GHG emissions six-year summary report

Final v1

Te Kaunihera-ā-Rohe o Taratahi
CARTERTON DISTRICT COUNCIL

Contents

Executive summary

Carterton District Council's (CDC's) annual net emissions remain negative (a good thing) but we have not made much impact on reducing our gross emissions (the amount of greenhouse gas (GHG) emissions we produce) since we started emissions reporting in 2018.

We also need to consider what the impact from the harvesting of CDC's forest from 2032 onwards will have.

Key findings on our gross emissions are:

- Wastewater accounts for the greatest proportion of CDC's gross emissions and was over 80% of gross emissions in the 2023 GHG emissions report. The wastewater network is sensitive to rain entering it (pipes are not pressurised like the drinking water network), and this gets reflected in our wastewater volumes, showing a marked increase in 2022 which was a particularly wet year.
- Leaving wastewater emissions aside, our gross emissions have been at a fairly constant level over the six-year period, though costs have risen. We experienced a dip in non-wastewater emissions over 2020 and 2021 which coincided with Covid 19 disruptions across the country

CDC's emissions inventory figures are carbon negative due to sequestration of carbon in growing trees in our Kaipaitangata forest in the Western ranges.

Key findings on sequestration are:

- If CDC continues with its harvesting plans, and we continue at the same level of Gross emissions, then we move from being carbon negative, to carbon positive from 2032.
    - Once trees in our forest reach a certain age, we can no longer count additional growth in our emissions inventories. For pines this is 23 years. The first of our growing pine stands was planted in 2004 and will be 23 years old in 2027 when we will no longer be able to count the sequestration from that stand.
    - When trees are harvested we also need to account for the change in sequestered carbon as it harvesting is the removal of a quantity of sequestered carbon. The removal of grown pine is much higher than we can offset with the remaining growing pine.
    - Even if the forest is not harvested, we will become emissions positive from 2036 at the current rate of gross emissions.

What is this report?

This report is an analysis and synthesis of six years (2018 to 2023 inclusive) of CDC GHG emissions reporting. It is put together to understand our emissions and any reductions in emissions over the 6-year period. It also looks ahead to what options we could consider for the future, and makes recommendations on what changes we could make – both to future emissions reporting, and CDC's emissions reduction efforts.

CDC is expected to contribute to the goal of net-zero New Zealand greenhouse gas emissions (other than biogenic methane) by 2050, have regard to the New Zealand Emissions Reduction Plan, and the Regional Emissions Reduction Plan. Under the Local Government Leaders Climate Change Declaration, Council committed to 'Develop and implement plans to reduce emissions'. Credible emissions measurement is needed to understand the Council's emissions[1].

CDC has been undertaking greenhouse gas (GHG) emissions inventories and reports since 2018, which is the base year for comparison and analysis. Our inventories are developed to meet the ISO 14064-1 international standard for GHG quantification and reporting, and use emissions factors supplied by the Ministry for the Environment (MfE) to calculate our GHG emissions based on the volumes of different emissions or sequestration sources we use in the year. These emissions factors (from MfE) can change year to year as more understanding of greenhouse gasses is known, or if in certain years electricity generation in New Zealand uses more or less fossil fuels than previously.

Context

CDC uses calendar years for its emissions measurement.

For context:

- the estimated resident population of the Carterton district grew from 9,510 in 2018, to 10,250 in 2023 (Stats NZ data).
- The number of Full-Time-Equivalents (FTEs) employed by CDC grew from 59.8 in 2018 to 82.3 in 2023.
- The reporting period encompasses the disruptions from Covid 19 in 2020 and 2021.

[1] CDC Climate Change Implementation Plan 2025/26

There are a few terms used in relation to emissions measurement which are useful to understand.

GHG emissions inventories and reports

An inventory is the spreadsheet of the GHG sources and removals, with the documentation of volumes, and calculations of the emissions using the MfE emissions factors.

