Canada's Path to Paris Targets

Diagram of Model for Forecasting GHG Emissions in Canada for Period 2019 to 2030

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Scene Set for the Paris Emission Targets

- Environment and Climate Change Canada (ECCC) published a document on March 29 2022 entitled the Emissions Reduction Plan (ERP) showing detailed targets for seven sectors plus land use

ECCC March 29 2022 ERP Showing Historical Emissions in Canada

	2005	2014	2015	2016	2017	2018	2019
	Mt CO_2 equivalent						
National GHG Total	739	723	723	707	716	728	730
Oil and gas	160	190	190	181	183	191	191
Electricity	118	76	79	74	72	62	61
Transport	160	171	172	174	179	184	186
Heavy Industry[a]	87	79	77	76	75	77	77
Buildings	84	85	83	81	86	90	91
Agriculture[b]	72	71	71	72	71	73	73
Waste and Others[c]	57	50	50	50	50	51	51

Notes:

Totals may not add up due to rounding.

Estimates presented here are under continuous improvement. Historical emissions may be changed in future publications as new data becomes available and methods and models are refined and improved.

a. Heavy industry represents emissions arising from non-coal, -oil and -gas mining activities, smelting and refining, and the production and processing of industrial goods such as fertilizer, paper or cement.

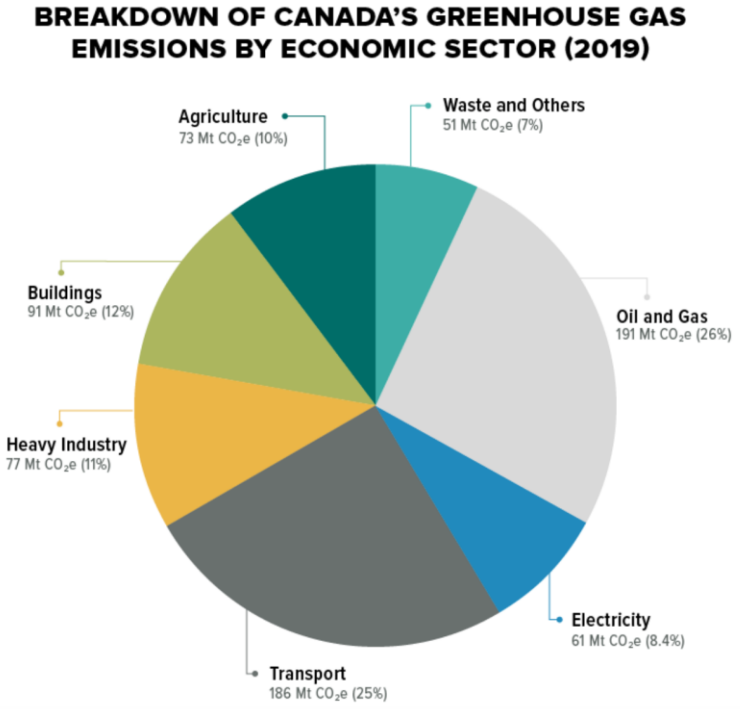
b. Emissions associated with the production of fertilizer are reported in the Heavy Industry sector.

c. "Others" includes Coal Production, Light Manufacturing, Construction and Forest Resources.

Source: 2021 National Inventory Report

ERP shows historical emissions. Trend since 2014 has been flat, meaning future targets for lower emissions will need to reverse this trend.

ECCC March 29 2022 ERP Showing Emissions in Canada in 2019



ERP shows 2019 emissions for seven sectors in Canadian economy totalling 730 MT. Land use was an additional 10 MT (not shown).

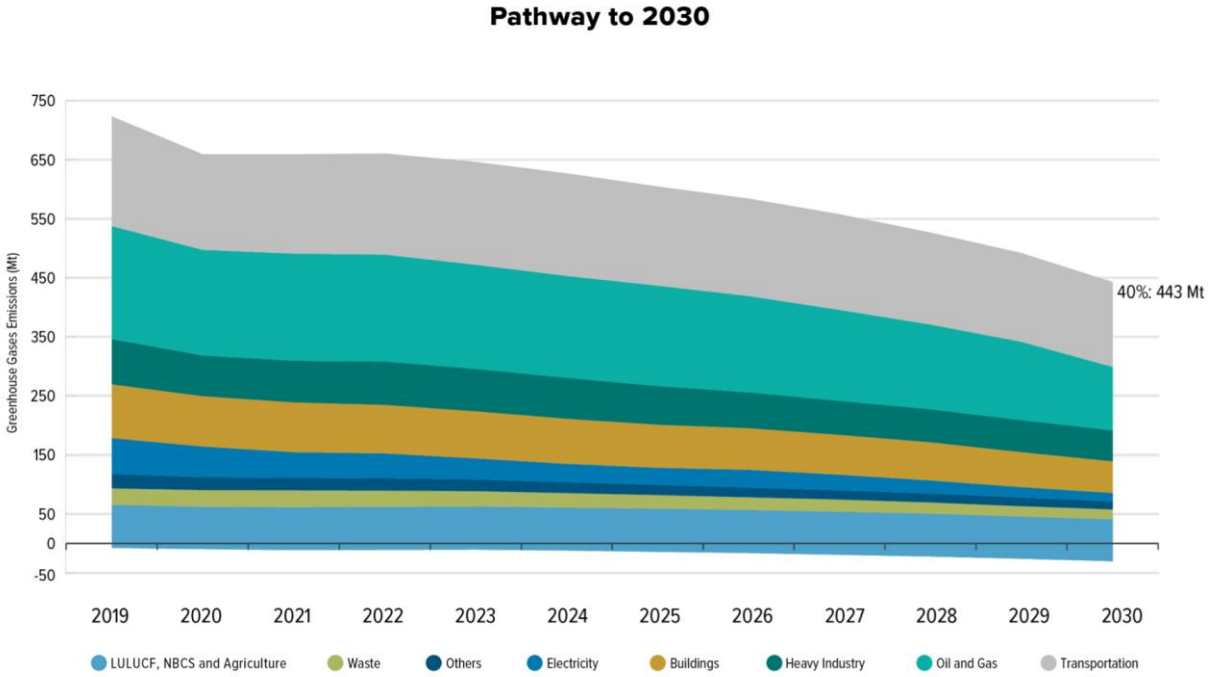
Specific Numbers for Paris Emission Targets for Each Sector

