Environment and Climate Change Canada | Environnement et Changement climatique Canada

Canada

Multi-Sector Air Pollutants Regulations (MSAPR)

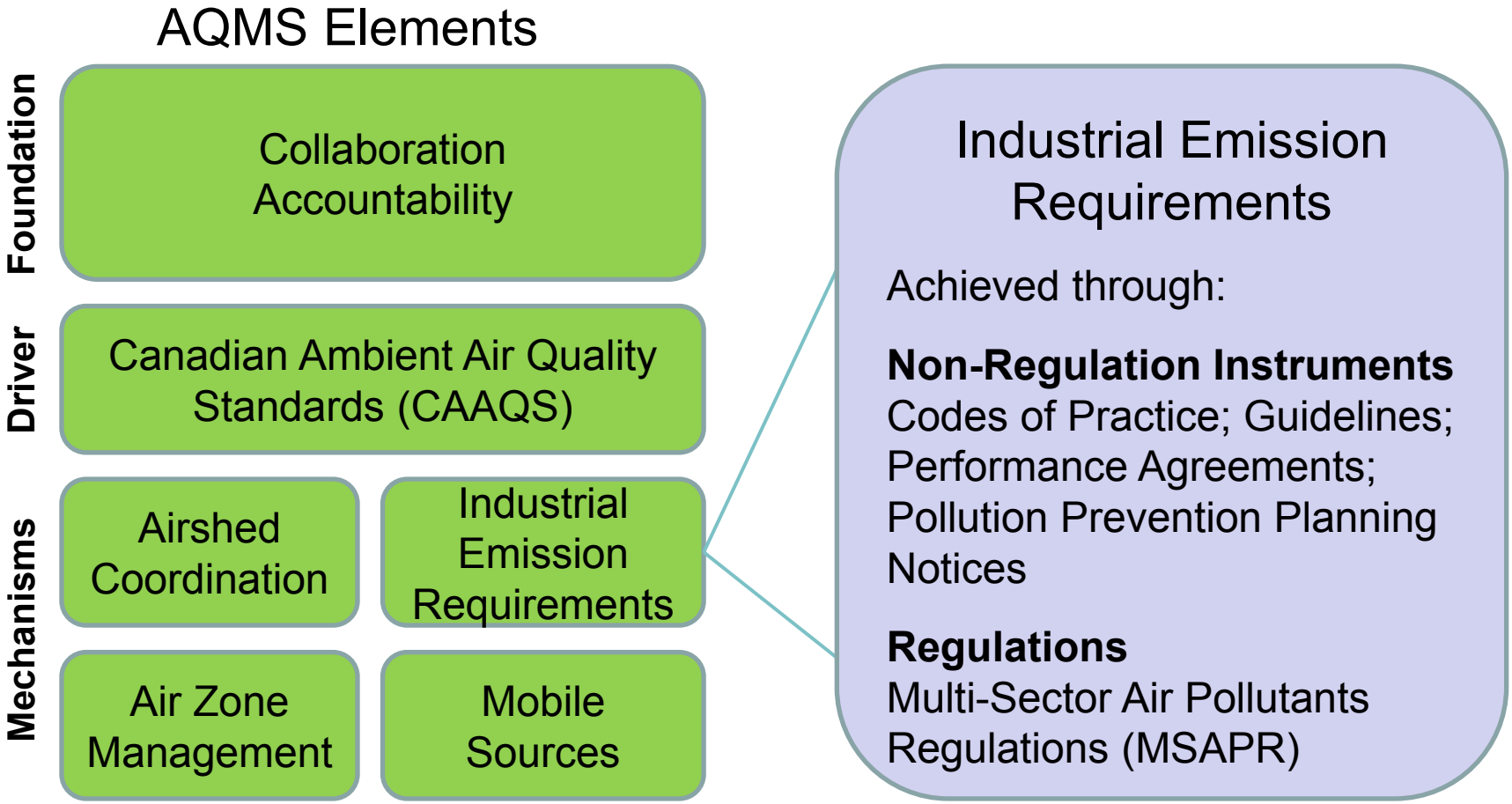
May 2017

Purpose

- The Multi-Sector Air Pollutants Regulations (MSAPR) came into force on June 17, 2016

- This presentation will provide an overview of:
  - MSAPR and its development;
  - Application of MSAPR Part 2 and key definitions;
  - Requirements for modern engines;
  - Key compliance dates.