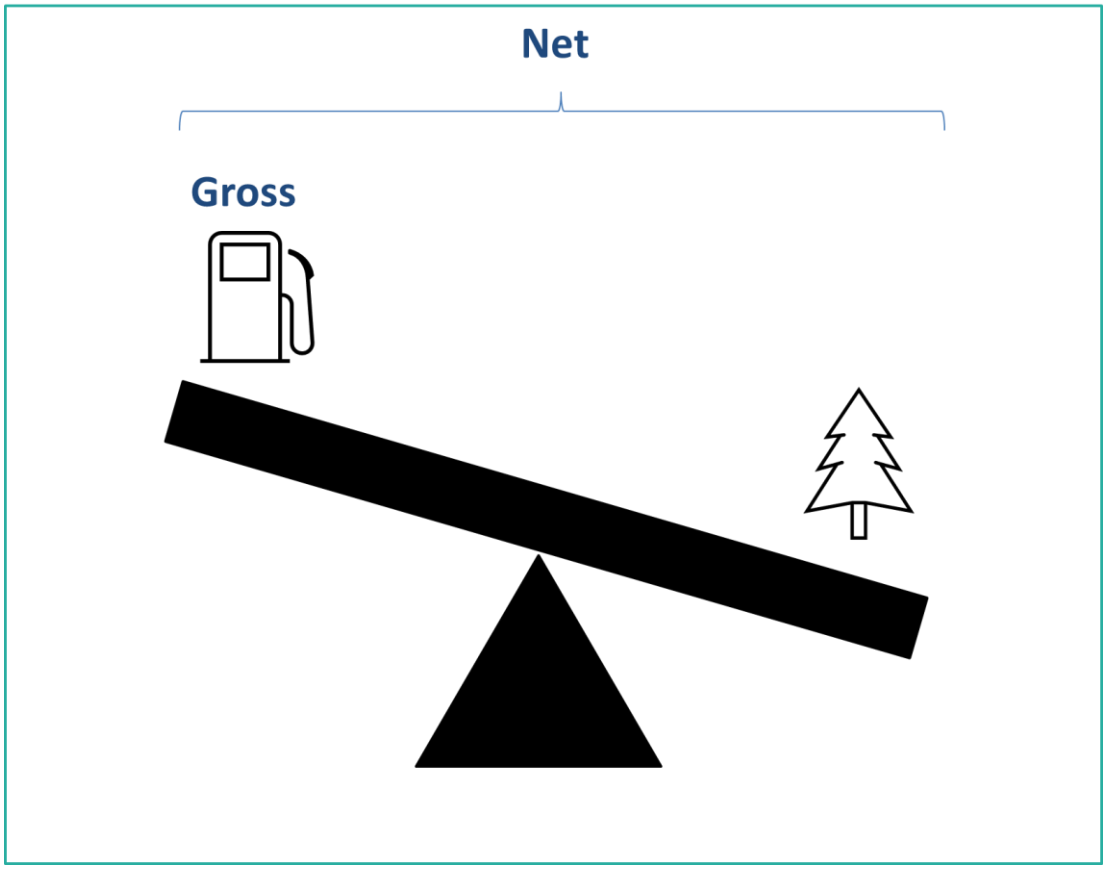
A report is the presentation of the inventory findings in a format that the audience can (hopefully) understand.

Gross and Net emissions

Gross emissions are the quantity of greenhouse gas emissions created by CDC in a year as it goes about its operations. It does not include any GHG removals/offsets such as forestry.

Net emissions are the gross emissions created by CDC in a year, less any emissions removals/offsets such as trees growing in our forest (the forest is a carbon sink).

DIAGRAM 1: GROSS VS. NET EMISSIONS



What we aren't counting but should.

There are two different approaches that organisations can count emissions under the ISO standard:

1. Control: the organization accounts for all GHG emissions and/or removals from facilities over which it has financial or operational control;
2. Equity share: the organization accounts for its portion of GHG emissions and or/removals from respective facilities

CDC has used the first approach consistently since 2018, as do other councils in the Wellington region.

However, there are some things that we haven't been counting, and we should be such as:

- Hotel accommodation used on work trips
- Vehicle milage in private vehicles
- Regenerating native forest in blocks of 1ha or larger
- Electricity generated and returned to our supplier

What we could give greater visibility of.

Although it is not required using the 'Control' approach, we could give greater visibility in our reporting to:

- Key suppliers emissions profiles (e.g. our energy suppliers Mercury and Meridian source electricity from 100% renewable sources)
- Our waste minimisation efforts in diverting volumes from landfill (e.g. recycling)
- Our carbon sinks: mature forest, their scale and location

Recommendations:

1. We continue to use the 'Control' approach to our emissions reporting
   yes/no
2. We include the things we haven't been counting that we should
   yes/no
3. We enhance our reporting with greater visibility of relevant climate and emissions information
   yes/no

Emissions over the past six years

Net emissions remain negative (that's a good thing) but gross emissions, the amount of GHG emissions we produce, has been increasing slightly. The main increase is in wastewater treatment volumes. Wastewater is the highest GHG emitting area of CDC operations by far.

DIAGRAM 2: GROSS AND NET EMISSIONS BY YEAR (IN TONNES OF CARBON DIOXIDE EQUIVALENT)