- ERP targets reductions in each of 7 sectors plus land use as shown below

	2019, MT	2030 Target, MT
Oil and Gas industry	191	110
Transportation	186	143
Buildings	91	53
Electricity	61	14
Heavy Industry	77	52
Agriculture	73	71
Waste and Other	51	29
Land use change (trees).	10	-30
Total	740	442

- ERP Report does not give any details as to how these reductions will be achieved
- It is a plan for a plan

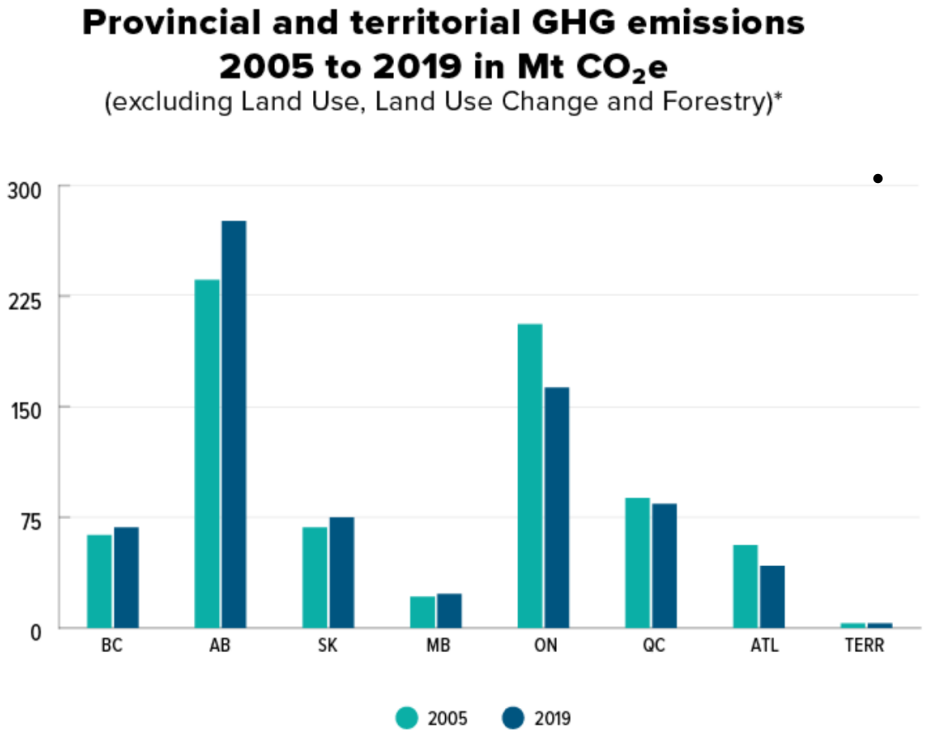
ECCC March 29 2022 ERP Showing Future Targets for Emissions in Canada



March 29 2022 ERP shows target reductions in each sector with a total reduction from 740 MT in 2019 to 443 MT in 2030, a drop of 40%.

