# *Canada's Clean Energy Transition*

## Phasing out conventional coal power and reducing GHG emissions from the electricity sector

**CANADA-CHILE CLIMATE CHANGE VIRTUAL DIALOGUE**
**Environment and Climate Change Canada (ECCC)**

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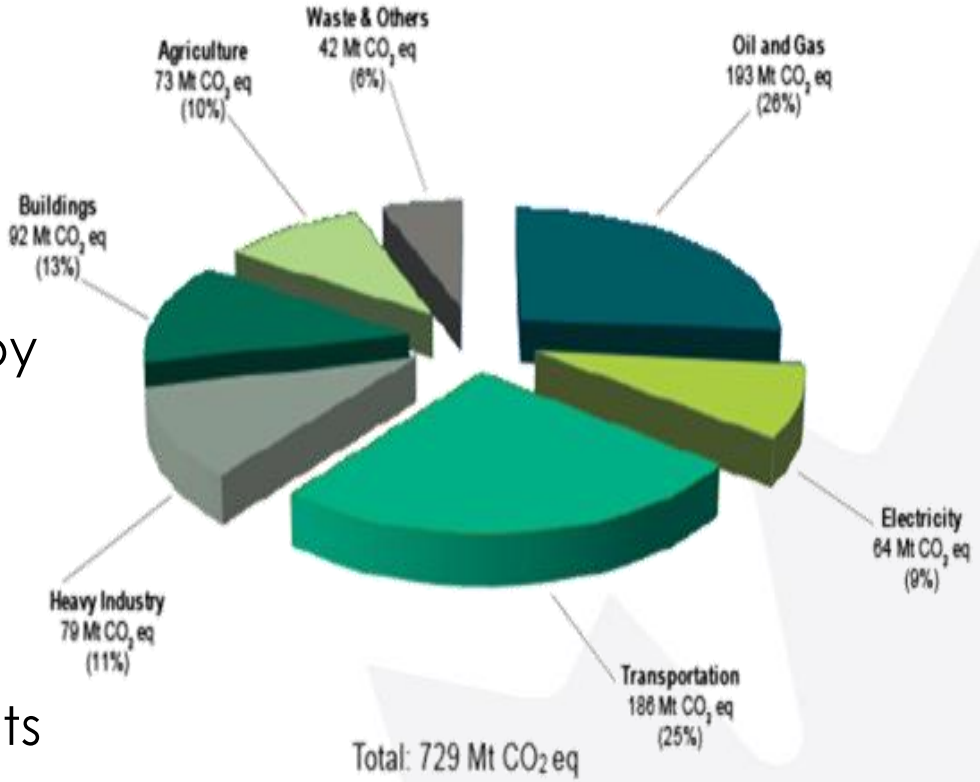
Canada