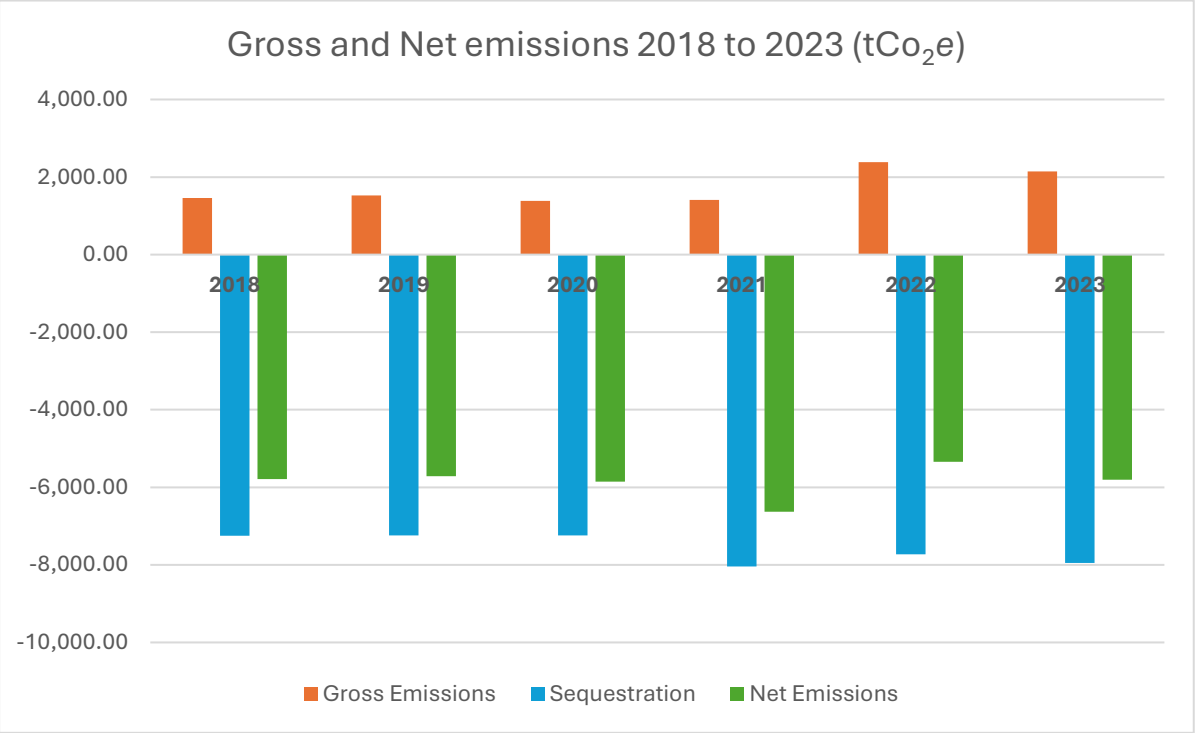


TABLE 1: GROSS AND NET EMISSIONS BY YEAR

	2018	2019	2020	2021	2022	2023
Gross Emissions	1,462.27	1,521.78	1,382.82	1,407.29	2,385.62	2,147.18
Sequestration	-7,249.14	-7,237.39	-7,237.39	-8,039.83	-7,729.08	-7,949.80
Net Emissions	-5,786.88	-5,715.61	-5,854.57	-6,632.54	-5,343.46	-5,802.62

Note that the 2022 and 2023 figures do not yet include refrigerants. They have no impact on this analysis as they round to 0% in all previous years gross emissions.

Diagram 3: Annual emissions by source (in tonnes of carbon dioxide equivalent)

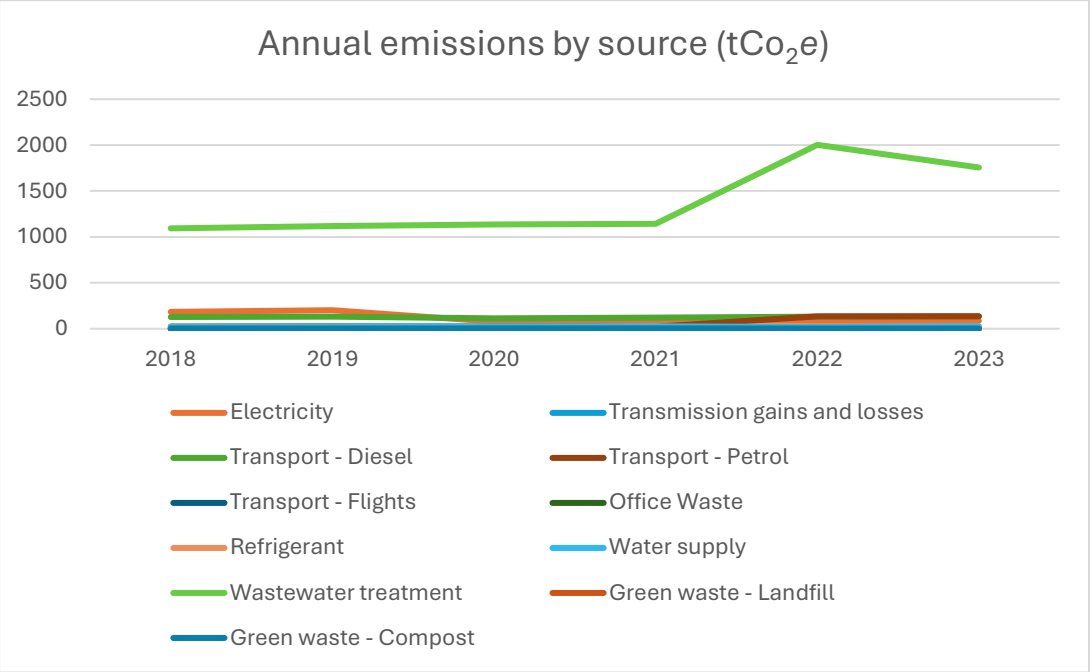


Table 2: Annual emissions by source (in tonnes of carbon dioxide equivalent)

