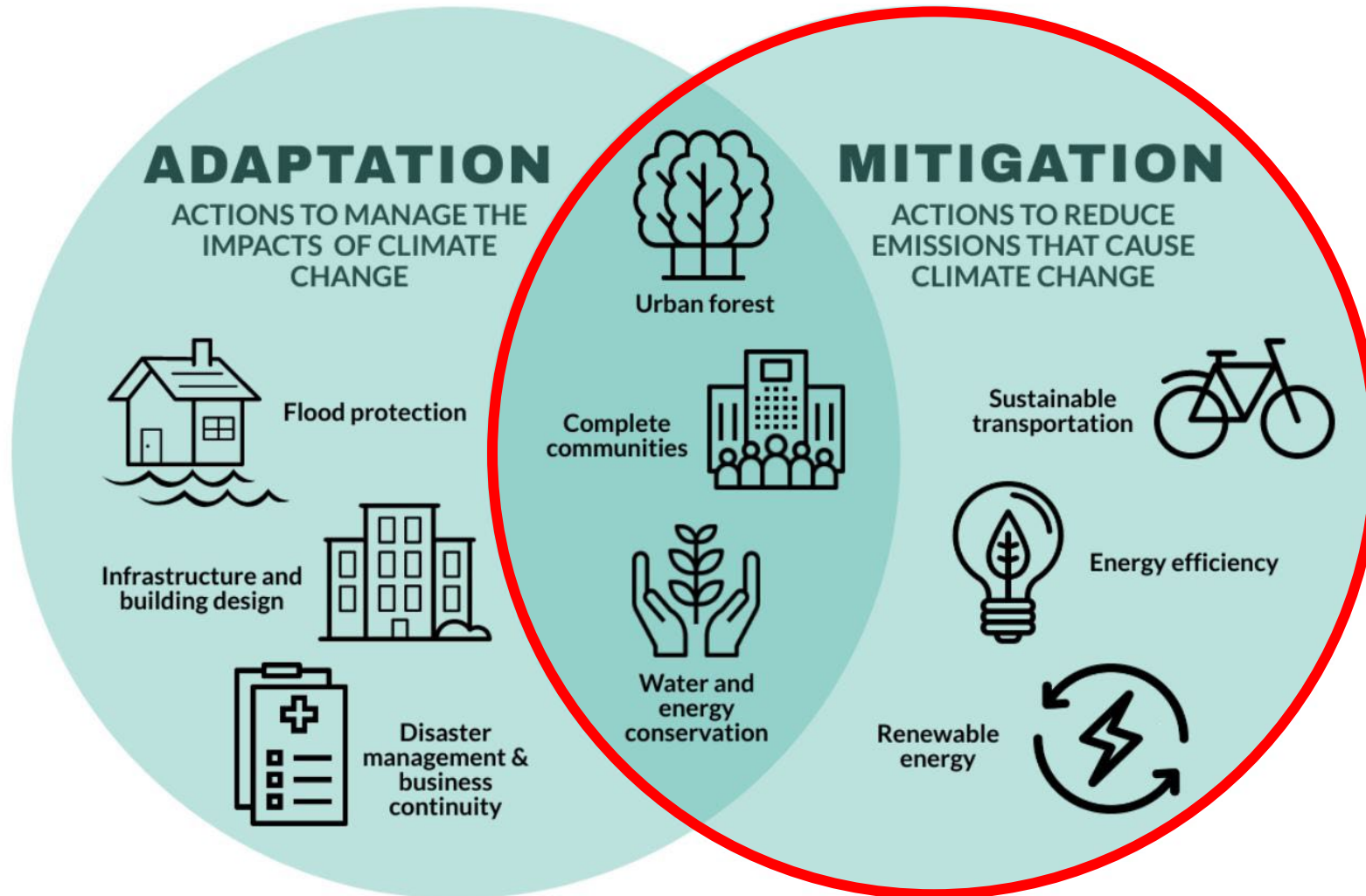




# Council Workshop: Emissions Modelling

14 April 2025

# Climate change has two faces



# Dunedin vs DCC emissions

- The DCC's Zero Carbon Policy directs that the organisation measure and aim to reduce emissions at two scales:
  - City-wide (**Dunedin** emissions)
  - Organisational (**DCC** emissions)
- As most of the DCC's activities occur within the Dunedin boundary, there is overlap between DCC and city-wide emissions.
  - However, the **key emissions sources** and **quantity of emissions** differ significantly between the two scales.

