



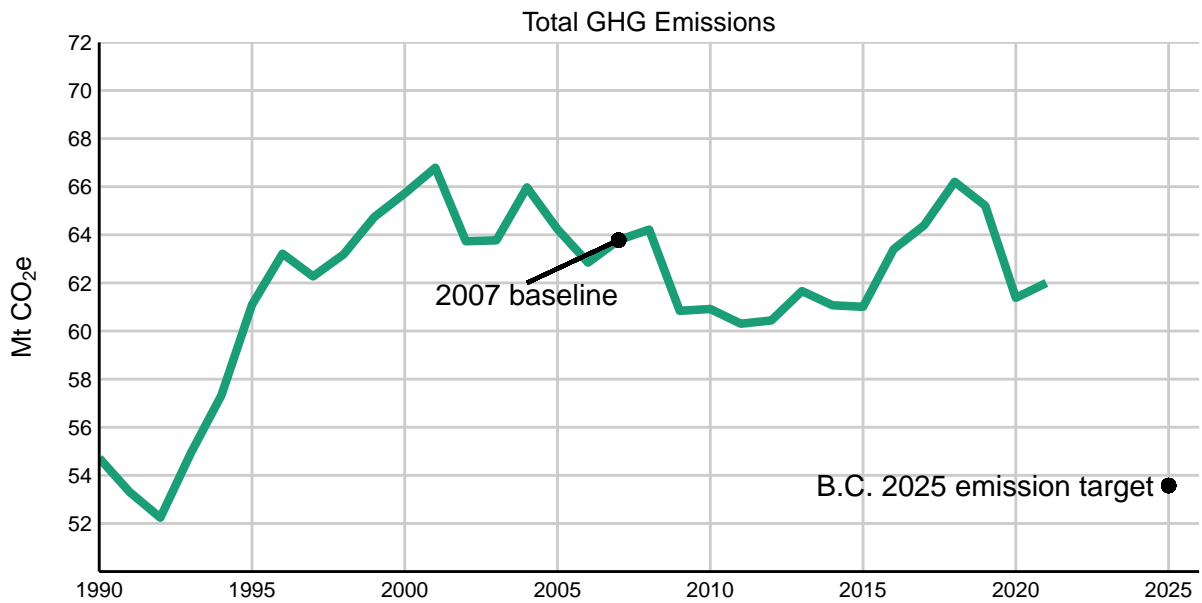
Sustainability

Trends in Greenhouse Gas Emissions in B.C. (1990-2021)

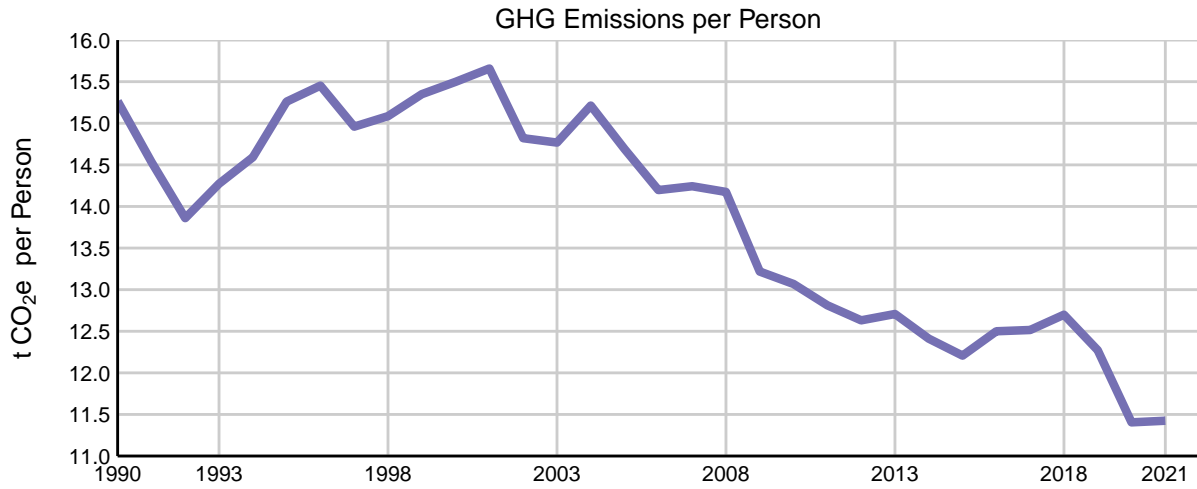
- **Greenhouse gas emissions warm the global atmosphere and cause our climate to change.** Reducing greenhouse gas emissions is a key component to limiting the increase in global average temperature and the resulting changes in climate.
- **A rebound in greenhouse gas emissions was observed in 2021, from the low 2020 levels brought about by the COVID-19 pandemic.** This was primarily driven by an increase in emissions from passenger and freight transportation.
- **Total greenhouse gas emissions in 2021 in B.C. were 62 million tonnes of carbon dioxide equivalent (MtCO₂e).** This is a 1% increase in gross emissions since 2020, a 4.9% decrease in gross emissions since 2019, and a 2.8% decrease in gross emissions since 2007—the Government of British Columbia’s baseline year for assessing reductions in greenhouse gas emissions.
- **B.C. applies emissions reductions from forest management carbon offsets to emission totals each year to determine net greenhouse gas emissions and progress to its official legislated targets.** In 2021, carbon offsets totaled 1.1 Mt CO₂e, bringing net greenhouse gas emissions down to 60.9 Mt CO₂e, 4.4% below 2007 levels. Figures and calculations presented in this indicator use gross totals from the [British Columbia Greenhouse Gas Emission Inventory \(2021\)](#)¹ and do not account for any emission reductions from offset projects.
- **B.C. has set targets for reducing greenhouse gas emissions over the next 30 years.** The targets are 40% reduction by 2030, 60% reduction by 2040 and 80% reduction by 2050, compared to 2007 levels. To keep B.C. on track, an interim target of reducing greenhouse gas emissions 16% from 2007 levels by 2025 was also set².
- **Greenhouse gas emissions intensity of the economy continues to fall.** Greenhouse gas emissions per million dollars of GDP have been in decline since 1990 with the trend accelerating after 2001. The trend in emissions per person is less consistent, but has been downward for most of the last 20 years.
- **Different gases make up the total greenhouse gas emissions reported over time.** The gases released in 2021 were carbon dioxide (84.3% of total emissions), methane (10.5%), nitrous oxide (2.6%), hydrofluorocarbons (2.5%) and perfluorocarbons (0.1%).
- **The transportation and fossil fuel sectors produce the most greenhouse gas emissions in B.C.** Major transportation-related sources of greenhouse gas emissions include large passenger vehicles, trucks, heavy-duty trucks, and rail. The major fossil fuel industry source is natural gas production and processing.

