DUNEDIN CITY EMISSIONS TARGETS OPTIONS REPORT

Department: Zero Carbon

EXECUTIVE SUMMARY

1 The purpose of this report is for Council to consider new city emissions targets, following the decision in July to replace the 2030 city-wide emissions targets.

2 Council resolved in July 2026 to adopt the following target structure for Dunedin's city-wide emissions:

a) For all greenhouse gases excluding biogenic methane:

i) A near term gross emissions reduction target; and

ii) A long-term net zero emissions target

b) Separate gross emissions reduction targets for biogenic methane

3 For the near-term gross emissions reduction target (all gases excluding biogenic methane), this report presents two options for Council to consider:

a) A 30% reduction in gross emissions by 2030/31, compared with a 2018/19 baseline

b) A 25% reduction in gross emissions by 2030/31, compared with a 2018/19 baseline

4 For the long-term net zero emissions target, this report presents three options for Council to consider, based on the extent of emissions reduction considered plausible under three different modelling scenarios:

a) Net zero emissions (excluding biogenic methane) by 2040

b) Net zero emissions (excluding biogenic methane) by 2045

c) Net zero emissions (excluding biogenic methane) by 2050

5 For biogenic methane, staff recommend retaining the existing target to reduce gross biogenic methane emissions 10% by 2030.

6 This report includes three options for a 2050 biogenic methane emissions reduction target:

a) Retain the target of a 24-47% reduction in biogenic methane emissions by 2050, compared with 2017 levels (set in 2019, in line with Government direction at that time)

b) Adopt the Climate Change Commission's 2024 recommendation to reduce biogenic methane emissions 35-47% by 2050, compared with 2017 levels

c) Adopt the current New Zealand government target to reduce biogenic methane 14-24% by 2050, compared with 2017 levels

7 An overview of best practice for setting city/district level targets, and a comparison of peer cities confirms that:

a) Action to reduce emissions and adapt to climate change in the short term has transition risks in a New Zealand local government context, however decisive action in the next 5 to 10 years is expected to lead to the lowest transition risks and physical hazards overall.

b) There are a range of target options used by local authorities within New Zealand.

c) A target with science-aligned ambition, is very difficult for Dunedin to achieve. Should Council seek to adopt a target as close as practicable to best practice guidance, the most ambitious targets presented in this report would be adopted.

RECOMMENDATIONS

That the Council:

a) **Decides** on a Dunedin short-term gross emissions reduction target (excluding biogenic methane) for 2030/31:

i) A 30% reduction by 2030/31, compared with 2018/19; or

ii) A 25% reduction by 2030/31, compared with 2018/19

b) **Decides** on a Dunedin long-term net zero emissions target (excluding biogenic methane):

i) Net zero emissions by 2040; or

ii) Net zero emissions by 2045; or

iii) Net zero emissions by 2050

c) **Decides** to retain the existing Dunedin 2030 biogenic methane target of a 10% reduction against 2017 levels

d) **Decides** on a 2050 Dunedin biogenic methane reduction target:

i) A 24-47% reduction compared with 2017 levels; or

ii) A 35-47% reduction compared with 2017 levels; or

iii) A 14-24% reduction compared with 2017 levels

e) **Notes** that staff will incorporate new Dunedin emissions targets into the Long Term Plan 2027-2037, and will undertake a light refresh of the Zero Carbon Plan to incorporate the new targets.

f) **Notes** that decisions on the level of Dunedin City Council funding towards Dunedin city-wide emissions reduction will be considered throughout Long Term Plan deliberation processes.

BACKGROUND

8 This report refers to emissions in tonnes of carbon dioxide equivalents (tCO2e). This is a measure used to standardise the climate effects of different greenhouse gases. A summary of the global warming potentials of three main greenhouse gases (carbon dioxide, methane, and nitrous oxide) is included in **Attachment A.**

9 This report also refers to **gross** emissions and **net** emissions. Total **gross** emissions refers to all emissions released into the atmosphere within an organisational or city boundary. It does not include emissions removed from the atmosphere from forestry (known as sequestration). Total **net** emissions refers to total gross emissions less emissions removed from the atmosphere.

10 Total **gross/net emissions excluding biogenic methane** refers to all emissions less biogenic methane emissions.

11 **Biogenic methane** refers to methane emissions produced by living things and processes. The majority of Dunedin's biogenic methane emissions come from ruminant animals in agriculture (approx. 80%), with the remainder from organic waste decaying in landfill and wastewater.

The DCC is seeking to manage and reduce greenhouse gas emissions at both the city and DCC scale

12 The DCC is seeking to manage and reduce emissions at two scales, as directed by the Zero Carbon Policy: city (Dunedin emissions) and organisational (DCC emissions).

13 The DCC's Zero Carbon Policy provides that all DCC activities, including renewals, should seek to minimise emissions and contribute to achieving both city-wide and DCC emissions reduction targets.

14 Throughout the 2027-2037 10 Year Plan deliberations, Council will make decisions which have implications for achieving both city-wide and DCC emissions reduction targets. The emissions implications of these decisions will be outlined in relevant options reports for Council's consideration.

Council resolved to replace the Zero Carbon 2030 targets

15 At the city scale, in 2019 the Council declared a climate emergency and adopted a 'Zero Carbon 2030' city emissions reduction target **(CNL/2019/154)**, which was in two parts:

a) net zero emissions of all greenhouse gases other than biogenic methane by 2030,

b) and a 24% to 47% reduction below 2017 biogenic methane emissions by 2050, including 10% reduction below 2017 biogenic methane emissions by 2030.

16 On 22 July 2026, Council resolved to replace the 2030 Dunedin emissions targets, noting staff would present a report on proposed target years and emissions reduction pathways:

Moved (Cr Mickey Treadwell/Cr Doug Hall):

That the Council:

*a) **Adopts** refreshed Carbon Zero targets for the Dunedin Carbon Zero Framework, replacing the existing Net Zero 2030 target.*

*b) **Adopts** a two-stage target comprising*

i) a near-term gross greenhouse gas emissions reduction target; and

ii) a long-term net zero greenhouse gas emissions target.

*c) **Adopts** separate targets for biogenic methane and all other greenhouse gases, maintaining a distinct biogenic methane reduction target.*

*d) **Notes** that staff will present a future report for Council to consider the level of ambition, including proposed target years and emissions reduction pathways, for the refreshed targets.*

Division

The Council voted by division

For: Crs John Chambers, Christine Garey, Doug Hall, Marie Laufiso, Cherry Lucas, Mandy Mayhem, Andrew Simms, Mickey Treadwell and Steve Walker (9).

Against: Crs Benedict Ong and Brent Weatherall (2).

Abstained: Nil

The division was declared CARRIED by 9 votes to 2

Motion carried (CNL/2026/131)

The Zero Carbon Plan outlines the changes needed for Dunedin to become a net zero city

17 In September 2023, Council adopted the Zero Carbon Plan 2030, which established a pathway for achieving the city's emissions target, building on existing trends.

18 The Zero Carbon Plan outlines how emissions reductions could be achieved through five interconnected areas: resource use and waste; transport and urban form; buildings, energy and industry; forestry, land use and agriculture; and communities and economies.

19 As well as identifying a pathway to net zero, the Zero Carbon Plan describes the broader shifts required for Dunedin to become a Zero Carbon city.

20 It also identifies the DCC's role in supporting the transition to zero carbon, with action areas for the DCC prioritised according to their emissions reduction potential. The Zero Carbon Plan recognises that many actions required to reduce emissions will reduce costs in the medium term, but there will be upfront costs especially for owners of assets/infrastructure.

21 The Zero Carbon Plan's key shifts remain unchanged despite the contextual changes since the Plan was adopted, and the resulting increase in projected emissions for 2030. To become a city with 'net zero emissions' at any stage, Dunedin will still need to take the same steps to reduce emissions. Modelling reconfirms that, in particular, unlocking shifts in transport is fundamental to achieving 'net zero carbon'.

22 Priority action areas for DCC also remain the same. Action areas that are likely to have a high or very high emissions reduction potential are:

23 Staff do not expect the changes to the city-wide emissions targets to require significant amendments to the Zero Carbon Plan, the key shifts for the city, or the DCC's action areas.

24 Despite headwinds, Dunedin is still comparatively well placed to tackle the challenge of reducing greenhouse gas emissions:

- Strong partnerships in place with major institutions/employers, including the Zero Carbon Alliance
- Significant growth in public transport patronage (outperforming other centres of a similar size and bucking national trends)[1]
- About double the national average for walking to work or education, and recent growth in cycle mode share[2]
- Urban densification in inner city continuing
- Phasing down coal well underway
- Reducing waste emissions underway
- Growing uptake of rooftop solar
- The cost of electric vehicles, solar panels, hot water heat pumps, and other technologies continues to decline over time

Dunedin's emissions have reduced between 2018/19 and 2024/25

25 An updated Dunedin emissions inventory up to 2024/25 was presented to the Policy and Planning Committee in April 2026, showing that Dunedin's gross emissions reduced 13% between 2018/19 and 2024/25 **(PAPCC/2026/012).**

[1] 2023 Census data; ORC annual bus patronage data
[2] 2023 Census data

26 The Zero Carbon Plan uses the 2018/19 financial year as the baseline for measuring city-wide emissions. Between 2018/19 and 2024/25:

a) **Dunedin's total gross emissions** reduced 13%, from 1,619,536 tCO2e in 2018/19 to 1,416,010 tCO2e in 2024/25.

b) **Dunedin's total net emissions** reduced 11%, from 1,258,198 tCO2e in 2018/19 to 1,119,876 tCO2e.

c) **Dunedin's total net emissions (excluding biogenic methane)** reduced 9%, from 704,845 tCO2e in 2018/19 to 641,057 tCO2e in 2024/25.

d) **Dunedin's total biogenic methane emissions** reduced 13%, from 553,353 tCO2e in 2018/19 to 478,819 tCO2e in 2024/25.