# Modelling is being updated

1. To support Council decision-making, in line with OAG guidance and in response to January 28<sup>th</sup> Council resolution:

*"Requests an update report from the CEO at the 9 year plan 2025-2034 deliberations meeting in May 2025. The report is to include:*

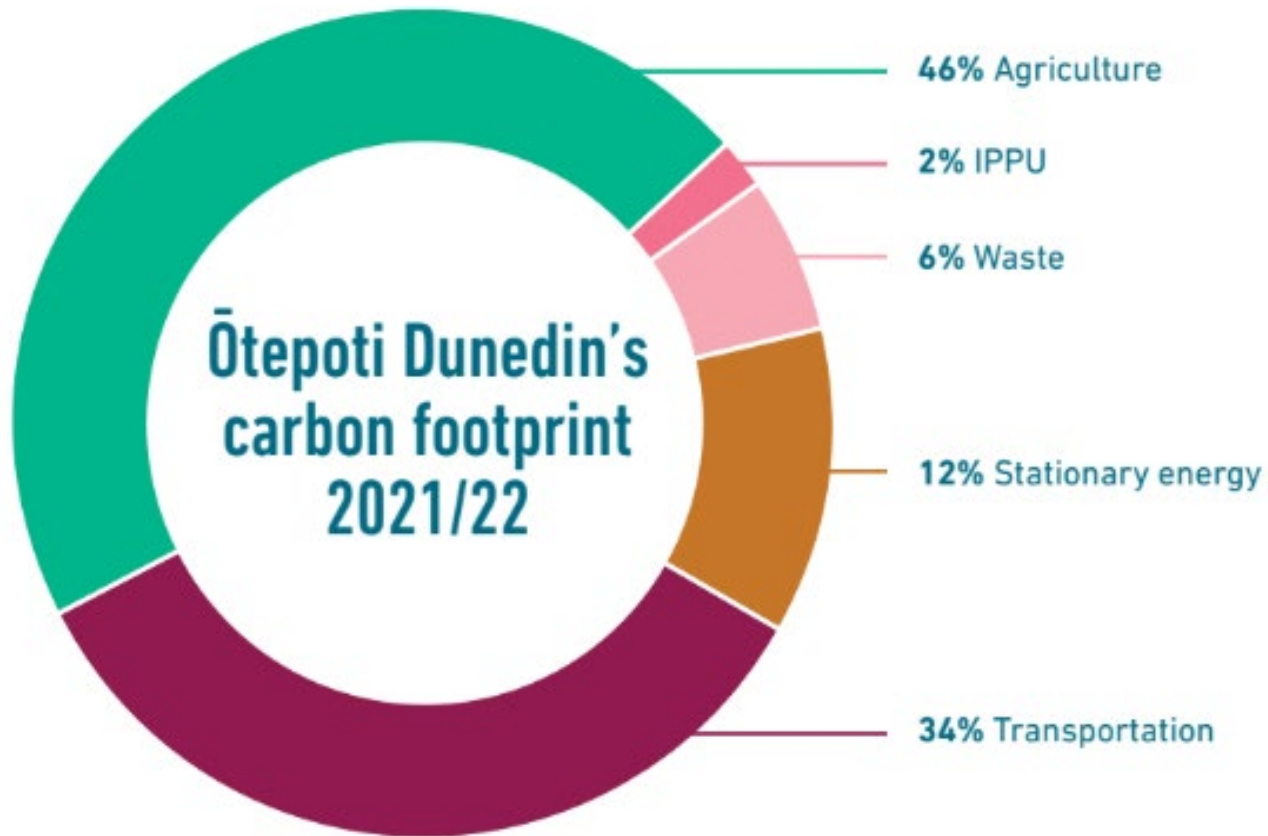
- 1. Modelling of the Zero Carbon impacts of the draft budget*
- 2. Alignment of the Council's position and OAG advice"*

2. (For DCC emissions), to enable the DCC to meet obligations under the LGFA Climate Action Loans programme



# Part 1: Modelling Dunedin's emissions

# Dunedin's emissions in 2021/22

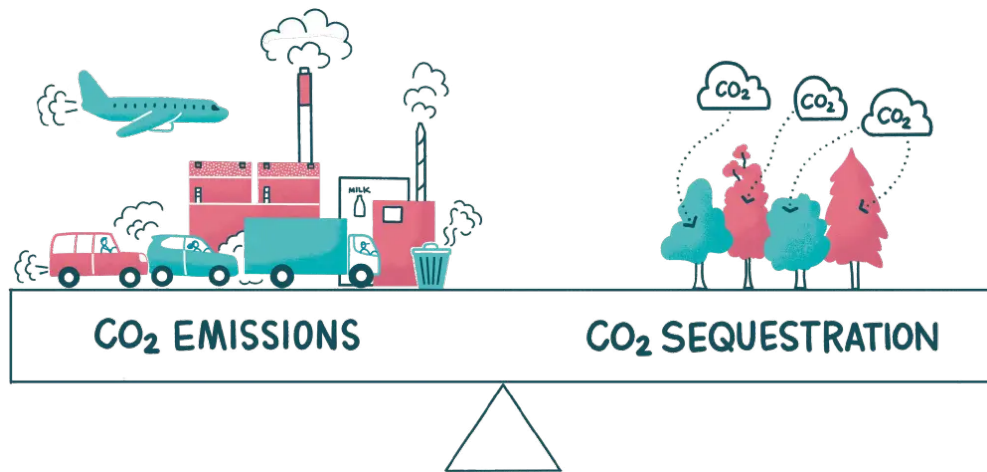


Gross: 1,542,500 tCO<sub>2</sub>e  
– Sequestered: (493,170 tCO<sub>2</sub>e)  

---

Net: **1,049,330 tCO<sub>2</sub>e**

# Dunedin's targets



1

**Net zero carbon by 2030**  
(excluding biogenic methane):

**Net zero carbon** means that any **greenhouse gases** (excluding biogenic methane) emitted into the atmosphere in Dunedin are **in balance** with the amount of carbon absorbed out of the atmosphere by trees, also known as **sequestration**.