Greenhouse Gas Emissions in British Columbia

- In 2021, gross greenhouse gas emissions in B.C. were 2.8% lower than the 2007 baseline year.
- Per capita and economic greenhouse gas intensities are based on gross emissions totals. Values reported differ from those used in the [Climate Change Accountability Report²](#), which uses net emissions totals to calculate corresponding intensities.

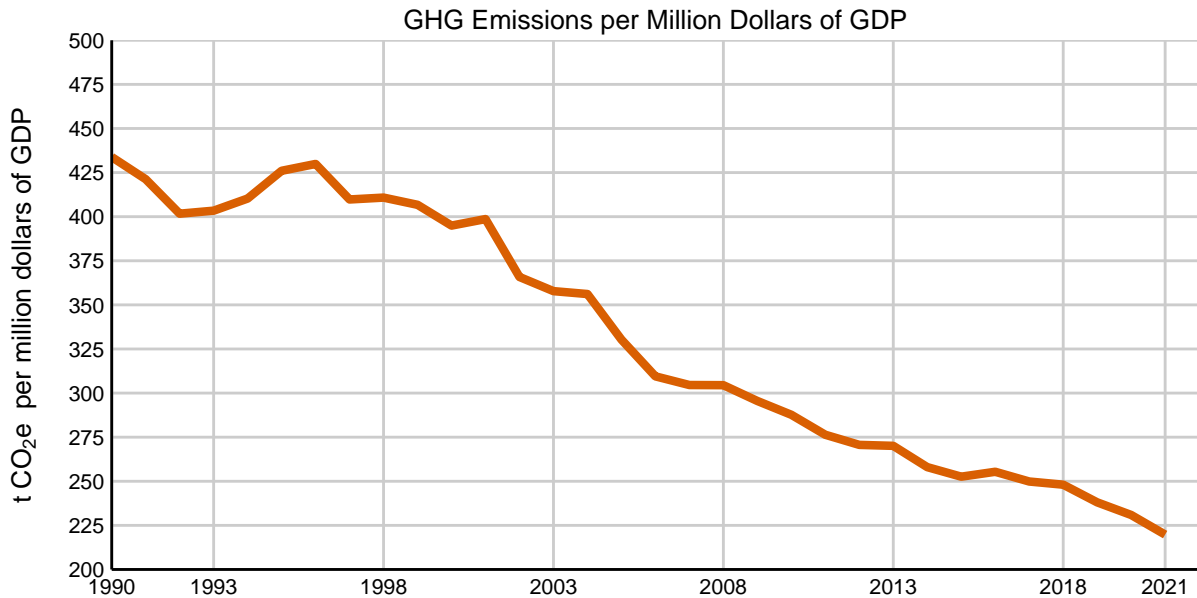


- Overall, the greenhouse gases produced per person in B.C. were less in 2021 than the 2007 baseline year. This lower level, as with the reduction seen in 2020, is likely due to effects of the COVID-19 pandemic, and this reduction held steady into 2021.

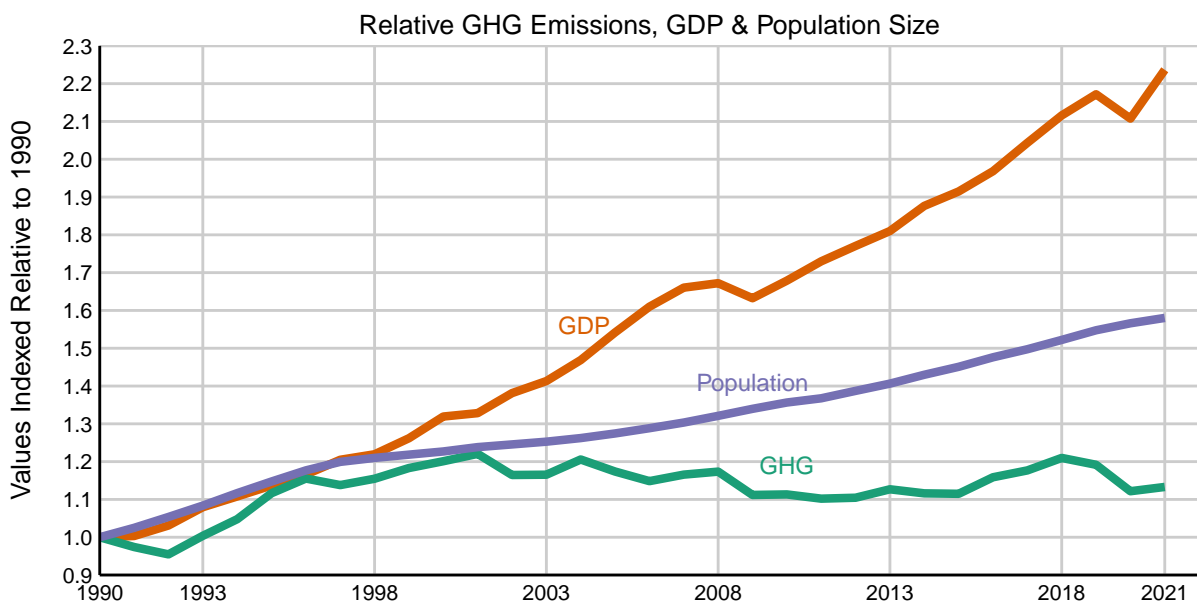


* To compare to per capita emissions from other jurisdictions, the afforestation and deforestation emissions in the B.C. inventory were removed for this calculation, as these emission sources are not tracked everywhere. More details on these emissions are available below.