GHG Emissions by Province

- Emissions Reduction Plan page 96

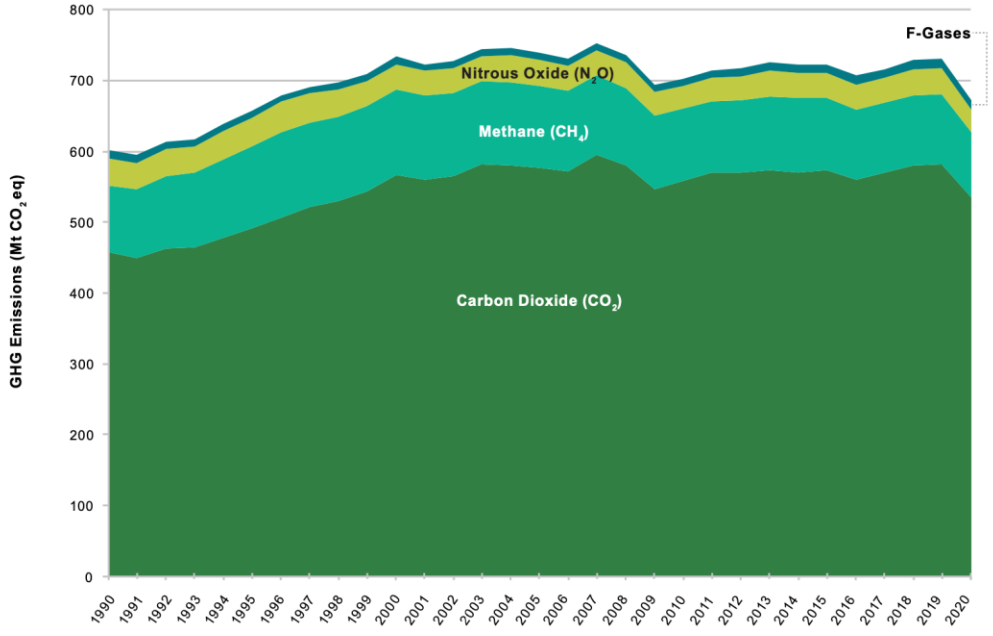


- Alberta has the largest emissions, largely due to the oil and gas sector

Different Types of Gases Comprising Canada's GHG Emissions

- National Inventory Report (NIR) of April 14 2022 shows different types of GHG in Canada

Figure 2–5 **Trends in Canadian GHG Emissions by Gas (1990–2020)**

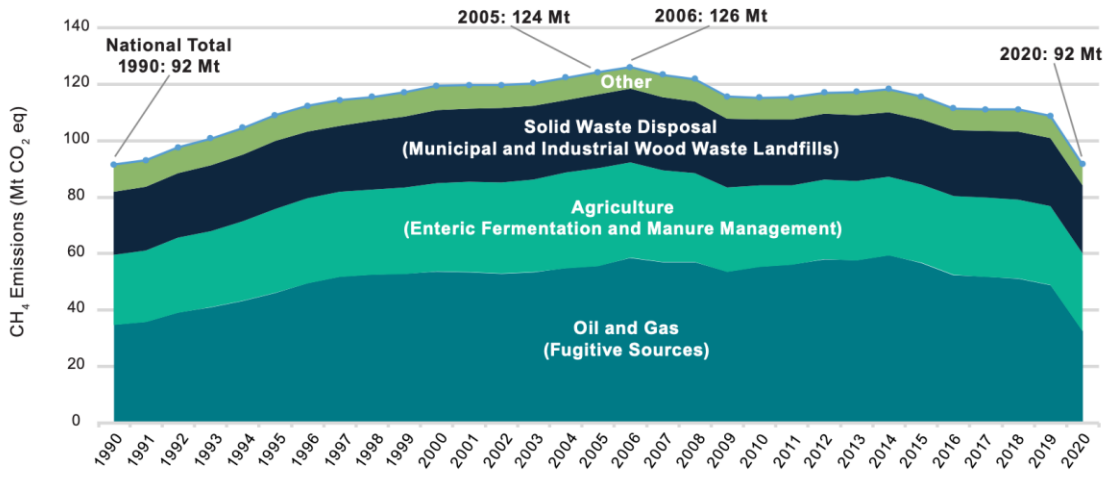


- Carbon dioxide comes from hydrocarbon fuel combustion.
- Methane comes from oil and gas, waste and animals
- Nitrous oxide comes from fertilizers

Methane Releases in Canada

- National Inventory Report (NIR) of April 14 2022 shows sources of methane releases

Figure 2–6 **Methane Emissions Trends in Canada (1990–2020)**



Note: Other includes various methane sources from the Energy, IPPU, Agriculture and Waste sectors.

Government Policies to Achieve 2030 Paris Emission Targets

- ECCC sets out several policy instruments designed to achieve these targets

- General - Carbon pricing
- Oil and Gas - Cap on emissions
  - Investment tax credits for carbon capture (CCUS) and direct air capture (DAC)
  - Small modular reactors
- Transportation - continue $5,000 incentive payment for purchase of EVs
  - impose ZEV mandate to require vehicle manufacturers to sell minimum number of EVs (for passenger vehicles 20% in 2026, 60% in 2030, 100% in 2035, 35% freight trucks in 2030)
  - governments to provide financing for car manufacturers to build EV capacity in Canada (Ford, GM, Stellantis, Honda)
- Buildings - $5,000 grants for heat pumps
  - plans to revise Building Codes
- Not a lot for other sectors