2

**Reducing biogenic methane emissions**

The city's **biogenic methane** reduction targets are the same as the central government targets:

- **10% reduction** from 2017 levels by 2030.
- **24-47% reduction** from 2017 levels by 2050.

# Zero Carbon Plan (2023) modelling

Reductions to  
achieve the  
'net zero  
carbon' part  
of the target



## Agriculture N<sub>2</sub>O

2030: ↓11%

(↓3% between 18/19 and 21/22)



## IPPU

2030: ↓15%

(↓1% between 18/19 and 21/22)



## Transport

2030: ↓42%

(↓16% between 18/19 and 21/22)



## Stationary energy

2030: ↓61%

(↓12% between 18/19 and 21/22)



## Sequestration

2030: ↑64%

(↑36% between 18/19 and 21/22)

# Zero Carbon Plan (2023) modelling

Reductions to  
achieve the  
**biogenic  
methane**  
target



**Agriculture CH<sub>4</sub>**

**2030: ↓11%**

(↓3% between 18/19 and 21/22)



**Waste**

**2030: ↓37%**

(↓13% between 18/19 and 21/22)

# Changes in context since 2023

Zero Carbon Plan set out how modelled reductions could be achieved through interrelated changes and actions grouped into five chapters:

Resource Use and Waste

Transport and Urban Form

Buildings, Energy & Industry

Forestry, Land Use & Agriculture

Communities and Economies

*“...net zero emissions by 2030 is possible if organisations, businesses and communities in Ōtepoti Dunedin collectively pull **all the available levers as hard as possible** to achieve the scale of change required.”*

- Since 2023 there have been changes in context across all five chapters.

# Modelling assumptions/limitations

- Modelling is **preliminary**.
  - External peer review is underway.
  - Still waiting on information for some data sources.
- Modelling is based on **current Central Government policy** settings.
  - These are key drivers of the model and are subject to change, particularly following elections.
- Modelling **reflects draft 9-year plan to the extent possible** at the scale the model operates.
  - Assumptions have been made around what might be achieved by the projects in the plan. More granular modelling of the impact of individual projects is not possible.
- Dunedin's **most recent emissions inventory** (2021/22) has been built into the modelling.
  - An updated inventory using 2024/25 data (anticipated to be available in late 2025) will provide a much stronger starting point for projections.

# Changes: Resource Use and Waste

| What has changed?  | What does it mean?  | Impact on modelled emissions       |
|--|---|------------------------------------|
| <p><u>Less Central Govt focus on:</u></p> <ul style="list-style-type: none"><li>• <b>Circular economy</b></li><li>• Community and <b>behaviour change</b></li></ul> <p><u>Main Central Govt focus is on:</u></p> <ul style="list-style-type: none"><li>• <b>Landfill</b> and <b>resource recovery</b> infrastructure</li></ul> | <ul style="list-style-type: none"><li>• DCC investment in <b>Waste Futures</b> is broadly continuing as planned</li><li>• <b>Some challenges</b> to divert waste streams such as construction and demolition waste</li><li>• BUT DCC and community/industry still collaborating on <b>shared solutions</b> and Central Govt revenue streams remain in place</li></ul> | <p><b>No change</b> since 2023</p> |

# Changes: Transport & Urban Form

| What has changed?   | What does it mean?   | Impact on modelled emissions  |
|---|--|---|
| <p><u>Fewer Central Govt incentives:</u></p> <ul style="list-style-type: none"><li>• No subsidies for most active and public transport improvements</li><li>• Removal of Clean Car Discount Scheme</li><li>• No plans to expand rail freight share/promote coastal shipping</li></ul> <p><u>More Central Govt focus on:</u></p> <ul style="list-style-type: none"><li>• Building network of EV chargers</li><li>• Low emissions heavy vehicles</li><li>• Growing tourism</li><li>• Growing 'private share' revenue for public transport</li></ul> <p><u>Improved understanding:</u></p> <ul style="list-style-type: none"><li>• Cruise emissions baseline</li><li>• Shore power at Port Chalmers not feasible</li></ul> | <ul style="list-style-type: none"><li>• Increased cost for pedestrian &amp; cycle improvements (several projects discontinued).</li><li>• Limited funds available to improve public transport services (many planned improvements discontinued). Fare increases.</li><li>• Lower rates of EV ownership projected.</li><li>• Some modelled emissions reductions will not be realised (no shift to rail/shipping, no shore power) under current settings.</li><li>• Cruise adds ~50,000tCO<sub>2</sub>e to 2018/19 baseline.</li></ul> | <p><b>On road transport emissions</b> in 2030 are modelled to be between <b>100,000 to 150,000tCO<sub>2</sub>e higher</b> than when modelled in 2023</p> <p><b>Marine emissions</b> (including cruise) in 2030 modelled to be approximately <b>70,000tCO<sub>2</sub>e higher</b> than when modelled in 2023</p> |

