain year was expected to be minimal or the province or territory had not provided the estimation. During the review, Canada explained that in some cases the federal implementing agencies had not provided the estimation, such as for the measure on federal energy-efficient building initiatives in 2020. Canada estimated the impacts of some of its PaMs as groups and explained why it had done so. For instance, the emission reductions relating to the amendments to regulations on the coal-fired generation of electricity were estimated to reach 12,800.00 kt CO_2 eq by 2030, which refers to country-level emission reductions; therefore, estimates were not quantified separately for the individual provinces and territories, but reported as “NE”, and this was clearly explained.

19. Canada reported on its self-assessment of compliance with its emission reduction targets and national rules for taking action against non-compliance. Canada reported that a federal GHG offset system is under development, which will provide regulated facilities with another compliance option for the output-based pricing system covering the provinces and territories of Manitoba, New Brunswick, Nunavut, Ontario, Prince Edward Island and Yukon, and partially Saskatchewan. Provinces such as British Columbia and Alberta have established their own compliance system. In Alberta, for example, there are four compliance options for regulated facilities: improving the GHG intensity of operations, buying provincial emission performance credits from facilities that achieve reductions beyond their requirement, buying provincial offset units or paying CAD 30/t CO_2 eq.

20. The key overarching cross-sectoral policy reported by Canada is the PCF. In addition, the Government's commitment to achieving net zero emissions by 2050, including by setting legally binding five-year emission reduction milestones, provides the framework for future climate policy. The mitigation effect of the carbon pollution pricing system (as shown in table 4), which includes the carbon pricing systems in all provinces and territories (e.g. British Columbia's carbon tax and others), is the most significant. Other policies that are delivering significant emission reductions are the Clean Fuel Standard, regulations for phasing down the consumption of HFCs, the British Columbia carbon tax and other sectoral and provincial/territorial policies. The Government of Canada has provided funding to support clean technology and green infrastructure, such as the newly committed CAD 1.4 billion to support clean technology firms. With regard to fossil fuel used in industry and buildings, the Clean Fuel Standard aims to reduce the life-cycle emission intensity for liquid fuels (e.g. gasoline and diesel) used mainly in transportation, as well as for gaseous (e.g. natural gas) and solid (e.g. petroleum coke) fuels, but has not yet been officially adopted; however, a proposed regulatory approach has been introduced.

21. Canada highlighted the mitigation actions that are under development and provide a foundation for significant additional action, such as federal energy-efficient building initiatives, additional electricity grid interconnections and the British Columbia renewable natural gas requirement. Canada also reported adopted PaMs, such as the British Columbia CleanBC Program for Industry, British Columbia's Zero-Emission Vehicles Act, and improvements to the New Brunswick electric vehicle network and infrastructure. Table 4 provides a summary of the reported information on the PaMs of Canada.

Table 4
Summary of information on policies and measures reported by Canada

Sector	*Key PaMs*	*Estimate of mitigation impact in 2020 (kt CO_2 eq)*	*Estimate of mitigation impact in 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	PCF	–	–
	Carbon pollution pricing system	33 000.00–37 000.00	61 000.00–85 000.00
	Clean Fuel Standard	NA	30 000.00
Energy	Regulations for reducing CH_4 in the oil and gas sector	4 000.00	20 000.00
	Alberta directive 060 on upstream petroleum industry flaring, incinerating and venting	4 000.00	NE
	Amendments to the coal-fired generation of electricity regulations to reduce CO_2 emissions	NA	12 800.00
Transport	Light-duty vehicle GHG regulations, phases 1 and 2	14 700.00	47 600.00
	Heavy-duty vehicle GHG regulations, phases 1 and 2	2 600.00	11 500.00
Renewable energy	ecoEnergy for renewable power programme	6 000.00	6 000.00
	Newfoundland and Labrador Muskrat Falls hydroelectric project	1 400.00	1 400.00

Sector	*Key PaMs*	*Estimate of mitigation impact in 2020 (kt CO_2 eq)*	*Estimate of mitigation impact in 2030 (kt CO_2 eq)*
Energy efficiency	Ontario natural gas demand-side management programmes	5 300.00	NE
	Federal energy-efficient building initiatives	NE	11 200.00
Industrial processes and product use	Regulations for phasing down the consumption of HFCs	1 000.00	9 000.00
	Newfoundland and Labrador Climate Change Challenge Fund	55.00	57.00
	British Columbia Cement Low Carbon Fuel Program	NE	NE
Agriculture	Prince Edward Island winter cover crop funding programmes	2.00	2.00
	Canadian Agricultural Partnership	NE	NE
LULUCF	British Columbia measure to encourage carbon offsets in the forestry sector	950.00	910.00
	Saskatchewan SaskPower Shand Greenhouse Seedlings	111.00	129.00
Waste	Ontario landfill gas collection and control regulation	1 800.00	NE
	British Columbia landfill gas management regulation	NE	700.00

Note: The estimates of mitigation impact are estimates of emissions of CO_2 eq avoided in a given year as a result of the implementation of mitigation actions.

(b) Policies and measures in the energy sector

22. **Energy efficiency.** Canada has updated or introduced minimum energy efficiency standards for 35 equipment and appliance product categories, resulting in almost 50 product categories with an energy efficiency standard. The federal programme for improving the energy efficiency of equipment and appliances promoted market transformation in the areas of windows, space heating and water heating. Energy efficiency PaMs targeting individual sectors are discussed below.

23. **Energy supply and renewables.** PaMs for energy supply focus on three areas: renewable energy, fossil fuel power plants and fossil fuel use in industry and buildings. To promote the use of renewable energy, Canada provided CAD 200 million to expand the portfolio of commercially viable renewable energy sources under the emerging renewable power programme, and introduced programmes to help remote communities reduce their use of fossil fuels. At the province and territory level, Saskatchewan SaskPower Shand Greenhouse Seedlings aims to achieve a renewable energy share in its total capacity of up to 50 per cent by 2030. With regard to fossil fuel power plants, the Party introduced regulations on reducing CO_2 emissions from coal-fired electricity generation with the aim of phasing out traditional coal-fired electricity by 2030. These regulations work in tandem with the regulations on limiting CO_2 emissions from natural gas-fired electricity generation to ensure that, where coal-fired electricity is replaced by natural gas-fired electricity, the new systems use highly efficient technology.

24. **Residential and commercial sectors.** In the BR4, Canada reported that it was pursuing the development of increasingly stringent model building codes, with the goal that provinces and territories adopt a "net zero energy ready" model building code by 2030, and supporting the research, development and presentation of associated technologies and practices, such as through the Low Carbon Economy Fund. Canada is of the view that the use of wood in construction can reduce emissions, and with this in mind initiated a programme to support projects and activities that increase the use of wood in infrastructure. PaMs to reduce emissions in buildings were also introduced at the province and territory level, such as Efficiency Manitoba, which aims to meet legislated savings targets of 22.5 per cent

of domestic electricity demand and 11.3 per cent of domestic natural gas demand over a 15-year period.

25. **Transport sector.** PaMs in the transport sector target three areas: emission standards, zero-emission vehicles, and investment in low-carbon transport. Canada introduced more stringent emission standards for heavy-duty and light-duty vehicles, including passenger vehicles. The Party also set sales targets for zero-emission light-duty vehicles: 10 per cent of all new light-duty vehicle sales by 2025; 30 per cent by 2030; and 100 per cent by 2040. In addition, Canada is investing over CAD 180 million in electric vehicle charging stations and other alternative refuelling infrastructure on the country's main roads and freight corridors, thus addressing a key barrier to the uptake of zero-emission vehicles and alternative fuel vehicles. Meanwhile, provinces and territories such as Ontario are investing in light rail or subway systems to reduce emissions from intercity transport use.

26. **Industrial sector.** The PaMs aimed at reducing emissions in the heavy industry sector focus mainly on improving energy efficiency, such as through the ENERGY STAR energy management system. Some provinces and territories also introduced projects to promote the use of alternative energy in the industrial sector. For example, Ontario introduced regulatory changes to help facilities use less carbon-intensive fuels, such as biomass. The Government of Canada has set a national target to reduce CH_4 in the oil and gas industry by 40–45 per cent by 2025 compared with the 2012 level, supported by the introduction of relevant regulations.

27. **Petroleum and natural gas production.** Canada established a CAD 100 million Strategic Innovation Fund to support the development and adoption of innovative technologies and processes aimed at reducing GHG emissions in the oil and gas industry. PaMs were also introduced at the province and territory level. For example, Newfoundland and Labrador started working with the Government on introducing emission regulations for offshore petroleum industries, while Alberta finalized its directives 060 and 017 on reducing upstream oil and gas CH_4 emissions by 45 per cent relative to the 2014 level by 2025.

(c) Policies and measures in other sectors

28. **Industrial processes.** Under the PCF, the Greenhouse Gas Pollution Pricing Act established a framework for the federal carbon pollution pricing system, which includes the output-based pricing system. In addition, regulations to phase down the consumption of HFCs were introduced in 2019 with the aim of achieving emission reductions of 1,000.00 kt CO_2 eq by 2020 and 9,000.00 kt CO_2 eq by 2030. PaMs to reduce emissions from industrial processes were also launched at the province and territory level, with Ontario having adopted GHG emission performance standards.

29. **Agriculture.** Canada launched the CAD 3 billion Canadian Agricultural Partnership, one of the objectives of which is to reduce GHG emissions. The CAD 25 million Agriculture Clean Technology programme supports the research, development and adoption of clean technologies for the agriculture sector. PaMs to reduce GHG emissions in the agriculture sector were also launched at the province and territory level, and include winter cover crop funding programmes in Prince Edward Island aimed at sequestering carbon and reducing direct and indirect N_2O emissions.

