Chapter 13

New Zealand Country Report

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Chapter 13
New Zealand Country Report

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1. Background

New Zealand's population was about 5.1 million as of 31 December 2020 (Statistics New Zealand, 2021. Although the country has some light and heavy industry, foreign trade is heavily dependent on agriculture, tourism, forestry, and fishing. In 2020, nominal gross domestic product (GDP) was about US$180.7 billion or about US$35,400 per capita.[6]

The coronavirus disease (COVID-19) pandemic has significantly affected the economy, including transport and households. New Zealand has managed the COVID-19 outbreak with relative success, using measures such as immediate response to the outbreak and enforcement of a lockdown under alert level 4, border closure, and social distancing.

This chapter compares the COVID-19 and business-as-usual (BAU) scenarios, analysing the impacts of the pandemic on the energy outlook in 2020 and beyond.

However, because official energy statistics for 2020 were not yet available as of this writing, estimated energy consumption in 2020 was used.

2. Macro Assumptions of the COVID-19 Scenario

In the COVID-19 scenario, GDP decreases by 4.8% in 2020 (New Zealand Institute of Economic Research, 2020) (3.7% in BAU), then rebounds by 5.4% in 2021, 4.1% in 2022, and 3.0% in 2023 (IMF, 2020).

After 2023, the GDP growth rate in 2023–2030 is 2.0% per year (1.9% in BAU) and increases by 1.5% per year in 2030–2040 and 1.1% per year in 2040–2050 (Table 13.1).

Table 13.1. Assumptions of Gross Domestic Product Annual Growth Rates, Business-as-Usual vs. COVID-19 Scenarios, 2018–2050

	2018	2019	2020	2021	2022	2023	2023–2030	2030–2040	2040–2050
COVID-19	2.5%	2.2%	–4.8%	5.4%	4.1%	3.0%	2.0%	1.5%	1.1%
BAU	2.5%	2.2%	3.7%	2.8%	2.5%	2.5%	1.9%	1.5%	1.1%

BAU = business as usual, COVID-19 = coronavirus disease.
Sources: Authors, based on International Monetary Fund (2020) and New Zealand Institute of Economic Research (2020).

[6] All United States dollars are in constant 2010 values unless specified.

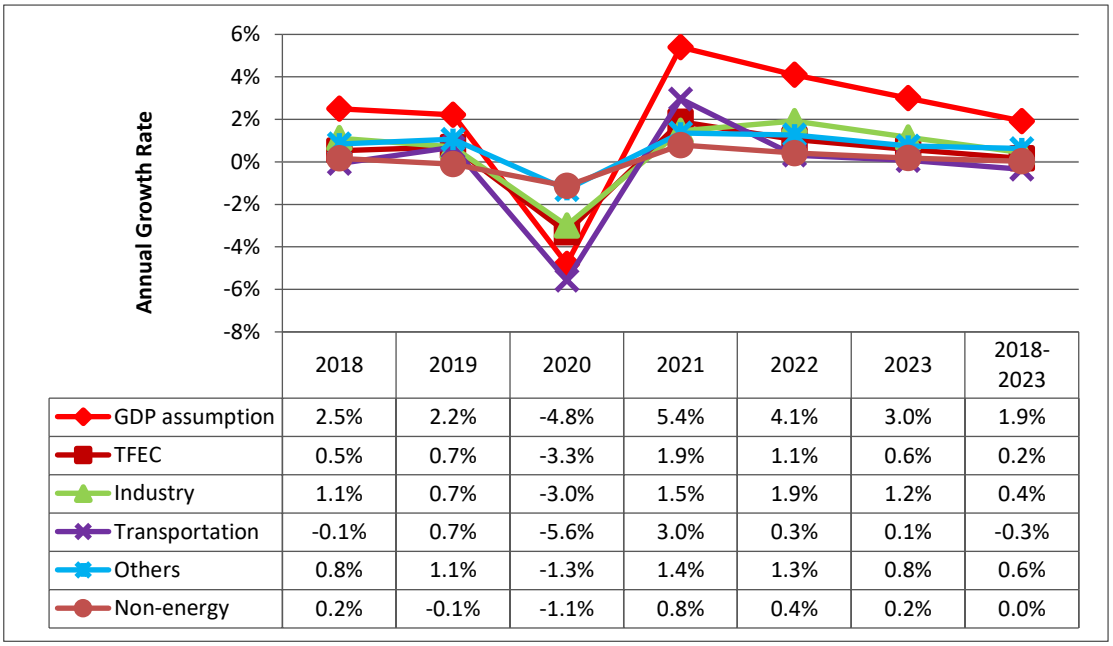
3. Short-term Impact (2018–2023)