# Changes: Buildings, Energy & Industry

| What has changed?   | What does it mean?   | Impact on modelled emissions   |
|---|--|--|
| <p><u>Slower decarbonisation of National Grid:</u></p> <ul style="list-style-type: none"><li>• NZ Battery Project (Lake Onslow) discontinued</li><li>• Tiwai Point smelter retained</li><li>• Central Govt replaced 2030 target of a 100% renewable grid, with a 2040 target to double renewable energy generation</li></ul> <p><u>Less support for industry/building decarbonisation:</u></p> <ul style="list-style-type: none"><li>• GIDI fund discontinued</li><li>• Other commercial heating funds discontinued</li></ul> <p><u>Less gas available:</u></p> <ul style="list-style-type: none"><li>• Yield from Taranaki gas fields lower than anticipated</li></ul> | <ul style="list-style-type: none"><li>• Higher electricity emissions are anticipated, with the grid forecast to be 94% renewable by 2030, BUT electrification is still the lowest emissions option.</li><li>• Fewer incentives for business/industry to decarbonise, but all schools and most large institutions in Dunedin have decarbonised/are on track to decarbonise their space heating</li><li>• Higher LPG prices likely to drive switch to alternatives</li></ul> | <p><b>Electricity emissions</b> in 2030 modelled to be approximately <b>30,000tCO<sub>2</sub>e higher</b> than when modelled in 2023</p> |

# Changes: Forestry, Land Use & Agriculture

| What has changed?   | What does it mean?  | Impact on modelled emissions  |
|---|---|---|
| <p><u>Central Govt delay in:</u></p> <ul style="list-style-type: none"><li>• Entry of agriculture into <b>ETS</b> until 2030</li></ul> <p><u>More Central Govt focus on:</u></p> <ul style="list-style-type: none"><li>• <b>Tools and technology</b> in food and fibre production</li><li>• Net emissions and <b>planting trees</b> to meet target</li><li>• Limiting highly productive <b>farmland</b> being converted to forestry</li></ul> <p><u>Improved understanding:</u></p> <ul style="list-style-type: none"><li>• Detailed estimation of sequestration in Dunedin (2030/2035)</li></ul> | <ul style="list-style-type: none"><li>• In the short to mid-term, the emissions trajectory for agriculture is largely unchanged</li><li>• Harvest intentions of major Dunedin foresters, as well as projections of additional areas planted using ERP2 estimates of conversions of sheep/beef farms to forestry show lower levels of sequestration by 2030 than previously anticipated.</li></ul> | <p>The estimated 11% reduction in <b>agriculture emissions</b> by 2030 is <b>unchanged</b>.</p> <p>More detailed modelling estimates <b>forestry will absorb</b> 100,000tCO<sub>2</sub> less than in 2021/22, and <b>200,000tCO<sub>2</sub> less than was modelled in 2023</b>.</p> |

# Changes: Communities and Economies

| What has changed?   | What does it mean?   | Impact on modelled emissions   |
|---|--|--|
| <p><u>Change in general economic climate</u></p> <p><u>Momentum in partnerships:</u></p> <ul style="list-style-type: none"> <li>• Zero Carbon Alliance well established and expanding</li> <li>• DCHL Carbon Roadmap underway</li> <li>• Staff connected with/supporting other sector groups that are organising around transition (e.g. ag, tourism)</li> </ul> <p><u>Momentum in supporting business to transition:</u></p> <ul style="list-style-type: none"> <li>• DCC Procurement Emissions Standards well established</li> <li>• Zero Carbon business support programme in phase 2 pilot</li> </ul> | <ul style="list-style-type: none"> <li>• Reduced capacity for DCC investment</li> <li>• Opportunities to build on strong relationships / realise emissions reduction through collaboration</li> <li>• Actions that reduce household/business costs are more attractive, BUT increased need for supports to overcome upfront investment costs for other emissions reduction actions.</li> </ul> | <p>Impact across all emissions sources reflected in scenarios modelled</p> |