30. **LULUCF.** Under the PCF, Canada identified three key areas for reducing emissions and increasing removals, namely increasing stored carbon and advancing sustainable forestry practices, increasing the use of wood in construction, and generating bioenergy and advanced bioproducts. PaMs such as the Low Carbon Economy Fund and the Forest Bioeconomy Framework were launched for this purpose. PaMs were also introduced at the province and territory level. For example, British Columbia launched a measure to encourage carbon offsets in the forestry sector, which are then purchased by the province as part of the Carbon Neutral Government Program. For example, a strict ecosystem-based management regime has been introduced in the Great Bear Rainforest, with a view to protecting 85 per cent of the total area (6.4 million ha).

31. **Waste management.** The PCF encourages provinces and territories to utilize landfill gas to reduce GHG emissions. Many PaMs were launched in this area, with the Ontario

landfill gas collection and control regulation, for example, expected to achieve CH_4 emission reductions of 1,800.00 kt CO_2 eq by 2020.

(d) Response measures

32. Canada reported on its assessment of the economic and social consequences of its response measures. The Party presented several initiatives aimed at minimizing adverse impacts. For example, under the federal carbon pollution pricing system, certain exceptions are provided for aviation fuels, as well as for light fuels (e.g. diesel) and marketable natural gas used by remote power plant operators to generate electricity for remote communities. In addition, the approach to pricing carbon pollution under the PCF takes into account the circumstances of Canada's northern territories, which have comparatively high costs of living, high energy costs, food security challenges and emerging economies.

(e) Assessment of adherence to the reporting guidelines

33. The ERT assessed the information reported in the BR4 of Canada and identified an issue relating to transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table 5.

Table 5
Findings on mitigation actions and their effects from the review of the fourth biennial report of Canada

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 6 Issue type: transparency Assessment: recommendation	The ERT noted that the information reported for some PaMs in CTF table 3 is inconsistent. Several PaMs (e.g. Impact Canada's clean technology stream; an infrastructure investment programme; the Prince Edward Island Climate Change Action Plan; the Ontario building code; federal energy-efficient building initiatives; the British Columbia CH_4 reduction policy; and the British Columbia incentive to reduce GHGs from marine transportation) were reported as planned; however, their start year of implementation was 2017 or 2018. During the review Canada explained that in the majority of instances where PaMs had a status of planned but with a start year of implementation of 2019 or earlier, the notation refers to a programme or policy that had been partially implemented; that is, formally announced or launched but not yet fully implemented at the time of reporting. For example, funding for projects for the Impact Canada initiative Clean Technology Stream and the Investing in Canada Infrastructure Program will continue to be released and allocated over a number of years and so the programmes were not labelled as fully implemented. Other PaMs with a status of planned and start year of implementation of 2019 or earlier concerned programmes that had been formally announced but were still in development, such as the Federal Energy Efficient Building Initiatives, which was announced in the budget for 2016 with an eight-year funding plan and a key focus on introducing new net zero buildings and retrofit codes. These actions had not been completed at the time of reporting. In other cases, regulations that were in place but not fully in force at the time of reporting were also not labelled as implemented. This included, for example, British Columbia's CH_4 reduction policy, which introduced amendments to the provincial Drilling and Production Regulation in December 2018 and entered into force on 1 January 2020. The ERT recommends that Canada improve the transparency of its reporting by clearly distinguishing in its next BR those PaMs that it has implemented from those that it plans to implement. The ERT notes that transparency would be improved if the Party followed the definitions of planned and implemented PaMs set out in the UNFCCC reporting guidelines on NCs, or explained the country-specific definitions applied.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on BRs.

2. Estimates of emission reductions and removals and the use of units from market-based mechanisms and land use, land-use change and forestry

(a) Technical assessment of the reported information

34. On its use of units from LULUCF activities, Canada reported in CTF tables 4 and 4(a) that in 2016 and 2017 it used units equivalent to 15,427.00 and 17,488.00 kt CO_2 eq, respectively, to offset 2.2 and 2.4 per cent of its total GHG emissions, respectively. Canada reported that it was still considering whether and how to use units from market-based mechanisms. Table 6 illustrates Canada's total GHG emissions, the contribution of LULUCF and the use of units from market-based mechanisms to achieve its target.

Table 6
Summary of information on the use of units from market-based mechanisms and land use, land-use change and forestry by Canada to achieve its target

Year	*Emissions excluding LULUCF (kt CO_2 eq)*	*Contribution of LULUCF (kt CO_2 eq)*	*Use of units from market-based mechanisms (kt CO_2 eq)*[a]	*Net emissions including LULUCF and market-based mechanisms (kt CO_2 eq)*
2005 (base year)	730 349.48	NA	NA	730 349.48
2010	692 618.85	7 540.00	NA	700 158.85
2011	703 378.95	7 109.00	NA	710 487.95
2012	711 023.23	–148.00	NA	710 875.23
2013	722 062.81	–5 295.00	NA	716 767.81
2014	723 090.99	–9 361.00	NA	713 729.99
2015	721 992.08	–12 813.00	NA	709 179.08
2016	707 727.17	–15 427.00	NA	692 300.17
2017	715 749.23	–17 488.00	NA	698 261.23
2020 target	NA	NA	NA	606 190.07

Sources: Canada's BR4 and CTF tables 1, 2(a), 4, 4(a)I, 4(a)II, 4(b) and 6(a).
[a] Canada reported that it has not yet decided on whether to use market-based mechanisms.

35. In assessing the Party's progress towards achieving the 2020 target, the ERT noted that Canada's emission reduction target under the Convention is 17 per cent below the 2005 level (see para. 11 above). In 2017 Canada's annual total GHG emissions excluding LULUCF were 2 per cent (14,600.25 kt CO_2 eq) below the base-year level. In addition, the ERT noted that in 2017 the contribution of LULUCF was 17,488.00 kt CO_2 eq, resulting in net emissions of 698,261.23 kt CO_2 eq, or 92,071.16 kt CO_2 eq above the 2020 target.

36. The ERT noted that Canada faces challenges in implementing mitigation actions that will deliver the emission reductions needed to make sufficient progress towards its target and may face challenges in achieving its target under the Convention without using market-based mechanisms.

37. In a custom footnote to CTF table 4(b), Canada explained that it is still examining its approach to using market-based mechanisms, including ITMOs, and will continue to work with interested provinces and territories, as well as with international partners, to ensure that allowances acquired through international emissions trading are counted towards its international targets. Canada also explained that its approach will take into account the applicable guidance under the Convention and the Paris Agreement, as well as other relevant input and programmes (e.g. the Carbon Offsetting and Reduction Scheme for International Aviation developed by the International Civil Aviation Organization).

(b) Assessment of adherence to the reporting guidelines

38. The ERT assessed the information reported in the BR4 of Canada and identified issues relating to completeness, transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 7.

Table 7
Findings on estimates of emission reductions and removals and on the use of units from market-based mechanisms and land use, land-use change and forestry from the review of the fourth biennial report of Canada

No.	*Reporting requirement issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraphs 9–10 Issue type: transparency Assessment: recommendation	The total emissions excluding LULUCF reported by Canada in CTF table 4 for all reported years are not consistent with those reported in CTF table 1. For example, GHG emissions for the base year were reported as 730,300.00 kt CO_2 eq in CTF table 4 but as 730,349.48 kt CO_2 eq in CTF table 1. During the review Canada explained that the difference in the values is as a result of rounding to the nearest hundred and noted that there is no specific guidance on rounding in CTF tables. The ERT noted that, according to paragraph 2 of the UNFCCC reporting guidelines on BRs, GHG inventory information in the BR should be consistent with that provided in the most recent inventory submission. Data from the most recent inventory submission were correctly reported in CTF table 1 by Canada; however, they were not carried over to CTF table 4, which resulted in inaccurate reporting of information on progress towards emission reduction targets for the base year and the reporting year under paragraphs 9–10 of the same guidelines. The ERT also noted that information presented in CTF table 4 concerns historical years, and is used to analyse the progress of the Party towards its emission reduction target. For this reason, the same GHG inventory data should be used in CTF tables 1 and 4. Thus the ERT recommends that the Party enhance the transparency of its reporting by providing consistent GHG inventory estimates in CTF tables 1 and 4 for each reporting year.
2	Reporting requirement specified in paragraph 10 Issue type: completeness Assessment: recommendation	The Party did not report on the use of units from market-based mechanisms in CTF table 4. In a custom footnote to CTF table 4(b), Canada explained that it is still examining its approach to using ITMOs. During the review Canada explained that it was still considering whether and how to use ITMOs to help it meet its national climate targets, including the 2030 target and its objective to achieve net zero emissions by 2050. It also explained that it will report on the achievement of its 2020 target in its BR5 by the end of 2022 using the inventory results for 2020 published in its 2022 national inventory report. The ERT reiterates the recommendation from the previous review report for Canada to provide in the next BR information on the use of units from market-based mechanisms for each reporting year.

Notes: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on BRs.

3. Projections overview methodology and results

(a) Technical assessment of the reported information

39. Canada reported updated projections for 2020 and 2030 relative to actual inventory data for 2017 under the WEM scenario. The Party reported that the WEM scenario includes PaMs that satisfy the following four criteria: the policy has the necessary legislative and financial support; the measure is expected to produce meaningful reductions in emissions (at least 100 kt CO_2 eq); there is sufficient quantifiable information available to estimate the impact of the policy or measure; and the policy or measure is incremental to other PaMs already included in the model used to develop projections.

40. In addition to the WEM scenario, Canada reported the WAM scenario. The WAM scenario includes planned PaMs. Canada provided a definition of its scenarios, explaining that its WEM scenario includes PaMs in place as of September 2019 that satisfy the four criteria described in paragraph 39 above, such as the carbon pollution pricing system, the accelerated phasing out of coal-fired power generation, GHG regulations for light- and heavy-duty vehicles, measures for reducing CH_4 in the oil and gas sector and regulations for

phasing down the consumption of HFCs, as well as other PaMs implemented at the province or territory level, such as British Colombia's carbon tax and Alberta's technology innovation and emission reduction system. The WAM scenario includes additional PaMs that are under development or have not yet been fully implemented, such as the Clean Fuel Standard and "net zero energy ready" model building codes under the PCF.