3.1. Final Energy Consumption

In the COVID-19 scenario, total final energy consumption (TFEC) decreases by 3.3% in 2020, mainly because the lockdown under alert level 4 closed businesses and restricted travel. Transport energy consumption falls the most, by 5.6%, in 2020. Industry falls by 3.0%; agriculture, commercial, and residential ('others') sectors by 1.3%; and non-energy by 1.1% in 2020 (Figure 13.1).

In the COVID-19 scenario, the growth rate of TFEC bounces back to 1.9% in 2021, 1.1% in 2022, and 0.6% in 2023. In 2018–2023, TFEC grows by an average rate of 0.2% per year in 2018–2023 (0.6% in BAU).

Figure 13.1. Annual Growth Rate of Final Energy Consumption, by Sector, COVID-19 Scenario, 2018–2023

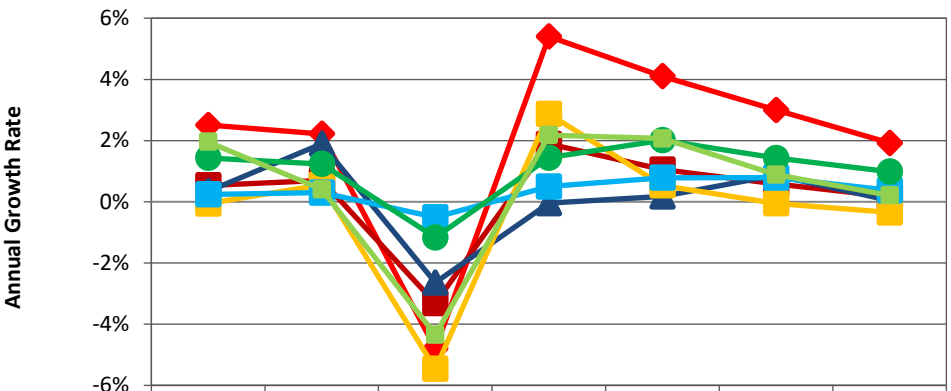


	2018	2019	2020	2021	2022	2023	2018-2023
GDP assumption	2.5%	2.2%	-4.8%	5.4%	4.1%	3.0%	1.9%
TFEC	0.5%	0.7%	-3.3%	1.9%	1.1%	0.6%	0.2%
Industry	1.1%	0.7%	-3.0%	1.5%	1.9%	1.2%	0.4%
Transportation	-0.1%	0.7%	-5.6%	3.0%	0.3%	0.1%	-0.3%
Others	0.8%	1.1%	-1.3%	1.4%	1.3%	0.8%	0.6%
Non-energy	0.2%	-0.1%	-1.1%	0.8%	0.4%	0.2%	0.0%

COVID-19 = coronavirus disease, GDP = gross domestic product, TFEC = total final energy consumption.
Source: Authors.

In the COVID-19 scenario, oil consumption falls by 5.5% in 2020 mainly because the lockdown under alert level 4 lowers transport energy demand. Light vehicle flows are lower than earlier in 2020. Other energy sources (heat, geothermal, solar, biogas, and woody biomass) decrease by 4.3% and coal consumption by 2.6% in 2020. Electricity consumption decreases by 1.2% and gas by 0.5% in 2020. Electricity and gas consumption do not decrease more than oil consumption because people stay home, using energy for cooking, lighting, and heating (Figure 13.2).