27 Changes in gross emissions between 2018/19 and 2024/25 are shown in Table 1, split by emissions source:

Table 1 – Gross Emissions changes from 2018/19 to 2024/25 by emissions source

Sector / Emissions Source		Emissions (tCO2e)		Percentage Change 18/19 – 24/25 (%)
		2018/19	2024/25	
Transport	On-Road	330,316	322,938	-2%
	Rail	4,559	3,797	-17%
	Air travel	43,354	29,512	-32%
	Marine	251,240	219,763	-13%
	Off-Road	47,741	48,118	1%
Stationary Energy	Electricity Consumption	100,366	87,957	-12%
	Stationary Diesel and Petrol Use	26,416	26,617	1%
	LPG	29,197	28,778	-1%
	Coal	44,077	13,329	-70%
	Biofuel	4,650	9,140	97%
	Biogas	27	73	168%
Waste	Solid Waste (Landfill)	80,279	33,535	-58%
	Wastewater Treatment	12,383	12,556	1%
IPPU	Refrigerant and Air Conditioning Gases	41,330	29,959	-28%
	Other Industrial Gases	3,085	2,634	-15%
Agriculture	Agriculture	600,515	547,303	-9%
Total Gross Emissions		**1,619,536**	**1,416,010**	**-13%**

DISCUSSION

28 To help inform Council's decision on the level of ambition for Dunedin's emissions targets, the following sections summarise key considerations including:

a) What is plausible for all greenhouse gases excluding biogenic methane, using three different emissions modelling scenarios;

b) Emissions modelling for biogenic methane, along with Climate Change Commission advice on what is possible by 2050;

c) Best practice on community/city level emissions target setting;

d) City/district level targets of other New Zealand cities; and

e) New Zealand targets

Dunedin Emissions Modelling to 2050

Summary of emissions modelling scenarios

29 To support Council's consideration for a refreshed city emissions target, emissions have been modelled through to 2050 to provide longer-term context:

a) A **BAU** scenario, which broadly follows national level trajectories included in the modelling underpinning the Second National Emissions Reduction Plan 2026-2030 (ERP2)

b) An **Accelerated Ambition** scenario, which requires some changes in central government policy (but not a complete reversal), as well as some additional local investment; and

c) A **High Ambition** scenario which would require significant changes in central government policy, and higher levels of local investment into a transition to becoming a lower carbon city.

30 As directed by the Zero Carbon Policy, emissions in the Dunedin City Territorial Area are estimated using the production-based Global Protocol for Community-Scale Greenhouse Gas Emissions Inventory (GPC) methodology. This method covers the key sectors of Transport, Stationary Energy, Waste, Industrial Processes and Product Use (IPPU), Agriculture, and Forestry. Production-based approaches exclude global emissions relating to consumption, such as the emissions used elsewhere to produce products used/consumed within Dunedin. The GPC methodology is the global standard for estimating emissions within a territorial area.

31 Council is considering the level of ambition for three targets:

a) a near-term gross greenhouse gas emissions reduction target (excluding biogenic methane);

b) a long-term net zero greenhouse gas emissions target (excluding biogenic methane); and

c) separate biogenic methane reduction targets.

32 Emissions modelling to inform Council's decision for each of these targets is presented below.

33 The key differences in the emissions scenarios through to 2050 are included under Attachment B, showing the impact of different levels of change across transport, stationary energy, Industrial Processes and Product Use (IPPU), agriculture (nitrous oxide), and carbon sequestration through to 2050.

34 The differences in the emissions modelling scenarios relate to the all greenhouse gases excluding biogenic methane targets. For biogenic methane, staff have only modelled one scenario based on changes in Dunedin between 2018/19 and 2024/25, local investment and action on waste diversion, and the ERP2 modelling for agriculture through to 2050.

35 It is worth noting that all scenarios, including the BAU scenario, involve significant changes between now and 2050. The BAU scenario refers to Dunedin following similar changes to those anticipated nationally in the ERP2, rather than assuming the level of emissions in 2024/25 carry through to 2050.

Near-term gross greenhouse gas emissions reduction target (excluding biogenic methane)

36 Table 2 below shows Dunedin's gross emissions (excluding biogenic methane) under each of the three scenarios through to 2030/31, with the level of emissions reduction compared against a baseline year of 2018/19 in line with the Zero Carbon Plan. This shows a range of between 24%-30% gross emissions reduction by 2030/31.

Table 2 – Gross emissions to 2030/31 under each scenario (excluding biogenic methane)

Emissions Scenario	Actual gross emissions (tCO2e)		Modelled gross emissions (tCO2e)	
	2018/19	2024/25	2030/31	% reduction against 2018/19
BAU	1,066,000	937,000	807,000	24%
Accelerated Ambition			775,000	27%
High Ambition			742,000	30%

Longer-term gross greenhouse gas emissions reduction target (excluding biogenic methane)

37 Table 3 below shows the net emissions (excluding biogenic methane) under each of the three scenarios through to 2050. Under each scenario, net zero emissions are achieved before 2050, with Dunedin becoming a net negative city by 2050 (excluding biogenic methane). This means that more carbon dioxide is absorbed by plants and forests than greenhouse gases emitted into the atmosphere.

38 Net zero emissions (excluding biogenic methane) are achieved in different timeframes across the three scenarios:

a) BAU Scenario – net zero by 2047

b) Accelerated Ambition Scenario – net zero by 2044

c) High Ambition Scenario – net zero by 2042

Table 3 - Net Emissions to 2050 under each scenario (all gases excluding biogenic methane)

Emissions Scenario	Actual net emissions (tCO2e)		Modelled net emissions (tCO2e)				
	2018/19	2024/25	2030	2035	2040	2045	2050
BAU	705,000	641,000	370,000	195,000	130,000	9,000	-68,000
Accelerated Ambition			336,000	155,000	84,000	-28,000	-100,000
High Ambition			303,000	103,000	30,000	-63,000	-113,000

39 Figures 1-3 below show the different emissions trajectories under each scenario through to 2050, showing the reductions in Stationary Energy, Transport, Industrial Processes and Product Use, and Agriculture (nitrous oxide only), along with the rate of forestry sequestration to balance emissions.

40 The **BAU** emissions scenario shows gross emissions reducing 49% by 2050 compared to baseline (2018/19), with net zero achieved approximately 2047:

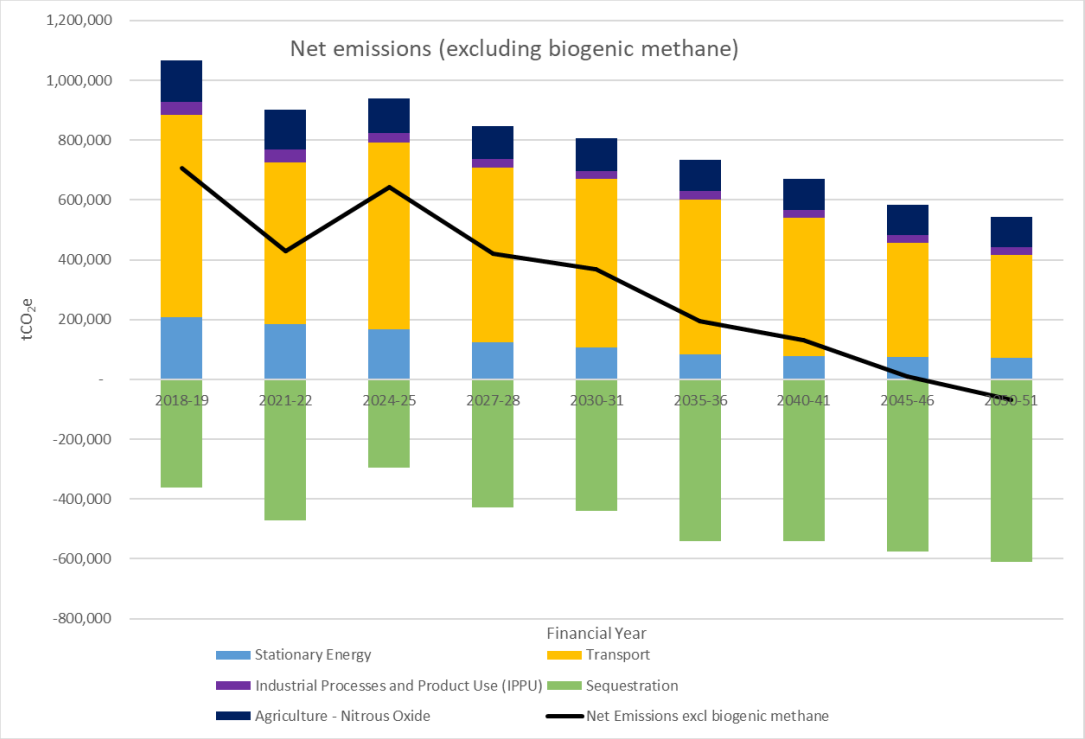

Figure 1 – BAU Scenario – All other greenhouse gases target

41 The **Accelerated Ambition** emissions scenario shows gross emissions reducing 52% by 2050 compared to baseline, with net zero achieved approximately 2044:

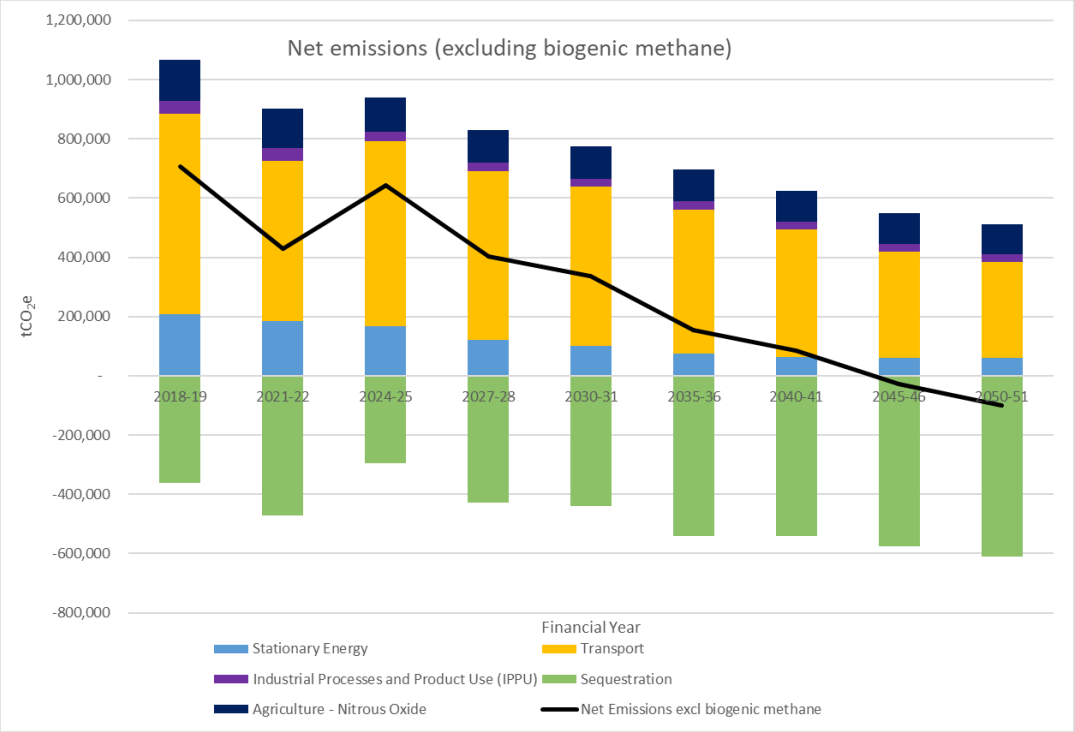

Figure 2 – Accelerated Ambition Scenario: All other greenhouse gases target

42 The **High Ambition** emissions scenario shows gross emissions reducing 53% by 2050 compared to baseline, with net zero achieved approximately 2042:

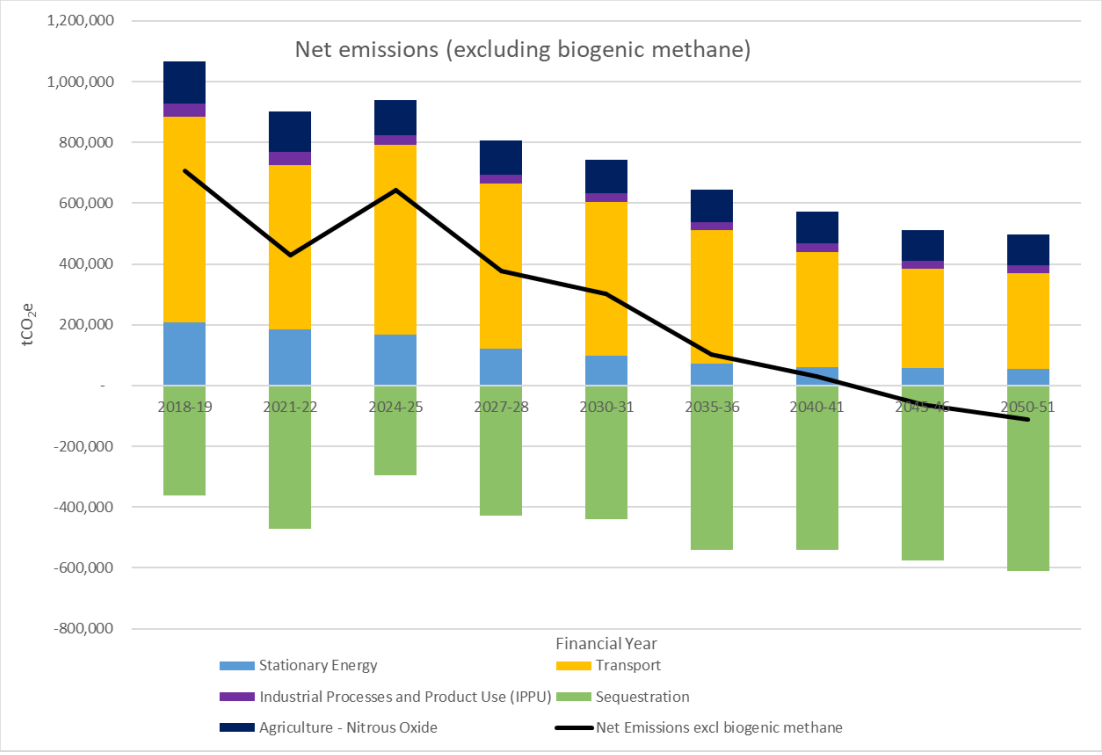

Figure 3 - High Ambition Scenario: All other greenhouse gases target

Biogenic methane reduction modelling

43 Table 4 below shows Dunedin's modelled biogenic methane emissions through to 2050. The scenarios used in this modelling for waste diversion and agricultural methane reductions are included in Attachment B. The agricultural methane emissions reductions are based on the ERP2 agricultural emissions modelling, considering changes in Dunedin's agricultural emissions between 2018/19 and 2024/25. This modelling anticipates:

a) 2030/31 biogenic methane emissions being 16% lower than the 2018/19 baseline; and

b) 2050 biogenic methane emissions being 27% lower than the 2018/19 baseline.

Table 4 – Biogenic methane emissions modelling to 2050

Emissions Source	Actual emissions (tCO2e)		Modelled emissions (tCO2e)				
	2018/19	2024/25	2030	2035	2040	2045	2050
Waste and wastewater	92,000	50,000	45,000	45,000	45,000	45,000	45,000
Agriculture	461,000	429,000	421,000	390,000	374,000	364,000	358,000
Total methane emissions	**553,000**	**479,000**	**466,000**	**435,000**	**419,000**	**409,000**	**403,000**

Climate Change Commission Recommendations

44 Staff have not modelled alternative biogenic methane emissions reduction pathways for Dunedin. However, the Climate Change Commission's 2024 review of New Zealand's 2050 emissions reduction targets recommended that Central Government adopt the following biogenic methane reduction targets:

a) Retain the 2030 target to reduce biogenic methane emissions by 10%, compared with a 2017 baseline; and

b) Reduce biogenic methane emissions 35-47% by 2050, compared with a 2017 baseline

45 The Climate Change Commission's recommended target range was based on their analysis that adoption of existing technologies could achieve the 35% reduction, with the 47% reduction possible based on the potential of emerging technologies:

For biogenic methane, the lower end of the recommended target range reflects a pathway that, according to our analysis, is largely possible with current technologies. The higher end reflects what is likely to be possible with significant changes in technology, in particular if methane inhibiting technologies become available in Aotearoa New Zealand.[3]

46 Central Government did not proceed with the Climate Change Commission's recommendation, instead in 2025 amending the biogenic methane target to be 14-24% below 2017 levels by 2050.

[3] 2024 review of the 2050 emissions target :: Climate Change Commission

Best Practice Guidance and Frameworks

47 This section summarises international guidance and frameworks relevant to setting city-wide emissions targets, and is similar to the information included in the *City-wide emissions target refresh options* report to Council on 22 July 2026 **(CNL/2026/131)**.

Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)

48 The IPCC AR6 synthesis report sets out core principles to define a scientifically robust target. Key findings include:

a) Every increment of warming increases risks, and methane is a major driver of near-term warming.

b) Rapid methane reductions deliver climate benefits within years, not decades, due to methane's short lifespan in the atmosphere compared to other greenhouse gases.

c) Limiting warming to 1.5°C or 2°C will require deep cuts in all gases, particularly methane.

d) Net-zero carbon dioxide alone is insufficient. Other greenhouse gases must also decline sharply.

e) 1.5°C compatible pathways require approximately 34% methane reductions by 2030 (from 2019 levels).

49 For setting a Dunedin emissions target, IPCC's AR6 synthesis report confirms:

a) Methane reductions matter immediately at the city-scale, and as such there should be a focus on short-term actions such as maximising landfill gas capture, wastewater methane management, and reducing landfilling of materials with high organic content (such as food, garden, and timber waste).

b) Net-zero all other gases does not remove the need for significant reductions in biogenic methane. AR6 is explicit that climate stabilisation requires:

i) Deep and sustained reductions in carbon dioxide reaching net-zero

ii) Significant reductions in methane and other non-carbon dioxide gases

Science-Based Targets for Cities (Guide)

50 The Science-Based Targets Network is a science-led initiative founded by a group of global Non-governmental Organisations (NGOs) to define what is necessary for cities to do to stay within planetary limits. The Science-Based Targets Network (SBTN) have issued guidance on how cities can set science-based targets[4].

51 The key implications for Dunedin emissions targets are that under the SBTN guide, the 2030 short term target should reflect Dunedin's fair share of halving global emissions by 2030. The

[4] https://sciencebasedtargetsnetwork.org/wp-content/uploads/2020/11/SBTs-for-cities-guide-nov-2020.pdf

recommended level of reduction would be a 70-75% reduction in emissions compared with 2015.

52 A 70-75% reduction in emissions by 2030 far exceeds what is considered plausible in any of the emissions modelling scenarios included in this report. If Council seek to adopt a target as close as possible to the level needed to support limiting warming to 1.5°C above pre-industrial levels, then the most ambitious emissions reduction and net zero target options presented in this report should be adopted.

Global Covenant of Mayors for Climate and Energy

53 Dunedin has been a signatory to the Global Covenant of Mayors for Climate and Energy (GCoM) since 2015. Cities in GCoM pledge to set "targets at least as ambitious as their country's Nationally Determined Contributions under the United Nations Framework Convention on Climate Change (UNFCCC)."[5]

54 This does not provide specific guidance on the level of ambition needed in a city target. Rather it affirms that for Dunedin to remain a signatory to GCoM, a city level target of some form is required, with a level of ambition at least equivalent to that set nationally.