41. Moreover, Canada reported a "technology case" scenario to show the impacts of faster technological advances than those assumed under the WEM and WAM scenarios. This scenario includes all PaMs included in the WEM and WAM scenarios, as well as the potential impacts of emerging technologies, such as heat pumps, electric vehicles and reduced capital costs for renewable generation. Canada did not report a WOM scenario.

42. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions. Canada used economic sectors to analyse its emission trends and PaMs. Although these sectors are different from the IPCC categories used in the GHG inventory, Canada provided a general explanation of how the economic sectors used for the projections relate to the IPCC categories used in the GHG inventory, which were also reflected in some adjustments made to the IPCC categories. Canada mainly discussed the results of the projections in the BR4 by economic sector, but also provided projections by the IPCC sector in the BR4 and CTF tables.

43. Canada reported a projection of the contribution of LULUCF towards achieving its emission reduction target, as well as projections of emissions and removals from the LULUCF sector. The ERT commends the Party for providing additional information, which facilitates a better understanding of its progress towards its target.

44. The projections are presented on a gas-by-gas basis for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) as well as NF_3 for 1990–2030. The projections are also provided in an aggregated format for each sector and for a Party total using GWP values from the AR4. Canada reported on factors and activities affecting emissions for each economic sector.

(b) Methodology, assumptions and changes since the previous submission

45. The methodology used for the preparation of the projections is virtually identical to that used for the preparation of the emission projections for the NC7, except for the projections for the LULUCF sector, which were reported for the first time in the BR4. Canada reported supporting information further explaining the methodologies and the changes made since the NC7. To prepare its projections, Canada uses the most up-to-date data on GHG emissions and energy use and develops emissions scenarios using the energy, emissions and economy model for Canada. This model includes two components: the Energy 2020 software, which simulates Canada's energy supply and demand structure, and the macroeconomic model of the Canadian economy. There have been many changes to the assumptions, methodologies, models and approaches used in the projection scenarios since the NC7 and BR3, such as revised costs for technologies used in electricity generation, lighting upgrades, more efficient geothermal and air source heat pumps, and adjustments to the modelling of heavy-duty vehicle regulations. Macroeconomic assumptions and oil and gas price and production forecasts were also updated. Canada reported in CTF table 5 the key variables and assumptions used in the preparation of the projection scenarios.

46. To prepare its projections, Canada relied on key underlying assumptions relating to GDP growth rate, population, number of households, international prices of oil, coal and gas, and agriculture. The assumptions were updated on the basis of the most recent economic developments known at the time of the preparation of the projections. The assumptions are derived from data from Statistics Canada, Finance Canada and the Canada Energy Regulator, for example. The ERT noted that Canada provided in the BR4 detailed information on future trends for each assumption listed above.

47. Emissions and removals from the LULUCF sector were modelled separately from those for the other sectors. Individual LULUCF subsectors were each projected using different models and methodologies. Canada reported on the models used for developing LULUCF projections, such as the Carbon Budget Model of the Canadian Forest Sector; the Canadian Regional Agricultural Model; the Canadian Agricultural Greenhouse Gas Monitoring,

Accounting and Reporting System; and the National Forest Carbon Monitoring, Accounting and Reporting Systems for Harvested Wood Products. A detailed description of the methodology and assumptions applied is provided in the annex to the BR4. Projections were provided for all subsectors except grassland, settlements remaining settlements and other land.

48. Canada also provided information on sensitivity analyses. Sensitivity analyses were conducted for a number of important assumptions, such as population, trends in energy prices and economic development indicators. Under one scenario, which assumed slow GDP growth, slow population growth and low global oil prices, projected GHG emissions amounted to 583 Mt CO_2 eq by 2030, which were lower than those under the WEM scenario by 90 Mt CO_2 eq. Under the opposite scenario, which assumed fast GDP growth, high population growth and high oil prices, projected GHG emissions were 729 Mt CO_2 eq by 2030, which were higher than those under the WEM scenario by 56 Mt CO_2 eq.

(c) Results of projections

49. The projected emission levels under different scenarios and information on the quantified economy-wide emission reduction target are presented in table 8 and figure 1.

50. Canada's total GHG emissions excluding LULUCF are projected to be 705.5 and 672.9 Mt CO_2 eq in 2020 and 2030, respectively, under the WEM scenario, which is an increase of 17.0 and 11.6 per cent, respectively, above the 1990 level and a decrease of 3.4 and 7.9 per cent, respectively, below the 2005 level. Under the WAM scenario, emissions in 2020 and 2030, amounting to 700.5 and 615.9 Mt CO_2 eq, respectively, are projected to be higher than those in 1990 by 16.2 and 2.2 per cent, respectively, and lower than those in 2005 by 4.1 and 15.7 per cent, respectively.

51. Canada's economy-wide target under the Convention is to reduce its total emissions by 17 per cent below the 2005 level by 2020 (see para. 11 above). The 2020 projections suggest that Canada may face challenges in achieving its 2020 target under the Convention.

52. Canada compared the contributions of each sector to the projected emissions under the WAM scenario in 2030 (including WCI allowances and the LULUCF contribution) (588 Mt CO_2 eq) with the projected emissions under the WEM scenario reported in the BR2 (815 Mt CO_2 eq), which does not include PCF. Other than differences due to the inclusion of the contribution of LULUCF, the most significant reductions occur in the building sector (47 Mt CO_2 eq), followed by the oil and gas sector (43 Mt CO_2 eq) and the electricity sector (40 Mt CO_2 eq). Canada explained that it expects to achieve the remaining emission reductions needed to achieve the 2030 target by increasing the use of clean electricity, making buildings and communities greener, promoting electric modes of transportation and introducing nature-based climate solutions, as well as adopting higher levels of clean technology than had been anticipated when developing previous projections.

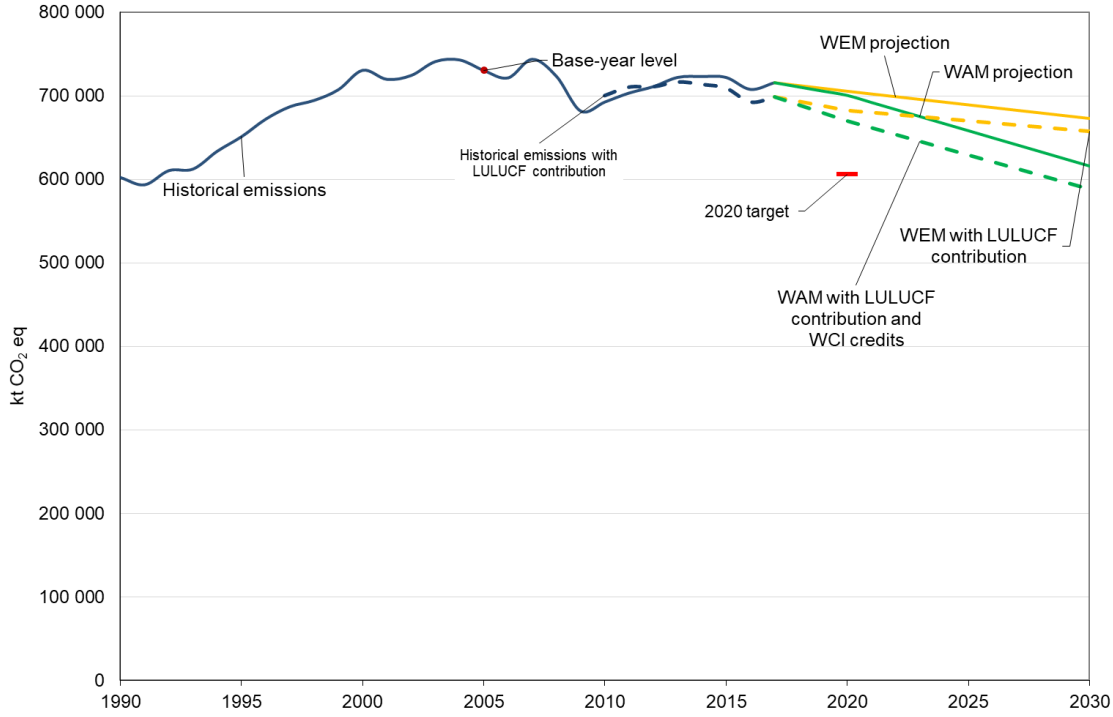
Table 8
Summary of greenhouse gas emission projections for Canada

	GHG emissions (kt CO_2 eq per year)	*Change in relation to base-year level (%)*	*Change in relation to 1990 level (%)*
Quantified economy-wide emission reduction target under the Convention	606 190.07	–17	0.56
Inventory data 1990	602 800.00	–17.5	NA
Inventory data 2005 (base year)	730 300.00	NA	21.2
Inventory data 2017	715 700.00	–2.0	18.7
WEM projections for 2020	705 500.00	–3.4	17.0
WAM projections for 2020	700 500.00	–4.1	16.2
WEM projections for 2030	672 900.00	–7.9	11.6
WAM projections for 2030	615 900.00	–15.7	2.2

Source: Canada's BR4 and CTF table 6. The WAM projections for 2020 and 2030 do not include LULUCF contribution or WCI credits; the figures for GHG emissions in 2005 and 2017 were rounded in CTF table 6 and do not match the values in CTF table 1.

Notes: (1) The projections are for GHG emissions without LULUCF and indirect CO_2 emissions. (2) The quantified economy-wide emission reduction target was calculated by the ERT.

Figure 1
Greenhouse gas emission projections reported by Canada



Source: Canada's BR4 and CTF tables 1 and 6 (total GHG emissions excluding LULUCF).