Air Quality Management System



Purpose of MSAPR

- MSAPR establishes Canada's first ever mandatory national air pollutant emissions standards for major industrial facilities.

- The Regulations establish requirements for emissions of:
  - NO_x from boilers and heaters across various industrial sectors
  - NO_x from stationary engines across various industrial sectors
  - NO_x and SO_2 from cement manufacturing facilities

- Requirements for other sectors may be proposed in subsequent phases of the Regulations

Extensive Stakeholder Engagement

- Expert group meetings with industry, provinces/territories, NGOs were held as part of the BLIERs process in 2011-2012
- Engagement continued in 2012-2013 during development of proposed federal Regulations
- Proposed MSAPR was published in Canada Gazette, Part I on June 7, 2014, for a 60 day comment period
- Engagement and development of proposed regulatory text continued into early 2016

Part 2: Stationary Engines

- Applies to stationary gaseous fuel-fired engines used by industrial sectors for gas compression, electricity generation or to pump water
- An average uncontrolled engine running for one hour emits as much NOx as a light-duty vehicle, on average, over 325,000 kilometers
- In 2014, the engines covered by the MSAPR accounted for more than 40% of Canada's total industrial NOx emissions

Application of Part 2

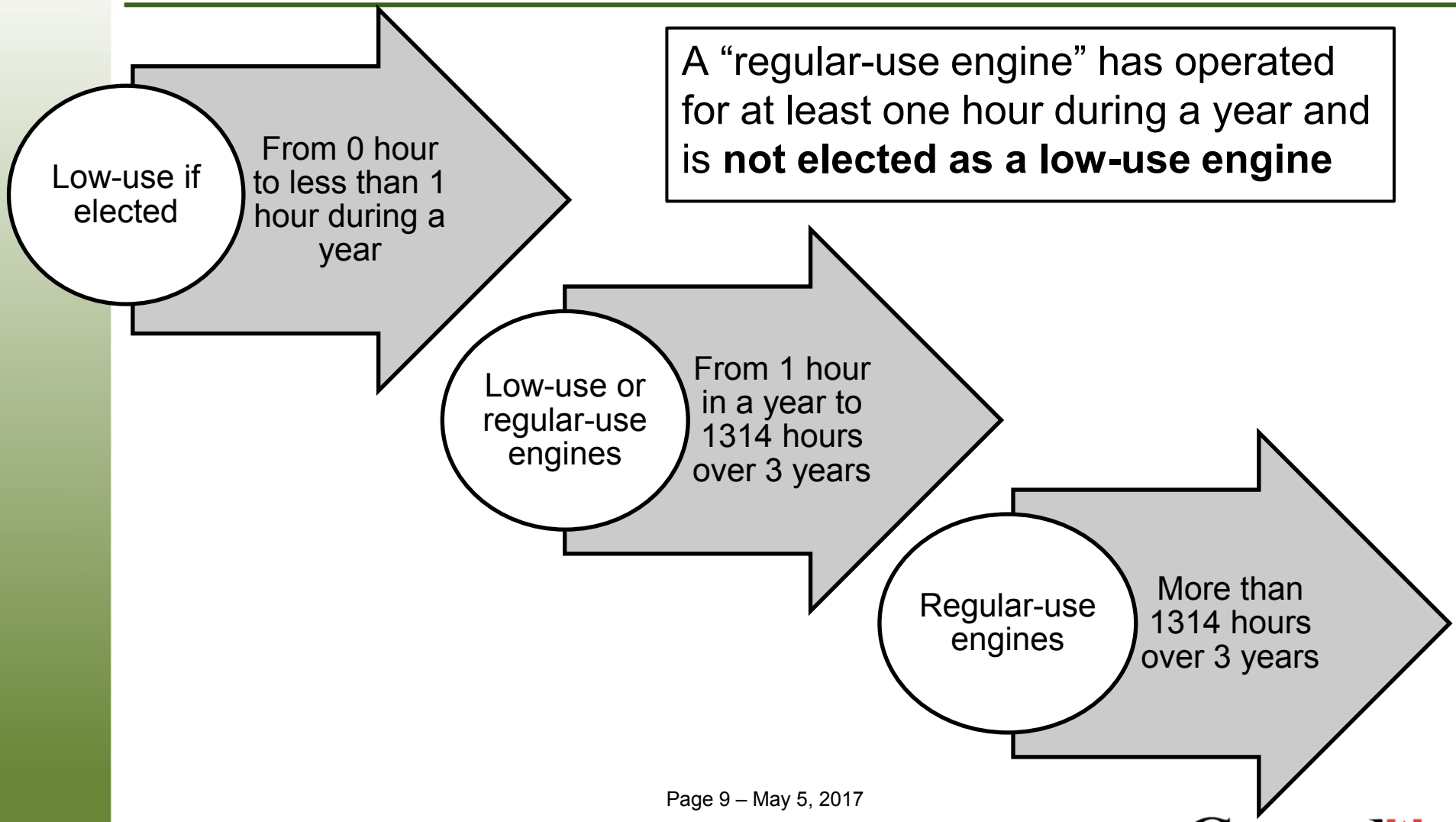
- Applies to all **modern engines** ≥ 75 kW that combust gaseous fuel located in 13 regulated facility types:
  - Oil and gas
  - Petroleum refineries
  - Pulp and paper
  - Potash
  - Power plants
  - Iron ore pelletizing
  - Oil sands
  - Chemicals
  - Nitrogen-based fertilizer
  - Base metals
  - Alumina and aluminium
  - Iron/steel/ilmenite
  - Cement manufacturing
- Applies to all **pre-existing engines** ≥ 250 kW that combust gaseous fuel located in an oil and gas facility other than an asphalt refinery

