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# An Overview of Canada's Actions to address Air Pollution

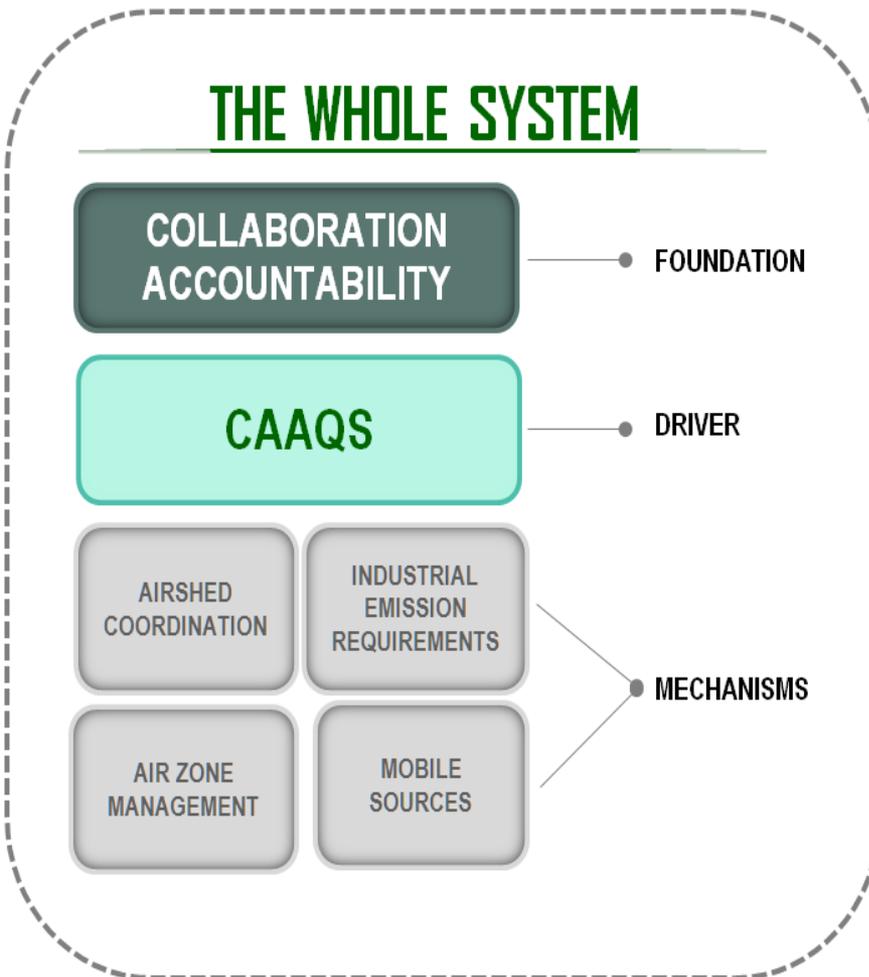
**54<sup>th</sup> Session of the Working Group on Strategies  
and Review**

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# Air Quality Management System (AQMS)



AQMS is endorsed by federal, provincial and territorial governments under the auspices of the Canadian Council of Ministers of the Environment (CCME) AQMS provides a comprehensive and cross-Canada framework for collaborative actions to improve air quality

The major elements of the system:

- Canadian Ambient Air Quality Standards (CAAQS)
- Air quality management through local air zones and regional airsheds
- Industrial Emissions Requirements implemented through regulatory and non-regulatory instruments
- Intergovernmental working group to improve collaboration and reduce emissions from mobile sources



# Canadian Ambient Air Quality Standards (CAAQS)

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As part of AQMS, CAAQS were established for fine particulate matter (PM<sub>2.5</sub>) and ground-level ozone in 2013

- Standards are more stringent and more comprehensive than the previous Canada-wide Standards for these pollutants
- Ozone CAAQS review is expected to begin during spring 2017
- PM<sub>2.5</sub> CAAQS review expected to begin during spring 2018

CAAQS for sulphur dioxide (SO<sub>2</sub>) were announced on October 3, 2016 by the Canadian Council of Ministers of the Environment