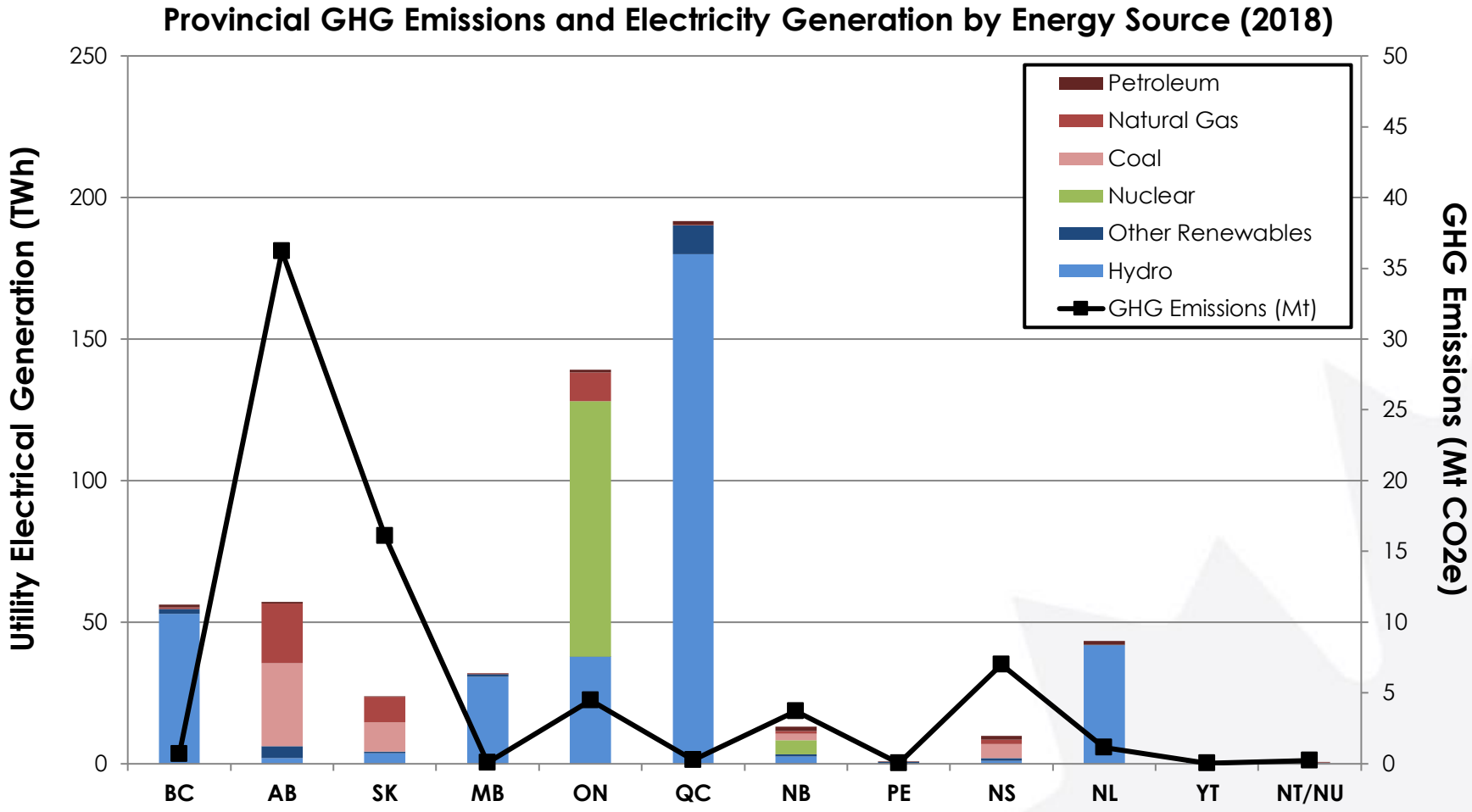
# The electricity sector contributes to Canada's GHG emissions

- Canada has one of the cleanest electricity systems in the world, with about 83% of generation from non-combustion sources.
- GHG emissions from the electricity sector decreased by almost half from 2005 to 2018.
- Over the same period, the quantity of electricity generated by coal decreased by 50%.
- In 2018, coal-fired power plants accounted for 69% of GHG emissions from the electricity sector, and about 6% of Canada's total GHG emissions.




Source: National Inventory Report 1990-2018

# GHG emissions from electricity are highest in provinces where coal-fired generation is used




Generation Source: Statistics Canada Table 25-10-0019-01 for fossil fuels sources and Table 25-10-0020-01 for other generation sources
Emission Source: NIR 1990 – 2018 economic sector for emissions

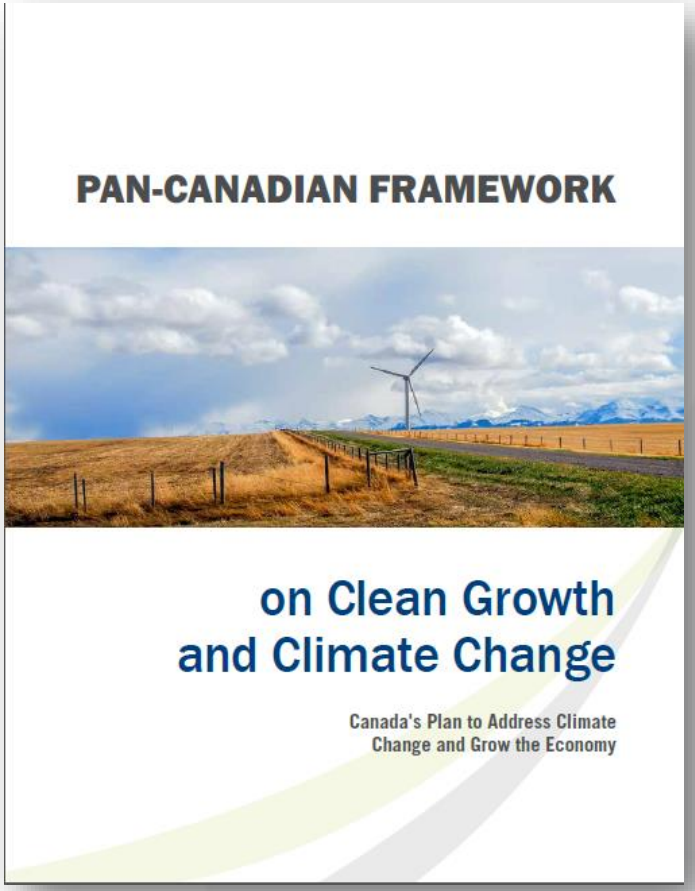
# Air pollution from coal power plants

- Coal-fired power plants are among the largest stationary sources of air pollution in Canada.
  - 22% of total national emissions of sulphur oxides.
  - 6% of nitrogen oxides.
  - 16% of mercury.