Local Government Funding Agency – Local Government Sector Climate Scenarios

55 In September 2025, the Local Government Funding Agency (LGFA) released their *Local Government Sector Climate Scenarios*[6] (LGFA Climate Scenarios). The LGFA Climate Scenarios illustrate how climate change could impact the local government sector under different plausible climate futures. While these scenarios do not provide guidance on how to set a district level target, they do provide guidance on the likely impacts to local government and the communities local government support.

56 There are three scenarios included in the LGFA Climate Scenarios report:

a) **Scenario 1: Acting now for our mokopuna –** based on coordinated global climate action from the late 2020s, driving a transition to a low-carbon, climate resilient economy, and limiting global warming to 1.7°C above pre-industrial levels by 2100.

b) **Scenario 2: Leaving it to the next generation –** Global climate action is delayed until the mid-2030s, with a rapid disorderly transition to a low-carbon economy. This leads to high economic and social costs for Aotearoa New Zealand. Global warming of 2.7°C above pre-industrial levels by 2100.

c) **Scenario 3: Inheriting a broken world –** Global climate action falters due to geopolitical tensions. Global warming of 3.9°C above pre-industrial levels by 2100.

57 Each of the scenarios leads to differences in the timing and severity of transition risks and physical hazards. As stated on page 7 of the LGFA Climate Scenarios report "[r]educing emissions or building resilience creates transition risk, whilst higher temperatures cause physical risk. Acting early leads to higher short-term transition risk, but reduces longer-term exposure to

[5] https://www.globalcovenantofmayors.org/journey/#1594369253859-2c931b65-720e "Set Goals and Targets" sub-header
[6] Local Government Sector Climate Scenarios Report - FINAL.pdf

physical impacts. Conversely, not reducing emissions leads to physical risks rising exponentially to 2100 and beyond."

58 This is illustrated below, in terms of the extent of the transition risks and physical risks under each scenario, as well as the impacts of each scenario over time:

59 The key implications of the LGFA Climate Scenarios for Dunedin emissions targets are that action to reduce emissions and adapt to climate change in the short term will lead to transition risks in a New Zealand local government context, however decisive action in the late 2020s/2030s is expected to lead to the lowest transition risks and physical hazards overall.

Peer Cities

60 A comparison of the Hamilton, Palmerston North and Christchurch district level targets is shown below in Table 5. While there are some similarities between Dunedin and these cities, for all three agriculture makes up a smaller share of their city emissions compared with Dunedin (agriculture made up 39% of Dunedin's emissions in 2024/25). Similarly, because of Dunedin's large territorial boundaries, there are higher rates of forestry sequestration in Dunedin than places like Hamilton which are largely urban. This can help explain why Hamilton have set ambitious gross emissions reduction targets for 2050, without setting an overall net zero emissions target for Hamilton city.

Table 5 – Comparative New Zealand District Level Targets

NZ Peer District	Target Statement	District Target Years (Gross or Net)	Biogenic Methane Treatment
Palmerston North City Council	*A central part of our goal to be an eco-city is achieving a 30% reduction in Palmy's greenhouse gas emissions by 2031. This target is our part of a national effort to make the whole of New Zealand carbon neutral by 2050.*[7]	Gross target for 2031. Reference to 2050 national net-zero target.	Included in 2031 target. (Agriculture was 17% of Palmerston North city gross emissions in 2021)

[7] https://www.pncc.govt.nz/Council/What-were-doing/Strategic-initiatives/Tackling-climate-change#section-1

Christchurch City Council	*Our targets for Christchurch are to halve emissions by 2030, compared with 2016-2017 levels, and to achieve net zero greenhouse gas emissions by 2045, with at least a 50% reduction in methane emissions by 2045.*[8]	Gross target for 2030. Net Zero 2045	Separate target – 50% reduction in biogenic methane by 2045 (Agriculture was 16% of Christchurch city gross emissions in 2023)
Hamilton City Council	*By 2030 our city's emissions are reduced by at least 30%. By 2050 our city's emissions are reduced by at least 82%.*[9]	Gross target for 2030 and 2050. No net zero community target.	Included in overall targets. (Agriculture was 1% of Hamilton city gross emissions in 2022)

New Zealand Targets Context

61 Central Government have set the following emissions reductions targets for New Zealand to meet, under the Climate Change Response Act:

a) Net zero emissions of all greenhouse gas emissions other than biogenic methane by 2050.

b) 14% to 24% reduction below 2017 biogenic methane emissions by 2050, including 10% reduction below 2017 biogenic methane emissions by 2030.

62 The 2050 biogenic methane emissions target was amended in December 2025, having previously been a target of a 24% to 47% reduction below 2017 biogenic methane emissions by 2050.

63 The New Zealand targets exclude international shipping and aviation emissions, which are included within Dunedin's emissions inventory and targets.

64 Central Government have also set the first and second Nationally Determined Contributions (NDCs) under the Paris Agreement covering 2021-2030 (NDC1) and 2031-2035 (NDC2). The NDC1 target is to reduce net greenhouse gas emissions to 50% below 2005 levels by 2030. This target can be met by domestic emissions reductions (reductions within New Zealand) and also by emissions reductions occurring offshore but paid for by New Zealand.

KEY CONSIDERATIONS

Fit with strategic framework

65 The relevant strategies and plans this decision relates to include the Zero Carbon Plan, DCC Emissions Management and Reduction Plan 2025-2030, and the Zero Carbon Policy. As noted within the report, the key shifts identified in the Zero Carbon Plan for Dunedin to become a low/zero net emissions city, and the action areas for DCC to support that transition, remain unchanged.

[8] Our climate emissions targets : Christchurch City Council
[9] Hamilton City Council Climate Change Strategy

Māori Impact Statement

66 A Treaty of Waitangi analysis was prepared previously as part of the Zero Carbon work programme. This indicated that, in general, taking action to reduce emissions is aligned with Treaty of Waitangi obligations because a wide range of taonga are at risk from climate change. However, individual projects will need to consider Te Taki Haruru and incorporate mana whenua and mātāwaka inputs when delivered.

Legislative Reforms

67 'Climate Action' is one of the United Nation's Sustainable Development Goals, reflecting the centrality of action on climate change to the achievement of sustainable development. Without significant cuts to emissions, climate change impacts will further accelerate, with commensurate negative impacts on the social, environmental, cultural and economic wellbeing of New Zealand communities. As such, efforts to reduce emissions support sustainable economic growth and development over the medium to long term, as part of global efforts to minimise the negative impacts of climate change, and forms part of meeting the current and future needs of communities.

Sustainability, Climate Mitigation (Zero Carbon), Adaptation and Resilience

68 As this report is about setting the level of ambition for city-wide reduction targets, there are significant implications for Dunedin's emissions trajectory to 2050 depending on the options chosen.

69 Adaptation alone cannot address all climate risks. Reducing greenhouse gas emissions is essential to limit the scale of future climate change and keep adaptation achievable and affordable. A low emissions Ōtepoti Dunedin can also deliver local benefits through more efficient infrastructure and systems, greater energy independence, healthier environments and improved public health, while contributing to global climate goals. As such, Council's decisions and support for emissions reduction within Dunedin can also support efforts to adapt to the effects of climate change, and increase local resilience.

OPTIONS

70 This report includes options for three different components of Dunedin city-wide targets:

a) For all greenhouse gases excluding biogenic methane:

i) A near term gross emissions reduction target; and

ii) A long-term net zero emissions target

b) Separate gross emissions reduction targets for biogenic methane

Near-term gross emissions reduction target options

71 For the near-term gross emissions reduction target (all gases excluding biogenic methane), this report presents two options for Council to consider:

a) A 30% reduction in gross emissions by 2030/31, compared with a 2018/19 baseline

- This is based on the **High Ambition Scenario** outlined under paragraph 36 of this report, and covered in Attachment B.

b) A 25% reduction in gross emissions by 2030/31, compared with a 2018/19 baseline

- This is based on the **BAU Scenario** outlined under paragraph 36 of this report, and covered in Attachment B.

Long-term net zero emissions target options

72 For the long-term net zero emissions target, this report presents three options for Council to consider, based on the extent of emissions reduction considered plausible under three different modelling scenarios:

a) Net zero emissions (excluding biogenic methane) by 2040

- This is broadly based on the **High Ambition Scenario** outlined in paragraph 37-42 of this report, with the changes needed to achieve this covered in detail in Attachment B. Emissions modelling anticipates net emissions of 30,000tCO2e in 2040 under this scenario. As such, achieving net zero by 2040 would require either finding further emissions reductions by 2040, or increasing forestry sequestration to bridge this gap.

b) Net zero emissions (excluding biogenic methane) by 2045

- This is based on the **Accelerated Ambition Scenario** outlined in paragraph 37-42 of this report, with the changes needed to achieve this covered in detail in Attachment B.

c) Net zero emissions (excluding biogenic methane) by 2050

- This is based on the **BAU Scenario** outlined in paragraph 37-42 of this report, with the changes needed to achieve this covered in detail in Attachment B.

Biogenic methane emissions reduction options

73 For biogenic methane, staff recommend retaining the existing target to reduce gross biogenic methane emissions 10% by 2030.

74 This report includes three options for a 2050 biogenic methane emissions reduction target:

a) Retain the target of a 24-47% reduction in biogenic methane emissions by 2050, compared with 2017 levels (set in 2019, in line with Government direction at that time)

b) Adopt the Climate Change Commission's 2024 recommendation to reduce biogenic methane emissions 35-47% by 2050, compared with 2017 levels

c) Adopt the current New Zealand government target to reduce biogenic methane 14-24% by 2050, compared with 2017 levels

Assumptions

75 Assumptions used in each of the emissions modelling scenarios is covered in detail under Attachment B.

Financial Comparison

76 Throughout the 2027-2037 10 Year Plan deliberations, Council will make decisions which have implications for achieving both city-wide and DCC emissions reduction targets. The emissions implications of these decisions will be outlined in relevant options reports for Council's consideration. As such, Council will consider funding of projects that support city-wide emissions reduction across the various options reports being presented through 2026.