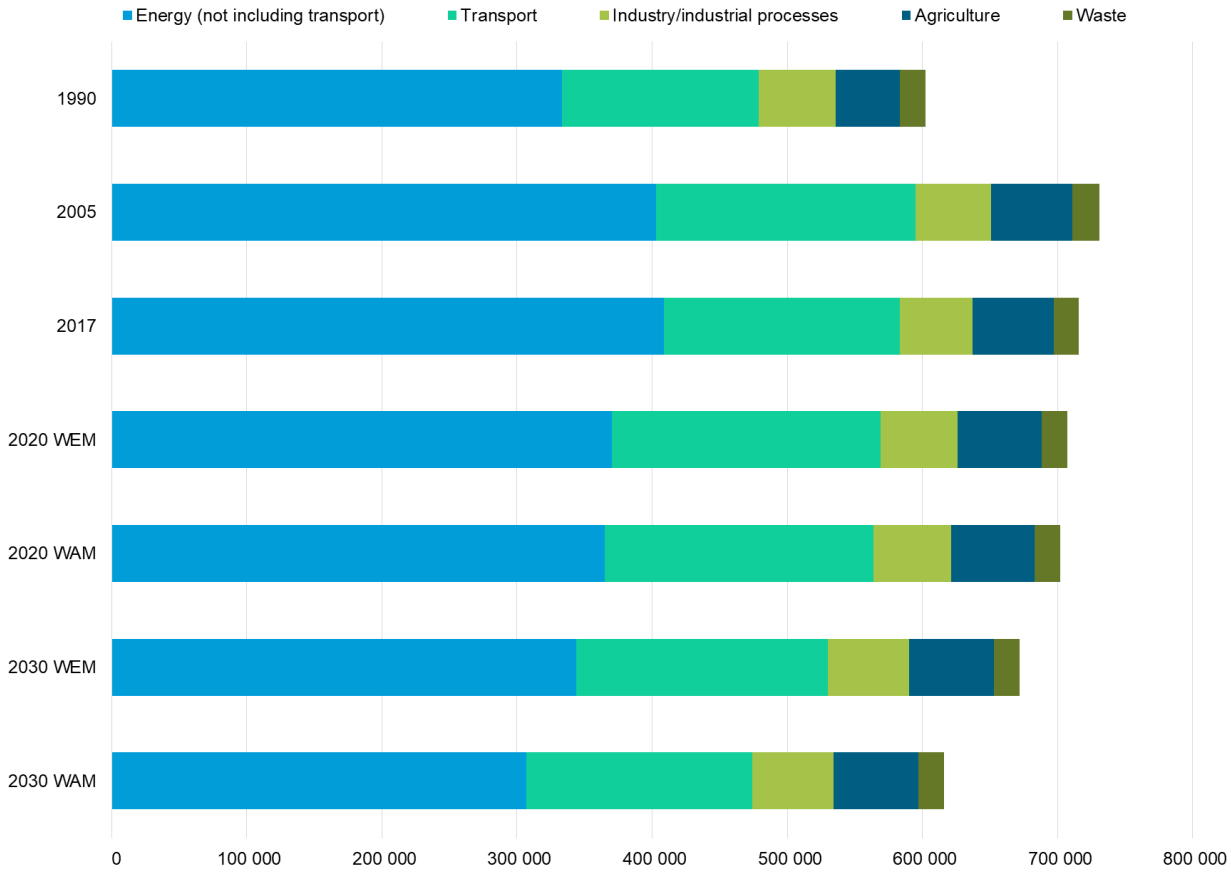
53. The WEM and WAM scenario projections reported by Canada in the BR4 did not include PaMs related to the Government's commitment in December 2019 to achieving net zero GHG emissions by 2050 or additional mitigation measures that may be implemented by provinces and territories by 2030. The ERT noted that the Party could further improve the transparency of its reporting by including this information in the next BR.

54. Canada presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in figure 2 and table 9.

55. According to the projections reported for 2020 under the WEM scenario, the most significant emission increases are expected to occur in the transport and LULUCF sectors, amounting to projected increases of emissions of around 53 Mt CO_2 eq (36.3 per cent) and decreases of removals of 46 Mt CO_2 eq (–67.6 per cent) and between 1990 and 2020, respectively. Compared with the 2005 level, which is the base year for Canada's emission reduction targets, the most significant emission reductions are expected to occur in the energy sector, amounting to projected reductions of 33 Mt CO_2 eq (8.2 per cent). The pattern of projected emissions reported for 2030 under the same scenario slightly changes. Emissions from the energy sector are projected to continue to decrease after 2020, mainly owing to the phasing out of coal in electricity generation, whereas emissions from the agriculture sector are projected to increase owing to increased use of fertilizers. As a result, the most significant emission increases between 1990 and 2030 are expected to occur in the transport and LULUCF sectors, amounting to projected increases of 40 Mt CO_2 eq (27.4 per cent) and 58 Mt CO_2 eq (–85.3 per cent), respectively. Compared with the 2005 level, the most significant emission reductions are expected to occur in the energy sector, amounting to projected reductions of 59 Mt CO_2 eq (14.6 per cent).

56. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 presented by sector remain the same. However, the patterns of emission reductions by 2030 presented by sector slightly change owing to large emission reductions in the energy and transport sector, mainly as a result of the Clean Fuel Standard. The projected emissions from the industrial processes, agriculture and waste sectors under the WAM scenario are the same as those under the WEM scenario.

Figure 2
Greenhouse gas emission projections for Canada presented by sector



Source: Canada's BR4 CTF table 6.

57. Canada reported the projections by economic sector to provide a better understanding of the relationship between economic activities and emissions. According to the projections reported by economic sector for 2020 and 2030 under the WEM scenario, the most significant emission reductions compared with the 2005 level are expected to occur in the electricity sector, amounting to projected reductions of approximately 67 and 95 Mt CO_2 eq, respectively. However, approximately half of these reductions are counteracted by the projected increase in emissions from the oil and gas sector.

58. Canada presented the WEM and WAM scenarios by gas for 2020 and 2030, as summarized in table 10.

Table 9
Summary of greenhouse gas emission projections for Canada presented by sector

	GHG emissions and removals (kt CO_2 eq)						*Change (%)*							
			2020		*2030*		*1990–2020*		*1990–2030*		*2005–2020*		*2005–2030*	
Sector	*1990*	*2005*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
Energy (not including transport)	333 000.00	403 000.00	370 000.00	365 000.00	344 000.00	307 000.00	11.1	9.6	3.3	–7.8	–8.2	–9.4	–14.6	–23.8
Transport[a]	146 000.00	192 000.00	199 000.00	199 000.00	186 000.00	167 000.00	36.3	36.3	27.4	14.4	3.6	3.6	–3.1	–13.0
Industry/industrial processes	57 000.00	56 000.00	57 000.00	57 000.00	60 000.00	60 000.00	0.0	0.0	5.3	5.3	1.8	1.8	7.1	7.1
Agriculture	47 000.00	60 000.00	62 000.00	62 000.00	63 000.00	63 000.00	31.9	31.9	34.0	34.0	3.3	3.3	5.0	5.0
LULUCF[b]	–68 000.00	–21 000.00	–22 000.00	–22 000.00	–10 000.00	–10 000.00	–67.6	–67.6	–85.3	–85.3	4.8	4.8	–52.4	–52.4
Waste	19 000.00	20 000.00	19 000.00	19 000.00	19 000.00	19 000.00	0.0	0.0	0.0	0.0	–5.0	–5.0	–5.0	–5.0
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total GHG emissions excluding LULUCF	**602 800.00**	**730 300.00**	**705 500.00**	**700 500.00**	**672 900.00**	**615 900.00**	**17.0**	**16.2**	**11.6**	**2.2**	**–3.4**	**–4.1**	**–7.9**	**–15.7**

Source: Canada's BR4 CTF table 6. The WAM projections for 2020 and 2030 do not include a LULUCF contribution or WCI credits; GHG emissions in 2005 and 2017 were rounded in CTF table 6 and do not match the values in CTF table 1.

[a] Transport sector projections include off-road transport in the residential, commercial and industry sectors.

[b] The LULUCF sector includes only the subsectors for which projections are available for both historical and projected years, as reported by the Party in its BR4 CTF table 6.

Table 10
Summary of greenhouse gas emission projections for Canada presented by gas

	GHG emissions and removals (kt CO_2 eq)						*Change (%)*							
			2020		*2030*		*1990–2020*		*1990–2030*		*2005–2020*		*2005–2030*	
Sector	*1990*	*2005*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
CO_2[a]	463 000.00	577 000.00	560 000.00	555 000.00	542 000.00	486 000.00	21.0	19.9	17.1	5.0	–2.9	–3.8	–6.1	–15.8
CH_4	89 000.00	106 000.00	92 000.00	92 000.00	80 000.00	79 000.00	3.4	3.4	–10.1	–11.2	–13.2	–13.2	–24.5	–25.5
N_2O	39 000.00	37 000.00	39 000.00	39 000.00	40 000.00	40 000.00	0.0	0.0	2.6	2.6	5.4	5.4	8.1	8.1
HFCs	1 000.00	5 100.00	13 900.00	13 900.00	10 400.00	10 400.00	1 290.0	1 290.0	940.0	940.0	172.5	172.5	103.9	103.9
PFCs	7 600.00	3 800.00	500.00	500.00	400.00	400.00	–93.4	–93.4	–94.7	–94.7	–86.8	–86.8	–89.5	–89.5
SF_6	3 200.00	1 400.00	100.00	100.00	100.00	100.00	–96.9	–96.9	–96.9	–96.9	–92.9	–92.9	–92.9	–92.9
NF_3[b]	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA
Total GHG emissions excluding LULUCF	**602 800.00**	**730 300.00**	**705 500.00**	**700 500.00**	**672 900.00**	**615 900.00**	**17.0**	**16.2**	**11.6**	**2.2**	**–3.4**	**–4.1**	**–7.9**	**–15.7**

Source: Canada's BR4 CTF table 6. The WAM projections for 2020 and 2030 do not include a LULUCF contribution or WCI credits; GHG emissions in 2005 and 2017 were rounded in CTF table 6 and do not match the values in CTF table 1.