- Greenhouse gas emissions per million dollars of GDP varied year to year between 1990-2001 and have consistently declined since 2001.

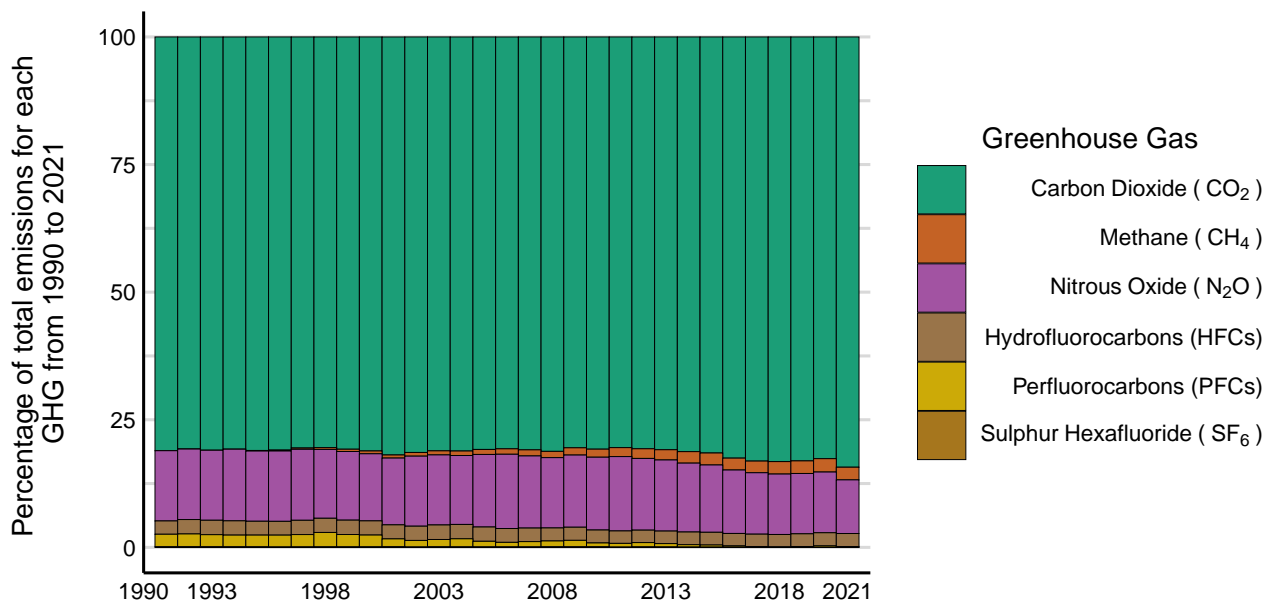


- Population size and gross domestic product in B.C. have continually increased since 1990 (with the exception of GDP in 2009 and 2020), while greenhouse gas emissions have not shown a clear upward or downward trend; both GDP and emissions showed marked reductions in 2020.