Short Term Gross Reduction Target: Option One – 30% Reduction by 2030/31

77 This short-term target option is for a 30% reduction in gross emissions (excluding biogenic methane) by 2030/31, compared with a 2018/19 baseline.

78 This is based on the High Ambition Scenario outlined under paragraph 36 of this report, and covered in Attachment B.

Option Assessment

Advantages

- More closely aligns with best practice guidance on science-aligned city emissions reduction targets than option two
- Supports Dunedin residents enjoying the co-benefits of transitioning to a lower carbon city sooner than option two (such as more efficient infrastructure and systems, greater energy independence, healthier environments and improved public health)

Disadvantages

- Achievement requires more significant investment and change across Dunedin through to 2030/31 than option two, which could lead to higher transition risks in the short term.

Short Term Gross Reduction Target: Option Two – 25% Reduction by 2030/31

79 This short-term target option is for a 25% reduction in gross emissions (excluding biogenic methane) by 2030/31, compared with a 2018/19 baseline.

80 This is based on the BAU Scenario outlined under paragraph 36 of this report, and covered in Attachment B.

Option Assessment

Advantages

- Requires a slower pace of change in the short term, which could mitigate transition risks for Dunedin residents over the short term

Disadvantages

- Achievement of this target would lead to reduced co-benefits associated with transitioning to a lower carbon city compared with option one, including higher dependence on fossil fuels for energy
- Less aligned with best practice guidance on city emissions reduction targets than option one

Long Term Net Zero Emissions Target – Option One – Net Zero 2040

81 This target option is for Dunedin to achieve net zero emissions (excluding biogenic methane) by 2040.

82 This is broadly based on the High Ambition Scenario outlined in paragraph 37-42 of this report, with the changes needed to achieve this covered in detail in Attachment B.

83 Emissions modelling anticipates net emissions of 30,000tCO2e in 2040 under this scenario. As such, achieving net zero by 2040 would require either finding further emissions reductions by 2040, or increasing forestry sequestration to bridge this gap.

Option Assessment

Advantages

- Strongest alignment with best practice guidance on science-based city emissions reduction targets than other long term target options
- Supports Dunedin residents enjoying the co-benefits of transitioning to a lower carbon city sooner than options two and three (such as more efficient infrastructure and systems, greater energy independence, healthier environments and improved public health)

Disadvantages

- Requires Dunedin to transition to a low emissions city at a significantly faster pace than is anticipated in the Second National Emissions Reduction Plan for 2026-2030, which could lead to higher levels of local investment and lower levels of support from Central Government than aligning more closely with the New Zealand emissions targets.

Risks

- Achievement of net zero relies on significant increases to forestry sequestration compared with 2024/25 levels. Natural hazards such as landslides or wildfires of forested areas could reduce the amount of carbon sequestration possible within Dunedin's territorial boundaries.

Opportunities

- Becoming net zero by 2040, and net negative from 2041 onwards, would support achievement of New Zealand's overall 2050 net zero targets, and enable districts with less capacity for forestry sequestration than Dunedin to have residual hard to abate emissions remaining by 2050.
- Given the number of investment and political cycles between 2026 and 2040, along with potential technological advancements over the same period, there may be additional opportunities to reduce Dunedin's emissions over the next 15 years which further support achievement of net zero by 2040

Long Term Net Zero Emissions Target – Option Two – Net Zero 2045

84 This target option is for Dunedin to achieve net zero emissions (excluding biogenic methane) by 2045.

85 This is broadly based on the Accelerated Ambition Scenario outlined in paragraph 37-42 of this report, with the changes needed to achieve this covered in detail in Attachment B.

Option Assessment

Advantages

- Supports Dunedin residents enjoying the co-benefits of transitioning to a lower carbon city sooner than option three (such as more efficient infrastructure and systems, greater energy independence, healthier environments and improved public health)
- Requires a slower pace of change than option one.

Disadvantages

- Requires Dunedin to transition to a low emissions city at a faster pace than is anticipated in the Second National Emissions Reduction Plan for 2026-2030, which could lead to higher levels of local investment and lower levels of support from Central Government than aligning more closely with the New Zealand emissions targets.
- More poorly aligned with best practice guidance on science-based city emissions reduction targets than option one

Risks

- Achievement of net zero relies on significant increases to forestry sequestration compared with 2024/25 levels. Natural hazards such as landslides or wildfires of forested areas could reduce the amount of carbon sequestration possible within Dunedin's territorial boundaries.

Opportunities

- Becoming net zero by 2045, and net negative from 2046 onwards, would support achievement of New Zealand's overall 2050 net zero targets, and enable districts with less capacity for forestry sequestration than Dunedin to have residual hard to abate emissions remaining by 2050.
- Given the number of investment and political cycles between 2026 and 2045, along with potential technological advancements over the same period, there may be additional opportunities to reduce Dunedin's emissions over the next 20 years which further support achievement of net zero by 2045

Long Term Net Zero Emissions Target – Option Three – Net Zero 2050

86 This target option is for Dunedin to achieve net zero emissions (excluding biogenic methane) by 2050.

87 This is broadly based on the BAU Scenario outlined in paragraph 37-42 of this report, with the changes needed to achieve this covered in detail in Attachment B. The BAU Scenario anticipates Dunedin becoming a net zero city by 2047.

Option Assessment

Advantages

- Requires a slower pace of change, which could mitigate transition risks for Dunedin residents over the short term
- Aligns with New Zealand government targets, which may mean there are greater incentives and policies available from Central Government to encourage achievement of a 2050 aligned target

Disadvantages

- Achievement of this target would lead to reduced co-benefits associated with transitioning to a lower carbon city compared with options one and two, including higher dependence on fossil fuels for energy between 2026 and 2050
- Poorest alignment with best practice guidance on science-based city emissions reduction targets of all long term net zero options

Risks

- Achievement of net zero relies on significant increases to forestry sequestration compared with 2024/25 levels. Natural hazards such as landslides or wildfires of forested areas could reduce the amount of carbon sequestration possible within Dunedin's territorial boundaries.

Opportunities

- Given the number of investment and political cycles between 2026 and 2050, along with potential technological advancements over the same period, there may be additional opportunities to reduce Dunedin's emissions over the next 25 years which further support achievement of net zero by 2050

Biogenic Methane Reduction Target: Option One – 24-47% Reduction by 2050

88 This option for biogenic methane emissions reduction involves a short term and long term target:

a) Retain the existing target of a 10% reduction in biogenic methane emissions by 2030, compared with 2017 levels; and

b) Retain the target of a 24-47% reduction in biogenic methane emissions by 2050, compared with 2017 levels (set in 2019, in line with Government direction at that time)

89 This target is within the range of the biogenic methane emissions modelling presented in paragraph 43 of this report, being a 27% reduction by 2050.

Option Assessment

Advantages

- Aligns well with the biogenic methane emissions modelling estimate of a 27% reduction by 2050
- Is more closely aligned with best practice guidance that deep reductions in biogenic methane are required than option 3 (adopt current Central Government targets)

Disadvantages

- This option no longer aligns with Central Government policy, nor does it align with the Climate Change Commission's recommendation to Central Government in 2024

Risks

- Achievement of the upper end of this range is significantly more ambitious than the current New Zealand government target of a 14-24% reduction by 2050, which may make achievement of a reduction close to 47% by 2050 significantly more challenging, due to a lack of associated national policy settings and incentives

Opportunities

- Given the number of investment and political cycles between 2026 and 2050, along with potential technological advancements over the same period, there may be additional opportunities to reduce Dunedin's biogenic emissions over the next 25 years which make it easier to achieve biogenic methane reductions closer to 47% by 2050

Biogenic Methane Reduction Target: Option Two – 35-47% Reduction by 2050

90 This option for biogenic methane emissions reduction involves a short term and long term target:

a) Retain the existing target of a 10% reduction in biogenic methane emissions by 2030, compared with 2017 levels; and

b) Adopt the Climate Change Commission's 2024 recommendation to reduce biogenic methane emissions 35-47% by 2050, compared with 2017 levels

91 The Climate Change Commission's recommendation is covered in paragraphs 44-45 of this report.

92 This target exceeds the level of biogenic emissions reduction modelled to 2050, presented in paragraph 43 of this report.

Option Assessment

Advantages

- Most closely aligned of all options with best practice guidance that deep reductions in biogenic methane are required to limit the impacts of climate change

Disadvantages

- This option does not align with Central Government policy

Risks

- This target is significantly more ambitious than the current New Zealand government target of a 14-24% reduction by 2050, which may make achievement of a reduction close to 35-47% by 2050 significantly more challenging, due to a lack of associated national policy settings and incentives

- This target is also moderately more ambitious than what the emissions modelling in this report anticipates (a 27% reduction by 2050)

Opportunities

- Given the number of investment and political cycles between 2026 and 2050, along with potential technological advancements over the same period, there may be additional opportunities to reduce Dunedin's biogenic emissions over the next 25 years which make it easier to achieve biogenic methane reductions closer to 35-47% by 2050

Biogenic Methane Reduction Target: Option Three – 14-24% Reduction by 2050

93 This option for biogenic methane emissions reduction involves a short term and long term target:

a) Retain the existing target of a 10% reduction in biogenic methane emissions by 2030, compared with 2017 levels; and

b) Adopt the current New Zealand government target to reduce biogenic methane 14-24% by 2050, compared with 2017 levels

Option Assessment

Advantages

- Aligns with Central Government policy

- Emissions modelling to 2050 predicts the upper end of this target (24% reduction) could be exceeded

Disadvantages

- Poorest alignment with best practice guidance, in particular IPCC analysis that deep reductions in biogenic methane are required to limit the impacts of climate change

- The lower end of this target band was almost achieved in 2024/25, meaning adopting this target range represents relatively low ambition given Dunedin's context

Risks

- This target is not aligned with either Climate Change Commission advice, or international best practice guidance, which could create credibility risks

Opportunities

- Given the number of investment and political cycles between 2026 and 2050, along with potential technological advancements over the same period, there may be additional opportunities to reduce Dunedin's biogenic emissions over the next 25 years which make it easier to reduce biogenic methane emissions in excess of a 14-24% reduction by 2050

NEXT STEPS

94 Following Council's decision on new city emissions reduction targets, staff will incorporate the new Dunedin emissions targets into the Long Term Plan 2027-2037. Staff will also undertake a light refresh of the Zero Carbon Plan to incorporate the new targets.