[a] Canada did not include indirect CO_2 emissions in its projections.

[b] Information on percentage change for NF_3 is not available since figures for historical emissions and projections are rounded to zero.

59. For 2020, the most significant reductions are projected for PFC and SF_6 emissions: 7.1 Mt CO_2 eq (93.4 per cent) and 3.1 Mt CO_2 eq (96.9 per cent), respectively, under the WEM scenario compared with the 1990 level. CO_2 emissions excluding LULUCF and HFC emissions are projected to increase by 97 Mt CO_2 eq (21.0 per cent) and 12.9 Mt CO_2 eq (1,290.0 per cent), respectively, compared with the 1990 level, contributing to the increase in projected total emissions compared with the 1990 level. Compared with the 2005 level, which is the base year for Canada's emission reduction target, CO_2 and CH_4 emissions without LULUCF are projected to decrease by 17 Mt CO_2 eq (2.9 per cent) and 14 Mt CO_2 eq (13.2 per cent), respectively. Although HFC and N_2O emissions are projected to increase compared with the 2005 level, the projected total emissions are forecast to decrease because of the large decline in projected CO_2 and CH_4 emissions.

60. For 2030, CH_4, PFC and SF_6 emissions are projected to decrease by 9 Mt CO_2 eq (10.1 per cent), 7.2 Mt CO_2 eq (94.7 per cent) and 3.1 Mt CO_2 eq (96.9 per cent), respectively, under the WEM scenario compared with the 1990 level. CO_2 emissions excluding LULUCF and HFC emissions are projected to increase by 79 Mt CO_2 eq (17.1 per cent) and 9.4 Mt CO_2 eq (940.0 per cent), respectively, compared with the 1990 level. Compared with the 2005 level, CO_2 and CH_4 emissions without LULUCF are projected to decrease by 35 Mt CO_2 eq (6.1 per cent) and 26 Mt CO_2 eq (24.5 per cent), respectively. Although HFC and N_2O emissions are projected to increase by 2030 compared with the 2005 level, total emissions are projected to decrease because of the large fall in projected CO_2 and CH_4 emissions.

61. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 and 2030 presented by gas slightly change owing to the large decrease in CO_2 emissions, especially for the 2030 projection. CO_2 emissions excluding LULUCF are projected to increase by 23 Mt CO_2 eq (5.0 per cent) by 2030 compared with the 1990 level but decrease by 91 Mt CO_2 eq (15.8 per cent) compared with the 2005 level. Under the WAM scenario, reductions in CO_2 and CH_4 emissions by 2030 are higher than those under the WEM scenario, by 56 and 1 Mt CO_2 eq, respectively. The projections for other gases under the WAM scenario are the same as under the WEM scenario.

62. Canada reported in its BR4 (p.129) that emissions of NF_3 are projected to decrease significantly; however, numerical values of projected estimates for this GHG are not presented in the BR4 or in CTF table 6, where figures for NF_3 emissions are rounded to zero.

63. Canada reported indirect CO_2 emissions in CTF table 1(a). The BR4 (footnote 38 on p.153) indicated that carbon monoxide emissions are not reported in the GHG inventory or CRF table 4, and are instead reported as indirect CO_2 emissions in CRF table 6. However, the ERT could not locate the indirect CO_2 emissions in CTF tables 6(a) and 6(c) and owing to extensive rounding in this table (see issue 3 in table 11) was not able to determine where these emissions could have been incorporated. During the review Canada explained that these indirect CO_2 emissions come from the atmospheric oxidation of carbon monoxide emitted by biomass burning in the LULUCF sector. Given that carbon monoxide is not a GHG, these emissions are not included in the sectoral totals for the LULUCF sector (or any other sector) in the 2019 national inventory report or in the projection scenarios. Canada further clarified that indirect CO_2 emissions are not included in the emission projections. The ERT noted that the Party could further improve the transparency of its reporting by clearly explaining whether projections of indirect CO_2 emissions are included in projections in the next BR.

64. Canada included the accounting contribution of LULUCF in its total national GHG emissions with LULUCF for the WEM and WAM scenarios in CTF tables 6(a) and 6(c). In addition, Canada included the projected purchases of international allowances under the WCI in the national totals under the WAM scenario. The ERT noted that this way of reporting helps to assess the progress towards the target. However, the ERT also noted that the primary objective of the projections is to provide an indication of future trends in GHG emissions and removals (and not reductions) in the territory of the country (and not for other countries). The ERT noted that the Party could improve the transparency of its reporting by separately reporting the projections of total national emissions and removals and those including any potential allowances from market-based mechanisms or the contribution of LULUCF. The ERT notes that, while CTF tables 6(a) and 6(c) are designed in such way to report total national emissions (by sector and by gas), Canada could use custom tables or graphs in the

textual part of the BR to show how it intends to meet its national target on the basis of projected total national emissions and removals, the contribution of LULUCF and credits from market-based mechanisms.

(d) Assessment of adherence to the reporting guidelines

65. The ERT assessed the information reported in the BR4 of Canada and identified issues relating to completeness, transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 11.

Table 11
Findings on greenhouse gas emission projections reported in the fourth biennial report of Canada

No.	*Reporting requirement issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 28 Issue type: completeness Assessment: encouragement	Canada did not report a WOM scenario in its BR4. During the review Canada explained that creating a counterfactual record dating back entails considerable uncertainty. It noted that estimating historical parameters (such as economic growth, market shares of technology and efficiency levels of equipment) in the absence of policies to create a WOM scenario is highly speculative. As such, the Party decided not to provide this scenario. Instead, the Party showed its progress through the WEM scenario from the BR2, which serves as a pre-PCF scenario but is not completely in line with the description of a WOM scenario set out in the UNFCCC reporting guidelines on NCs. The ERT encourages Canada to improve the completeness of its reporting by providing WOM scenario projections or explaining why providing such a scenario does not add value in its next submission.
2	Reporting requirement specified in paragraph 29 Issue type: transparency Assessment: recommendation	CTF table 3 lists several PaMs that are labelled as implemented or adopted, but are not included in the WEM scenario, or are exclusively modelled under the WAM scenario. Furthermore, there are measures that have a starting year of 2019 or earlier but are labelled as planned measures and not included in the WEM scenario (see issue 1 in table 5). In its BR4 (p.145) the Party explained that the inclusion of PaMs in the WEM scenario is decided on the basis of the criteria described in paragraph 39 above. Thus, some implemented and adopted measures may not be included in WEM. During the review, Canada further clarified that in the majority of instances where PaMs had a status of planned but with a start year of implementation of 2019 or earlier, the programme or policy in question had been partially implemented, that is formally announced or launched, but had not yet been fully implemented at the time of reporting. This includes cases where the budget had not yet been fully allocated or where regulations were in place but not yet fully in force. The ERT notes that this not in accordance with the definitions of implemented, adopted and planned measures from the UNFCCC reporting guidelines on NCs. The ERT recommends that Canada improve the transparency of its reporting by including in its WEM scenario implemented and adopted PaMs, using the definitions from the UNFCCC reporting guidelines on NCs.
3	Reporting requirement specified in paragraph 31 Issue type: transparency Assessment: recommendation	The GHG emissions and removals for historical years reported in CTF tables 6(a) and 6(c) are not consistent with those reported in CTF table 1. In addition, the emissions from transport reported in CTF tables 6(a) and 6(c) are significantly different from those reported in CTF table 1. For example, for 1990, Canada reported 126,109.70 kt CO_2 eq in CTF table 1, and 146,000 kt CO_2 eq in CTF tables 6(a) and 6(c). Historical emissions of NF_3, on the other hand, are reported as equal to zero in CTF table 6, which does not enable the analysis of trends in those emissions. During the review Canada confirmed that most of the differences in historical emissions between CTF tables 6(a) and 6(c) and CTF table 1 are due to rounding and noted that there is no specific guidance on rounding in CTF tables. The Party clarified that rounding is used for projections tables to avoid giving a sense of false precision, since the projections cannot be accurate to a kilogram (the unit of measurement in CTF table 1). The inconsistency in the reporting for the transport sector is caused by the difference between the economic sector classification used for the projections and the IPCC inventory categories, as well as the reallocation of residential, commercial and industrial off-road transport to the transport sector. The ERT understands the

No.	Reporting requirement issue type and assessment	Description of the finding with recommendation or encouragement
		Party's rationale for presenting historical emissions with the same level of accuracy and with the same sector classifications as the projections; however, it noted that this reduced transparency made it very difficult to determine which emissions are being reported under each sector and gas. Furthermore, it is not clear how total values are calculated, since total emissions in CTF tables 6(a) and 6(c) are significantly different from the sums of the corresponding items in these tables. The ERT recommends that Canada consistently report historical emissions and removals between CTF table 1 and CTF tables 6(a) and 6(c) in the next BR in order to present projections relative to actual inventory data.
4	Reporting requirement specified in paragraph 31 Issue type: completeness Assessment: recommendation	Canada reported projected GHG emissions and removals from LULUCF in its BR4. However, as explained in section A2.6.3 and shown in table A2.45 of the BR4, the projections include only the subsectors for which projections are available, with projections for grassland and settlements remaining settlements not provided. Canada explained that it did not report these categories because it had insufficient data on the impact of management practices on GHG emissions for grassland and an insufficient understanding of the drivers of changes in urban tree cover for settlements. Canada also explained in the BR4 (p.155) that work is ongoing to increase the scope of LULUCF projections for future reporting. During the review Canada explained that it continuously studies trends in emissions from LULUCF, taking into account new scientific information. It is still considering options for improving its reporting on emissions from LULUCF but does not yet have sufficient information to develop a workplan to expand its scope of projections for LULUCF, and additional LULUCF subsectors are not currently planned to be included in the projections for the BR5. The ERT noted that the historical removals of the two missing subsectors mentioned (i.e. grassland and settlements remaining settlements) for 2012–2017 are small compared with the total removals from LULUCF. The ERT also noted that significant trends have not been observed in either of these subsectors since 2005. Consequently, adding these two subsectors is not likely to have a significant impact on the total LULUCF projected for future years. The ERT noted that the currently insignificant nature of the impact of these missing categories on the total LULUCF projections may change in the future. The ERT recommends that Canada include projections for the categories grassland and settlements remaining settlements in the next BR, or where this is not feasible, to explain why projections for these categories were not included.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs, as per para. 11 of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on NCs and on BRs.