# Changes: Dunedin's advantages

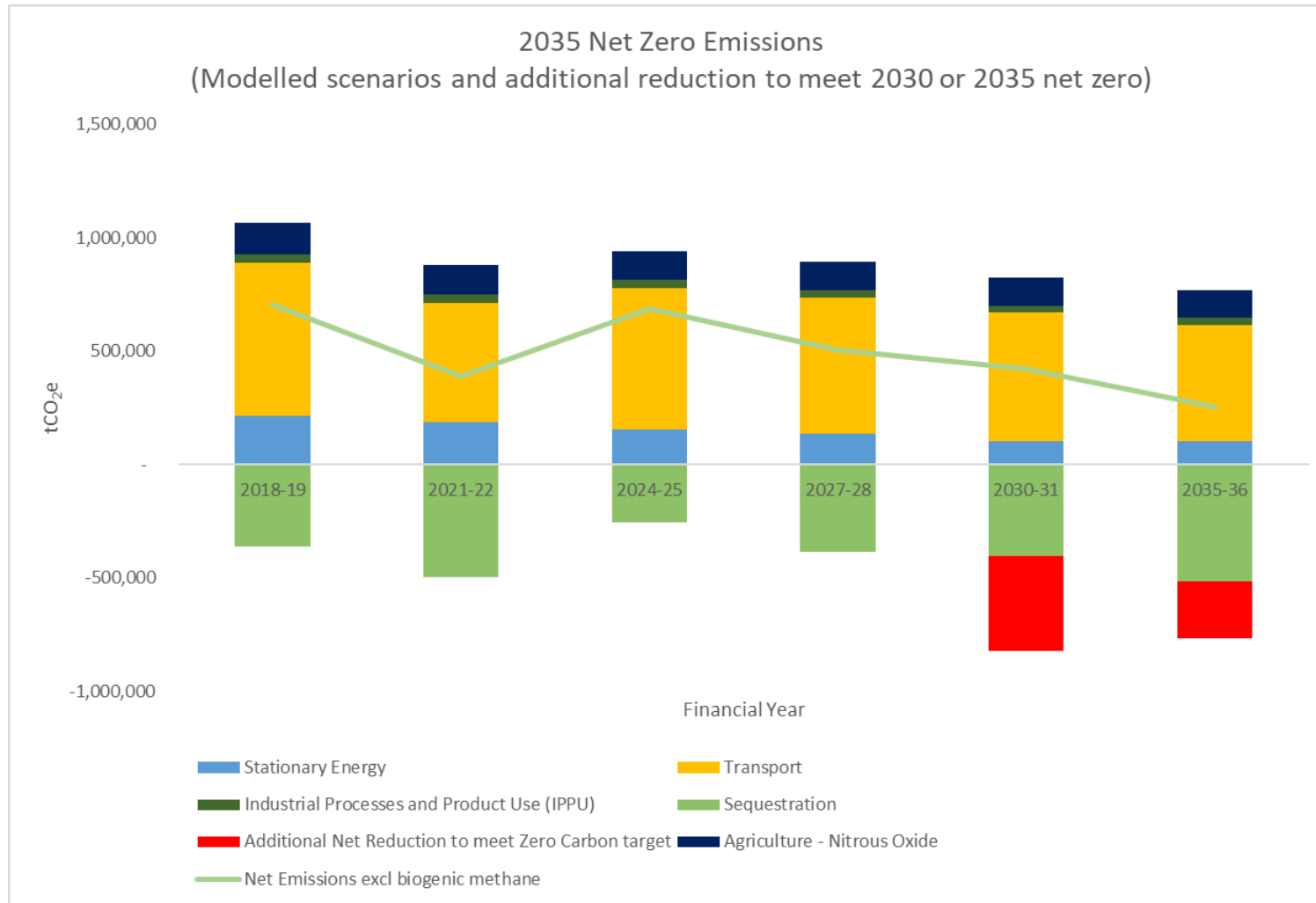
**Despite headwinds, Dunedin is still comparatively well placed to tackle the challenge:**

- Strong partnerships in place with major institutions/employers
- 2<sup>nd</sup> lowest VKT per capita of NZ cities
- Above average rate of EV ownership
- About double national average for walking to work or education
- Urban densification in inner city underway
- Large land area/significant forest cover
- Phasing down coal and gas well underway
- Reducing waste emissions underway
- Strong uptake in rooftop solar
- The costs of EVs, solar panels, hot water heat pumps, and other technologies continues to decline

# Modelling update: 'net zero' part of target

- Emissions have been modelled through to 2035.
- Two emissions scenarios for the 'net zero carbon' target have been modelled:
  - A **BAU** scenario, which broadly follows national level trajectories included in the Emissions Reduction Plan 2 (2026-2030) modelling
  - An **accelerated ambition** scenario. Achievement of this scenario would require some changes in Central Government policy setting (though not radical 180-degree shifts) and additional local investment