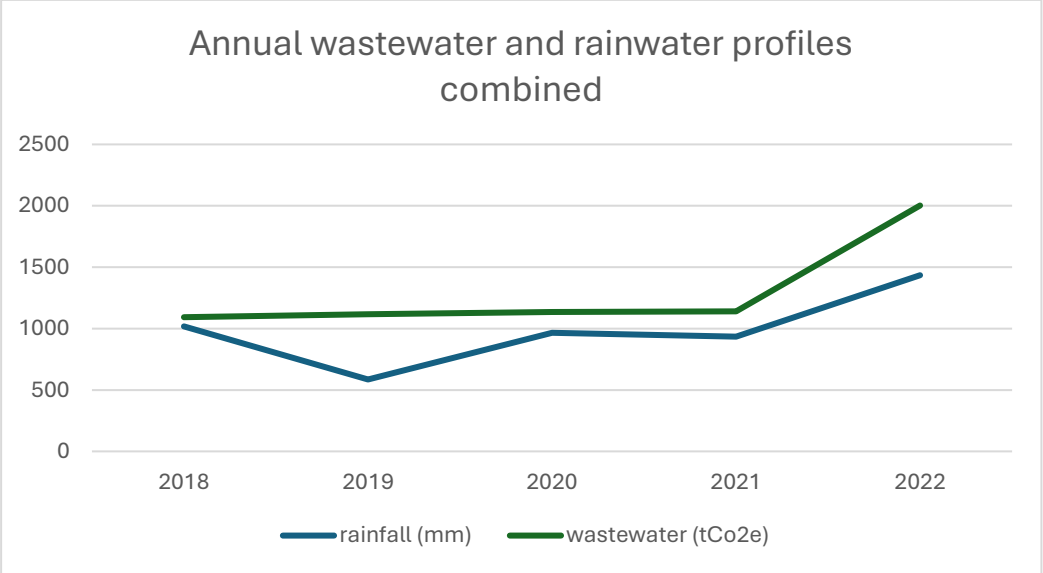
	2018	2019	2020	2021	2022	2023
Electricity	182.24	201.37	76.41	88.97	87.01	85.78
Transmission gains and losses	13.8	17.27	6.55	8.08	10.08	6.27
Transport - Diesel	127.25	130.47	113.02	119.19	131.01	135.64
Transport - Petrol	21.87	27.27	23.86	21.75	133.28	135.08
Transport - Flights	0.6	0.75	0.83	0.87	1.59	1.17
Office Waste	0.48	0.61	0.78	0.95	1.07	0.37
Refrigerant	0	0	0	0	0	0
Water supply	21.64	24.97	25.55	25.71	18.28	27.41
Wastewater treatment	1,092.83	1,117.08	1,134.95	1,140.91	2002.42	1754.59
Green waste - Landfill	1.55	1.99	0	0	0	0
Green waste - Compost	0	0	0.86	0.86	0.88	0.88
Gross Emissions	**1,462.27**	**1,521.78**	**1,382.82**	**1,407.29**	**2385.62**	**2147.18**
Sequestration	-7,249.14	-7,237.39	-7,237.39	-8,039.83	-7,729.08	**-7949.8**
Net Emissions	**-5,786.88**	**-5,715.61**	**-5,854.57**	**-6,632.54**	**-5,343.46**	**-5,802.62**

Our wastewater network is sensitive to rain entering it (pipes are not pressurised like our drinking water pipes), and this gets reflected in our wastewater volumes. The big spike in wastewater volumes in 2022 coincided with the wettest year recorded in the available records (beginning in 1960, recorded at Masterton). Annual rain records for 2023 are not yet available through the same data source. NIWA's climate projections for the region is for less rainfall in the medium and long

term than currently. CDC continues its programme of pipe replacement and management.

We can refine the way we account for wastewater emissions going forward that could bring the figures down a little, and account for sludge removal (in 2025).

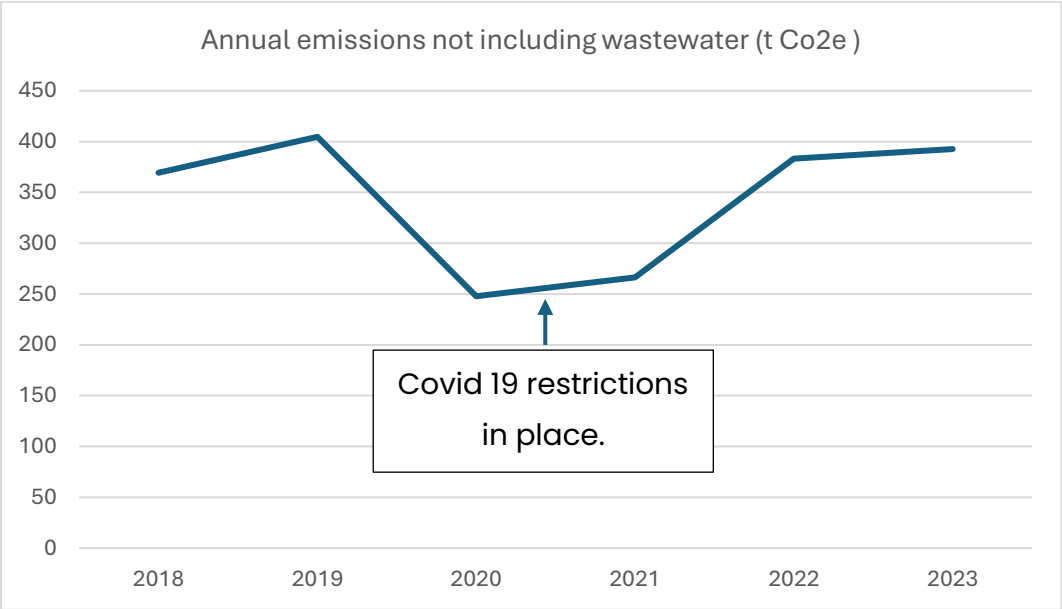
DIAGRAM 4: WASTEWATER AND RAINFALL PROFILES BY YEAR



It is likely that Carterton's water operations will become part of a separate, jointly owned company under *Local Water Done Well* arrangements. If this occurs, we would no longer count water emissions in our inventories and reports, as water would then be outside CDC's direct 'Control' for reporting purposes. It could be reported for greater visibility as suggested in recommendation 3.