Figure 13.2. Annual Growth Rate of Final Energy Consumption, by Fuel, COVID-19 Scenario, 2018–2023



	2018	2019	2020	2021	2022	2023	2018-2023
GDP assumption	2.5%	2.2%	-4.8%	5.4%	4.1%	3.0%	1.9%
TFEC	0.5%	0.7%	-3.3%	1.9%	1.1%	0.6%	0.2%
Coal	0.3%	1.9%	-2.6%	0.0%	0.2%	0.9%	0.0%
Oil	-0.1%	0.6%	-5.5%	2.9%	0.5%	-0.1%	-0.3%
Natural gas	0.2%	0.3%	-0.5%	0.5%	0.8%	0.8%	0.4%
Electricity	1.4%	1.2%	-1.2%	1.4%	2.0%	1.4%	1.0%
Others	2.0%	0.4%	-4.3%	2.2%	2.1%	0.9%	0.2%

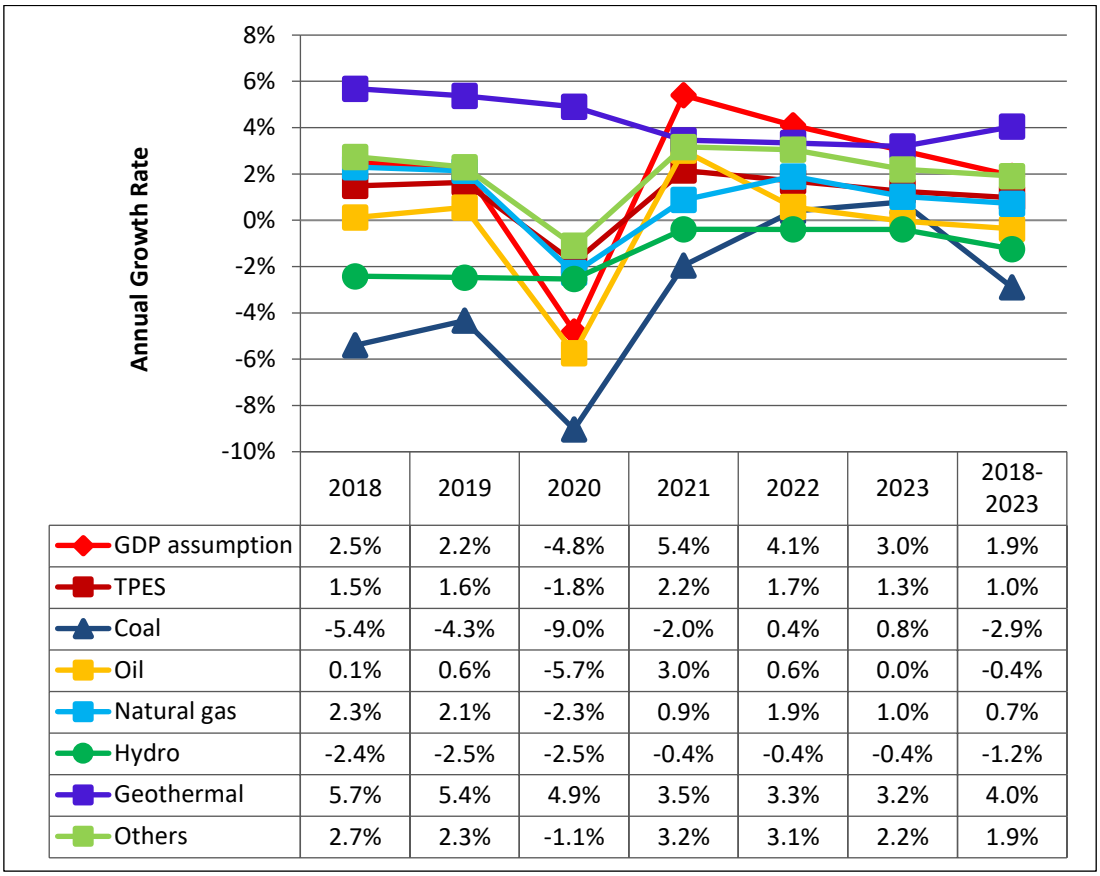
COVID-19 = coronavirus disease, GDP = gross domestic product, TFEC = total final energy consumption.
Source: Authors.