Key Definitions

- Engine:
  - When used, is stationary and is not in or on a machine that is self-propelled
  - Operates under characteristics significantly similar to the theoretical Otto combustion cycle
  - Uses a spark plug or other sparking device
- Pre-Existing Engine:
  - Engines with a date of manufacture, as provided by its manufacturer, before September 15th, 2016; or
  - Engines for which there is a proof that they were owned or operated before that date.
- An engine is modern if it is not pre-existing

“Regular-Use” and “Low-Use”

A “regular-use engine” has operated for at least one hour during a year and is **not elected as a low-use engine**



Different Requirements

Modern Regular-Use Engines ≥ 75 kW	Modern Low-Use Engines ≥ 75 kW
NOx Limit	NOx Limit ≥ 100 kW
Performance Tests and Emissions Checks	No Performance Tests or Emissions Checks
Maintenance and Air-to-Fuel Ratio	Maintenance and Air-to-Fuel Ratio ≥ 100 kW
No Measurement of Operating Hours	Measurement of Operating Hours
Labelling, Registration and Annual Report	Labelling, Registration and Annual Report
Record-Keeping	Record-Keeping

NOx Limits for Modern Engines

Performance Standards

Criteria	Regular-Use	Low-Use
Coverage	13 industrial facility types	
Size Threshold	≥ 75 kW	≥100 kW
NOx Limit	2.7 g/kWh output or 160 $ppmvd_{15\%}$	160 $ppmvd_{15\%}$

Other Jurisdictions

US EPA	2011	1.3 g/kWh output
	2007-2011	2.7 g/kWh output
British Columbia	2005	2.7 g/kWh output
Alberta	1988	6 g/kWh output

NO_x Emission Intensity Determination

- Performance testing is key to compliance assurance
  - Determines whether an engine meets the emissions limits
  - Performance tests are conducted in accordance with the reference methods incorporated by reference in the Regulations.

- Emissions checks provide additional flexibility for performance testing
  - Time between performance tests for rich-burn engines can be extended by performing emissions checks

- Emissions checks are performed using an electrochemical analyzer following a procedure that is included in the Regulations
  - Procedure is simplified compared to performance tests conducted in accordance with ASTM D6522-11.