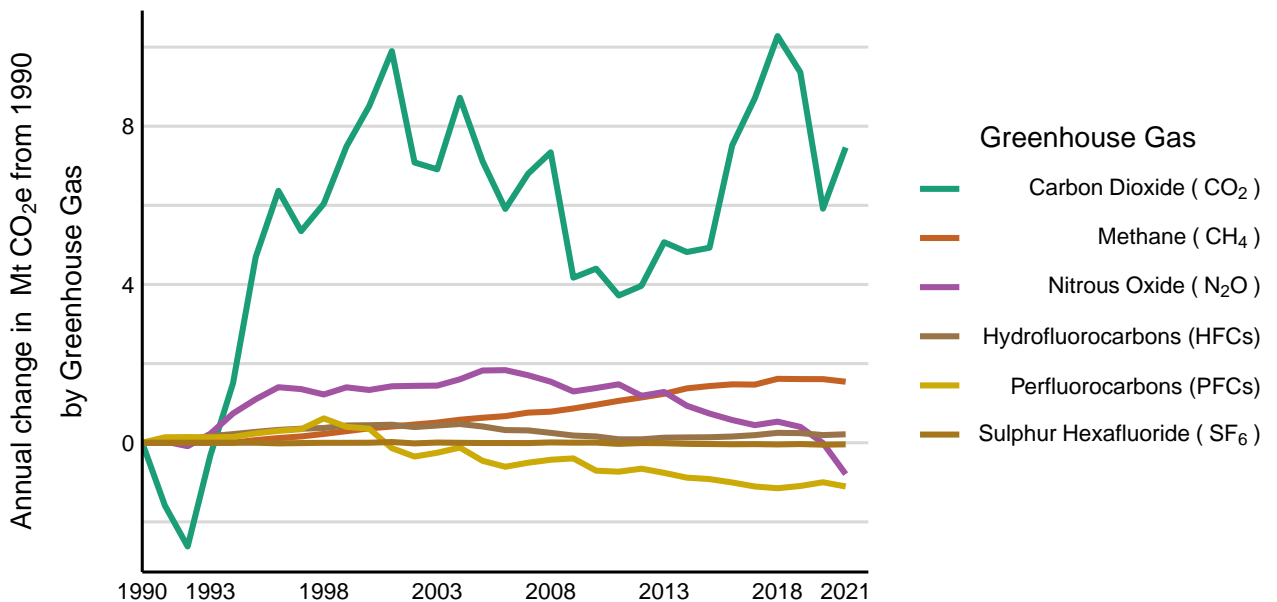
Emissions by Greenhouse Gas

- There are 7 greenhouse gases monitored in B.C. The gases are carbon dioxide (CO₂), hydrofluorocarbons (HFCs), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).
- Greenhouse gases have different [Global Warming Potential](#)³ (GWP). The GWP determines how much a gas traps heat in the atmosphere. For example, methane traps 25 times more heat than carbon dioxide, while sulphur hexafluoride traps 22,880 times more heat than carbon dioxide. To combine different gases for an overall emissions total, the emission values of each gas is converted to CO₂ equivalent in all of the figures and data in this indicator ([British Columbia Greenhouse Gas Provincial Inventory Methodology](#)⁴).
- The relative contribution of each greenhouse gas emitted in 2021 was CO₂ at 84.3%, CH₄ at 10.5%, N₂O at 2.6%, HFCs at 2.5%, PFCs at 0.1% and SF₆ at 0%. There has been no recorded emissions of NF₃ in B.C. to date.



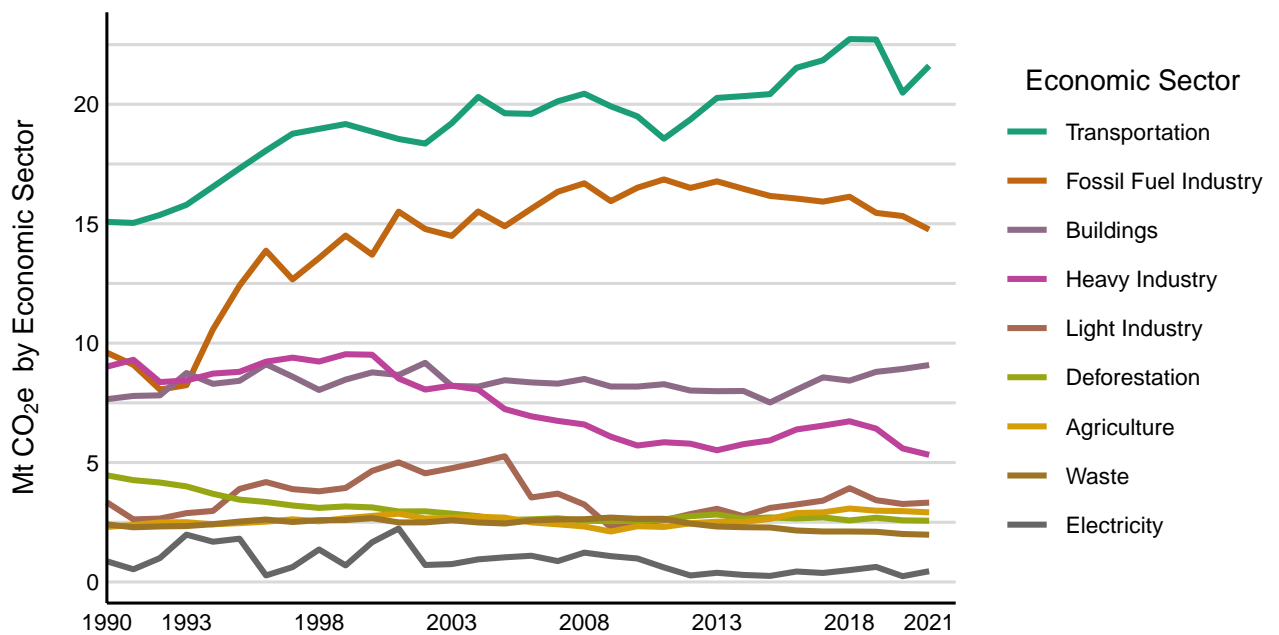
How have emissions of different greenhouse gases changed over time?

- The amount of carbon dioxide equivalent emitted annually by each greenhouse gas was compared to 1990 levels. CO₂ emissions have fluctuated over time. CH₄ emissions have also varied since 1990 but have consistently declined since 2013.
- HFC emissions have gradually increased since 1990, peaking in 2020.
- N₂O and SF₆ emissions have changed very little since 1990. SF₆ emissions have been at or near 0 MtCO₂e since 2011.
- PFC emissions have varied year to year but have generally declined since 1998 and are below 1990 emissions.