Signatories

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Authoriser:	Scott MacLean - General Manager, City Services

Attachments

OTHER CONSIDERATIONS

Fit with purpose of Local Government

Implementation of the Zero Carbon Policy, Zero Carbon Plan and DCC's Emissions Management and Reduction Plan promotes the economic, social and environmental wellbeing of communities in the present and for the future, by facilitating the transition to a low carbon economy.

LTP / Financial Strategy /Infrastructure Strategy/ Water Services Strategy

References to the 2030 Zero Carbon targets are embedded throughout the 9 Year Plan 2025-2034. Following Council decisions on new Dunedin emissions reduction targets, reference to these new targets will be incorporated into the Long Term Plan 2027-2037.

Financial considerations

There are no direct financial implications of this decision. Council decisions on actions to support reducing Dunedin emissions will be considered as part of Long Term Plan processes.

Significance

This decision is considered low significance as the proposed changes seek to give effect to existing resolutions of Council, and as noted in the report staff have assessed that should Council decide on adopting refreshed targets, this does not fundamentally change the priority action areas for DCC as outlined in the Zero Carbon Plan. Any changes to the emissions targets Council set for Dunedin will be incorporated into consultation on the Long Term Plan 2027-2037 for community engagement and feedback.

Engagement – external

There was significant external engagement during 2023 in the development of the Zero Carbon Plan. There has been limited external engagement in relation to options to refresh Dunedin's emissions targets, given adopting refreshed targets does not fundamentally change the key shifts needed for Dunedin to reduce its emissions, and the priority action areas for DCC to support emissions reduction at the city level.

DCC's Zero Carbon team have engaged with Zero Carbon Alliance partners on target refresh options, given the Memorandum of Understanding for the Zero Carbon Alliance includes direct reference to the previous 2030 city emissions targets.

Adopting new city targets is not anticipated to change the overall purpose of the Zero Carbon Alliance, or the level of urgency required for both organisational and city-wide emissions reduction efforts across the 6 partners.

Engagement - internal

A range of teams have been informed that Council will be considering refreshed Dunedin emissions targets, with specific engagement as necessary to update emissions modelling scenarios assumptions (for instance, engagement with Transport).

Risks: Legal / Health and Safety etc.

There are a range of risks associated with the different emissions target options, particularly regarding achievability (for higher ambition options) to credibility (for lower ambition target options). These have been addressed under each of the options.

Conflict of Interest

No conflict of interest has been identified.

OTHER CONSIDERATIONS
Community Boards There are no direct implications identified for Community Boards relating to this decision.

Global Warming Potentials

There are many greenhouse gases, each with a different ability to warm the atmosphere. *Global Warming Potential (GWP)* is a measure used to compare how much heat a greenhouse gas traps in the atmosphere over time, relative to carbon dioxide (CO_2).

The GWP of a gas depends on:

- How effectively it traps heat, and
- How long it remains in the atmosphere before breaking down.

To account for these differences, emissions are standardised by converting each gas into *carbon dioxide equivalents (CO2e)* using its GWP. This allows different greenhouse gases to be compared and reported on a consistent basis.

GWP values using in the Dunedin inventory

The Dunedin City Greenhouse Gas Emissions Inventory for 2024/25 uses the most recent values from the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (2021), often referred to as *AR6*.

These values are based on a 100-year timeframe, known as *GWP100*, which is the most commonly used approach for emissions reporting.

There is a minor error in the Global Warming Potentials used in the 2024/25 inventory – see page 2 of this document for an explanation.

The GWP100 values for the main greenhouse gases are:

Greenhouse Gas	Global Warming Potential (GWP100)	Margin of error
Carbon dioxide (CO_2)	1	-
Biogenic methane (CH_4)	27	±11
Non-biogenic methane (CH_4)	29.8	±11
Nitrous oxide (N_2O)	273	±130

Biogenic methane comes from biological sources (plants and animals), while non-biogenic methane is associated with fossil fuels (such as natural gas leakage). It lasts about 12 years in the atmosphere in the form of methane, before breaking down into carbon dioxide and water vapour.

As shown above, there is a relatively high margin of error for methane and nitrous oxide. There are also many other greenhouse gases (such as refrigerants) with their own GWP values that are not included here.

Why GWP values change over time

GWP100 values are updated in each IPCC Assessment Report to reflect the latest scientific understanding.

For example, the GWP100 value for biogenic methane (CH4) has changed over time:

IPCC Assessment Report	Year Released	GWP100 for methane
AR1	1990	21
AR4	2007	25
AR5	2014	34[1]
AR6	**2021**	**27**

These updates reflect ongoing improvements in climate science and measurement.

Minor error in Dunedin Greenhouse Gas Inventory 2024/25

A minor discrepancy has been identified in the Dunedin City Greenhouse Gas Emissions Inventory 2024/25.

A GWP100 value of 27.2 was used for biogenic methane in the inventory prepared by AECOM. This figure of 27.2 was stated by staff at the Policy and Planning Committee on 2 April 2026.

The correct GWP100 value for biogenic methane from the final IPCC AR6 report is 27.

This occurred because an earlier version of the IPCC report (used during drafting) included the 27.2 figure, which was later updated to 27 in the final published version. Staff have confirmed this with AECOM.

The impact of this difference is very small. Using the correct value reduces reported biogenic methane emissions by 3,511 tCO_2e, equivalent to 0.25% of Dunedin's total emissions for 2024/25. Given the minor impact on Dunedin's total emissions for 2024/25, the Greenhouse Gas Inventory report will not be updated to amend this error. Rather, it will be corrected when the next inventory is completed.

[1] When climate change feedback is included. The Fifth Assessment Report is the first time the IPCC reported on climate change feedback in Global Warming Potentials (GWP), and included *with climate change feedback* and *without climate change feedback* GWP values. This was an emerging area of research at the time of the Fifth Assessment Report. In the Sixth Assessment Report, all GWPs included climate change feedbacks by default. Climate change feedbacks refer to flow on impacts caused by the release of greenhouse gases – for example, burning of fossil fuels releases CO2, which traps more heat in the atmosphere, which leads to melting of ice sheets. Ice sheets have high albedo (reflect sunlight away, which has a cooling effect) and the ocean has low albedo, so as the ice sheets melt due to the release of CO2, more sunlight is absorbed by oceans, which leads to more warming, which leads to more ice and snow melt.

Overview of Emissions Modelling Scenarios

BAU Scenario – All Other Gases Target

Area	2030	2035	2040	2045	2050	Rationale for Scenario
Gross emissions	**807,000 tCO2e**	**735,000 tCO2e**	**672,000 tCO2e**	**584,000 tCO2e**	**542,000 tCO2e**	**24% gross emissions reduction by 2030, 49% gross reduction by 2050**
Net emissions	**368,000 tCO2e**	**195,000 tCO2e**	**130,000 tCO2e**	**8,629 tCO2e**	**- 68,000 tCO2e**	**Net zero achieved approximately 2047**
Light vehicle travel demand	Light vehicle travel demand reduces 10% per capita	Light vehicle travel demand reduces 11% per capita	Light vehicle travel demand reduces 12% per capita	Light vehicle travel demand reduces 12% per capita	Light vehicle travel demand reduces 12% per capita	Changes in comparison to 2018/19 baseline. Slight increase compared with 2021/22, held through to 2050. Informed by ERP2 per capita projections, and trends in Dunedin from 2018/19 to 2024/25
Cycling	4% of trips done by bike	4% of trips done by bike	4% of trips done by bike	4% of trips done by bike	4% of trips done by bike	Baseline 2018/19 trip share approx. 2%. Assumes cycling trip share increases slightly on 2024/25 levels
Walking	10% of trips done by walking	10% of trips done by walking	10% of trips done by walking	10% of trips done by walking	10% of trips done by walking	Baseline 2018/19 trip share approx. 10%. Assumes walking trip share stays at 2024/25 levels
Public Transport	4% of trips done by public transport	4% of trips done by public transport	4% of trips done by public transport	4% of trips done by public transport	4% of trips done by public transport	Baseline 2018/19 trip share approx. 3%. Assumes Public Transport demand stays at 2024/25 levels
Rail/Road Freight Share	Current road/rail freight share remains the same	Current road/rail freight share remains the same	Current road/rail freight share remains the same	Current road/rail freight share remains the same	Current road/rail freight share remains the same	Based on maintenance of status quo share of rail freight
Total Freight Demand	4% reduction in land freight task	5% reduction in land freight task	5% reduction in land freight task	5% reduction in land freight task	6% reduction in land freight task	No change in projections used in Zero Carbon Plan modelling.
Aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	All reductions in comparison to baseline 2018/19. Based on holding 2024/25 levels of flights.
Cruise ship emissions	Cruise emissions reduce by 20%	Cruise emissions reduce by 25%	Cruise emissions reduce by 30%	Cruise emissions reduce by 35%	Cruise emissions reduce by 40%	All reductions in comparison to baseline 2018/19. Target relies upon International Maritime Organisation meeting 20-30% gross reduction target by 2030, and 40% gross reduction by 2050.
Marine emissions	Marine emissions reduce by 20%	Marine emissions reduce by 25%	Marine emissions reduce by 30%	Marine emissions reduce by 35%	Marine emissions reduce by 40%	All reductions in comparison to baseline 2018/19. Target relies upon IMO meeting 20-30% gross reduction target by 2030, and 40% gross reduction by 2050.
Heavy vehicle EV share	Electrify 1% of heavy vehicle fleet	Electrify 2% of heavy vehicle fleet	Electrify 6% of heavy vehicle fleet	Electrify 13% of heavy vehicle fleet	Electrify 18% of heavy vehicle fleet	Aligns with national level projections included in the ERP2