D. Provision of financial technological and capacity-building support to developing country Parties

1. Technical assessment of the reported information

(a) Approach and methodologies used to track support provided to non-Annex I Parties

66. In its BR4 Canada reported information on its provision of financial, technological and capacity-building support to non-Annex I Parties.

67. Canada provided details on how the support it has provided is "new and additional", including how it has determined resources as being "new and additional". Canada's definition is support provided to non-Annex I Parties that is additional to what was planned prior to the entry into force of the Convention and the Copenhagen Accord. Looking ahead, this includes Canada's commitment to providing CAD 2.65 billion in climate finance over five years, announced by the Government in 2015, with a view to addressing the Party's commitments under the Paris Agreement concerning the needs and priorities of developing countries.

68. Canada reported the support that it has provided to non-Annex I Parties, distinguishing between support for mitigation and adaptation activities and recognizing the capacity-

building elements of such support. It explained how it tracks finance for adaptation and mitigation using the national monitoring and evaluation systems in place. These systems facilitate the collection and tracking of detailed project-by-project information on the basis of defined parameters and indicators. Canada works with partners with clear accountability frameworks in tracking the support it has provided. These partners measure and evaluate project results and report back to Canada on outcomes and indicators.

69. The BR4 includes information on the national approach to tracking the provision of support, indicators, delivery mechanisms used and allocation channels tracked. In tracking core contributions to multilateral organizations Canada uses climate-related imputed multilateral contributions, calculated annually by OECD DAC. Climate-specific contributions are identified using the OECD DAC Creditor Reporting System, where activities are marked as either principal or significant in relation to climate change.

70. Canada did not include information on how it has refined its approach to tracking climate support and methodologies as compared with what was reported in its NC7 However, a description of this approach provided by the Party in the BR4 is similar to that described in the NC7. Canada further reported that it is committed to the continuous improvement and strengthening of the transparency and tracking of its climate finance, recognizing the importance of promoting good reporting practices, strengthening accountability and effectively informing global climate action.

71. Canada described the methodology and underlying assumptions used for collecting and reporting information on financial support, including definitions and assumptions. Canada tracks climate finance at the project level. This level of granularity allows for a comprehensive picture of the Party's climate finance and avoids double counting of public flows. Canada uses the term "provided" to refer to support that has been disbursed in all cases except in relation to development finance institution FinDev Canada, where it concerns amounts that have been committed.

72. Canada indicated that it provided estimates of the amounts mobilized by the private sector (via estimated associated public investments), owing to challenges in tracking private finance mobilized and the relative inexperience of collecting these data and applying the OECD DAC methodologies.

(b) Financial resources

73. Canada reported information on its provision of financial support to non-Annex I Parties as required under the Convention, including on financial support provided, committed and pledged, allocation channels and annual contributions.

74. Canada described how its resources address the adaptation and mitigation needs of non-Annex I Parties. By tracking both the expected and the achieved results at the project level, it is possible to evaluate the success of a project, which is measured by its achievement of planned outcomes and impacts. Furthermore, by tracking the specific activities of a project it is possible to assess which activities are the most effective in achieving desired outcomes. Canada also described how those resources assist non-Annex I Parties in mitigating GHG emissions and adapting to the adverse effects of climate change and any economic and social consequences of response measures, and contribute to technology development and transfer and capacity-building related to mitigation and adaptation. The Party reported that its support results in enhanced resilience for the poorest and most vulnerable people, reduced GHG emissions, and the mobilization of considerable amounts of co-financing for climate action, especially from the private sector, in developing countries.

75. With regard to the most recent financial contributions aimed at enhancing the implementation of the Convention by developing countries, Canada reported that its climate finance has been allocated on the basis of the complex needs and priorities of developing countries across sectors and regions. Specifically, Canada explained that it had increased its support for adaptation action, especially for the poorest and most vulnerable. Canada reported that its support aims to help to empower women and girls through climate action, and that it works with the private sector and non-traditional donors to increase climate investments. Table 12 summarizes the information reported by Canada on its provision of financial support.

Table 12
Summary of information on provision of financial support by Canada in 2017–2018
(Millions of United States dollars)

	Year of disbursement	
Allocation channel of public financial support	*2017*	*2018*
Official development assistance	4 304.89	4 640.51
Climate-specific contributions through multilateral channels including:	60.88	47.05
Least Developed Countries Fund	23.12	–
Trust Fund for Supplementary Activities	0.31	–
United Nations bodies	37.46	47.05
Climate-specific contributions through bilateral, regional and other channels	216.75	397.86

Sources: BR4 CTF tables and Query Wizard for International Development Statistics, available at http://stats.oecd.org/qwids/.

76. Canada reported on its climate-specific public financial support[6], totalling USD 277.63 million in 2017 and USD 444.91 million in 2018. It has increased its contributions by 129.7 per cent (in 2018) since the BR3, as reported in its local currency. With regard to financial pledges aimed at enhancing the implementation of the Convention by developing countries, in 2015 Canada committed to providing CAD 2.65 billion over five years, recognizing the need for critical support in developing countries to help them prevent and cope with the devastating consequences arising from climate change.

77. During the reporting period, Canada placed a particular focus on small island developing States and the least developed countries. The ERT noted that Canada reported in CTF table 7(b) its bilateral support allocated to Parties included in Annex I to the Convention in 2017 and 2018. Information on financial support from the public sector provided through multilateral and bilateral channels and the allocation of that support by target area is presented in figure 3 and table 13. Note that variances in contribution amounts from year to year can occur that are not reflective of trends due to factors such as biennial or triennial contribution cycles of some multilateral funds, timing of approval of individual bilateral projects or changes in exchange rates.

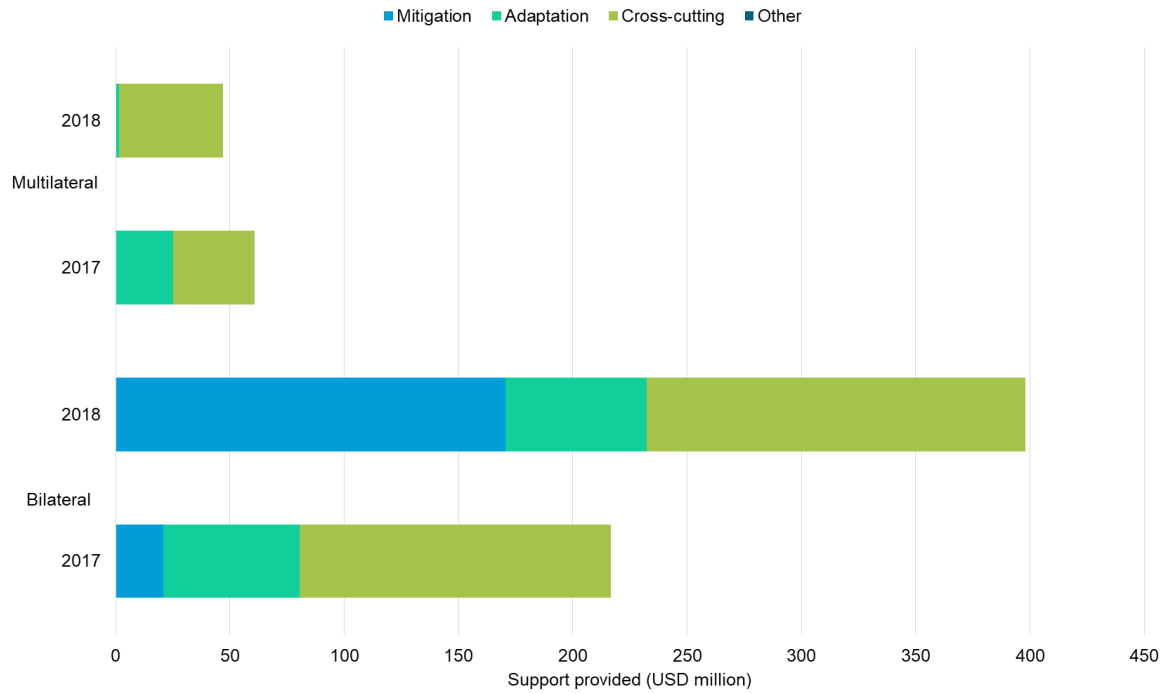
78. The BR4 detailed information on the financial support provided through multilateral bilateral and regional channels in 2017 and 2018. More specifically, Canada contributed through multilateral channels, as reported in the BR4 and in CTF table 7(a), USD 60.88 million and 47.05 million for 2017 and 2018, respectively. The contributions were made to specialized multilateral climate change funds, such as the Least Developed Countries Fund and the Trust Fund for Supplementary Activities. Canada has decreased its support provided through multilateral channels since the BR3 but significantly increased its contributions through bilateral channels.

79. The BR4 and CTF table 7(b) also include detailed information on the total financial support provided though bilateral (USD 216.75 million and 397.86 million) channels in 2017 and 2018, respectively.