Different Steps That Could Reduce Emissions

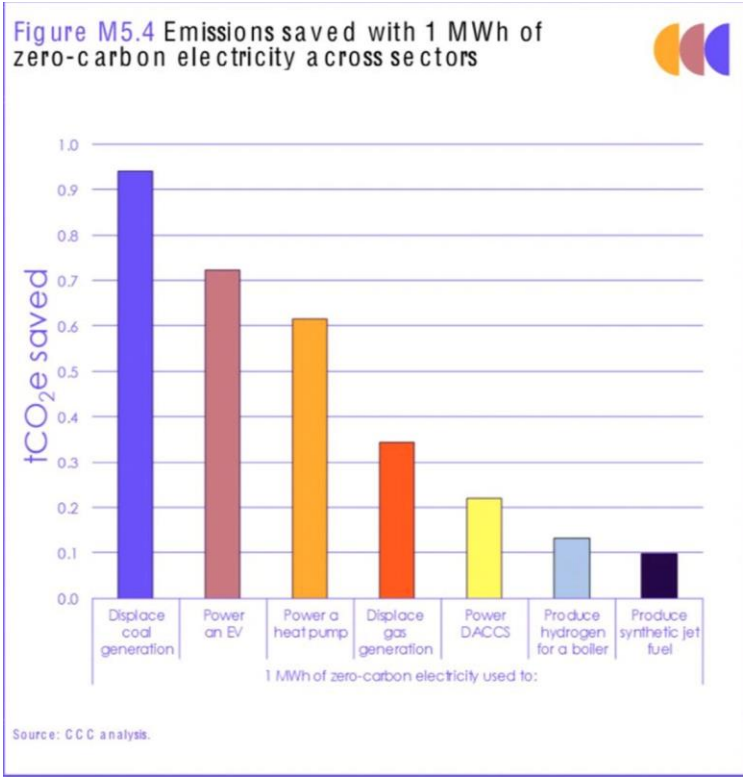


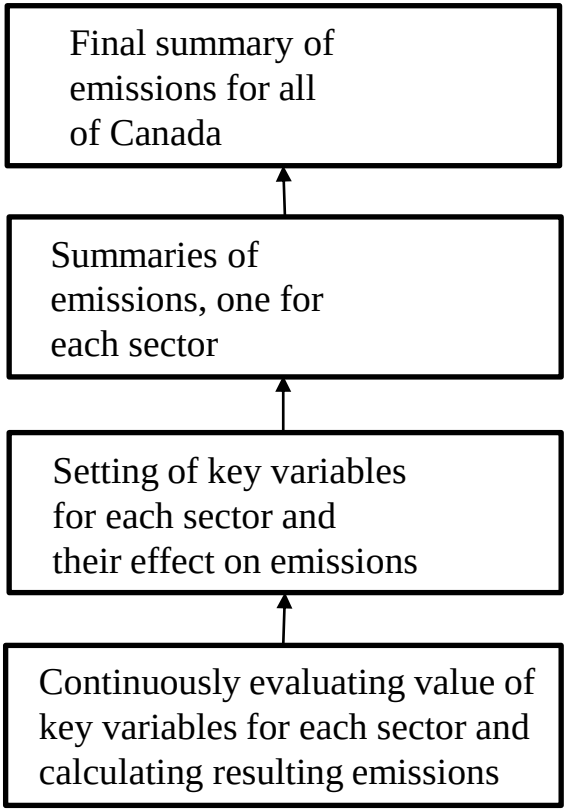
Chart shows emissions reductions resulting from various steps such as replacing coal or natural gas with renewables, electric vehicles, heat pumps, Direct Air Capture for carbon dioxide, hydrogen fuels and renewable fuels

Source: https://twitter.com/CoppiceJT/status/1585260144539336705/photo/1

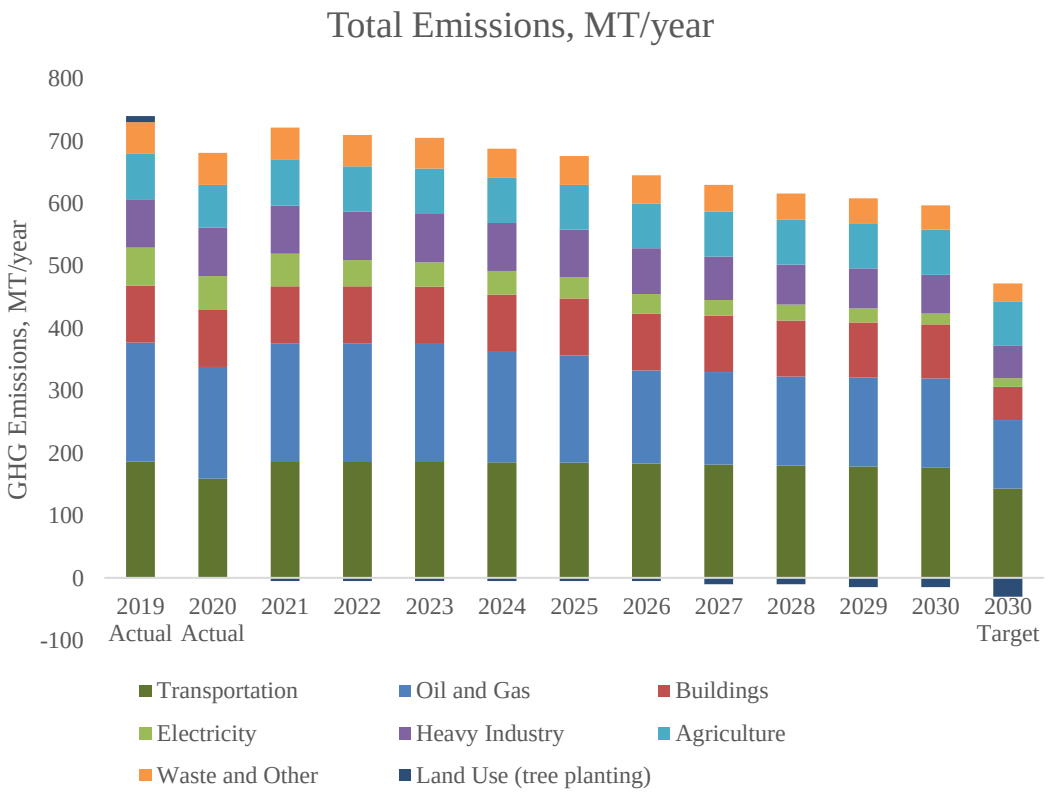
Scene Set for the Paris Emission Targets

