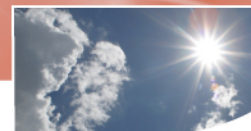




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# Data Sources and Methods for the International Comparison of Air Pollutant Emissions Indicators

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# 1 Introduction

The International Comparison of Air Pollutant Emissions indicators (<http://ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=0B0E77F5-1>) are 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.

## 2 Data Sources and Methods for the International Comparison of Air Pollutant Emissions Indicators

### 2.1 Description

The International Comparison of Air Pollutant Emissions indicators track air pollutant emissions for Canada and nine other leading economies (G8 countries plus Australia and Sweden). Four pollutants were selected for these indicators, including: sulphur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOC) and ammonia (NH<sub>3</sub>). Emissions are reported in kilotonnes.

A country's air pollutant emissions intensity for the same four pollutants was also provided in terms of total tonnes of emissions per unit of gross domestic product (GDP in million US\$). The GDP used is in American dollars (US\$), at constant prices, and constant purchasing power parity (PPP), for the base year of 2005.

### 2.2 Rationale

These indicators help to inform Canadians about how Canada's emissions compare to those from other countries. The indicators report on key air pollutants that contribute to smog and acid rain and help the government to identify priorities, track progress, and develop strategies and policies for reducing or controlling air pollution. The emissions data used for these indicators are also used to fulfill Canada's international and domestic commitments and reporting obligations.<sup>1</sup>

## 3 Data

### 3.1 Data source

The air pollutant emissions data used to calculate the International Comparison of Air Pollutant Emissions indicators are directly retrieved from the Centre on Emission Inventories and Projections database (<http://www.ceip.at/status-of-reporting>) of the Convention on Long-Range Transboundary Air Pollution (CLRTAP). For Japan and Australia, the emissions were taken from the National Inventory Submissions 2013 ([http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/7383.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php)) of the United Nations Framework Convention on Climate Change (UNFCCC).

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<sup>1</sup> Convention on Long-Range Transboundary Air Pollution (CLRTAP).

GDP statistics were obtained through the National Accounts of the Organization for Economic Co-operation and Development (OECD) StatExtracts ([http://stats.oecd.org/Index.aspx?DataSetCode=SNA\\_TABLE1](http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE1)).

### 3.2 Spatial coverage

The following countries are included in the International Comparison of Air Pollutant Emissions indicators: Canada, United States, Germany, United Kingdom, France, Italy, Sweden, Russian Federation, Australia and Japan.

### 3.3 Temporal coverage

Two years are used to compare these countries: 2011, which is the year with the latest available information at the release time of these indicators and 2001 (10 years prior).

### 3.4 Data completeness

Japan and Australia were excluded from the comparison provided for NH<sub>3</sub> emissions, as comparable NH<sub>3</sub> data were not available for these two countries. Emission values for 2000 and 2010 were used in place of 2001 and 2011 values for the Russian Federation, as no emission values were available for 2011.

### 3.5 Data timeliness

The data is current up to the end of 2011 except for the Russian Federation, which uses data current to the end of 2010. The International Comparison of Air Pollutant Emissions indicators are reported two years after data collection.

## 4 Methods

### 4.1 International Comparison of Air Pollutant Emissions indicators

Emission data used to calculate the International Comparison of Air Pollutant Emissions indicators are taken directly from the Centre on Emission Inventories and Projections (CEIP) database (<http://www.ceip.at/status-of-reporting>). This database contains all the information on emissions for the countries that have signed the CLRTAP. It provides time-series emissions by pollutant and by source (sectors). Each country is required to report their emissions by February 15 of each year.

Canada's annual CLRTAP submission for air pollutant emission data is based on Canada's Air Pollutant Emission Summaries and Historical Emission Trends (<http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=F98AFAE7-1>). This includes information reported by facilities to the National Pollutant Release Inventory (NPRI) as well as emission estimates that are compiled for other sources such as motor vehicles. For Japan and Australia, the emissions used were directly taken from the National Inventory Submissions 2013 ([http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/7383.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php)) of the UNFCCC.

Each country compiles and estimates their emissions, generally using a combination of top-down and bottom-up approaches. Top-down approaches involve the multiplication of sector activity levels by emissions factors. Bottom-up approaches are based on facility emissions. The

emissions are collated, verified, validated and grouped into the format required by the international organizations (CEIP and UNFCCC) and reported.

The emissions are estimated or measured using one of the following methods:

- Continuous emission monitoring systems (CEMS)
- Predictive emission monitoring (PEM)
- Source testing
- Mass balance
- Site-specific emission factors
- Published emission factors
- Engineering estimates
- Special studies

#### **4.2 International air pollutant emissions per unit GDP**

This indicator is obtained by dividing the emissions from the International Comparison of Air Pollutant Emissions indicators by the GDP data from the OECD. The emissions intensity are expressed in tonnes/million US\$ (GDP) using constant PPP and the 2005 base year. PPP are weighted averages of the relative prices, quoted in national currency, of comparable items between countries. The use of PPP facilitates international comparison of GDP by creating an equivalent purchasing power basis for each country compared.

## **5 Caveats and limitations**

Air pollutant emissions inventories from different countries are being estimated with the best data, measurements and methodologies available. Even though the national emissions inventories used for these comparisons follow the CEIP database (<http://www.ceip.at/webdab-emission-database/>) structure, users need to be cautious when comparing the data as emissions estimation methodologies among countries may differ.

The emissions in CEIP or in the National Inventory Submissions of the UNFCCC for a given year may be different from those previously published by those organizations. Caution is advised when comparing data released in different years.

## **6 References and further reading**

### **6.1 References**

Centre on Emission Inventories and Projections (CEIP) European Monitoring and Evaluation Programme (2013) Centre on Emission Inventories and Projections 2013 submission. Retrieved in December 2013. Available from:  
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