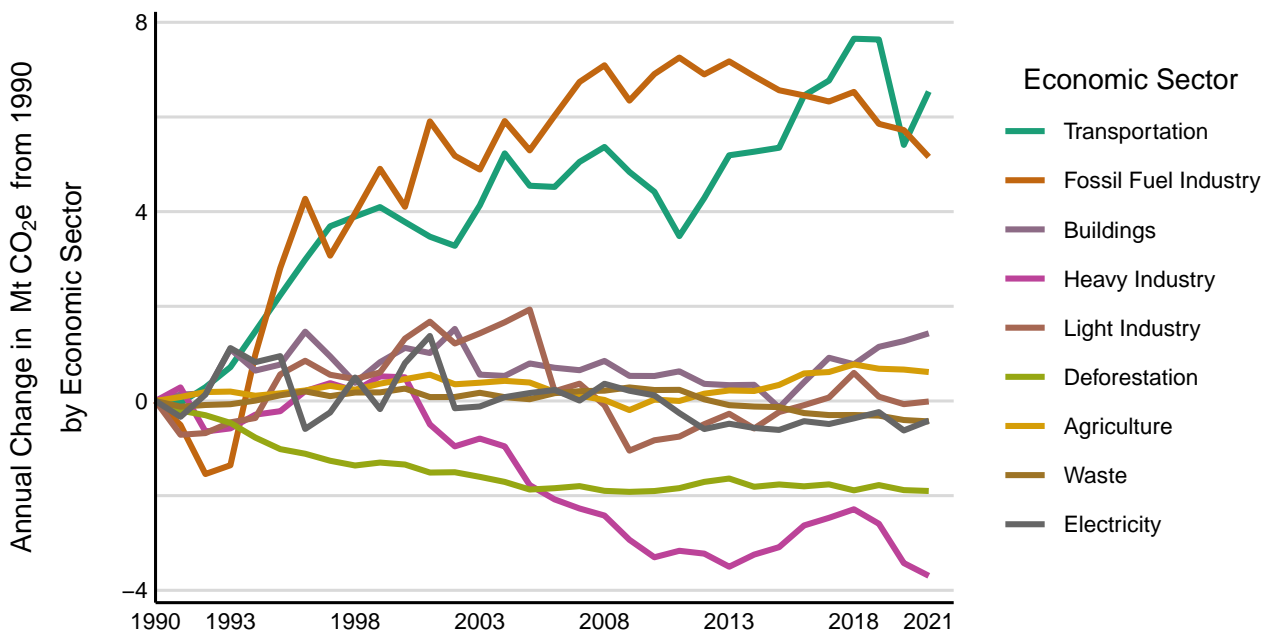
Greenhouse Gas Emissions by Economic Sector

- Greenhouse gas emissions are sorted here into the following economic sectors: transportation, fossil fuels, buildings, heavy industry, waste, deforestation, agriculture, electricity generation, and light industry (includes light manufacturing, construction, and forest resources). Note that the categorizations represented here vary from those used in the [Climate Change Accountability Report](#)².
- By looking at the greenhouse gas emissions across the different sectors, we can see where the majority of B.C.'s emissions are coming from, as well as the trends in emissions from those sectors.
- The transportation sector produces the largest amount of greenhouse gas emissions in British Columbia. Passenger transport (trucks, SUVs, small cars, and motorcycles) and freight transport (heavy duty trucks and rail) produce the most emissions within the transportation sector.
- The fossil fuel sector produces the second largest amount of greenhouse gas emissions in British Columbia. This sector includes production, refining and distribution activities.



How have greenhouse gas emissions changed within economic sectors?

- The amount of carbon dioxide equivalent emitted annually by each economic sector was compared to 1990 levels. The transportation sector had the largest increase in annual emissions of any sector over the past three decades. The fossil fuel sector also had consistent increases in annual emissions, with levels peaking from 2011 to 2014.
- Emissions from the transportation sector in 2021 increased 5.5% from 2020 levels but remain 5.1% lower than 2019 levels. The rebound in transportation emissions in 2021 is likely due to fewer COVID-19 travel restrictions.
- Heavy industry's emissions declined from 2000 to 2013 and have fluctuated over the past decade. Deforestation emissions declined from 1990 to 2005, after which they have remained consistent.
- Emissions from the buildings, agriculture, light industry, electricity, and waste sectors have fluctuated over the past three decades, but at a lower magnitude (< 2 Mt CO₂e) than other sectors.
- Each economic sector was broken down into more specific categories where available. This information is provided below.



Methods

The [British Columbia Greenhouse Gas Provincial Inventory Methodology](#)⁴ provides a description of the methodologies and data sources used in preparing B.C.'s greenhouse gas emissions inventory. Currently, most of the Provincial Inventory data and methods come from [Canada's National Inventory Report \(NIR\)](#).⁵ Any deviations from the NIR methodology or categorization are described in detail in the B.C. Provincial Inventory Methodology⁴. Additional information is also available in the [British Columbia Greenhouse Gas Emission Inventory Report \(2021\)](#)².

British Columbia population estimates ([Table: 17-10-0005-01](#)) and gross domestic product ([Table: 36-10-0222-01](#)) data were sourced from [Statistics Canada](#). Gross domestic product (GDP) is calculated using expenditure-based GDP and reported in millions of chained 2012 dollars.

The Economic Sector data in this indicator is from the 'Economic Sector' tab in the Provincial Inventory¹. The [Climate Change Accountability Report](#)² follows the categories outlined in the tab labelled 'Activity Categories'.

The **R** code for repeating the analysis and data visualizations presented on this page is [available on GitHub](#).

References and Other Useful Links

¹[British Columbia Greenhouse Gas Emission Inventory \(2021\)](#)

²[B.C.'s 2022 Climate Change Accountability Report](#)

³[Global Warming Potential](#)

⁴[Methodology Report for the British Columbia Provincial Inventory of Greenhouse Gas Emissions 1990-2021](#)

⁵[Canada's National Greenhouse Gas Inventory](#)

[B.C. Climate Change Home Page](#)

[Canadian Environmental Sustainability Indicators: Air and Climate Indicators](#)

Data

*By accessing these datasets, you agree to the licence associated with each file, as indicated below.