3.2. Primary Energy Supply

In the COVID-19 scenario, total primary energy supply (TPES) drops by 1.8% in 2020 (increases by 2.0% in BAU). Coal decreases the most, by 9.0% (5.7% in BAU). Oil decreases by 5.7% (increases by 0.3% in BAU), natural gas decreases by 2.3% (increases by 4.4% in BAU), hydro decreases by 2.5% (2.5% in BAU), and other primary energy sources (biomass, solar, wind, liquid biofuels) decrease by 1.1% (increase by 3.4% in BAU). In contrast, geothermal energy use for electricity generation is only slightly affected by the pandemic and grows by 4.9% in 2020 (5.1% in BAU) compared with 5.4% in 2019.

In 2018–2023, TPES in the COVID-19 scenario increases by an average of 1.0% per year. Coal decreases by an average of 2.9% per year and hydro by 1.2%, while geothermal energy use for electricity generation grows by 4.0% per year (Figure 13.3).

Figure 13.3. Annual Growth Rate of Primary Energy Supply, by Fuel, COVID-19 Scenario, 2018–2023



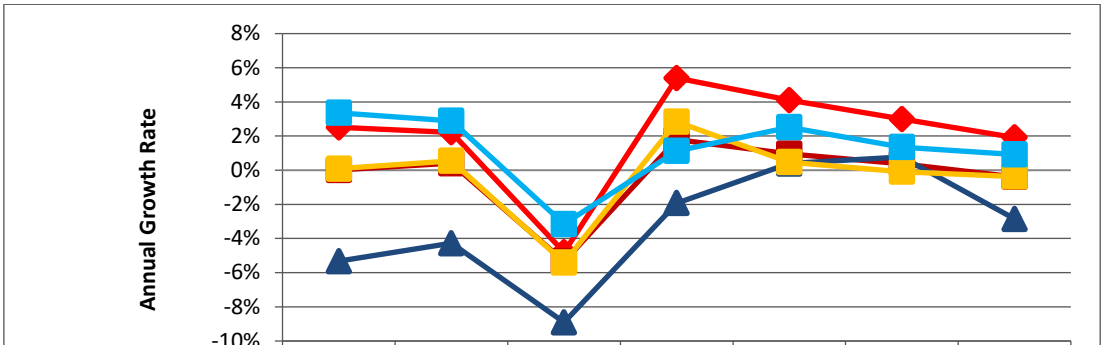
	2018	2019	2020	2021	2022	2023	2018-2023
GDP assumption	2.5%	2.2%	-4.8%	5.4%	4.1%	3.0%	1.9%
TPES	1.5%	1.6%	-1.8%	2.2%	1.7%	1.3%	1.0%
Coal	-5.4%	-4.3%	-9.0%	-2.0%	0.4%	0.8%	-2.9%
Oil	0.1%	0.6%	-5.7%	3.0%	0.6%	0.0%	-0.4%
Natural gas	2.3%	2.1%	-2.3%	0.9%	1.9%	1.0%	0.7%
Hydro	-2.4%	-2.5%	-2.5%	-0.4%	-0.4%	-0.4%	-1.2%
Geothermal	5.7%	5.4%	4.9%	3.5%	3.3%	3.2%	4.0%
Others	2.7%	2.3%	-1.1%	3.2%	3.1%	2.2%	1.9%

COVID-19 = coronavirus disease, GDP = gross domestic product, TPES = total primary energy supply.
Source: Authors.

3.3. CO_2 Emissions

In the COVID-19 scenario, CO_2 emissions decrease by 5.3% in 2020 (0.7% in BAU). Energy-related CO_2 emissions from coal decrease by 8.9%, from oil by 5.4%, and from natural gas by 3.2% in 2020. In 2018–2023, energy-related CO_2 emissions drop by an average of 0.4% per year (increase by 0.3% in BAU) reflecting the effects of the lockdown in March 2020 (Figure 13.4).