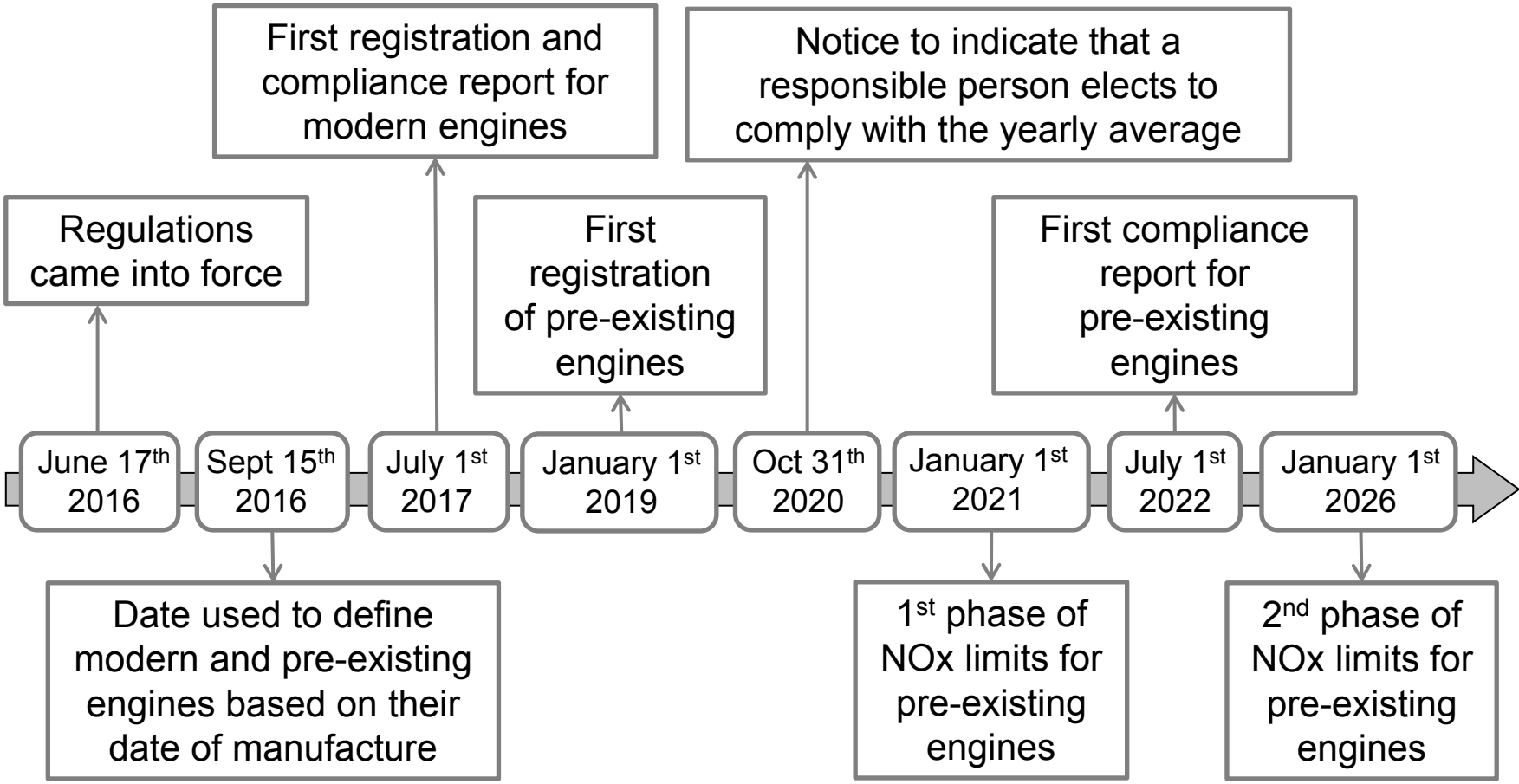
Performance Tests and Checks

- An initial performance test for all modern regular-use engines
  - Within 12 months after the first operating hour as regular-use
- Subsequent performance tests for modern regular-use engines ≥ 375 kW
- Frequency for lean-burn engines ≥ 375 kW
  - 17 520 operating hours or 36 months (whichever is completed first)
  - Emissions checks: within 365 days after the most recent performance test or emissions check
- Frequency for rich-burn engines ≥ 375 kW
  - 4 380 operating hours or 9 months (whichever is completed first) or
  - 8 760 operating hours or 36 months (whichever is completed first)
    - ➢ when an emission check demonstrates, each 90-day period, that the applicable limit is met

“Rich-Burn” and “Lean-Burn”

- “Rich-burn” describes an engine for which the oxygen content in the exhaust gas, before any dilution, is < 4%, determined by volume on a dry basis
- “Lean-burn” describes an engine other than a rich-burn engine
- If an engine is designated by its manufacturer as rich-burn, it is presumed to be rich-burn, unless the responsible person establishes that the oxygen content in the exhaust gas, before any dilution, is ≥ 4%, determined by volume on a dry basis

Important Compliance Dates



Registration and compliance report for modern engines: July 1st that follows the first year in which there is a responsible person for the engine

First Reporting Deadline

- If a modern engine was operated for more than one hour in 2016, the owner or operator must :
  - register these engines by July 1st 2017 as set out in Schedule 9; and
  - provide one compliance report for all of these engines by July 1st 2017 as set out in Schedule 10.