- [British Columbia Greenhouse Gas Emissions](#) (Licence: [Open Government Licence - British Columbia](#))

Published and Available On-Line at Environmental Reporting BC:

<http://www.env.gov.bc.ca/soe/indicators/sustainability/ghg-emissions.html>

Email correspondence to: envreportbc@gov.bc.ca

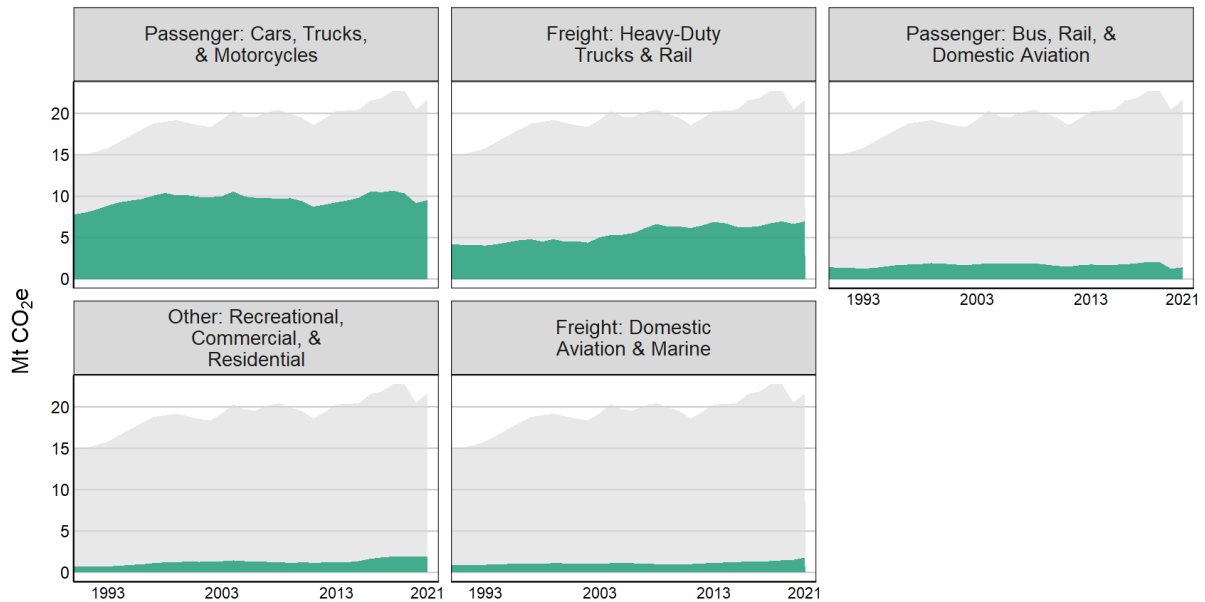
Suggested Citation:

Environmental Reporting BC. 2024. Trends in Greenhouse Gas Emissions in B.C. (1990-2021). State of Environment Reporting, Ministry of Environment and Climate Change Strategy, British Columbia, Canada.

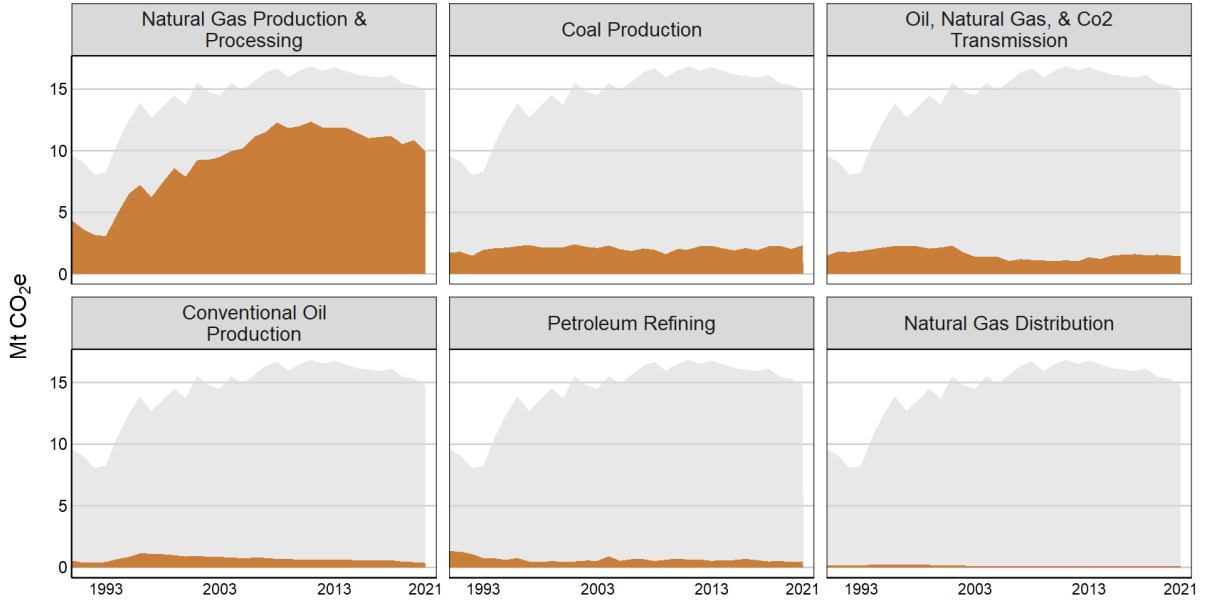
Appendix A: Breakdown of Economic Sectors

- Economic sectors were broken down into subsectors, where subsectors were available. Further information on the emissions categorized in each subsector are provided in the [British Columbia Greenhouse Gas Provincial Inventory Methodology](#)².
- Each subsector contributes varying amounts of emissions to the sector total. Examining these breakdowns further can give us a greater insight into the sources of emissions in B.C.
- In each economic subsector figure below, the grey background shows the total emissions from each sector over time and the color sections show the contribution of each sub-sector compared to the sector total.