- Federal, provincial, and territorial governments will work collaboratively to implement measures to reduce SO<sub>2</sub> emissions and prevent ambient concentrations in local air zones to exceed the SO<sub>2</sub> CAAQS

Development of air quality standards for nitrogen dioxide (NO<sub>2</sub>) has been initiated, with recommendations on the CAAQS for 2020 and 2025 in 2017



# *Multi-Sector Air Pollutants Regulations* (MSAPR)

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*Multi-sector Air Pollutants Regulations* (MSAPR) published in the *Canada Gazette*, Part II on June 29, 2016

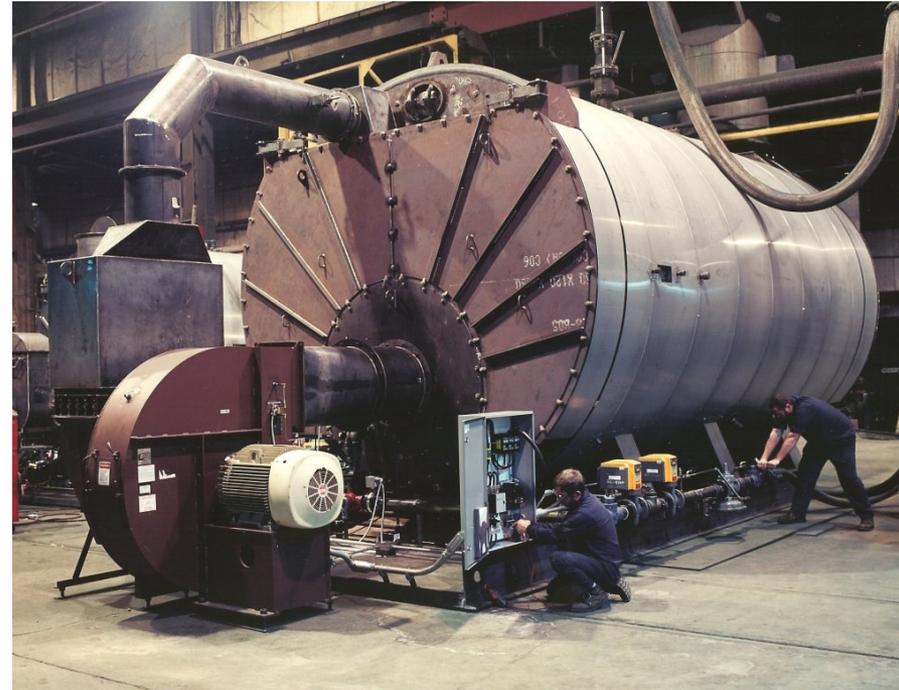
- implementing some AQMS industrial emission requirements as regulations

- Sets mandatory emission standards for:
  - Non-utility boilers and heaters (NO<sub>x</sub> emissions)
  - Stationary gaseous fuel-fired engines (NO<sub>x</sub> emissions)
  - Cement manufacturing (NO<sub>x</sub> and SO<sub>2</sub> emissions)
- The regulations are expected to reduce NO<sub>x</sub> emissions by ~2,000 kilotonnes during the first 19 years
  - Equivalent to removing all passenger cars and trucks from Canadian roads for ~12 years



# Non-utility boilers and heaters

- Apply to new and existing boilers and heaters at industrial facilities that burn gaseous fossil fuels in key industrial sectors with a capacity of at least 10.5GJ/hour:
  - aluminium and alumina
  - base metal smelting
  - cement, chemicals and fertilizers
  - electricity
  - iron ore pellets, iron, steel and ilmenite
  - natural gas pipelines, oil sands, upstream oil and gas,
  - potash, pulp and paper
- Equipment that generate steam and thermal energy for various industrial process
  - New boilers to meet 16 to 23 g/GJ at commissioning
  - Existing qualifying boilers to meet 26 to 40 g/GJ within prescribed timelines