Light vehicle EV share	Electrify 10% of light vehicle fleet	Electrify 21% of light vehicle fleet	Electrify 39% of light vehicle fleet	Electrify 58% of light vehicle fleet	Electrify 73% of light vehicle fleet	Projections updated in line with updated national level projections in ERP2.
Vehicle fuel efficiency	ICE vehicle fuel efficiency to improve by 5%	ICE vehicle fuel efficiency to improve by 6.3%	ICE vehicle fuel efficiency to improve by 7.5%	ICE vehicle fuel efficiency to improve by 8.8%	ICE vehicle fuel efficiency to improve by 10%	Changes in efficiency in comparison to baseline 2018/19. No change in projections.
Coal	Phase out coal use	Phase out coal use	Phase out coal use	Phase out coal use	Phase out coal use	Major institutions in Dunedin have committed to switching from coal use, with Dunedin Energy Centre, and all schools now using alternatives for space heating.
Stationary LPG	26% reduction in stationary LPG use	33% reduction in stationary LPG use	40% reduction in stationary LPG use	47% reduction in stationary LPG use	54% reduction in stationary LPG use	All reductions in comparison to baseline 2018/19. Projections refined from 2023, to reflect differing uses of stationary LPG across commercial/industry/and residential. There is less Central Govt support available, however increasing LPG prices and reductions in the cost of low carbon alternatives incentivise building and home owners to switch from LPG to low carbon space heating/hot water heating. LPG use for process heat is more challenging to displace.
Stationary diesel	16% reduction in stationary diesel use	20% reduction in stationary diesel use	24% reduction in stationary diesel use	27% reduction in stationary diesel use	30% reduction in stationary diesel use	All reductions in comparison to baseline 2018/19. Projections refined from 2023, to reflect differing uses of stationary diesel across commercial/industry/and residential. While there is reduced central government funding, there are still incentives for building/asset owners to decarbonise stationary energy. Stationary diesel use for process heat is more challenging to displace.
Energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	No change in projections used in Zero Carbon Plan modelling.
Solar	Increased uptake of solar	Increased uptake of solar	Increased uptake of solar	Increased uptake of solar	10% of north facing household rooftops with solar PV	Based on modest uptake of residential rooftop solar PV, limited to no commercial/industrial uptake.
National electricity grid	92% renewable grid	98% renewable grid	98% renewable grid	98% renewable grid	98% renewable grid	Based on MBIE projections for mix of electricity, along with anticipated additional electricity demand through more widespread electrification.
IPPU Emissions	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	All reductions in comparison to baseline 2018/19. Amended to account for significant reduction in IPPU emissions up to FY25, with FY25 levels held through to 2050.
Agricultural emissions – nitrous oxide	21% reduction in agricultural nitrous oxide emissions	23% reduction in agricultural nitrous oxide emissions	25% reduction in agricultural nitrous oxide emissions	26% reduction in agricultural nitrous oxide emissions	27% reduction in agricultural nitrous oxide emissions	All reductions in comparison to baseline 2018/19. Based on national projections for agriculture emissions, taking into account changes in Dunedin from FY19 to FY25.
Sequestration	22% increase in sequestration	50% increase in sequestration	50% increase in sequestration	59% increase in sequestration	68% increase in sequestration	All increases in comparison to sequestration in 2018/19. The total extent of forestry cover within Dunedin is forecast to increase, with the carbon sequestration per annum modelled based on trends between 2018/19-2024/25, and ERP2 modelling on the increase in forestry cover through to 2050 downscaled to Dunedin.

Accelerated Ambition Scenario – All Other Greenhouse Gases Target

Area	2030	2035	2040	2045	2050	Rationale for Scenario
Gross emissions	**775,000 tCO2e**	**695,000 tCO2e**	**625,000 tCO2e**	**548,000 tCO2e**	**510,000 tCO2e**	27% Gross emissions reduction by 2030. 52% gross emissions reduction by 2050.
Net emissions	**336,000 tCO2e**	**155,000 tCO2e**	**84,000 tCO2e**	**- 28,000 tCO2e**	**- 100,000 tCO2e**	Net zero achieved approximately 2044
Light vehicle travel demand	Light vehicle travel demand reduces 14% per capita	Light vehicle travel demand reduces 17% per capita	Light vehicle travel demand reduces 20% per capita	Light vehicle travel demand reduces 24% per capita	Light vehicle travel demand reduces 25% per capita	Changes in comparison to 2018/19 baseline. Assumes increasing urban densification leads to moderate vehicle kilometres travelled reductions by 2050.
Cycling	8% of trips done by bike	9% of trips done by bike	11% of trips done by bike	12% of trips done by bike	15% of trips done by bike	Baseline 2018/19 trip share approx. 2%. Assumes significantly higher active transport share than 2024/25.
Walking	13% of trips done by walking	14% of trips done by walking	14% of trips done by walking	14% of trips done by walking	15% of trips done by walking	Baseline 2018/19 trip share approx. 10%. Assumes walking trip share increases on 2024/25 levels.
Public Transport	6% of trips done by public transport	7% of trips done by public transport	8% of trips done by public transport	9% of trips done by public transport	10% of trips done by public transport	Baseline 2018/19 trip share approx. 3%. Assumes trend of modest growth in Public Transport patronage between 2018/19 to 2024/25 carries on through to 2050.
Rail/Road Freight Share	Shifting 4% freight by rail rather than road	Shifting 5% freight by rail rather than road	Shifting 5% freight by rail rather than road	Shifting 5% freight by rail rather than road	Shifting 5% freight by rail rather than road	% change refers to proportion of existing road freight switching to rail. Baseline rail freight already built into model. Relies on modest change to status quo road/rail share.
Total Freight Demand	4% reduction in land freight task	5% reduction in land freight task	5% reduction in land freight task	5% reduction in land freight task	6% reduction in land freight task	No change in projections used in Zero Carbon Plan modelling.
Aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	All reductions in comparison to baseline 2018/19. Based on holding 2024/25 levels of flights.
Cruise ship emissions	Cruise emissions reduce by 20%	Cruise emissions reduce by 25%	Cruise emissions reduce by 30%	Cruise emissions reduce by 35%	Cruise emissions reduce by 40%	All reductions in comparison to baseline 2018/19. Target relies upon International Maritime Organisation meeting 20-30% gross reduction target by 2030, and 40% gross reduction by 2050.
Marine emissions	Marine emissions reduce by 20%	Marine emissions reduce by 25%	Marine emissions reduce by 30%	Marine emissions reduce by 35%	Marine emissions reduce by 40%	All reductions in comparison to baseline 2018/19. Target relies upon IMO meeting 20-30% gross reduction target by 2030, and 40% gross reduction by 2050.
Heavy vehicle EV share	Electrify 1% of heavy vehicle fleet	Electrify 2% of heavy vehicle fleet	Electrify 6% of heavy vehicle fleet	Electrify 13% of heavy vehicle fleet	Electrify 18% of heavy vehicle fleet	Aligns with national level projections included in the ERP2

Light vehicle EV share	Electrify 10% of light vehicle fleet	Electrify 21% of light vehicle fleet	Electrify 39% of light vehicle fleet	Electrify 58% of light vehicle fleet	Electrify 73% of light vehicle fleet	Projections updated in line with updated national level projections in ERP2.
Vehicle fuel efficiency	ICE vehicle fuel efficiency to improve by 5%	ICE vehicle fuel efficiency to improve by 6.3%	ICE vehicle fuel efficiency to improve by 7.5%	ICE vehicle fuel efficiency to improve by 8.8%	ICE vehicle fuel efficiency to improve by 10%	Changes in efficiency in comparison to baseline 2018/19. No change in projections.
Coal	Phase out coal use	Phase out coal use	Phase out coal use	Phase out coal use	Phase out coal use	Major institutions in Dunedin have committed to switching from coal use, with Dunedin Energy Centre, and all schools now using alternatives for space heating.
Stationary LPG	42% reduction in stationary LPG use	64% reduction in stationary LPG use	84% reduction in stationary LPG use	85% reduction in stationary LPG use	85% reduction in stationary LPG use	All reductions in comparison to baseline 2018/19. Projections refined from 2023, to reflect differing uses of stationary LPG across commercial/industry/and residential. Assumes almost all buildings and households switch from LPG to low emissions alternatives by 2050. LPG use for process heat is more challenging to displace.
Stationary diesel	23% reduction in stationary diesel use	29% reduction in stationary diesel use	40% reduction in stationary diesel use	41% reduction in stationary diesel use	42% reduction in stationary diesel use	All reductions in comparison to baseline 2018/19. Projections refined from 2023, to reflect differing uses of stationary diesel across commercial/industry/and residential. While there is reduced central government funding, there are still incentives for building/asset owners to decarbonise stationary energy. Stationary diesel use for process heat is more challenging to displace.
Energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	No change in projections to 2030.
Solar	Increased uptake of solar	Increased uptake of solar	Increased uptake of solar	Increased uptake of solar	10% of north facing household rooftops with solar PV. 10% of available commercial/industrial roof area with solar PV.	Based on modest uptake of residential rooftop solar PV, modest commercial/industrial uptake.
National electricity grid	92% renewable grid	98% renewable grid	98% renewable grid	98% renewable grid	98% renewable grid	Based on MBIE projections for mix of electricity, along with anticipated additional electricity demand through more widespread electrification.
IPPU Emissions	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	All reductions in comparison to baseline 2018/19. Amended to account for significant reduction in IPPU emissions up to FY25, with FY25 levels held through to 2050.
Agricultural emissions – nitrous oxide	21% reduction in agricultural nitrous oxide emissions	23% reduction in agricultural nitrous oxide emissions	25% reduction in agricultural nitrous oxide emissions	26% reduction in agricultural nitrous oxide emissions	27% reduction in agricultural nitrous oxide emissions	All reductions in comparison to baseline 2018/19. Based on national projections for agriculture emissions in ERP2, taking into account changes in Dunedin from FY19 to FY25.
Sequestration	22% increase in sequestration	50% increase in sequestration	50% increase in sequestration	59% increase in sequestration	68% increase in sequestration	All increases in comparison to sequestration in 2018/19. The total extent of forestry cover within Dunedin is forecast to increase, with the carbon sequestration per annum modelled based on trends between 2018/19-2024/25, and ERP2 modelling on the increase in forestry cover through to 2050 downscaled to Dunedin.