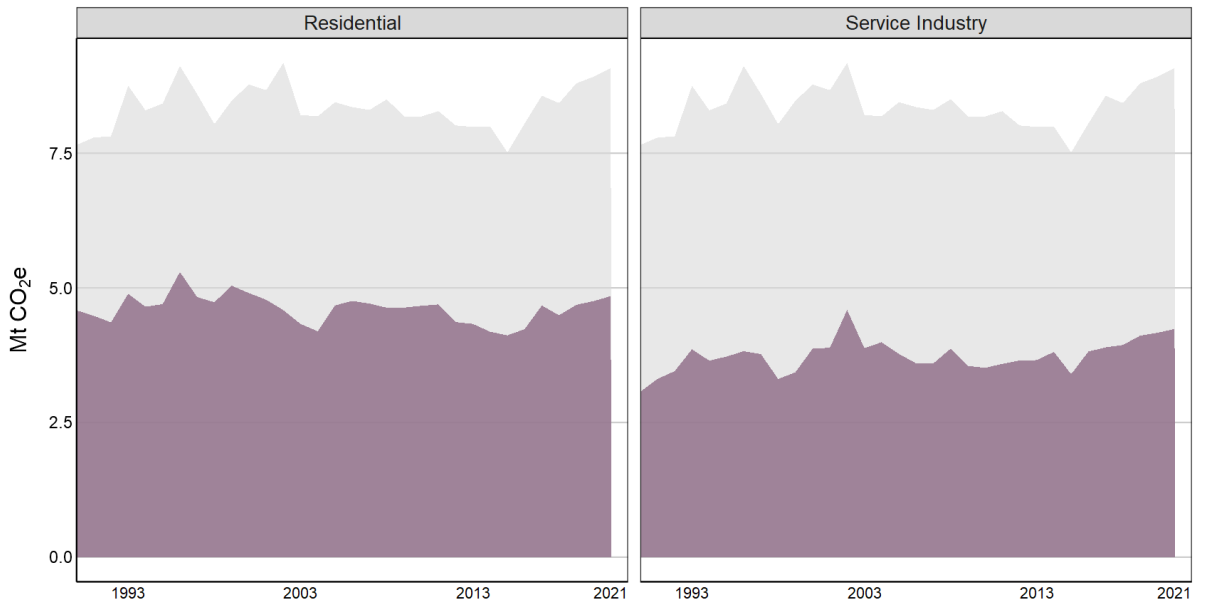
Transportation Sector



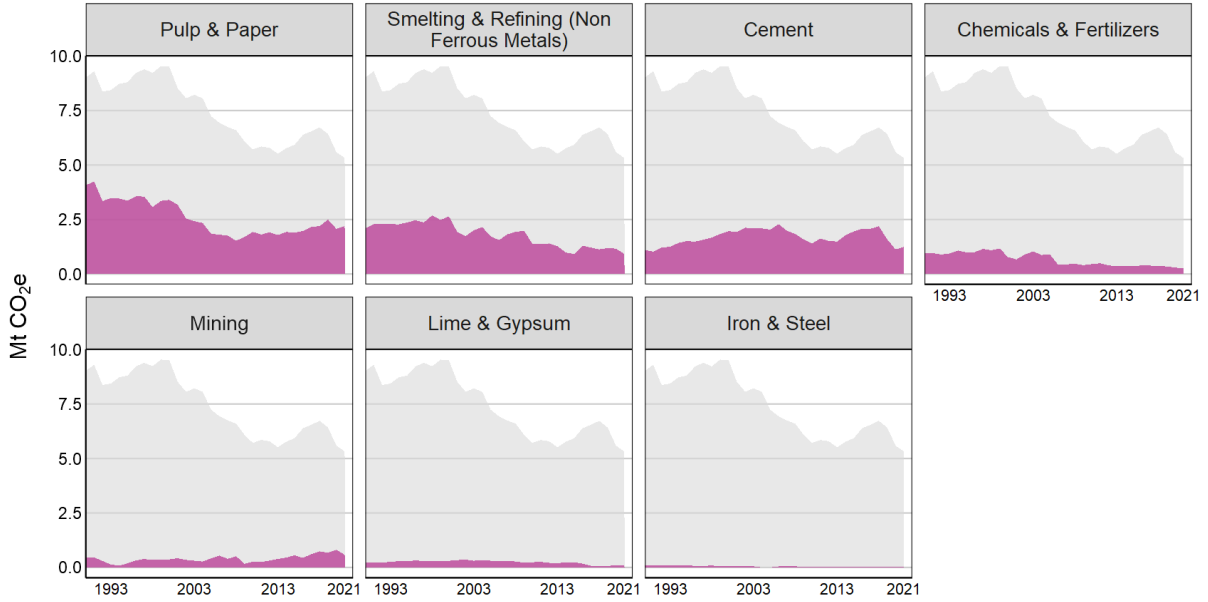
Fossil Fuel Industry Sector



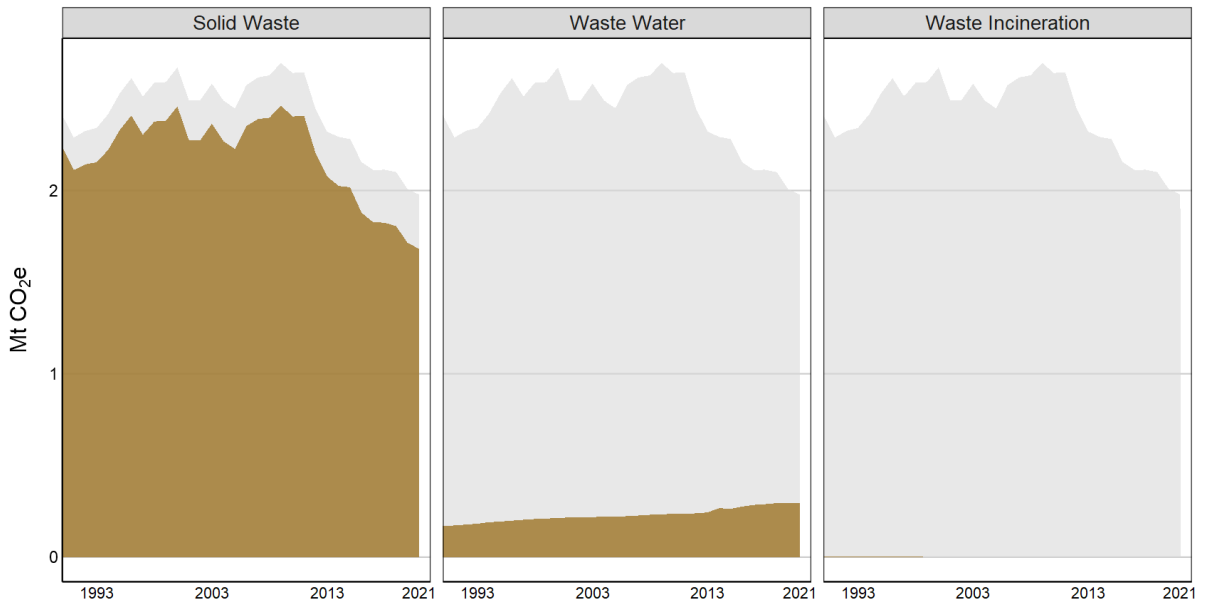
Buildings Sector