- Approximately 820 existing boilers and heaters are subject to the regulations



# Stationary engines

- $\text{NO}_x$  limit of 2.7 g/kWh output for new stationary gaseous fuel-fired engines  $\geq 75$  kW at industrial facilities in key sectors
  - aluminum and alumina
  - base metal smelting
  - cement, chemicals and fertilizers
  - electricity,
  - iron ore pellets, iron, steel and ilmenite,
  - natural gas pipelines, oil sands, petroleum refinery, upstream oil and gas
  - potash, pulp and paper
- As of 2026,  $\text{NO}_x$  limit of 4 g/kWh output for existing stationary gaseous fuel-fired engines  $\geq 250$  kW at industrial facilities in key sectors
  - natural gas pipelines and upstream oil and gas



- Approximately 6,300 existing engines are subject to the regulations



# Cement manufacturing

- Regulations apply to cement kilns for all 15 grey cement manufacturing facilities in Canada. The one white cement manufacturing facility is excluded
- Regulations set a national standard for a sector that has already taken action to meet standard and reduce emissions
- Facilities must comply by 2020 to the following:
  - For long dry and wet kilns: 2.55 kg NO<sub>x</sub>/tonne of clinker or 30% reduction in emission intensity from calendar year 2006
  - For preheater and precalciner kilns: 2.25 kg NO<sub>x</sub>/tonne of clinker
  - For all kiln types: 3.0 kg SO<sub>2</sub>/tonne of clinker



- A code of practice will be developed to address particulate matter emissions



# Other industrial air pollutant instruments

Published in May 2016

- **Final Codes of Practice**

- Iron, Steel and Ilmenite sectors (Fugitive TPM, Fugitive VOC)
- Primary Aluminum Sector (PM<sub>2.5</sub>)

- **Proposed instruments**

- Codes of Practice for Potash sector (PM<sub>2.5</sub>) and Pulp and Paper sector (SO<sub>2</sub>, TPM)
- Pollution Prevention Planning Notice for Iron, Steel and Ilmenite sector (NO<sub>x</sub>, SO<sub>2</sub>, VOC)
- Guideline for stationary combustion turbines (NO<sub>x</sub>)
- Performance Agreements
  - Aluminum and Alumina sector (PAHs, SO<sub>2</sub>, TPM and PM<sub>2.5</sub>)
  - Iron Ore Pellets sector (SO<sub>2</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>),
  - Base Metals Smelting and Refining sector (SO<sub>2</sub>, PM)



# Transportation

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A series of transportation and fuel related regulations have been published or amended including:

*On-Road Vehicle and Engine Emission Regulations* published in *Canada Gazette, Part II* on January 1, 2003 (Amended 2006, 2013, 2015)

- Applies stringent Tier 3 emissions standards to light-duty vehicles, light-duty trucks, heavy-duty trucks; in line with US federal standards

*Off-Road Small Spark-Ignition Engine Emission Regulations* published in *Canada Gazette, Part II* on November 19, 2003 (Amended 2012, current proposal)

- Emissions standards for 2005 and later model-year small spark-ignition engines (that typically use gasoline); in line with US federal standards



# Transportation

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## *Off-Road Compression-Ignition Engine Emission Regulations*

published in *Canada Gazette, Part II* on February 23, 2005 (Amended 2011)

- Applies stricter emissions standards to 2012 and later model-year engines usually found in construction and primary sector industries (typically using diesel)

## *Marine Spark-Ignition Engine, Vessel and Off-Road Recreational*

*Vehicle Emission Regulations* published in *Canada Gazette, Part II* on February 16, 2011

- Establishes emissions standards for marine engines with installed fuel lines or fuel tanks and off-road recreational vehicles while implementing streamlined regulatory processes; in line with US federal standards

## *Sulphur in Gasoline Regulations* published in *Canada Gazette, Part II*

on June 23, 1999 (Amended 2000, 2003, 2009, 2015)

- Limits sulphur level in gasoline produced, imported or sold in Canada to lower sulphur dioxide emissions after combustion



# Consumer and Commercial Products (VOCs)

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Regulations have been published to address air pollutant emissions from consumer and commercial products, setting VOC concentration limits for architectural coatings and automotive refinishing products