Figure 13.4. CO_2 Emissions, by Fuel, COVID-19 Scenario, 2018–2023



	2018	2019	2020	2021	2022	2023	2018-2023
GDP assumption	2.5%	2.2%	-4.8%	5.4%	4.1%	3.0%	1.9%
Total	0.0%	0.4%	-5.3%	1.8%	1.0%	0.4%	-0.4%
Coal	-5.3%	-4.3%	-8.9%	-1.9%	0.4%	0.8%	-2.9%
Oil	0.1%	0.5%	-5.4%	2.8%	0.5%	-0.1%	-0.4%
Natural gas	3.4%	2.9%	-3.2%	1.1%	2.5%	1.4%	0.9%

COVID-19 = coronavirus disease, GDP = gross domestic product.
Source: Authors.

4. Long-term Impact (2023–2050)

4.1. Final Energy Consumption

In the COVID-19 scenario, GDP grows by an average of 1.6% per year in 2017–2050 (1.7% in BAU). TFEC in both the COVID-19 and BAU scenarios decreases by an average of 0.3% per year in 2017–2050. In the COVID-19 scenario, GDP decreases by 3.6% and TFEC by 1.8% in 2050.

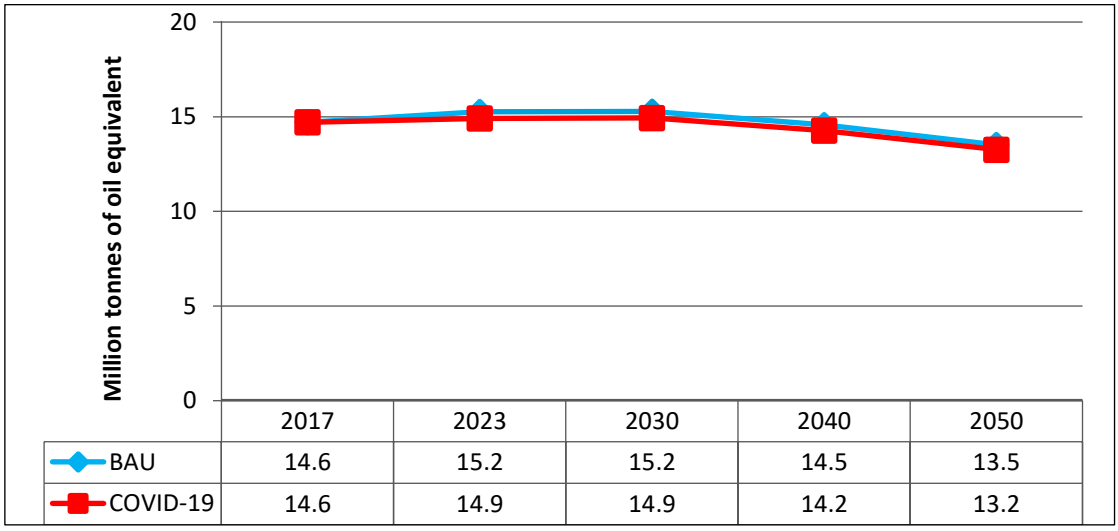
Table 13.2. Gross Domestic Product and Total Final Energy Consumption, Business-as-Usual vs. COVID-19 Scenarios, 2017–2050

		2017	2023	2030	2040	2050	AAGR (2017–2050)
GDP (constant US$ billion, 2010)	BAU	181.1	212.7	243.2	280.9	314.6	1.7%
	COVID-19	181.1	204.2	234.5	270.8	303.3	1.6%
	COVID-19 vs BAU	0.0%	–4.0%	–3.6%	–3.6%	–3.6%	
TFEC (Mtoe)	BAU	14.6	15.2	15.2	14.5	13.5	–0.3%
	COVID-19	14.6	14.9	14.9	14.2	13.2	–0.3%
	COVID-19 vs BAU	0.0%	–2.3%	–2.2%	–2.0%	–1.8%	

AAGR = average annual growth rate, BAU = business as usual, COVID-19 = coronavirus disease, GDP = gross domestic product, Mtoe = million tonnes of oil equivalent, TFEC = total final energy consumption.
Source: Authors.