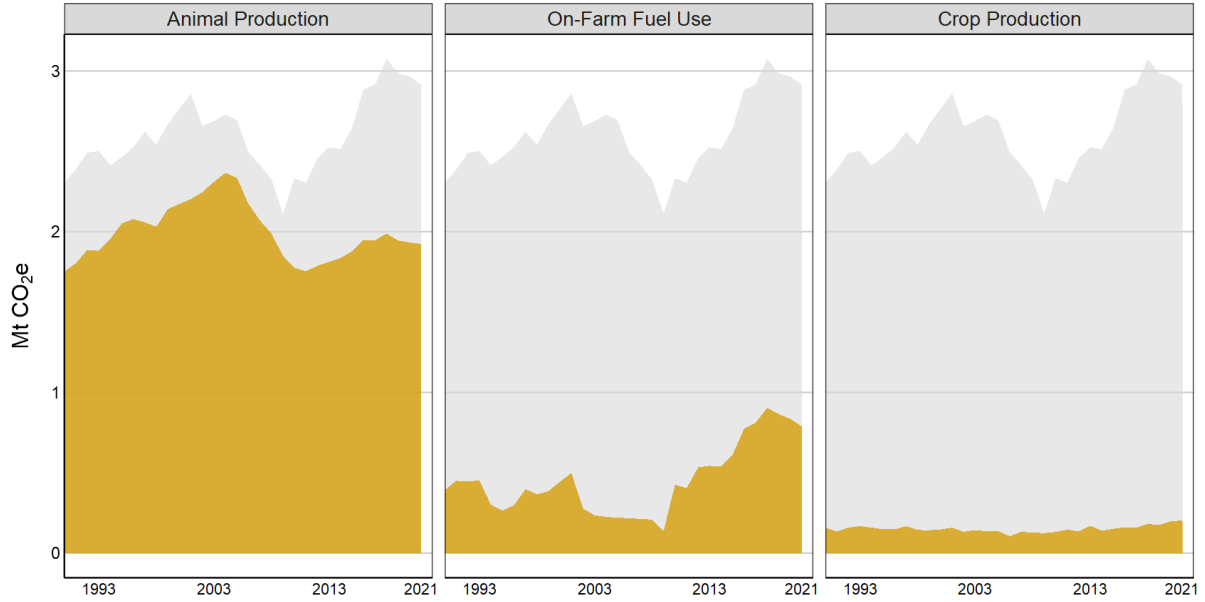
Heavy Industry Sector



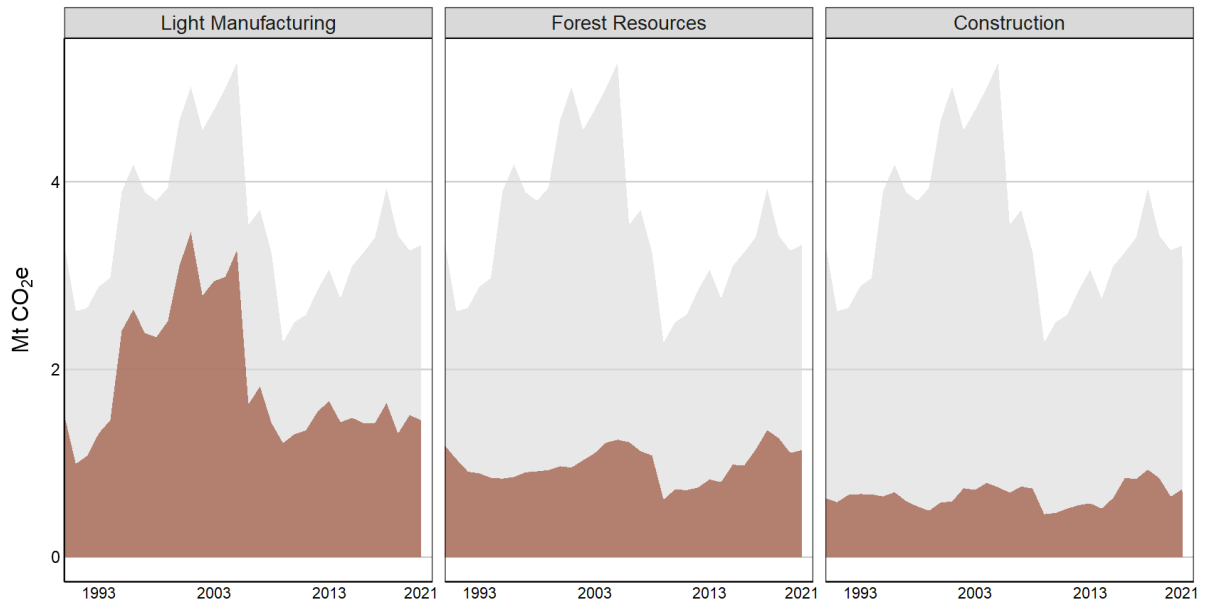
Waste Sector



Agriculture Sector



Light Industry Sector



Deforestation