- What is missing are several things
  - What specific things have to occur in order to achieve these targets
  - what are the specific key variables in each sector that will determine the GHG emissions for each sector for each year from 2019 to 2030
  - what is a realistic assessment of how much these key drivers will occur
- What is needed is for someone to construct a model that will determine the forecast of GHG emissions for each sector for each year from 2019 to 2030
- ECCC has not published anything like this as of December 2022, and no forecast will be published until 2023
- No public policy institute has stated that it will do so
- The model described in the following charts will perform this function
- It is designed to be updated periodically in order to measure the progress towards the 2030 GHG emission targets

Simplified Schematic of Model Contained in Spreadsheet



Summary of Forecasted Emissions for Period 2019 to 2030



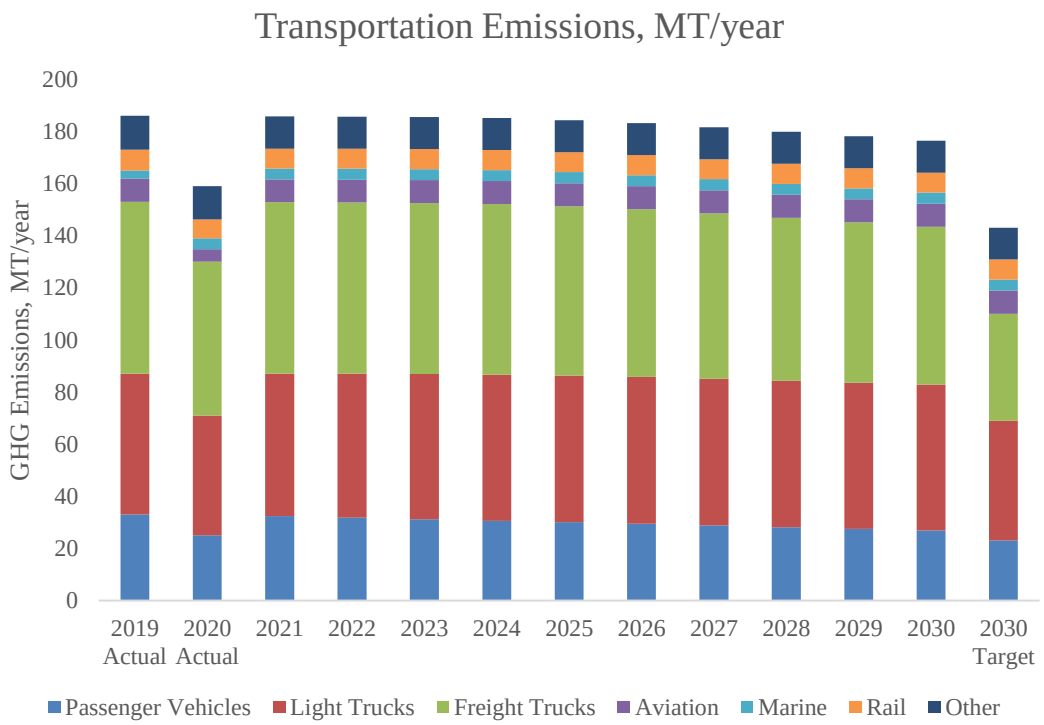
There is a gap of 140 MT between the 2030 Forecast of 582 MT and the 2030 target of 442 MT.

Summaries of Emissions for Sectors

Models for Forecasting Emissions From Each Sector

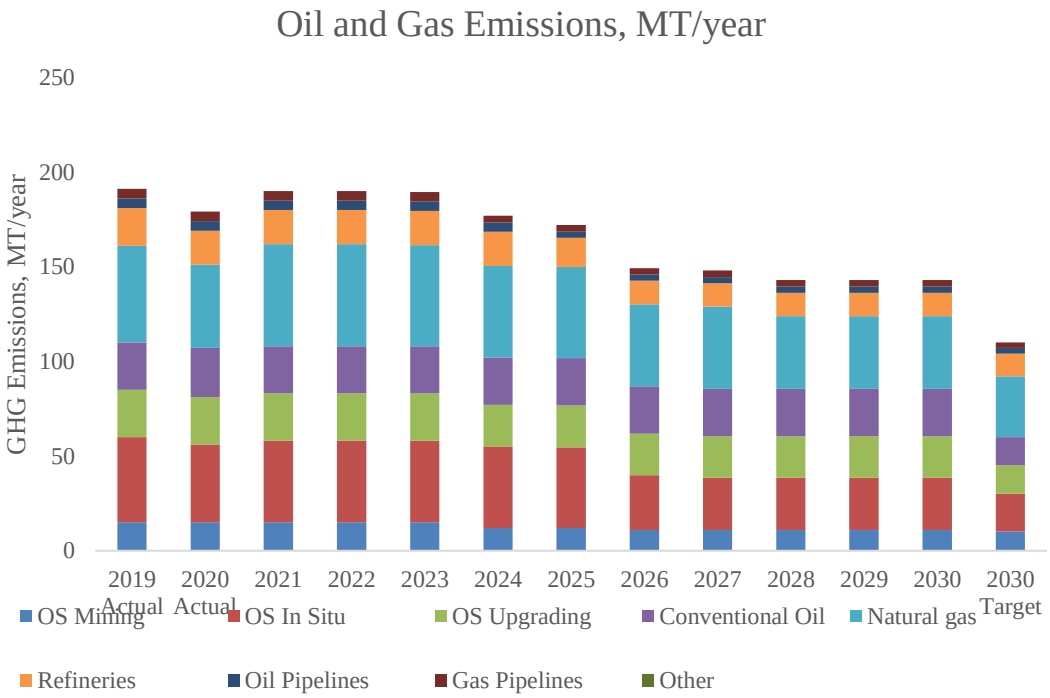
- The following charts give the forecast of emissions for each sector, with a breakdown of the emissions from the various sub-sectors within each sector
- Each sector has a series of PowerPoint charts that describe the model used to forecast emissions from that specific sector
- These charts are available on the C.D. Howe Institute website

