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Data Sources and Methods for the Progress toward Canada's Greenhouse Gas Emissions Reduction Target Indicator

November 2013

Canada

ISBN : En4-144/48-2013E-PDF
Cat. No.: 978-1-100-22840-2

Aussi disponible en français

1 Introduction

The Progress toward Canada's Greenhouse Gas Emissions Reduction Target indicator is part of the Canadian Environmental Sustainability Indicators (CESI) program (http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=47F48106-1), which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the Federal Sustainable Development Strategy (http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1).

2 Description and rationale of the Progress toward Canada's Greenhouse Gas Emissions Reduction Target indicator

2.1 Description

The Progress toward Canada's Greenhouse Gas Emissions Reduction Target indicator provides an overview of the projected greenhouse gas (GHG) emissions in Canada until the year 2020. This indicator is based on two scenarios developed by Environment's Canada Economic Analysis Directorate:

1. A "without measures" scenario projecting GHG emissions where consumers, businesses and governments take no action after 2005 to reduce emissions (baseline).
2. A "with current measures" scenario projecting GHG emissions by taking into account federal and provincial climate change measures announced up to May 2013. These measures must be concrete or legislated, financially backed, and specific enough to be added to the forecast.

Scenarios 1 and 2 are reported in Canada's Emissions Trends 2013 (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1).

2.2 Rationale

Environment Canada has committed to publish annually a report on projections of GHG emissions. Emission projections allow for Canadians and policy-makers to view progress towards the established future target based on initiatives that are being implemented today. This year's report is the basis for the next "Canada's National Communication to the United Nations Framework Convention on Climate Change" (UNFCCC), expected to be released by the end of 2013.

3 Data

3.1 Data source

The data for this indicator were obtained from the Canada's Emissions Trends 2013 report (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1). The data used to determine projected greenhouse gas (GHG) emissions are taken from the following sources:

- Historical energy demand and supply data from Statistics Canada (http://www5.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=57-003-X&lang=eng)
- Historical economic data (e.g., GDP, investment levels, capacity utilization) from Statistics Canada (http://www5.statcan.gc.ca/subject-sujet/theme-theme.action?pid=3764&lang=eng&more=0&HPA)
- Population growth projections from Statistics Canada (http://www5.statcan.gc.ca/bsolc/olc-cel/olc-cel?lang=eng&catno=91-520-X&CHROPG=1&fpv=3867)
- Historical GHG emissions from Environment Canada's National Inventory Report 1990-2011: Greenhouse Gas Sources and Sinks in Canada (http://ec.gc.ca/Publications/default.asp?lang=En&xml=A07ADAA2-E349-481A-860F-9E2064F34822)
- Future oil and natural gas production levels from the National Energy Board 2013 Outlook (http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/prcng/prcng-eng.html)
- Future economic activity from the Government of Canada's short-term economic outlook (Budget 2013) (http://www.budget.gc.ca/2013/doc/plan/toc-tdm-eng.html) and the Department of Finance's Economic and Fiscal Implications of Canada's Aging Population report (http://www.fin.gc.ca/pub/eficap-rebvpc/index-eng.asp)
- Emissions factors derived from the Intergovernmental Panel on Climate Change (IPCC) methodology guidelines (http://www.ipcc-nggip.iges.or.jp/public/gp/english/)

3.2 Spatial coverage

Coverage is national.

3.3 Temporal coverage

The GHG projections associated with Canada's Emissions Trends 2013 cover the years 2012 to 2020 for the scenario with measures and the years 2005 to 2020 for the scenario without measures. Historical GHG data cover the years 1990 to 2011.

3.4 Data completeness

The indicator is based on analysis that incorporates the most up-to-date statistics on GHG emissions and energy available at the time the technical modelling was completed for the report. Data up to May 2013 are included in the Canada's Emissions Trends 2013 report (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1). Annex 2 of the Trends report provides more details on baseline data and underlying assumptions for this indicator.

3.5 Data timeliness

The time lag between data availability and indicator publication allows for data collection, quality control and validation processes.

4 Methods

The emissions projections have been developed in line with generally recognized best practices, including:

- Incorporating Intergovernmental Panel on Climate Change (IPCC) standards for estimating greenhouse gas (GHG) emissions across different fuels and processes.
- Relying on expert reviews and the most up-to-date data available for key drivers such as economic growth, energy prices, and energy demand and supply.
- Applying an internationally recognized energy and macroeconomic modelling framework for estimating emissions and economic interactions.
- Using a methodology to develop the projections and underlying assumptions that has been subject to peer review by leading external experts on economic modelling and GHG emissions projections, and that has been vetted with key stakeholders.

The approach to developing Environment Canada's Emissions Trends involves two main features:

- Using the most up-to-date statistics on GHG emissions and energy use, and using key assumptions from the best available public and private expert sources.
- Developing emissions projections scenarios using the detailed, proven Energy, Emissions and Economy Model for Canada, also known as E3MC.

Annex 4 of Canada's Emissions Trends 2013 (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1) provides detailed information on the methodology used to develop the projections.

The Land Use, Land-Use Change and Forestry (LULUCF) sector contribution to emissions reduction is modeled and accounted for separately from other sectors. A LULUCF contribution estimate of 28 Mt is added to the "with current measures" emissions projections in 2020 as a credit towards the target. Annex 1 of Canada's Emissions Trends 2013 (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1) provides more detailed information on LULUCF modelling.

5 Caveats and limitations

A series of plausible assumptions regarding, among others, the level of continuing population and economic growth, prices, demand and supply of energy, and the evolution of energy efficiency technologies were employed to make the projections. The projections assume no further government actions to address greenhouse gas emissions beyond those already in place or imminently pending as of spring 2013.

The emissions projections presented in the indicator cannot be viewed as a forecast or prediction of emissions at a future date. Rather, they represent a simple projection of the current structure and policy context into the future. They do not attempt to account for the inevitable, but as yet unknown, changes that will occur in government policy; energy supply, demand and technology; or domestic and international economic and political events.

Emissions projections are subject to uncertainty and are most appropriately viewed as a range of plausible outcomes. Many of the events that shape emissions and energy markets cannot be

anticipated. In addition, future developments in technologies, demographics and resources cannot be foreseen with certainty.

Annex 3 of Canada's Emissions Trends 2013 (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1) provides details of alternative emissions scenarios and a sensitivity analysis that focuses on two key uncertainties: 1) the growth of the economy and 2) the evolution of world oil prices and their respective impacts on macroeconomic growth and energy consumption.

6 References and further reading

Environment Canada (2013) Canada's Emissions Trends 2013 (http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=985F05FB-1).

Environment Canada (2013) National Inventory Report 1990-2011: Greenhouse Gas Sources and Sinks in Canada (http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=A07ADAA2-E349-481A-860F-9E2064F34822).

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Additional information can be obtained at:
Environment Canada
Inquiry Centre
10 Wellington Street, 23rd Floor
Gatineau, QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800
Fax: 819-994-1412
TTY: 819-994-0736
Email: Enviroinfo@ec.gc.ca