# Preliminary results – BAU scenario



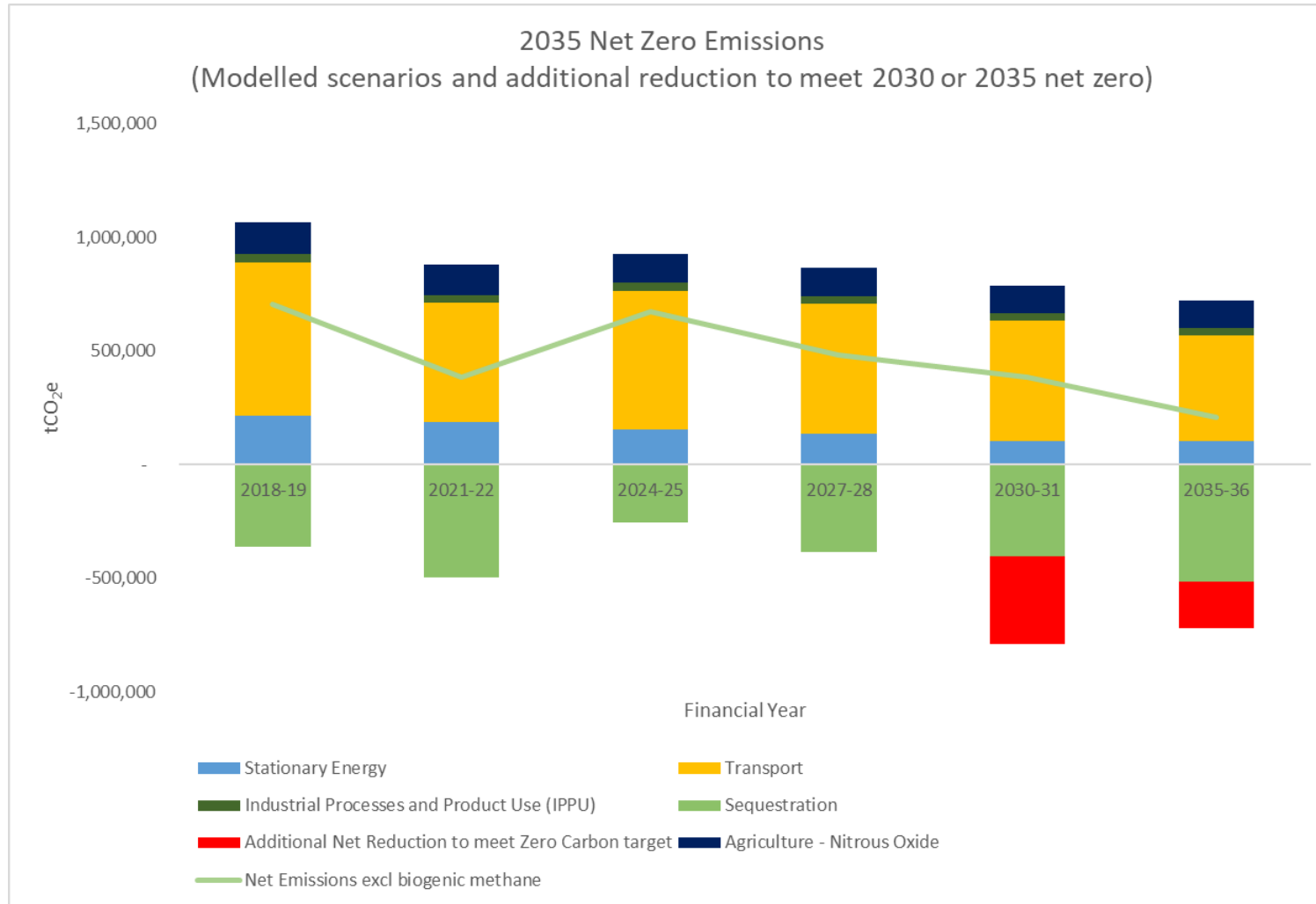
## Net emissions

**2030/31: 420,000tCO<sub>2</sub>e**

**2035/36: 255,000tCO<sub>2</sub>e**

Additional reduction required to meet net zero is shown in red.

# Preliminary results – accelerated ambition scenario



## Net emissions

**2030/31: 384,000tCO<sub>2</sub>e**

**2035/36: 206,000tCO<sub>2</sub>e**

Additional reduction required to meet net zero is shown in red.

# Modelling update: biogenic methane

There has been little to no change in the emissions modelled for agriculture and waste

- Dunedin city is **still anticipated to meet the 2030 10% reduction in biogenic methane target**

# Implications for the Zero Carbon Plan?

To become a Zero Carbon city (or to reduce emissions in line with any target),  
Dunedin will **still** need to...

Use resources in a  
more circular way

Divert more waste  
from landfill

Improve landfill  
and wastewater  
management

Switch to low carbon  
energy sources

Improve energy  
efficiency of buildings  
and industry

Increase local  
renewable generation

Reduce emissions  
from refrigerants

Nurture low  
emissions urban  
form

Target closer  
visitor markets,  
encourage local  
destinations,  
and inspire  
longer stays

Unlock remote  
solutions

Develop  
convenient and  
attractive cycling  
and walking  
networks and  
public transport  
services

Reduce emissions  
from agriculture

Grow sequestration  
that aligns with  
mana whenua and  
community values

Emphasis on  
sequestration depends  
on relative focus on  
net target vs gross  
reduction

Boost travel  
demand  
management to  
support use of  
active and  
public modes

Shift freight to low  
emissions modes

Electrify light  
vehicles

Decarbonise heavy  
vehicles, marine  
and aviation

Build resilient  
and connected  
communities, including  
by enabling local food,  
resource sharing,  
and access to local  
amenities

Foster  
collaboration,  
partnership, and  
systems change to  
unlock opportunities  
and promote a  
cohesive  
transition