- For this first reporting deadline, the owner or operator must use the Excel spreadsheet provided by Environment and Climate Change Canada pursuant to Section 120(1) of the Regulations

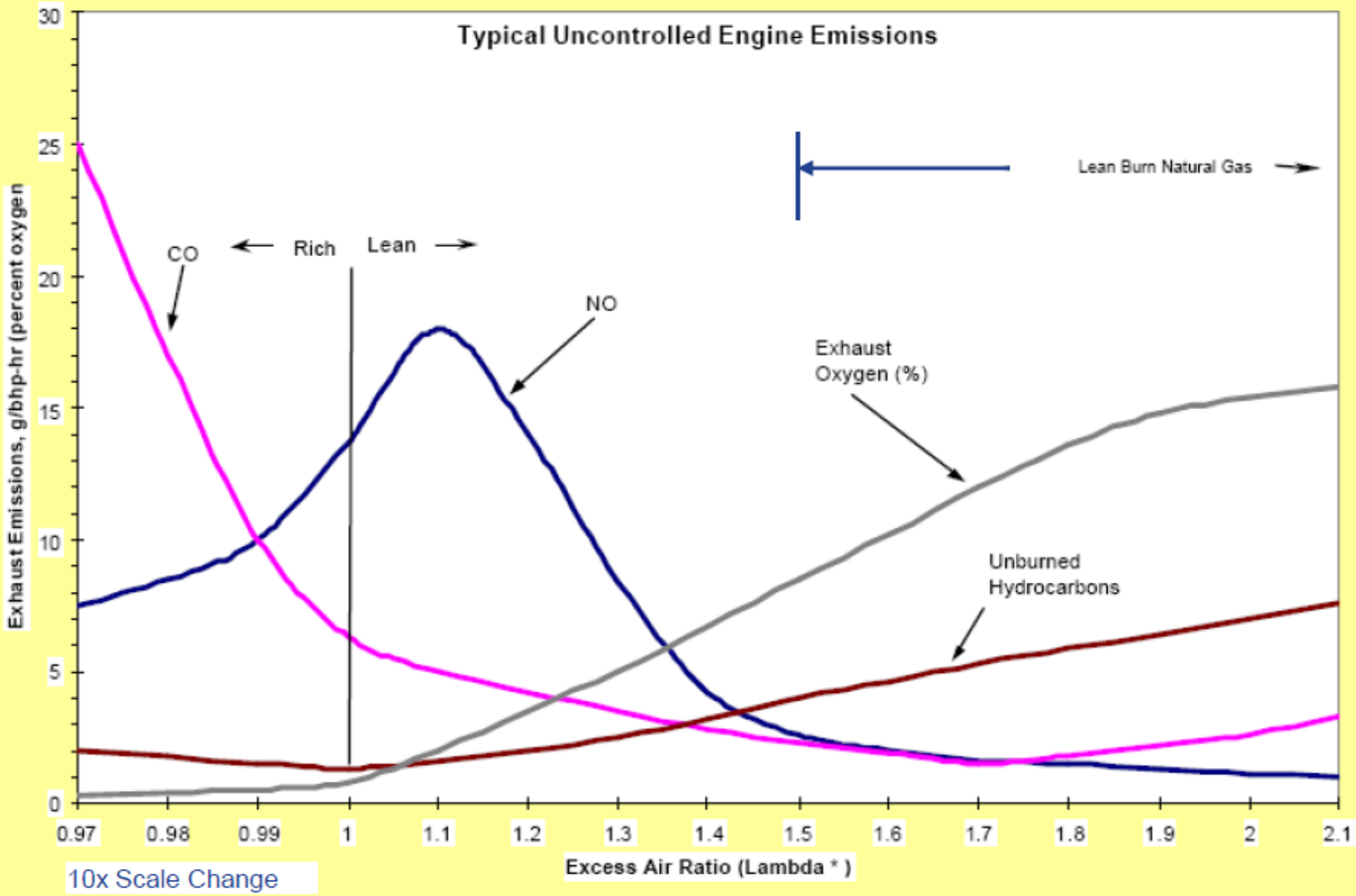
How to Reach Us?