80. The BR4 provides information on the types of support provided. In terms of the focus of public financial support, as reported in CTF table 7 for 2017, the shares of the total public financial support allocated for mitigation, adaptation and cross-cutting projects were 7.5, 30.5 and 62.0 per cent, respectively. In addition, 21.9 per cent of the total public financial support was allocated through multilateral channels and 78.1 per cent through bilateral, regional and other channels. In 2018, the shares of total public financial support allocated for mitigation, adaptation and cross-cutting projects were 38.4, 14.2 and 47.4 per cent, respectively. Furthermore, 10.6 per cent of the total public financial support was allocated through multilateral channels and 89.4 per cent through bilateral, regional and other channels.

[6] For the remainder of this chapter, the term “financial support” means climate-specific financial support unless otherwise noted.

Figure 3
Provision of financial support by Canada in 2017–2018



Source: Canada's BR4 CTF tables 7, 7(a) and 7(b).

Table 13
Summary of information on channels of financial support used in 2017–2018 by Canada
(Millions of United States dollars)

	Year of disbursement				*Share (%)*	
Allocation channel of public financial support	*2017*	*2018*	*Difference*	*Change (%)*	*2017*	*2018*
Detailed information by type of channel						
Multilateral channels						
Mitigation	–	–	–	–	–	–
Adaptation	25.19	1.55	–23.64	–93.8	41.4	3.3
Cross-cutting	35.69	45.50	9.81	27.5	58.6	96.7
Other	–	–	–	–	–	–
Total multilateral	**60.88**	**47.05**	**–13.83**	**–22.7**	**100.0**	**100.0**
Bilateral channels						
Mitigation	20.85	170.61	149.75	718.1	9.6	42.9
Adaptation	59.48	61.69	2.21	3.7	27.4	15.5
Cross-cutting	136.42	165.56	29.14	21.4	62.9	41.6
Other	–	–	–	–	–	–
Total bilateral	**216.75**	**397.86**	**181.11**	**83.6**	**100.0**	**100.0**
Total multilateral and bilateral	**277.63**	**444.91**	**167.27**	**60.2**	**100.0**	**100.0**

Source: Canada's BR4 CTF tables 7, 7(a) and 7(b).

81. The ERT noted that in 2017 a majority of financial contributions made through multilateral channels were allocated to cross-cutting sectors, and the rest was allocated to the transport and agriculture sectors and disaster prevention and preparedness activities, as reported in CTF table 7(a). The corresponding allocations for 2018 were directed mostly to the same sectors and activities. In 2017 a majority of financial contributions made through bilateral and regional channels were allocated to energy, agriculture and forestry, as reported

in CTF table 7(b). The corresponding allocations for 2018 were directed mostly to environmental management, disaster prevention and preparedness activities as well as the agriculture sector.

82. CTF tables 7(a) and 7(b) include information on the types of financial instrument used for providing assistance to developing countries, which include grants and concessional loans. The ERT noted that the grants provided in 2017 and 2018 accounted for most of the total public financial support.

83. Canada reported that private finance is mainly mobilized for infrastructure and services in the energy and commercial sectors. It reported on how it uses public funds to catalyse private investment in mitigation and adaptation in developing countries by working collaboratively with a number of multilateral organizations. Canada explained its approach to reporting and highlighted its success stories in reporting on private financial flows leveraged by Canadian facilities established at multilateral development banks, which aim to support climate-friendly private sector investments in developing countries by addressing technical and financial risks. During the review Canada clarified that it reported in its BR4 on all the private finance mobilized that it was able to estimate for the reporting period (2017–2018) and that this mainly concerned finance mobilized through the above-mentioned Canadian facilities embedded in multilateral institutions, which is referred by OECD as "multi-bi funding". Canada further clarified that the private finance mobilized during the reporting period did not include any funding leveraged by bilateral climate finance.

84. During the review Canada clarified that it had difficulty in obtaining information on private investments leveraged by finance from EDC owing to the private sector nature of export credit financing and confidentiality issues associated with providing detailed transaction-level information. As a result, Canada provided aggregated information on funding from EDC. Canada indicated that it is making efforts to improve the transparency of its reporting over time and will strive to highlight case studies on private investments where appropriate.

(c) Technology development and transfer

85. Canada provided information on activities related to technology transfer, access and deployment benefiting developing countries, including information on activities undertaken by the public and private sectors. Canada provided examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties. For example, Canada is working with other countries in the International Smart Grid Action Network, an initiative of the International Energy Agency and the Clean Energy Ministerial, to build endogenous adaptation capacity in Mexico in collaboration with Mexico's National Institute of Electricity and Clean Energy to develop a common certification software platform for smart grids.

86. The ERT took note of the information provided in CTF table 8 on recipient countries, target areas, measures and focus sectors of technology transfer programmes.

87. The ERT noted that Canada reported on its measures and activities, including on activities implemented or planned since its NC7 and BR3, as well as success stories in relation to technology transfer, and in particular on measures taken to promote, facilitate and finance the transfer and deployment of climate-friendly technologies. For example, the Natural Resources Canada project provides Chinese counterparts with the expertise and resources needed to verify that the emission measurement and reduction technologies are operational at oil and gas facilities in China. Another example is the collaboration of the Canadian Forest Service with partners in other countries to help them understand how forest management could contribute to climate change adaptation and help reduce GHG emissions and increase carbon storage.

(d) Capacity-building

88. In its BR4 and CTF table 9, Canada supplied information on how it has provided capacity-building support for mitigation, adaptation and technology that responds to the existing and emerging needs identified by non-Annex I Parties. Canada described individual measures and activities related to capacity-building support in textual and tabular format.

Examples include the SmartDriver for Highway Trucking programme, which was used to provide training to commercial truck drivers in Brazil, eco-driving training workshops for heavy-duty vehicle operators in Jamaica and a pilot project to assess Mexico's readiness for the adoption of SmartWay tools, which can be used to benchmark and track fuel consumption of freight transport.

89. Canada reported that it has supported climate-related capacity development activities relating to emission reductions, energy efficiency, forestry and land-use planning and clean electricity. Canada also reported on how it has responded to the existing and emerging capacity-building needs of non-Annex I Parties through different approaches, including by using its position and leadership within numerous multilateral organizations, such as through engagement under the International Energy Agency, sharing climate change expertise directly with developing countries and making investments through the International Development Research Centre to support research and capacity-building in developing countries, as well as sharing its expertise in carbon capture, utilization and storage (see para. 91 below).

90. In 2018 Canada invested CAD 4 million through the International Development Research Centre to support research and capacity-building in developing countries with a view to fostering effective long-term climate action, reducing social inequality, promoting greater gender parity and empowering women and girls. This investment supported six projects in Argentina, Bangladesh, Benin, the Democratic Republic of the Congo, Nepal and Nigeria.

91. Canada shared its expertise in carbon capture, utilization and storage in trilateral multi-stakeholder workshops involving counterparts from the United States of America and Mexico. The purpose of these workshops was to raise awareness of achievements in carbon capture, utilization and storage, deepen relationships between stakeholders and provide opportunities to exchange experience.

2. Assessment of adherence to the reporting guidelines

92. The ERT assessed the information reported in the BR4 of Canada and identified issues relating to completeness, transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 14.

Table 14
Findings on provision of support to developing country Parties from the review of the fourth biennial report of Canada

No.	*Reporting requirement issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 14 Issue type: completeness Assessment: recommendation	The Party described its national approach to tracking the provision of financial support in annex 3.2 to the BR4, including the monitoring and evaluation systems, parameters and indicators and delivery mechanisms. However, Canada did not report on its approach to tracking the provision of technological and capacity-building support to non-Annex I Parties. During the review Canada explained that many technology transfer and capacity-building activities fall under initiatives funded through its climate finance, and that reporting on them separately could result in double counting. In addition, it is often difficult to separate and quantify the technology transfer and capacity-building components of a project. To avoid confusion and double counting, Canada focuses on providing qualitative information on the technology transfer and capacity-building activities that are additional to those reported under initiatives supported through the climate finance pledge. The ERT recommends that Canada improve the completeness of its reporting by providing a description of its national approach to tracking the provision of technological and capacity-building support to non-Annex I Parties, if appropriate.

No.	*Reporting requirement issue type and assessment*	*Description of the finding with recommendation or encouragement*
2	Reporting requirement specified in paragraph 18 Issue type: transparency Assessment: recommendation	The ERT identified a number of inconsistencies between the data on the provision of annual financial support to non-Annex I Parties presented in textual format in the BR4 and those presented in the CTF tables. For example, in the BR4 Canada reported that it provided CAD 192 million for adaptation, CAD 315 million for mitigation and CAD 498 million for cross-cutting projects in 2017 and 2018. However, the sum of corresponding figures for 2017 and 2018 reported in CTF table 7 were CAD 192 million, CAD 248 million and CAD 497 million, respectively. Further, Canada reported in the BR4 that it provided approximately CAD 1.5 billion to developing countries for climate action, but it is not possible to obtain this value from the figures reported in CTF table 7 for 2017 and 2018. During the review Canada explained the reasons for these differences and clarified in detail what type of support is excluded or included in the corresponding CTF tables and BR4 figures. The ERT recommends that the Party improve the transparency of its reporting by providing consistent information in the CTF tables and the textual part of the BR on the provision of annual financial support to non-Annex I Parties or by clearly explaining the reasons for any inconsistencies.
3	Reporting requirement specified in paragraph 19 Issue type: transparency Assessment: encouragement	Canada reported on private financial flows leveraged by multilateral climate finance, namely at the Asian Development Bank, the Inter-American Development Bank and the World Bank, for mitigation and adaptation activities in non-Annex I Parties. It estimates that approximately USD 309 million of private finance for climate-related activities was mobilized in developing countries in 2017 and 2018 via its investment of USD 213 million in public finance. However, the Party did not report on the financial flows leveraged by bilateral climate finance, despite mentioning that its export credit agency EDC and development finance institution FinDev Canada are involved in efforts to meet the climate finance goal under the Paris Agreement to jointly mobilize USD 100 billion annually, and that they directly channel development finance to mobilize private investments. During the review Canada explained that private finance mobilized during the reporting period did not include any funding leveraged by bilateral finance. It also explained that the private finance reported in the BR4 was mainly mobilized through dedicated national climate change facilities embedded in multilateral development banks; such finance is often referred by OECD as “multi-bi funding”. Furthermore, the Party reported that it had difficulty in obtaining information on private investments leveraged at EDC owing to the private sector nature of export credit financing and the confidentiality issues associated with providing detailed transaction-level information. As a result, Canada provided aggregated information on funding from EDC. Canada further clarified that it is working with OECD and EDC to improve its reporting of private finance and to highlight case studies on private investments. The ERT encourages Canada to improve the transparency of its reporting by clearly distinguishing between private finance leveraged by multilateral finance and that leveraged by bilateral finance, to the extent possible, and explaining the challenges encountered in and plans for improving its reporting in this area.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on BRs.