*Volatile Organic Compound (VOC) Concentration Limits for Automotive Refinishing Products Regulations* published in *Canada Gazette, Part II* on July 8, 2009

- limiting VOC emissions from solvent-based automotive refinishing products and to a lesser extent, from water-based products

*Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations* published in *Canada Gazette, Part II* on September 30, 2009

- setting VOC concentration limits for 49 categories of architectural coatings



# Consumer and Commercial Products (VOCs)<sub>(continued)</sub>

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## Proposed Instruments:

*Proposed VOC Concentration Limits for Certain Products Regulations* have been published in *Canada Gazette, Part I*

- The proposed regulations would establish VOC concentration limits for approximately 130 product categories/sub-categories including personal care, automotive and household maintenance products; adhesives, adhesive removers, sealants and caulks; and other miscellaneous products.

*Proposed Code of Practice for the Reduction of Volatile Organic Compound (VOC) Emissions from Cutback and Emulsified Asphalt* has been published

- The code identifies best practices and aligns with similar standards adopted in North America.



# VOCs from Oil and Gas

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## Regulation in development:

*Intent to regulate VOCs from Refineries, Upgraders and Petrochemical Facilities to be published in Canada Gazette, Part 1 (March 2017)*

- Developed in response to the finding of toxicity on harmful petroleum and refinery gases.
- A discussion paper was released last spring for stakeholders, provinces, territories, and Indigenous peoples.



# Coal-fired electricity generation

- *The Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations* was published in 2012 and came into effect in July 2015. These regulations include performance standards for new and end-of-life coal-fired electricity generation units. While these Regulations focus on CO<sub>2</sub>, the following air pollutant reductions will also be achieved:

Key Air Pollutants	2015–2035 (kt)	Change by 2035 (%)
Sulphur oxides (SO <sub>x</sub> )	-1,156	21.7
Nitrogen oxides (NO <sub>x</sub> )	-546	10.0
Particular matter (TPM)	-71	14.3
Particular matter <10 microns (PM <sub>10</sub> )	-24	8.3
Carbon monoxide (CO)	-48	3.7
Fine Particular matter <2.5 microns (PM <sub>2.5</sub> )	-9	4.3

- On November 21<sup>st</sup> 2016, the Government of Canada announced that Canada is moving to phase out the use of coal-fired generation of electricity. The goal is to have 90 per cent of the electric power generated in Canada free of greenhouse gas emissions by 2030. These actions are expected to further reduce key air pollutants.



# Progress towards improving Canada's air quality

- Between 2000 and 2014, emissions of key air pollutants released have decreased:
  - SO<sub>x</sub> emissions decreased by 53% due to the Eastern Canada Acid Rain Program, the phase out of coal-fired electricity generation in Ontario, and reductions from the base metals smelting and refining sector due to the implementation of the Pollution Prevention Planning Notice and the closure of the two largest SO<sub>x</sub> emitters within the sector
  - NO<sub>x</sub> emissions decreased by 31% due to emission reductions from mobile sources, the electricity generation sector, and many other industrial sectors
  - PM<sub>2.5</sub> emissions decreased by 43% due to emission reductions from many industrial sectors such as the wood industry and electricity generation, and from residential wood combustion
  - VOC emissions decreased by 38%, mainly due to reductions from mobile sources
- Canada has consistently ranked in the top 10 of the World Health Organization ambient air quality list. Canada ranks 3<sup>rd</sup> out of 127 countries (tied with Finland and Vanuatu) with eight countries ranking higher on the latest 2016 report



# Canada-United States Air Quality Agreement

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- Established in 1991 to reduce the transboundary flow of air pollutants between Canada and the United States that contribute to acid rain and ground-level ozone formation
- Includes commitments:
  - to reduce air pollutant emissions
  - to provide notification of proposed activities that could cause significant transboundary air pollution
  - report on implementation progress every two years