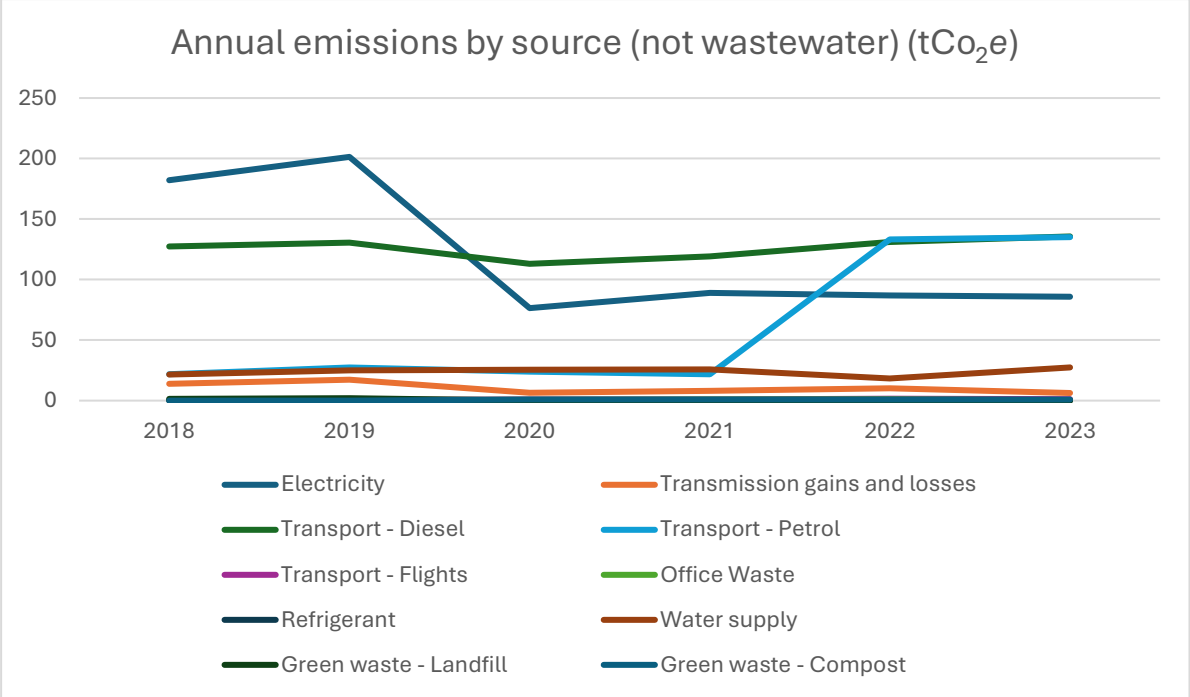
Even without taking wastewater into account, our emissions have been at a fairly constant level over the six year period. We experienced a dip in non-wastewater emissions over 2020 and 2021 which coincided with Covid 19 disruptions across the country

DIAGRAM 5: COMBINED ANNUAL EMISSIONS NOT INCLUDING WASTEWATER (IN TONNES OF CARBON DIOXIDE EQUIVALENT)



Electricity usage has dropped over the 2018 to 2023 period, and petrol use took a big upswing following the Covid 19 restrictions being eased (and more accurate fuel reporting). Although only small in relation to CDC's emissions, we should note the change in treatment of green waste from the Parks and Reserves team. It is now being diverted from the landfill and being composted.

DIAGRAM 6: ANNUAL EMISSIONS BY SOURCE NOT INCLUDING WASTEWATER

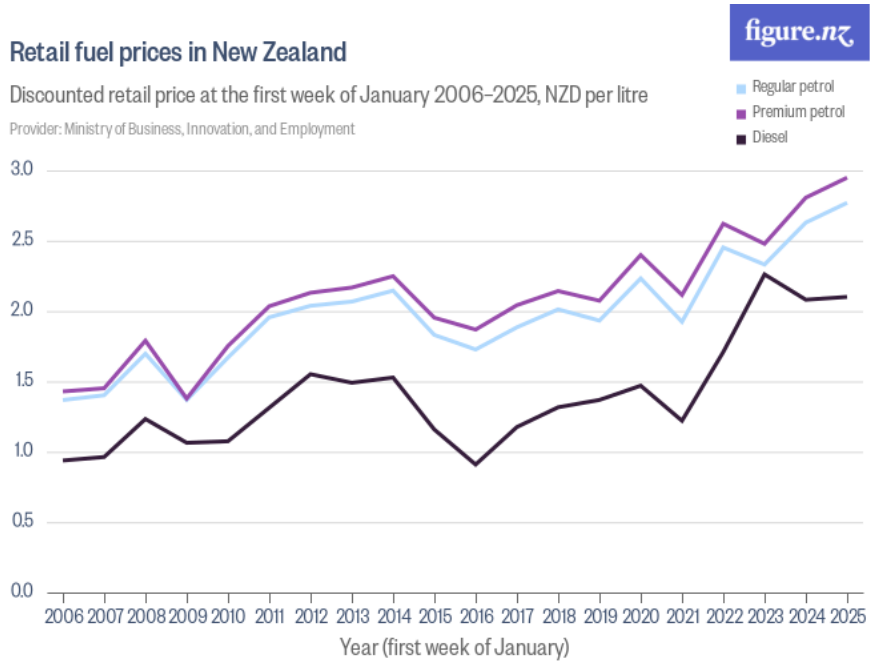


Although our overall emissions are about the same level as they were at the start and end of the analysis period, casting a cost lens over our energy use over the same period gives us another perspective (and incentive for lowering our carbon footprint).