Support innovation  
and grow diverse low  
carbon sectors and  
businesses

Support businesses  
and sectors to reduce  
emissions from their  
operations

# Priority action areas for Dunedin City Council

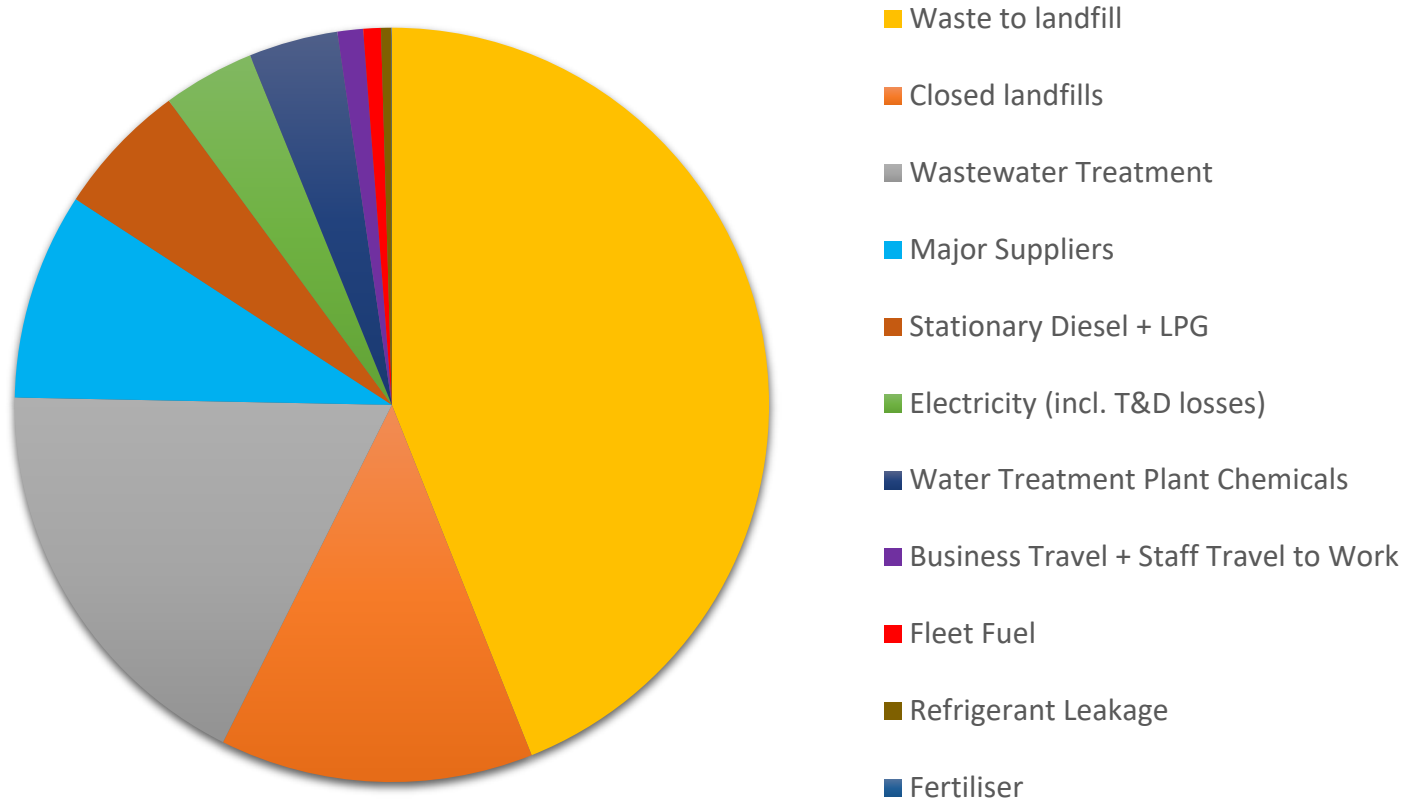




# Part 2: Modelling the DCC's emissions

# DCC's emissions in 2023/24

Total 2023/24 DCC Emissions = 57,487tCO<sub>2</sub>e



# DCC target and modelling

- DCC's most recent **Emissions Management and Reduction Plan (EMRP)** was adopted by ELT in June 2024, noted by Council in July 2024.
- It reconfirmed a 2030/31 target:
  - **Reduce** DCC emissions **by 42%** compared with baseline (2018/19)
  - Set with reference to Council's guiding principles for the work programme and best practice (GHG protocol; Science-based targets; LGFA)
- At the time, DCC's estimated emissions were projected to **decrease by 38%** by 2030/31, just short of the 42% reduction target
- Since 2024, there have been some relevant changes in context.