Forecast of Transportation Emissions for Period 2019 to 2030



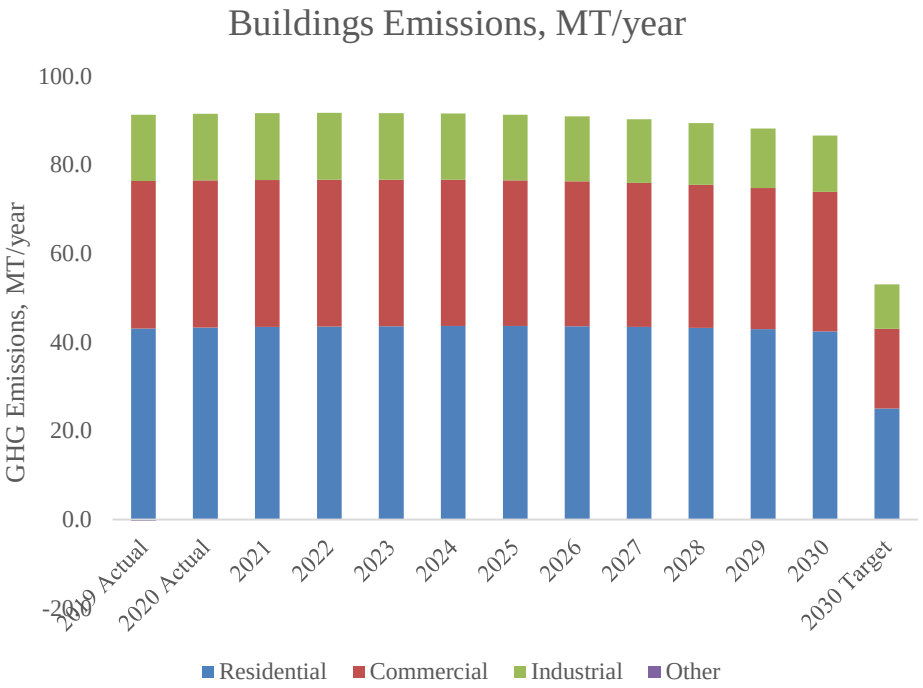
There is a gap of 34 MT between the 2030 Forecast of 177 MT and the 2030 target of 143 MT.

Forecast of Oil and Gas Emissions for Period 2019 to 2030



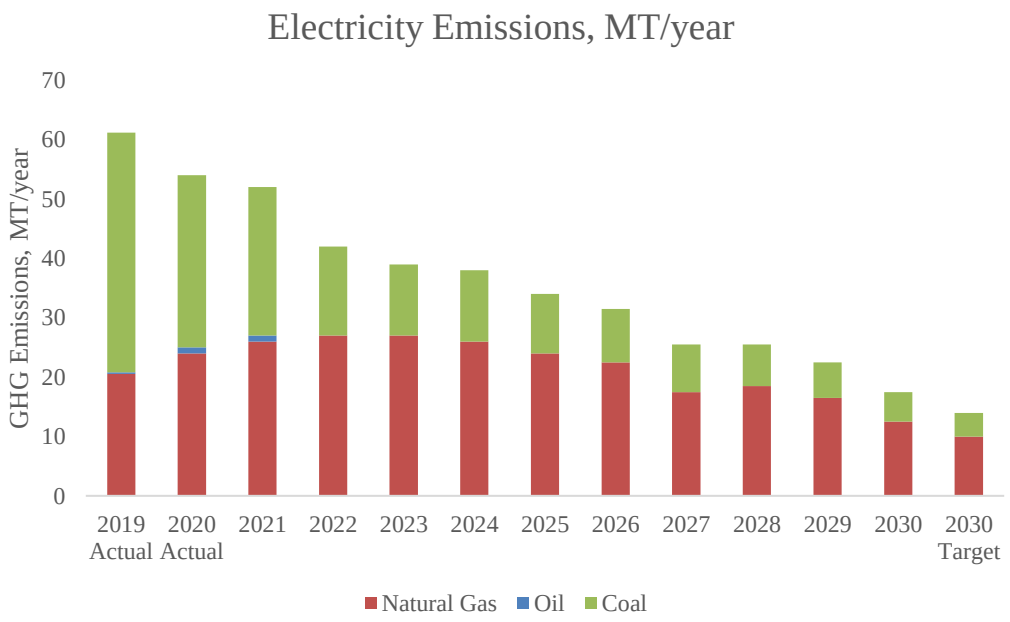
There is a gap of 33 MT between the 2030 Forecast of 143 MT and the 2030 target of 110 MT.