Rising costs

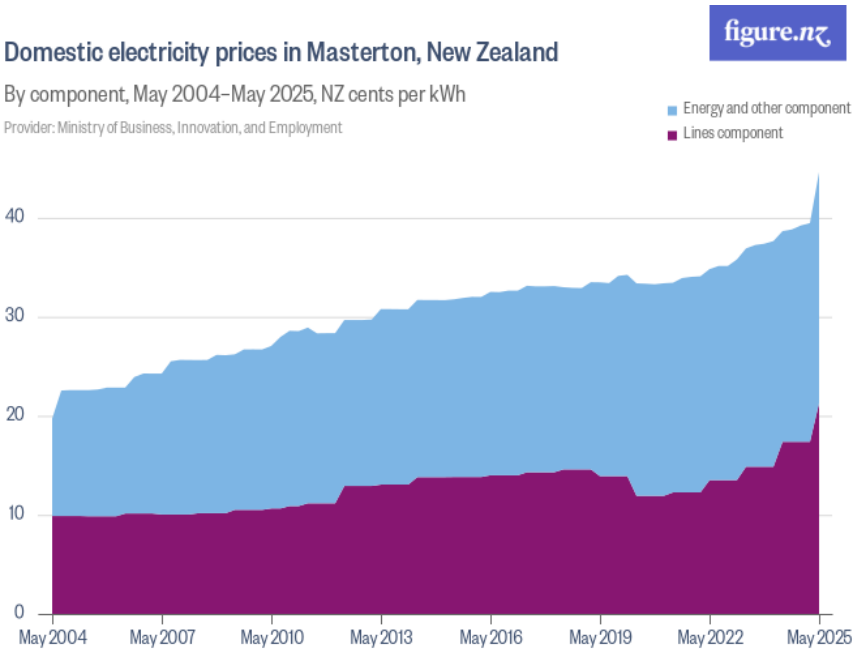
Fuel prices rose considerably between 2018 and 2023, with diesel making a huge leap from $1.37/L in 2018 to $2.26/L in 2023. Our fuel usage also rose over this period. Based on these per litre figures, our fuel cost rose from just under $82,000 in 2018, to over $121,000 in 2023.

DIAGRAM 7: RETAIL FUEL PRICES IN NZ (SOURCE: FIGURE.NZ)



Similarly, the retail cost of electricity has also been rising over the same period, as a commercial user, our cost was less than the chart below indicates, but still rose over the period. Our electricity use reduced over the period.

DIAGRAM 8: RETAIL ELECTRICITY PRICES IN NZ (SOURCE: FIGURE.NZ)



***Recommendations*:**

4. We develop a longer term climate adaption plan (including our approach to emissions reduction) in the coming triennium , to deliberately manage a reduction in CDC generated emissions~~;~~ as opportunities arise over a longer timeframe (e.g. 15 to 20 years). Yes/no

Sequestration – looking forward

The reason CDC's emissions inventory figures are carbon negative is due to sequestration of carbon in growing trees in our Kaipaitangata forest in the Western ranges.

As at June 30 2024 this forest contains:

- 210.2 ha of growing pine
- 2.1 ha of growing cypress
- 24.5 ha of growing manuka
- 24.9 ha of older pine planted between 1973 and 1981 – no longer considered a "growing tree" for emissions counting purposes

We count the annual growth of the growing trees at different factor rates (using the MfE emissions factors) depending on the variety. Pine factors are much higher than manuka due to the trees being larger and faster growing.

Once trees reach a certain age, we can no longer count additional growth in our emissions inventories. For pines this is 23 years, and cypress is 29 years (they haven't yet set a limit for the Manuka, which is considered "natural forest"). We don't count the 24.9 ha of older pine as this is all over 23 years old (but it is a carbon sink and we'd need to account for it if we felled it).

The first of our growing pine stands was planted in 2004 and will be 23 years old in 2027, when we will no longer be able to count its sequestration. All our growing pine will reach 23 years old by 2036. At that date we will only be able to count our Manuka stands for sequestration. Our current CDC Gross emissions are greater than the sequestration from the Manuka in our forest.

When trees are harvested we also need to account for the change in sequestered carbon as harvesting is the removal of a quantity of sequestered carbon. The 210.2 ha of growing pine and the 2.1 ha of growing cypress are planned to be harvested from 2032, and all these trees harvested by the end of 2040.