High Ambition Scenario – All other greenhouse gases target

Area	2030	2035	2040	2045	2050	Rationale for Scenario
Gross emissions	**742,000 tCO2e**	**644,000 tCO2e**	**572,000 tCO2e**	**512,000 tCO2e**	**497,000tCO2e**	30% Gross emissions reduction by 2030. 53% gross emissions reduction by 2050.
Net emissions	**303,000 tCO2e**	**103,000 tCO2e**	**30,000 tCO2e**	**- 63,000 tCO2e**	**- 113,000 tCO2e**	Net zero achieved approximately 2042
Light vehicle travel demand	Light vehicle travel demand reduces 14% per capita	Light vehicle travel demand reduces 17% per capita	Light vehicle travel demand reduces 20% per capita	Light vehicle travel demand reduces 24% per capita	Light vehicle travel demand reduces 25% per capita	Changes in comparison to 2018/19 baseline. Assumes increasing urban densification leads to moderate vehicle kilometres travelled reductions by 2050.
Cycling	8% of trips done by bike	9% of trips done by bike	11% of trips done by bike	15% of trips done by bike	18% of trips done by bike	Baseline 2018/19 trip share approx. 2%. Assumes significantly higher active transport share than 2024/25, with 2050 target aligning with 2030 Zero Carbon Plan target.
Walking	20% of trips done by walking	21% of trips done by walking	22% of trips done by walking	24% of trips done by walking	25% of trips done by walking	Baseline 2018/19 trip share approx. 10%. Assumes walking trip share increases significantly on 2024/25 levels.
Public Transport	8% of trips done by public transport	11% of trips done by public transport	13% of trips done by public transport	14% of trips done by public transport	18% of trips done by public transport	Baseline 2018/19 trip share approx. 3%. Assumes Public Transport patronage by 2050 gets to Zero Carbon plan target of 18% of all trips by PT.
Rail/Road Freight Share	Shifting 5% freight by rail rather than road	Shifting 6% freight by rail rather than road	Shifting 7% freight by rail rather than road	Shifting 9% freight by rail rather than road	Shifting 10% freight by rail rather than road	% change refers to proportion of existing road freight switching to rail. Baseline rail freight already built into model. Relies on moderate change to status quo road/rail share, which could be achieved via progression of inland port proposal/s.
Total Freight Demand	4% reduction in land freight task	5% reduction in land freight task	5% reduction in land freight task	5% reduction in land freight task	6% reduction in land freight task	No change in projections used in Zero Carbon Plan modelling.
Aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	30% reduction in aviation emissions	All reductions in comparison to baseline 2018/19. Based on holding 2024/25 levels of flights.
Cruise ship emissions	Cruise emissions reduce by 20%	Cruise emissions reduce by 25%	Cruise emissions reduce by 30%	Cruise emissions reduce by 35%	Cruise emissions reduce by 40%	All reductions in comparison to baseline 2018/19. Target relies upon International Maritime Organisation meeting 20-30% gross reduction target by 2030, and 40% gross reduction by 2050.
Marine emissions	Marine emissions reduce by 20%	Marine emissions reduce by 25%	Marine emissions reduce by 30%	Marine emissions reduce by 35%	Marine emissions reduce by 40%	All reductions in comparison to baseline 2018/19. Target relies upon IMO meeting 20-30% gross reduction target by 2030, and 40% gross reduction by 2050.
Heavy vehicle EV share	Electrify 2% of heavy vehicle fleet	Electrify 6% of heavy vehicle fleet	Electrify 13% of heavy vehicle fleet	Electrify 18% of heavy vehicle fleet	Electrify 18% of heavy vehicle fleet	Based on being 5 years ahead of ERP2 targets (ie achieve 2035 EV % in ERP2 by 2030).
Light vehicle EV share	Electrify 21% of light vehicle fleet	Electrify 39% of light vehicle fleet	Electrify 58% of light vehicle fleet	Electrify 73% of light vehicle fleet	Electrify 73% of light vehicle fleet	Based on being 5 years ahead of ERP2 targets (ie achieve 2035 EV % in ERP2 by 2030).

Vehicle fuel efficiency	ICE vehicle fuel efficiency to improve by 5%	ICE vehicle fuel efficiency to improve by 6.3%	ICE vehicle fuel efficiency to improve by 7.5%	ICE vehicle fuel efficiency to improve by 8.8%	ICE vehicle fuel efficiency to improve by 10%	Changes in efficiency in comparison to baseline 2018/19. No change in projections.
Coal	Phase out coal use	Phase out coal use	Phase out coal use	Phase out coal use	Phase out coal use	Major institutions in Dunedin have committed to switching from coal use, with Dunedin Energy Centre, and all schools now using alternatives for space heating.
Stationary LPG	42% reduction in stationary LPG use	64% reduction in stationary LPG use	84% reduction in stationary LPG use	85% reduction in stationary LPG use	85% reduction in stationary LPG use	All reductions in comparison to baseline 2018/19. Projections refined from 2023, to reflect differing uses of stationary LPG across commercial/industry/and residential. Assumes almost all buildings and households switch from LPG to low emissions alternatives by 2050. LPG use for process heat is more challenging to displace.
Stationary diesel	23% reduction in stationary diesel use	29% reduction in stationary diesel use	40% reduction in stationary diesel use	41% reduction in stationary diesel use	42% reduction in stationary diesel use	All reductions in comparison to baseline 2018/19. Projections refined from 2023, to reflect differing uses of stationary diesel across commercial/industry/and residential. While there is reduced central government funding, there are still incentives for building/asset owners to decarbonise stationary energy. Stationary diesel use for process heat is more challenging to displace.
Energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	Improvements in energy efficiency	
Solar	Increased uptake of solar	Increased uptake of solar	Increased uptake of solar	Increased uptake of solar	25% of north facing household rooftops with solar PV. 50% of available commercial/industrial roof area with solar PV.	High ambition scenario based on widespread uptake of residential, commercial and industrial uptake of rooftop solar PV through to 2050.
National electricity grid	92% renewable grid	98% renewable grid	98% renewable grid	98% renewable grid	98% renewable grid	Based on MBIE projections for mix of electricity, along with anticipated additional electricity demand through more widespread electrification.
IPPU Emissions	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	38% reduction in IPPU	All reductions in comparison to baseline 2018/19. Amended to account for significant reduction in IPPU emissions up to FY25, with FY25 levels held through to 2050.
Agricultural emissions – nitrous oxide	21% reduction in agricultural nitrous oxide emissions	23% reduction in agricultural nitrous oxide emissions	25% reduction in agricultural nitrous oxide emissions	26% reduction in agricultural nitrous oxide emissions	27% reduction in agricultural nitrous oxide emissions	All reductions in comparison to baseline 2018/19. Based on national projections for agriculture emissions in ERP2, taking into account changes in Dunedin from FY19 to FY25.
Sequestration	22% increase in sequestration	50% increase in sequestration	50% increase in sequestration	59% increase in sequestration	68% increase in sequestration	All increases in comparison to sequestration in 2018/19. The total extent of forestry cover within Dunedin is forecast to increase, with the carbon sequestration per annum modelled based on trends between 2018/19-2024/25, and ERP2 modelling on the increase in forestry cover through to 2050 downscaled to Dunedin.

Biogenic Methane Emissions Modelling

Area	2030	2035	2040	2045	2050	Rationale for Scenario
Gross emissions	**466,000 tCO2e**	**435,000 tCO2e**	**419,000 tCO2e**	**409,000 tCO2e**	**403,000 tCO2e**	
% reduction compared with 2018/19	**16%**				**27%**	
Food, garden and timber waste	95% diversion of *divertable* food, garden and timber waste	95% diversion of *divertable* food, garden and timber waste	95% diversion of *divertable* food, garden and timber waste	95% diversion of *divertable* food, garden and timber waste	95% diversion of *divertable* food, garden and timber waste	Assume 2030 waste diversion rates held through to 2050.
Paper waste	80% diversion of *divertable* paper waste	80% diversion of *divertable* paper waste	80% diversion of *divertable* paper waste	80% diversion of *divertable* paper waste	80% diversion of *divertable* paper waste	Assume 2030 waste diversion rates held through to 2050.
Landfill management	Improved landfill gas capture	Improved landfill gas capture	Improved landfill gas capture	Improved landfill gas capture	Improved landfill gas capture	No change in projections
Total waste	10% reduction in per capita waste	10% reduction in per capita waste	10% reduction in per capita waste	10% reduction in per capita waste	10% reduction in per capita waste	Assume 2030 per capita waste rates held through to 2050.
Wastewater	At minimum, no increase in per capita emissions from wastewater	At minimum, no increase in per capita emissions from wastewater	At minimum, no increase in per capita emissions from wastewater	At minimum, no increase in per capita emissions from wastewater	At minimum, no increase in per capita emissions from wastewater	No change in projections.
Agriculture emissions - methane	9% reduction in agricultural methane emissions	13% reduction in agricultural methane emissions	17% reduction in agricultural methane emissions	20% reduction in agricultural methane emissions	23% reduction in agricultural methane emissions	Based on national projections for agriculture emissions in ERP2, taking into account changes in Dunedin from FY19 to FY25, and the share of sheep and beef farms vs dairy farms within Dunedin.