TFEC remains lower in the COVID-19 scenario than in BAU through 2050, with a difference between the two scenarios of 2.3% by 2023, 2.2% by 2030, 2.0% by 2040, and 1.8% by 2050 (Table 13.2, Figure 13.5). TFEC in the COVID-19 scenario does not bounce back to the same level as BAU by 2050 because the COVID-19 outbreak reduces demand for final energy consumption.

Figure 13.5. Total Final Energy Consumption, Business-as-Usual vs. COVID-19 Scenarios, 2017–2050



	2017	2023	2030	2040	2050
BAU	14.6	15.2	15.2	14.5	13.5
COVID-19	14.6	14.9	14.9	14.2	13.2

BAU = business as usual, COVID-19 = coronavirus disease.
Source: Authors.

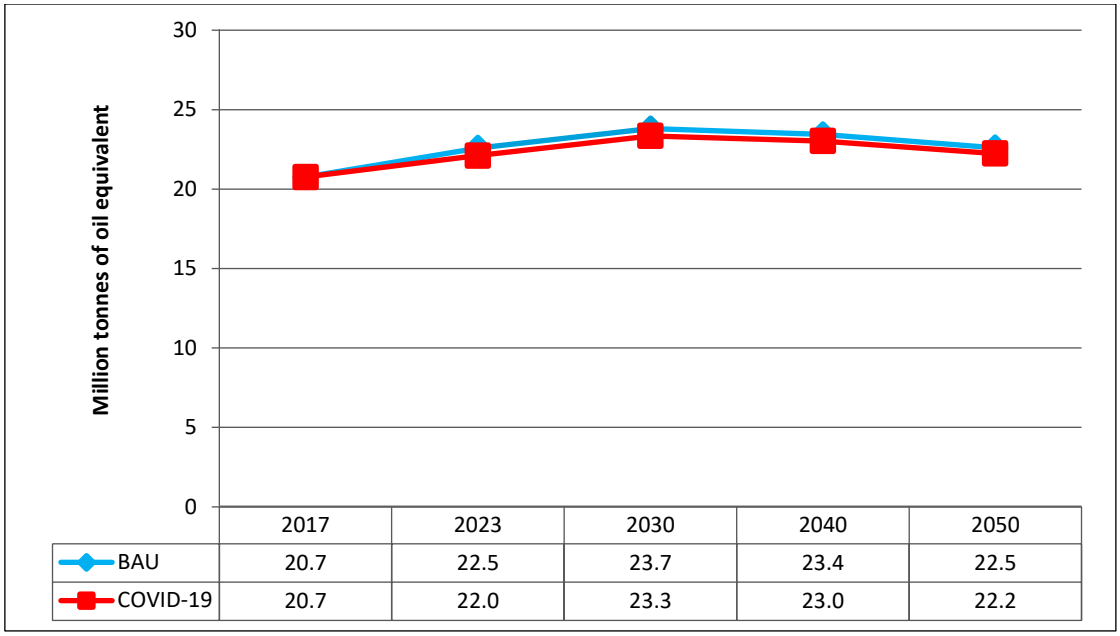
4.2. Primary Energy Supply

In the COVID-19 scenario, TPES increases by an average of 0.2% per year in 2017–2050 (0.3% in BAU). The pace of TPES growth is only slightly affected by the pandemic, but in absolute terms the cumulative impact is moderately larger.

TPES in the COVID-19 scenario is 2.1% less than in BAU in 2023, and while the gap narrows, it does not close through 2050: 2.0% in 2030, 1.8% in 2040, and 1.6% in 2050 (Figure 13.6).

In the COVID-19 scenario, natural gas decreases by 5.0%, oil by 1.9%, other primary energy sources (biomass, solar, wind, liquid biofuels, biogas) by 1.6%, coal by 0.5%, and geothermal by 0.1% in 2050 compared with BAU.