# Canada-United States Air Quality Agreement (continued)

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- Includes collaboration:
  - on the development and implementation of aligned regulations for vehicles, engine, and fuels
  - to reduce emissions from the oil and gas sector
  - on air quality monitoring, emission inventories, control technologies, atmospheric modelling, environmental and health effects of air pollutants
  - on scientific assessments and research
- The Agreement has contributed to significant reductions of air pollutant emissions during the past 25 years, contributing to the recovery of sensitive ecosystems, and the improvement of local air quality in the two countries
- Canada and the US are currently engaged in discussions to renew and update the agreement



# Annex 1 - Canadian Ambient Air Quality Standards (CAAQS)

Pollutant	Averaging Time	CAAQS (numerical values)		Previous Canada- wide Standards	Metric
		2015	2020		
PM <sub>2.5</sub>	24-hour (calendar day)	28 µg/m <sup>3</sup>	27 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	3-yr average of the annual 98 <sup>th</sup> percentile of the daily 24-hr average concentrations
PM <sub>2.5</sub>	annual (calendar year)	10.0 µg/m <sup>3</sup>	8.8 µg/m <sup>3</sup>	N/A	3-yr average of the annual average concentrations
Ozone	8-hour	63 ppb	62 ppb	65 ppb	3-yr average of the annual 4 <sup>th</sup> -highest daily maximum 8-hr average concentrations



# Annex 2 - SO<sub>2</sub> CAAQS and management levels

Management Level	Management levels for the 1-hour CAAQS for SO <sub>2</sub> (ppb)		Management levels for the annual CAAQS for SO <sub>2</sub> (ppb)	
	2020	2025	2020	2025
<b>Red</b> To reduce pollutant levels below the CAAQS through advanced air management actions	> 70 (CAAQS)	> 65 (CAAQS)	> 5.0 (CAAQS)	> 4.0 (CAAQS)
<b>Orange</b> To improve air quality through active air management and prevent exceedance of the CAAQS	>50 to ≤70	> 50 to ≤ 65	> 3.0 to ≤ 5.0	> 3.0 to ≤ 4.0
<b>Yellow</b> To improve air quality using early and ongoing actions for continuous improvement	> 30 to ≤ 50		> 2.0 to ≤ 3.0	
<b>Green</b> To maintain good air quality through proactive air management measures to keep clean areas clean	≤ 30		≤ 2.0	

## Statistical form of the standards

**1-hour:** The 3-year average of the annual 99<sup>th</sup> percentile of the daily-maximum 1-hour average concentrations.

**Annual:** The arithmetic average over a single calendar year of all 1-hour average concentrations.



# Annex 3 – Implementation of POPs Protocol in Canada

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- **Persistent Organic Pollutants (POPs) Protocol:**
  - Efforts to eliminate and restrict the production, use and release of POPs are implemented using authorities under the *Canadian Environmental Protection Act, 1999* and the *Pest Control Products Act* and associated regulations such as:
    - *The Prohibition of Certain Toxic Substances Regulations*
    - *PCB Regulations*
    - *PBDE Regulations*
    - *PFOS Regulations*
    - *Export of Substances on the Export Control List Regulations.*
  - Canada's most recent report (2014) can be found on the National Pollutant Release Inventory (NPRI) website under the heading: *Air Pollutant Emission Inventory*  
(<http://www.ec.gc.ca/pollution/default.asp?lang=En&n=E96450C4-1>)



# Annex 4 – Implementation of Heavy Metals Protocol in Canada

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- **Heavy Metals (HM) Protocol:**
  - Canada has fully implemented its obligations under both the existing and amended HM Protocol
  - Canada implements its commitments through existing federal, provincial, and territorial instruments, such as the *Canadian Environmental Protection Act*, the *Hazardous Products Act*, the *Food and Drugs Act*, regulations implemented under these acts and the Canada Wide Standards for Mercury
  - Report is on the National Pollutant Release Inventory (NPRI) website under the heading: *Air Pollutant Emission Inventory* (<http://www.ec.gc.ca/pollution/default.asp?lang=En&n=E96450C4-1>)
  - Current emissions of lead, cadmium and mercury are well below Canada's 1990 emissions levels (reduction of 88% in lead, 90% in cadmium and 91% in mercury, based on 2012 data)