- These air pollutants have been shown to adversely affect the health of Canadians through direct exposure and the creation of smog (including particulate matter and ground-level ozone).
- They can cause asthma, breathing difficulties, and more serious respiratory and cardiovascular problems.

# Canada's 2016 Plan to address climate change and grow the economy

- **Carbon pricing** is central component
- Approach for electricity includes four complementary components:
  1. **Increasing the amount of electricity generated from renewable and low-emitting sources**
  2. Connecting clean power with places that need it
  3. Modernizing electricity systems
  4. Reducing reliance on diesel working with Indigenous Peoples and northern and remote communities
- GHG reductions in the electricity sector support reductions in other sectors through enhanced electrification of transportation, buildings and industry



# Phasing-out coal-fired electricity by 2030

- Canada's *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations* were published in 2012.
  - Coal-fired units were subject to a "clean-as-gas" emissions-intensity performance standard of 420 tonnes of $CO_2$ equivalent per gigawatt-hour (t/GWh).
  - The performance standard applied to units built after July 1, 2015, and would apply to existing units once they had reached the end of their "useful life" (45-50 years of operation).
- In December 2018, Canada published amendments to the regulations to accelerate the phase-out of conventional coal-fired electricity generation.
- Coal-fired units are now required to meet the 420 t/GWh performance standard either at their "end-of-life" or by December 31, 2029, whichever is earlier.

# Reducing GHG emissions and air pollution

The regulations are expected to:

- Result in significant cumulative GHG reductions.
  - 94 megatonnes over 2019-2055.
  - 12.8 megatonnes in 2030.
- Reduce air pollutants over 2019-2055.
  - 555 kilotonnes of sulphur dioxide ($SO_2$).
  - 206 kilotonnes of nitrous oxides (NOx).
- Improve the health of Canadians.
  - 260 avoided deaths.
  - 40,000 fewer asthma episodes.
  - 190,000 fewer days of breathing difficulty and reduced activity.

# Significant net benefits

Over 2019-2055:

- An estimated $4.7 billion in benefits.
  - $3.4 billion in avoided climate change damage; and
  - $1.3 billion in health benefits from reduced air pollutant emissions and avoided human exposure to mercury.
- **Net benefit of $2.7 billion.**

# Regulating natural gas-fired electricity

Complementary to the coal phase-out and Canada's transition to cleaner electricity, ECCC has also has regulations for natural gas-fired electricity generation that include:

- Performance standards for new natural gas-fired generation to ensure efficient technology will be used for new natural gas units, while providing flexibility for new units to meet electricity system demand and incorporate variable renewables, like wind and solar; and
- Clear parameters for coal plants converted to run on natural gas, which encourage early conversion and provide assurance that higher-emitting converted units will be phased out over time.

# Regulatory approach for new natural gas-fired units

- The regulations cover natural gas-fired units that:
  - Are new, which is defined as having been built 2 years after the publication of the final regulations in *Canada Gazette*, Part II;
  - Have a minimum installed capacity of 25 megawatts (MW);
  - Sell or distribute more than 33% or more of their average annual potential electricity output to the grid; and
  - Receive more than 30% of their heat input from natural gas.
- Units covered by the regulations have to meet the following performance standards on an annual average basis:

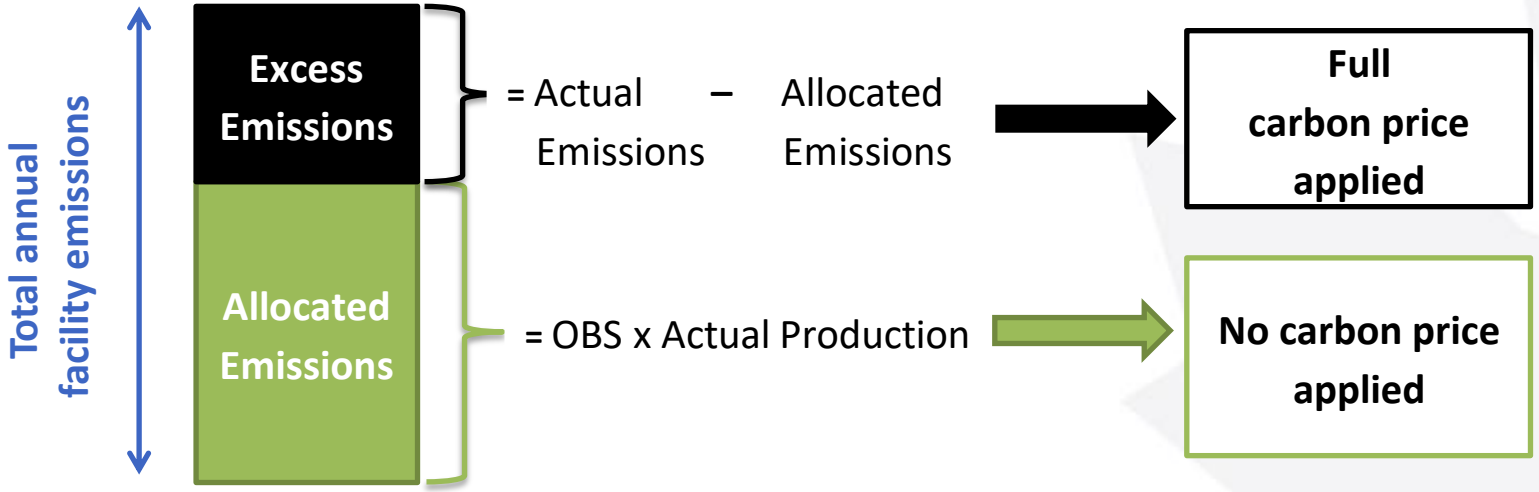
| Type of Unit | Size of Unit | Emissions Intensity Standard |
|---|---|---|
| Large | > 150 MW | 420 t/GWh |
| Small | > 25 MW to ≤ 150 MW | 550 t/GWh |

# Regulatory approach for converted coal-to-gas units

- Coal units converted to run on natural gas have lower emissions than coal-fired generation, but higher emissions than some types of new natural gas-fired generation.
- These converted units are allowed to operate without meeting a performance standard for a fixed period of time (from 0 to 10 years) under certain conditions, after which they would have to meet a stringent performance standard of 420 t/GWh.
- The allowable operating period would be based on the result of a performance test conducted in the first year of operation.
- The regulations also cover new natural gas-fired *boilers*, though none are expected to be built.

# Carbon pricing

- Canada's carbon pricing system includes an Output-based Pricing System (OBPS) for emissions intensive industries that are trade exposed.
- The OBPS is designed to ensure there is a price incentive for these industries to reduce their greenhouse gas emissions and spur innovation while maintaining competitiveness and protecting against carbon leakage.
- OBPS carbon costs for a facility are determined by its output-based Standard (OBS). A facility only pays the carbon price on the portion of its emissions that are in excess of the applicable OBS.



# Carbon pricing (cont'd)

- The OBPS applies a carbon price to fossil fuel-fired electricity generation in order to provide an incentive to reduce emissions and drive cleaner electricity generation.
- The electricity output-based standard applies to all fossil fuel-fired electricity generation:
    - Gross generation, consumed on-site or sold.
    - Utility and non-utility generation.
- The electricity output-based standard uses a fuel-differentiated approach:
  - Existing generation using gaseous fuels: 370 t/GWh.
  - Generation using gaseous fuels starting in 2021 or after: starts at 370 t/GWh in 2021, and then declines linearly to 0 t/GWh in 2030.
  - Liquid fuels: 550 t/GWh.
  - Solid fuels: 800 t/GWh in 2019, followed by a linear decline that starts at 650 t/GWh in 2020 and ends at 370 in 2030.

| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 and thereafter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solids OBS value | 800 | 650 | 622 | 594 | 566 | 538 | 510 | 482 | 454 | 426 | 398 | 370 |

# Regulations were developed with significant engagement and collaboration

- In developing it's regulations, ECCC collaborates with provinces and territories, National Indigenous Organizations, businesses, public utilities, industry associations, Independent System Operators, and environmental non-government organizations.

# The accelerated coal phase-out builds on significant provincial action

- **Alberta** has a December 31, 2030, coal phase-out, a price on carbon and a requirement for 30% of electricity generation to come from renewables by 2030.
- **Saskatchewan** has a carbon capture and storage (CCS) project in place – technology that captures carbon emissions and stores them underground – and has committed that up to 50% of electric generating capacity will come from renewable sources by 2030.
- **New Brunswick** has committed that 40% of in-province electricity sales will come from renewable sources by 2020.
- **Nova Scotia** has set emission caps for its electricity sector, and has also committed that 40% of electricity will come from renewable sources by 2020.

# Net-zero 2050

- Canada is developing a plan to achieve economy-wide net-zero emissions by 2050 and will set legally-binding, five-year emissions reduction milestones, based on the advice of experts and consultations with Canadians.
- The electricity sector will be critical for any plans to reach net-zero:
  - Decarbonizing electricity generation and supply
  - Meeting growing electricity demand due to electrification

Thank you.