Figure 13.6. Total Primary Energy Supply, Business-as-Usual vs. COVID-19 Scenarios, 2017–2050



	2017	2023	2030	2040	2050
BAU	20.7	22.5	23.7	23.4	22.5
COVID-19	20.7	22.0	23.3	23.0	22.2

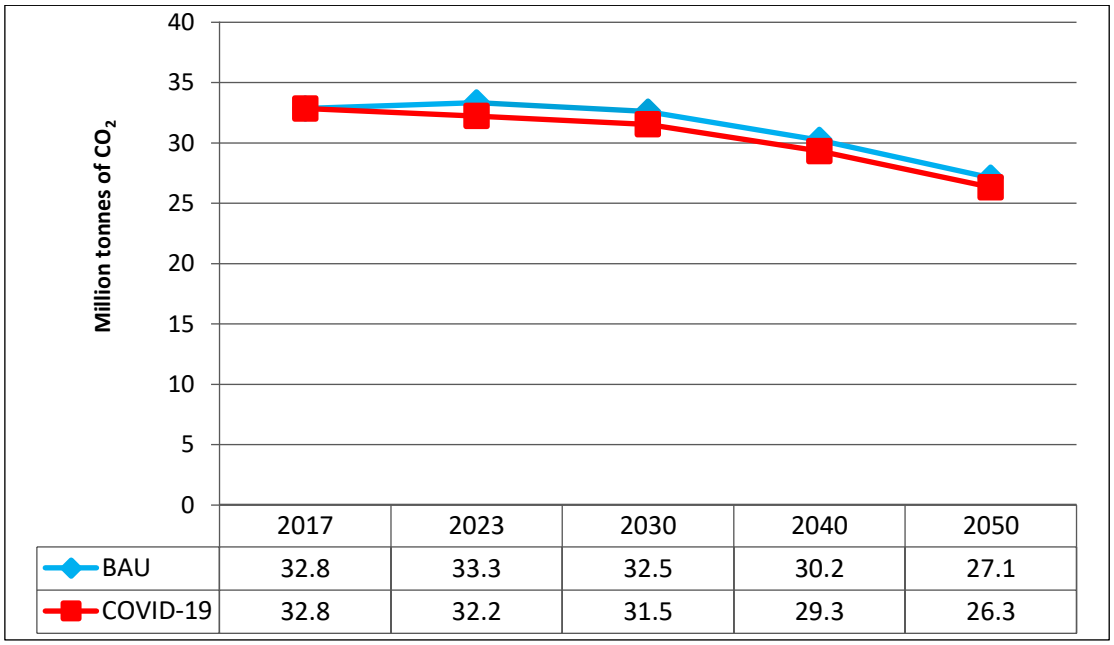
BAU = business as usual, COVID-19 = coronavirus disease.
Source: Authors.

4.4. CO_2 Emissions

In the COVID-19 scenario, energy-related CO_2 emissions decrease by an average of 0.7% per year in 2017–2050 (0.6% in BAU) (Figure 13.7).

Energy-related CO_2 emissions from oil reduce by 0.9% per year in 2017–2050 in both BAU and COVID-19 scenarios. Emissions from coal decline by 0.8% per year in BAU and by 0.9% in the COVID scenario.

Figure 13.7. Total CO_2 Emissions, Business-as-Usual vs. COVID-19 Scenarios, 2017–2050



	2017	2023	2030	2040	2050
BAU	32.8	33.3	32.5	30.2	27.1
COVID-19	32.8	32.2	31.5	29.3	26.3

BAU = business as usual, COVID-19 = coronavirus disease.
Source: Authors.

5. Implications and Policy Recommendations

In 2011, New Zealand set an ambitious goal to generate 90% of its electricity from renewable sources by 2025 and to reduce greenhouse gas emissions by 30% in 2005–2030 and by 50% in 1990–2050. The New Zealand Energy Efficiency and Conservation Strategy 2017–2022, titled 'Unlocking Our Energy Productivity and Renewable Potential' (June 2017) aims to turn the country into an energy-productive and low-emission economy by encouraging businesses, individuals, and public sector agencies to help unlock renewable energy, energy efficiency, and productivity potential.