III. Conclusions and recommendations

93. The ERT conducted a technical review of the information reported in the BR4 and CTF tables of Canada in accordance with the UNFCCC reporting guidelines on BRs. The ERT concludes that the reported information mostly adheres to the UNFCCC reporting guidelines on BRs and provides an overview of emissions and removals related to the Party’s quantified economy-wide emission reduction target; assumptions, conditions and methodologies related to the attainment of the target; the progress of Canada towards achieving its target; and the Party’s provision of support to developing country Parties.

94. Canada's total GHG emissions excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 20.9 per cent above its 1990 level, whereas total GHG emissions including LULUCF were 31.7 per cent above its 1990 level, in 2018. Emissions reached the highest point in 2007 (742,313.66 kt CO_2 eq) and dropped significantly in 2008–2009, after which there was an increasing trend with emissions reaching the highest point of recent years in 2018 (729,349.27 kt CO_2 eq). Emission increases were driven by factors such as the increase in oil and gas extraction; the rise in the number of light-duty gasoline trucks and heavy-duty diesel vehicles in operation, resulting in higher fuel consumption in the transport sector; the increase in the production and consumption of HFCs, SF_6 and NF_3; and the increase in the use of inorganic nitrogen fertilizers. Those factors outweighed the improvements due to the reduced share of coal and oil use in electricity and heat generation.

95. Under the Convention, Canada committed to achieving a quantified economy-wide emission reduction target of 17 per cent below the 2005 level by 2020. The target covers CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3, expressed using GWP values from the AR4, and covers all sources and sectors included in the annual GHG inventory. Canada reported that it is still considering whether and how to use market-based mechanisms to help it meet its national climate targets, including the 2030 target and the objective to achieve net zero emissions by 2050. In absolute terms, this means that under the Convention Canada has to reduce its emissions without LULUCF from 730,349.48 kt CO_2 eq (in the base year) to 606,190.07 kt CO_2 eq by 2020. The contribution of LULUCF will be used to meet this target, which is expected to reach 23,000.00 kt CO_2 eq in 2020 in the WEM scenario.

96. In addition to its 2020 target, Canada also provided information on its 2030 and 2050 targets in the BR4. Under the Paris Agreement Canada committed to reducing its GHG emissions by 30 per cent below the 2005 level by 2030, as noted in its nationally determined contribution submitted in May 2017. Canada also submitted its mid-century long-term low GHG development strategy under the Paris Agreement, which sets a net emission reduction target of 80 per cent below the 2005 level by 2050. In the BR4 Canada also reported that, in December 2019, the Government announced a target to achieve net zero emissions by 2050.

97. Canada's annual total GHG emissions excluding LULUCF in 2017 were 2 per cent (14,600.25 kt CO_2 eq) below the base-year level. Canada reported in CTF table 4 that the contribution of LULUCF was 17,488.00 kt CO_2 eq in 2017, resulting in net emissions of 698,261.23 kt CO_2 eq, or 92,071.16 kt CO_2 eq above the 2020 target. The ERT noted that Canada is making slow progress towards the target.

98. The GHG emission projections provided by Canada in its BR4 correspond to the WEM and WAM scenarios. Under these scenarios, emissions are projected to be 3.4 and 4.1 per cent below the 2005 (base-year) level by 2020, respectively. On the basis of the reported information, the ERT concludes that Canada may face challenges in achieving its 2020 target under the WEM and WAM scenarios without using market-based mechanisms.

99. Canada's main policy framework relating to energy and climate change is the PCF. Key legislation supporting Canada's climate change goals includes the Canadian Environmental Protection Act (1999) and the Greenhouse Gas Pollution Pricing Act (2018). The mitigation actions with the most significant estimated mitigation impact by 2030 are economic and regulatory instruments, mostly in the energy sector, namely the carbon pollution pricing system; the light-duty vehicle GHG regulations; the Clean Fuel Standard; measures to reduce CH_4 in the oil and gas sector; the amendments to regulations on the coal-fired generation of electricity; and federal energy-efficient building initiatives. PaMs to reduce GHG emissions were also launched at the province and territory level, such as the Ontario natural gas demand-side management programmes, estimated to result in emission reductions of 5,300 kt CO_2 eq by 2020.

100. Canada continues to provide climate financing to developing countries in line with its climate finance programmes, such as its pledge to provide CAD 2.65 billion in climate finance over five years, as announced in 2015. It has increased its contributions significantly since the BR3; its public climate-specific financial support in 2017 and 2018 totalled USD 277.63 million and 444.91 million per year, respectively. The biggest share of financial support went to cross-cutting projects and programmes, followed by projects and

programmes in the energy sector. In addition, Canada reported core contributions through multilateral channels as USD 138.56 million and 140.04 million in 2017 and 2018, respectively.

101. Canada continues to provide information on support for technology development and transfer and capacity-building. Priority in technological support was given to programmes in the energy, forestry, LULUCF and other sectors in Chile, Colombia, Costa Rica, Czechia, Ecuador, Ireland, Italy, Japan, Mexico, Poland, Slovakia, Slovenia, Turkey and Uruguay. Priority in capacity-building support was given to projects in the areas of emission reductions, energy efficiency, forestry and land-use planning and clean electricity in countries such as Argentina, Bangladesh, Benin, Brazil, the Democratic Republic of the Congo, Jamaica, Mexico, Nepal, Nigeria and Turkey. A highlight was the collaboration between the Canadian Forest Service and partners in other countries to improve understanding of how forest management can contribute to climate change adaptation and help reduce GHG emissions and increase carbon storage. Also a good example of support for capacity-building is a CAD 4 million investment to support research and capacity-building in six projects in Argentina, Bangladesh, Benin, the Democratic Republic of the Congo, Nepal and Nigeria with the aim of fostering effective long-term climate action, reducing social inequality, promoting greater gender parity and empowering women and girls.

102. In the course of the review, the ERT formulated the following recommendations for Canada to improve its adherence to the UNFCCC reporting guidelines on BRs in its next BR:

(a) To improve the completeness of its reporting by:

(i) Providing information on the use of units from market-based mechanisms for each reporting year (see issue 2 in table 7);

(ii) In reporting projections for the LULUCF sector, including projections for grassland and settlements remaining settlements in the next BR, or, where this is not feasible, explaining why projections for these categories were not included (see issue 4 in table 11);

(iii) Describing its national approach to tracking the provision of technological and capacity-building support to non-Annex I Parties, if appropriate (see issue 1 in table 14);

(b) To improve the transparency of its reporting by:

(i) Transparently describing the outcome of the process of developing an approach to using market-based mechanisms, including the expected scale of contribution of each source of international unit and/or allowance from market-based mechanisms used in attaining its economy-wide target (see issue 1 in table 3);

(ii) Transparently distinguishing those PaMs that it has implemented from those that it plans to implement (see issue 1 in table 5);

(iii) Providing consistent GHG inventory estimates for the base year and reporting year in CTF tables 1 and 4 (see issue 1 in table 7);

(iv) Including in its WEM scenario implemented and adopted PaMs, using the definitions from the UNFCCC reporting guidelines on NCs (see issue 2 in table 11);

(v) Presenting projections relative to actual inventory data by consistently reporting historical emissions and removals between CTF table 1 and CTF tables 6(a) and 6(c) in the next BR (see issue 3 in table 11);

(vi) Providing consistent information on financial, technological and capacity-building support in the CTF tables and the textual part of the BR, or clearly explaining the reasons for any inconsistencies (see issue 2 in table 14).

Annex

Documents and information used during the review

A. Reference documents

2019 GHG inventory submission of Canada. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2019.

2020 GHG inventory submission of Canada. Available at https://unfccc.int/ghg-inventories-annex-i-parties/2020.

BR4 of Canada. Available at https://unfccc.int/BRs.

BR4 CTF tables of Canada. Available at https://unfccc.int/BRs.

"Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention". FCCC/SBSTA/2014/INF.6. Available at http://unfccc.int/resource/docs/2014/sbsta/eng/inf06.pdf.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories". Annex to decision 24/CP.19. Available at http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf.

"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 technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention". Annex to decision 13/CP.20. Available at http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf.

Report on the technical review of the BR3 of Canada. FCCC/TRR.3/CAN. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/review-reports-of-seventh-national-communications-and-third-biennial-reports.

"UNFCCC biennial reporting guidelines for developed country Parties". FCCC/SBSTA/2014/INF.6. Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Leigh Crawford (Environment and Climate Change Canada), including additional material. The following document[1] was provided by Canada:

Her Majesty the Queen in Right of Canada, represented by the Minister of Agriculture and Agri-Food, 2018, Medium Term Outlook for Canadian Agriculture 2018 - International and Domestic Markets.

[1] Reproduced as received from the Party.