Forecast of Buildings Emissions for Period 2019 to 2030



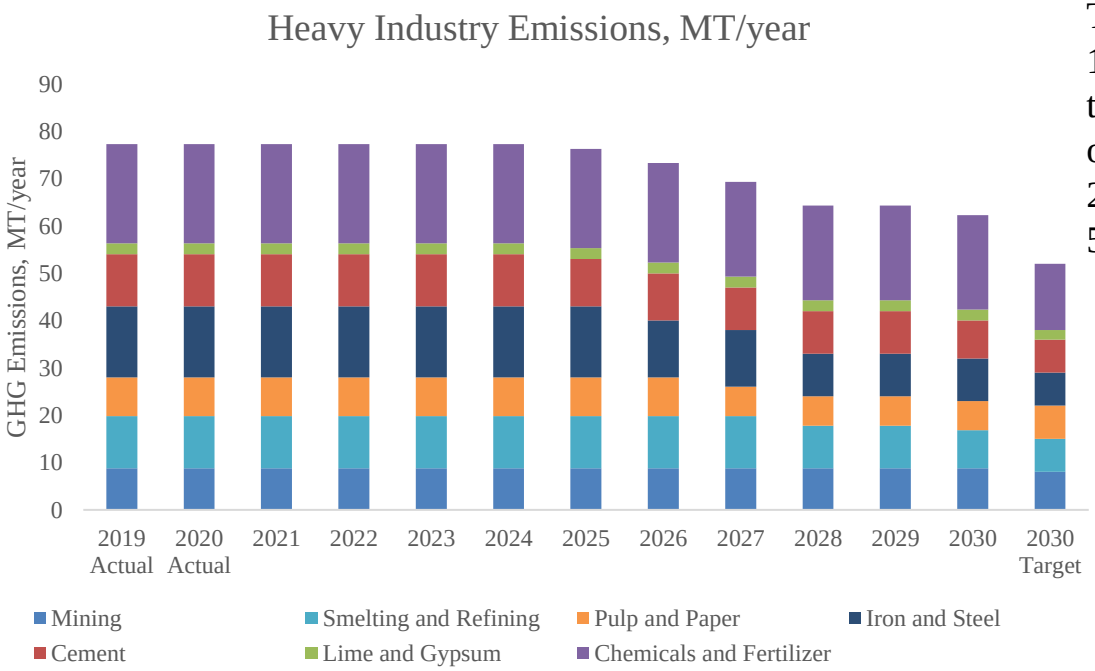
There is a gap of 34 MT between the 2030 Forecast of 87 MT and the 2030 target of 53 MT.

Forecast of Electricity Emissions for Period 2019 to 2030



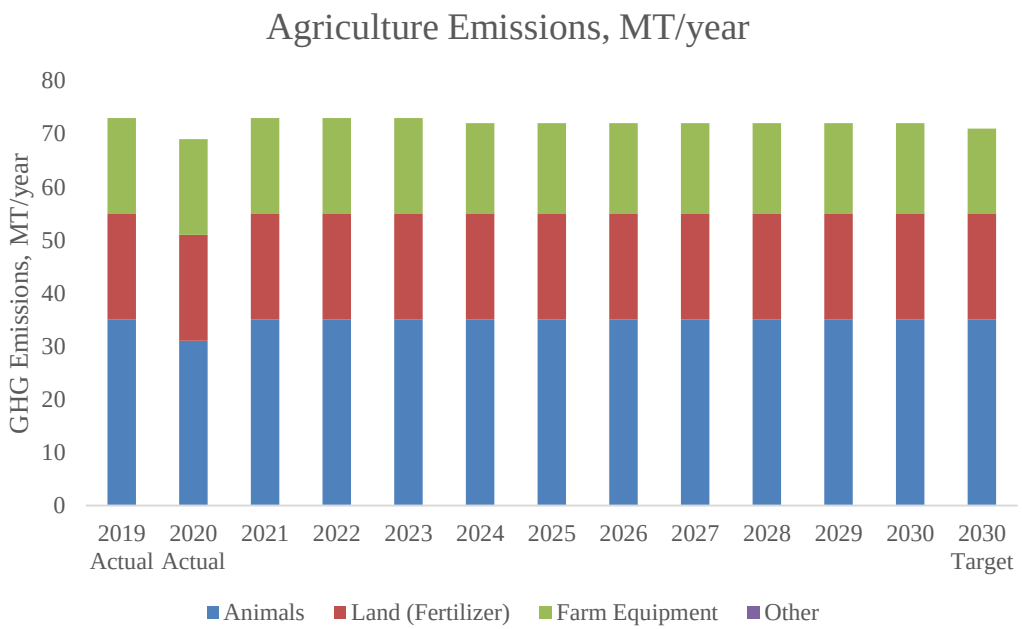
There is a gap of 4 MT between the 2030 Forecast of 18 MT and the 2030 target of 14 MT.