The strategy has three priority areas:

(i) renewable and efficient use of process heat,[7]
(ii) efficient and low-emission transport, and
(iii) innovative and efficient use of electricity.

It has targets for promoting renewable energy and reducing greenhouse gas emissions.

By December 2020, New Zealand was generating about 84% of its electricity from renewable sources (Ministry of Business, Innovation and Employment, Markets Team, Evidence and Insights Branch (2021), *Energy in New Zealand*, New Zealand (2021).

In the COVID-19 scenario, energy consumption is 4.3% lower than in BAU in 2020, a result that should be compared with actual energy consumption after the release of official energy statistics.

[7] Energy used as heat in industry and commerce.

In 2020, GDP growth rate in the COVID-19 scenario declines by 4.8% (increases by 3.7% in BAU) (The New Zealand Institute of Economic Research, <2020 then TFEC declines by 3.3%.

In the long term, TFEC is slightly lower in the COVID-19 scenario than in BAU in 2050 but almost at the same level in BAU in 2000. In the COVID-19 scenario, GDP grows by 1.6% per year in 2017–2050 (1.7% in BAU).

In the COVID-19 scenario, New Zealand significantly reduces energy-related CO_2 emissions by 19.9% in 2017–2050 (17.5% in BAU).

Energy-related CO_2 emissions decline because of less fuel consumption for transport and process heat resulting from travel restrictions and working from home during the COVID-19 outbreak in 2020; the shift to more energy-efficient vehicles, particularly electric vehicles; the switch from thermal generation to renewable energy in electricity generation; and the use of efficient appliances.

Transport and process heat account for the largest energy use and carbon savings; 51% of energy-related emissions come from transport (The Energy Efficiency and Conservation Authority New Zealand Annual Report, For the Year ended June 2021) and 40% from business, mainly the burning of fossil fuels for process heat.

The government has committed to reaching net-zero emissions of long-lived gases by 2050 and to reducing biogenic (plant and animal) methane emissions by 24%–47% by 2050. In January 2021, the Climate Change Commission (2021) provided the first draft advice to government and set out the direction of policy to meet the targets. The commission delivered the finalised advice to the minister of climate change and then tabled it in Parliament in June 2021. In 2022, Climate Change Commission has received additional funding to help the Government to make sound decisions on how Aotearoa New Zealand can meet its emissions reductions targets and adapt to the impacts of climate change.

References

The historical energy data (except for estimated 2020 energy consumption) was sourced from Ministry of Business, Innovation and Employment, Markets Team, Evidence and Insights Branch (2021), *Energy in New Zealand*.

Climate Change Commission (2021), *Ināia Tonu Nei: A Low Emissions Future for Aotearoa.* Wellington. https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/inaia-tonu-nei-a-low-emissions-future-for-aotearoa/.

Climate Change Commission (2022), *New Funding Will Support Our Mahi*. Wellington. https://www.climatecommission.govt.nz/news/new-funding-will-support-our-mahi/.

International Monetary Fund (2020), *World Economic Outlook, October 2020: A Long and Difficult Ascent*. Washington, DC. https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020.

Ministry of Business, Innovation and Employment and the Energy Efficiency and Conservation Authority New Zealand (2017), *Energy Efficiency and Conservation Strategy (2017–2022), Unlocking Our Energy Productivity and Renewable Potential*.

Ministry of Business, Innovation and Employment, Markets Team, Evidence and Insights Branch (2021), *Energy in New Zealand*, New Zealand, 2021.

Ministry of Business, Innovation and Employment, Markets Team, Evidence and Insights Branch (2021 *Quarterly Electricity Generation and Consumption*. <

New Zealand Institute of Economic Research (2020), Consensus Forecasts. Media release. 14 December.

Statistics New Zealand (2021), Population, New Zealand. https://www.stats.govt.nz/topics/population/.

The Energy Efficiency and Conservation Authority New Zealand (2022), *Statement of Performance Expectations, 1 July 2021–30 June 2022*.