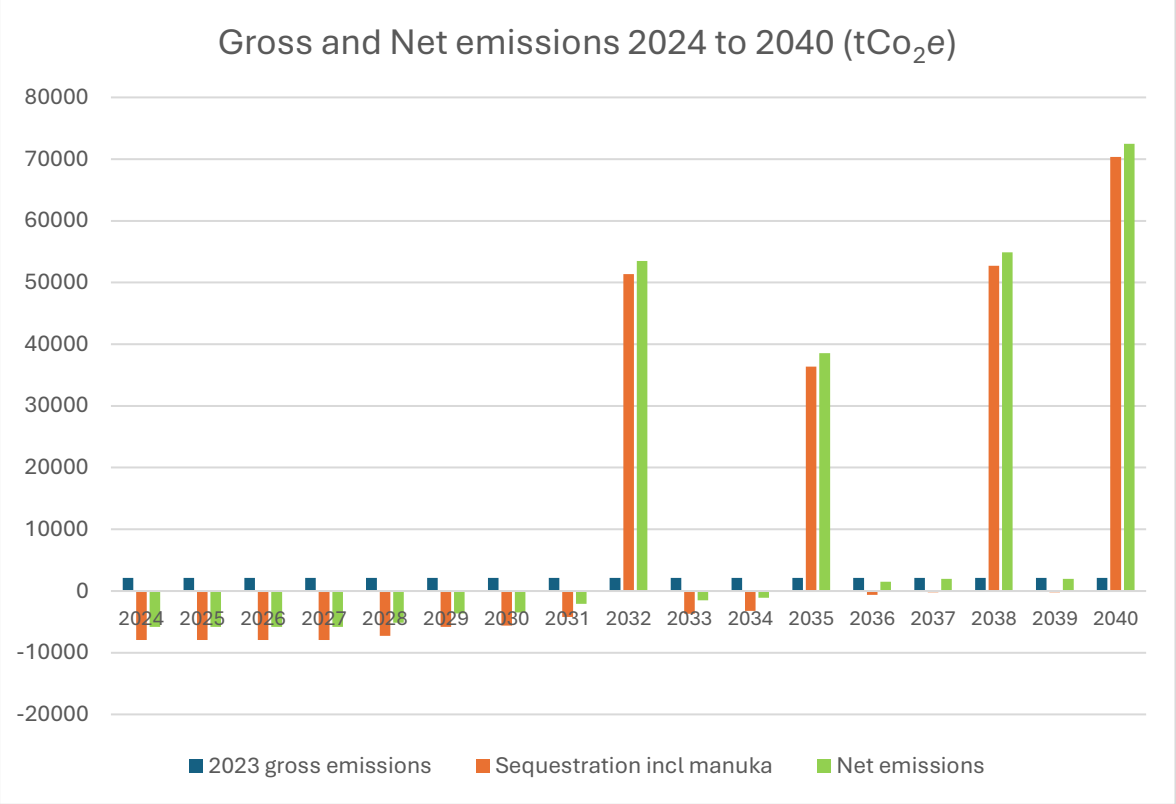
In the annual emissions inventories the removal emissions (the estimated amount of sequestered carbon) are listed as liabilities due to them needed to be accounted for if the trees were removed (or the forest destroyed).

This means that if we continue with our harvesting plans, and CDC continue at the same level of Gross emissions, then we move from being carbon negative, to carbon positive from 2032.

In 2024, the dollar value of the forest when harvested was estimated at just over one million dollars (no value has been put on the manuka).

CDC also holds Emission Trading Scheme (ETS) units relating to the 24.9 ha of older pine. These are treated in the annual report as zero value, and they would need to be surrendered if we ever chose to harvest the older forest (or if it burnt down).

DIAGRAM 9: FORECAST GROSS AND NET EMISSIONS 2024 TO 2040



Harvests are planned to occur in the 2032, 2035, 2038, and 2040 years

TABLE 3: GROSS AND NET EMISSIONS 2024 TO 2040

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2023 gross emissions	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18	2147.18
Sequestration incl manuka	-7944.21	-7944.21	-7944.21	-7944.21	-7271.41	-5790.53	-5615.02	-4225.55	51368.52	-3666.10	-3219.26	36389.03	-630.46	-195.34	52736.77	-195.34	70346.68
Net emissions	-5797.03	-5797.03	-5797.03	-5797.03	-5124.23	-3643.35	-3467.84	-2078.37	53515.70	-1518.92	-1072.08	38536.21	1516.72	1951.84	54883.95	1951.84	72493.86

CDC has a number of options, though most mean there will be some years where we are carbon positive. Options include:

1. Continuing with the forest harvesting, and
    a. Replanting in Pine
    b. Replanting, non-commercial forest (or natural regeneration)
    c. Not replanting (as shown in the table above)
2. Not harvesting the forest