Forecast of Heavy Industry Emissions for Period 2019 to 2030



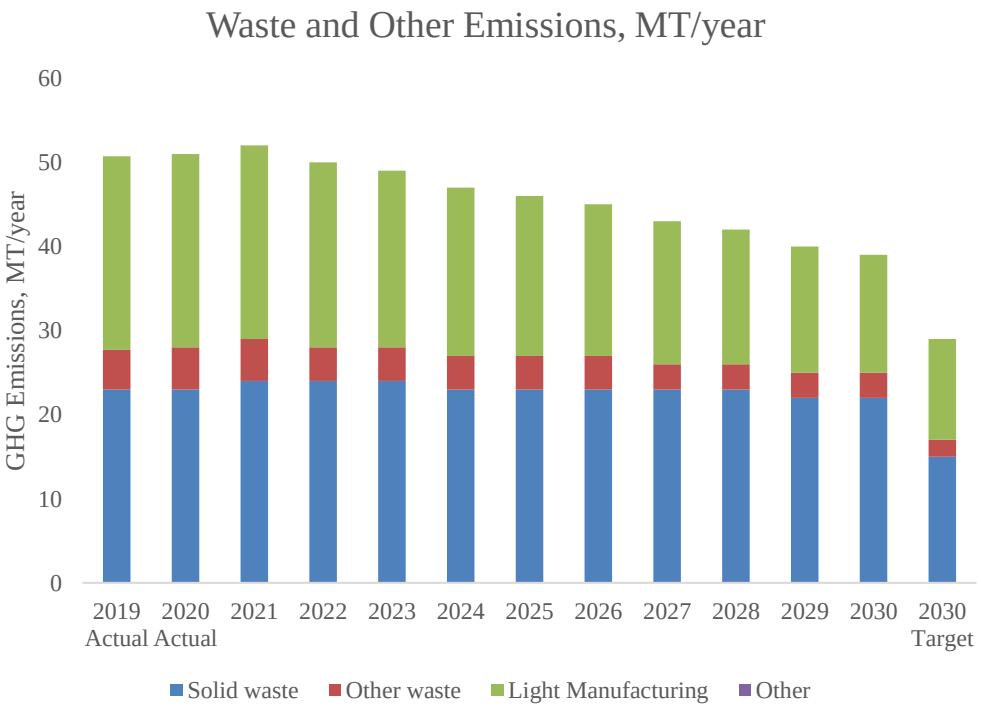
There is a gap of 10 MT between the 2030 Forecast of 62 MT and the 2030 target of 52 MT.

Forecast of Agriculture Emissions for Period 2019 to 2030



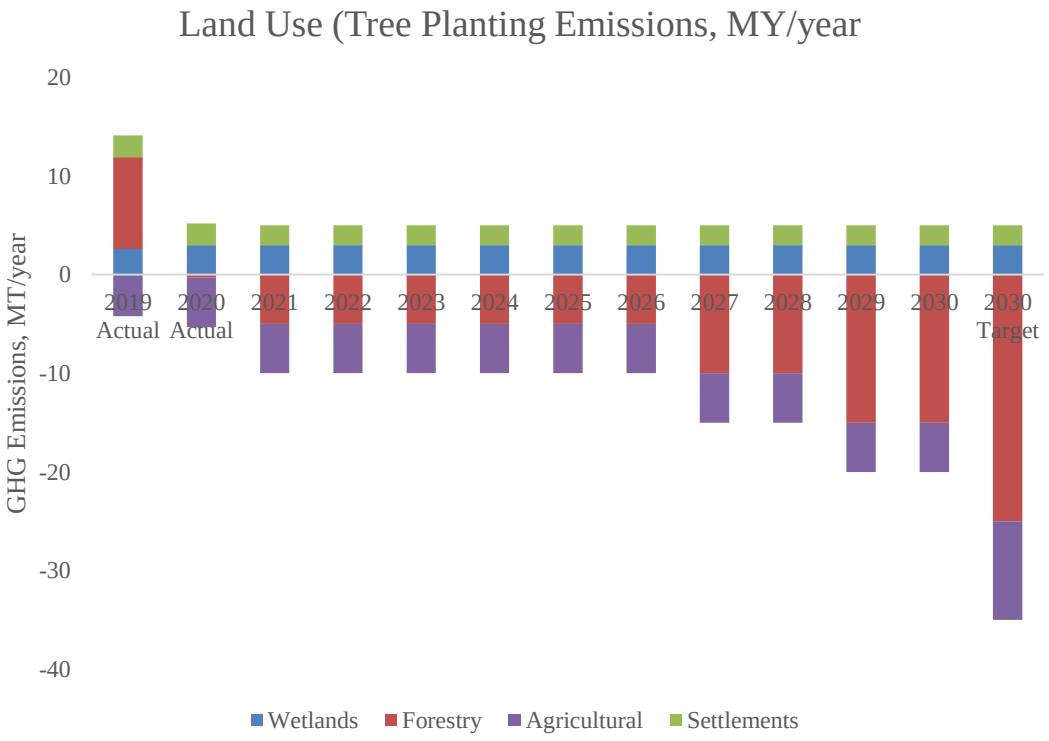
There is a gap of 1 MT between the 2030 Forecast of 72 MT and the 2030 target of 71 MT.

Forecast of Waste and Other Emissions for Period 2019 to 2030



There is a gap of 10 MT between the 2030 Forecast of 39 MT and the 2030 target of 29 MT.

Forecast of Land Use (Tree Planting) Emissions for Period 2019 to 2030



There is a gap of 15 MT between the 2030 Forecast of -15 MT and the 2030 target of -30 MT.