- Should you have any questions, please feel free to contact us at one of the following email addresses:
  - General, Policy, AQMS: ec.airpur-cleanair.ec@canada.ca
  - Part 1- Boilers and Heaters: ec.combustion.ec@canada.ca
  - Part 2 - Engines : ec.nge-mgn.ec@canada.ca
  - Part 3 - Cement : ec.mmp-tmm.ec@canada.ca

- Generic phone number for Part 2 – Engines:

  1-844-882-3774

Annex
NOx Emissions versus Air-to-Fuel Ratio



Annex
“Oil and Gas Facility”

- Means a facility, including an asphalt refinery or underground storage facility for gaseous fuel, that is used or designed to:
  a) extract hydrocarbons from underground deposits or reservoirs other than by means of thermal methods or surface mining;
  b) transport or process those hydrocarbons;
  c) transport or treat wastewater or waste that is related to the extraction or processing of those hydrocarbons for its injection underground; or
  d) inject that wastewater or waste underground.

- It does not include an oil sands facility, petroleum refinery, chemicals facility, nitrogen-based fertilizer facility or facility — other than an underground storage facility for gaseous fuel — that is primarily engaged in the local distribution of natural gas.

Annex
Sampling Port

Sampling Port and Number of Traverse Points	EPA Method 1 or 1A ASTM D6522–11 EC Method A

- If an after-treatment control device is used, the sampling port must be located downstream of the device
- If a pre-existing engine does not have a proper sampling port, emission intensities may only be expressed in $ppmvd_{15\%}$ and are measured using a single point at the centre of the exhaust pipe located at a distance from the engine or from the after-treatment control device of at least twice the diameter of that pipe

Annex
Emission Intensity in $ppmvd_{15\%}$

In $ppmvd_{15\%}$: $5.9*C_d/(20.9-\%O_2)$

- C_d is the concentration of NOx in the engine's exhaust gas in ppmvd determined at a given percentage of oxygen ($\%O_2$)
- $\%O_2$ is the % of oxygen, on a dry volumetric basis, in the engine's exhaust gas
- NO_X and O_2 concentrations must be measured simultaneously at the same traverse point

O_2 Concentration	EPA Method 3, 3A, or 3B ASTM D6522–11, ASME PTC 19.10–1981
NOx Concentration	EPA Method 7, 7A, 7C or 7E or Method 320 ASTM D6522–11, ASTM D6348–12e1, EC Method AP-77-33

Annex
Emission-Intensity in g/kWh

In g/kWh: $(1.88 \times 10^3 \times C \times Q \times T) / BW$

- C is the concentration of NOx in the engine's exhaust gas in ppmv at a given percentage of oxygen ($\%O_2$)
- Q is the volumetric flow rate of the engine's exhaust gas, in m^3/h
- T is the duration of the test-run, in hours to two decimal places
- BW is the brake work of the engine during the test-run in kWh
- NO_X and O_2 concentrations, the moisture content and the flow rate of the exhaust gas must be measured simultaneously at the same traverse point
- The NO_X concentration and the flow rate must be expressed on the same basis, whether wet or dry

O_2 Concentration	EPA Method 3, 3A, or 3B, ASTM D6522–11 or ASME PTC 19.10–1981
Flow Rate	EPA Method 2 or 19, EC Method B
Moisture Content	EPA Method 4 or Method 320, ASTM D6348–12e1 or EC Method D
NOx Concentration	EPA Method 7, 7A, 7C or 7E or 320, ASTM D6348–12e1, ASTM D6522–11 or EC Method AP-77-3

Annex
Emissions Checks

Section(s)	Title
79	When emissions check required for certain engines
80	Electrochemical analyzers
81, 83 and 84	Calibration error checks, interference responses and calibration gases
82	Analyzer operation and maintenance, set-up and measurement system
85 and 90	Invalid emissions check
86	Sampling ports and single traverse point
87	Operating conditions for emissions checks
88	Sampling procedure
89	Averaged concentration and calculation