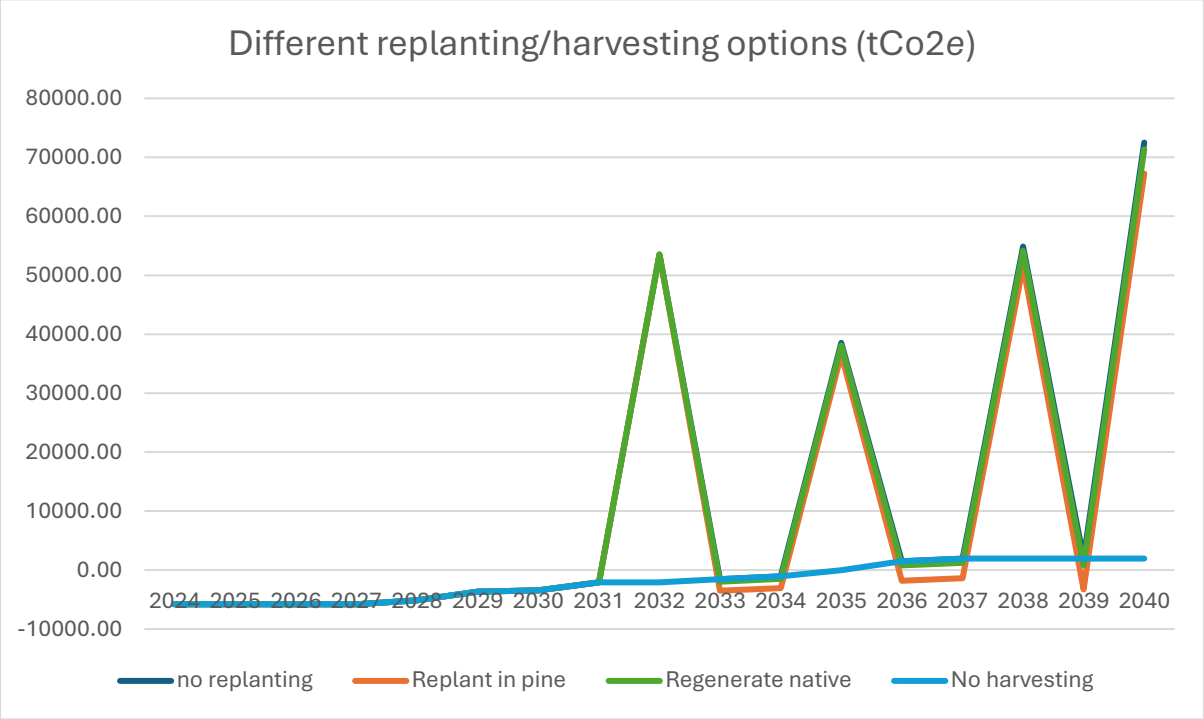
There is also a third option of Council divesting itself of the forest that is not shown here, but it may need to be considered under the proposed central Government's 'Local Government System Improvement' work.

TABLE 4: REPLANTING OPTIONS

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
no replanting	-5797.03	-5797.03	-5797.03	-5797.03	-5124.23	-3643.35	-3467.84	-2078.37	53515.70	-1518.92	-1072.08	38536.21	1516.72	1951.84	54883.95	1951.84	72493.86
Replant in pine	-5797.03	-5797.03	-5797.03	-5797.03	-5124.23	-3643.35	-3467.84	-2078.37	53515.70	-3504.43	-3057.59	36550.70	-1832.68	-1397.55	51534.56	-3287.98	67254.04
Regenerate native	-5797.03	-5797.03	-5797.03	-5797.03	-5124.23	-3643.35	-3467.84	-2078.37	53515.70	-1951.86	-1505.02	38103.27	786.39	1221.51	54153.63	809.31	71351.33
No harvesting	-5797.03	-5797.03	-5797.03	-5797.03	-5124.23	-3643.35	-3467.84	-2078.37	-2078.37	-1518.92	-1072.08	-19.01	1516.72	1951.84	1951.84	1951.84	1951.84

Even if there was no harvesting, we would become carbon positive from 2036 as blocks of trees reach maturity and we can no longer account for them increasing sequestration.

DIAGRAM 10: REPLANTING OPTIONS



There are pros and cons associated with each option, such as the harvest value of the logs (current estimates are at over $1m), the increasing fire risk of pines in a warming environment, and alternative uses of the land for recreational purposes.

There is no hurry to make a decision on how to treat the forest, though it should be discussed and a general direction agreed in the coming Council triennium (2025 to 2028) to allow any planning to be done ahead of 2032 when it is planned to start harvesting the first blocks of trees.

Recommendations:

5. Note: that GHG emissions will become positive in the 2030's

   Noted/not

6. That discussion and direction on future forest use is undertaken in the up-coming Council triennium period.

   Yes/no

Appendix A: greenhouse gasses accounted for

The seven GHG included in the emissions inventories are:

- Carbon dioxide: CO_2
- Methane: CH_4
- Nitrous oxide: N_2O
- Hydrofluorocarbons: HFCs
- Perfluorocarbons: PFCs
- Sulfur hexafluoride: SF_6
- Nitrogen trifluoride: NF_3

These are converted to tonnes of carbon dioxide equivalent (tCO_2e) and then aggregated to produce the emissions levels.

TABLE 5: EMISSIONS FOR ALL SEVEN GHGS

	2018	2019	2020	2021	2022	2023
T CO_2 E	1,462.27	1,521.78	1,382.82	1,407.29	2,385.62	2147.18
T CO_2	354.29	388.88	238.80	258.26	613.70	593.14
T CH_4	859.52	878.83	886.27	890.24	786.98	740.66
T N_2O	248.46	254.08	257.76	259.16	983.87	817.24
T HFCS	0	0	0	0	0	0
T PFCS	0	0	0	0	0	0
T SF_6	0	0	0	0	0	0
T NF_3	0	0	0	0	0	0