# Modelling assumptions/limitations

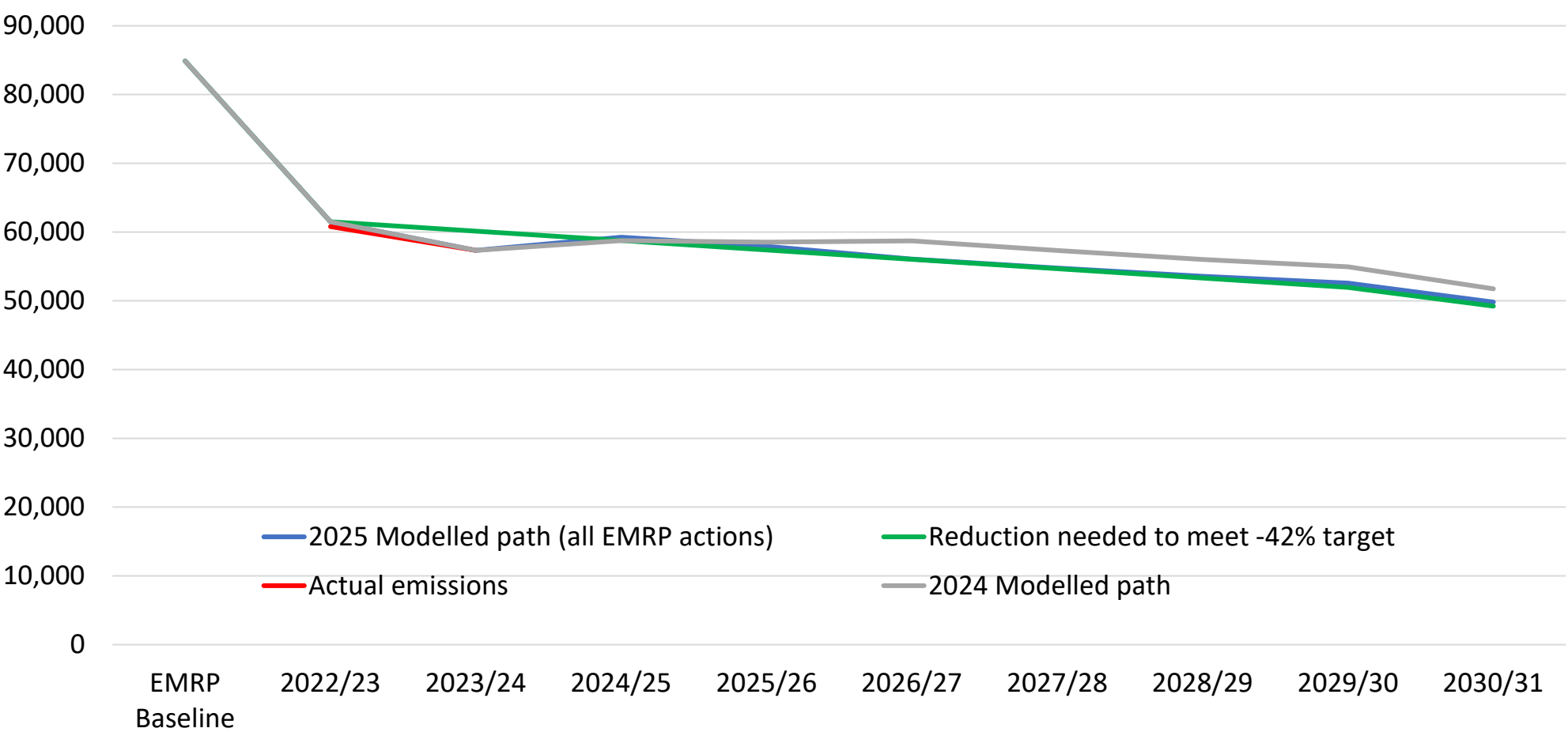
- Reflects draft 9 year plan
- Assumes that the scope of the DCC's current inventory doesn't change significantly (e.g. assumes 3 Waters continued to be managed in-house; assumes CCOs continue to be excluded from DCC inventory). Any change to this would result in re-baselining and further updates to modelling.

# Changes: DCC emissions

| What has changed?  | How has it changed?   | Impact on emissions                |
|--|---|------------------------------------|
| <b>Waste to landfill</b> emissions   | <p>Actual emissions have reduced more than expected as a result of investment to date.</p> <p>Forecast to continue to reduce through FOGO collection, upgrades to gas capture/destruction infrastructure.</p> | <b>Significant positive impact</b> |
| <b>Wastewater treatment plant</b> emissions  | Actual emissions were higher using real time data.  | <b>Moderate negative impact</b>    |
| Decarbonisation of:<br><b>Moana Pool</b><br><b>Biosolids and Tahuna sludge incinerator</b> | Scope of decarbonisation projects now smaller than anticipated.   | <b>Moderate negative impact</b>    |
| <b>Fleet fuel</b><br><b>Staff travel to work</b>   | Fewer EV incentives and active/public transport mode incentives available   | <b>Minor negative impact</b>       |

# Modelling update: DCC emissions

Preliminary modelling suggests DCC is **on track to meet its 2030/31 organisational emissions target.**



# Implications for the EMRP?

- The DCC's EMRP will be updated to reflect projects included in the 9 year plan, and submitted to the LGFA for approval.



# Part 3: Summary & Next Steps

# Modelling summary

- Estimated emissions by 2030 have changed since both the Zero Carbon Plan & EMRP were adopted, due to changes in context and improved understanding:
  - Dunedin target: **'Net zero' element of target very unlikely to be achieved by 2030/31; biogenic methane element of target likely to be achieved by 2030/31**
  - DCC target: **Likely to be achieved by 2030/31**

# Implications summary

- **Zero Carbon Plan:** Despite changes in the 2030 modelling position, Zero Carbon Plan **key shifts** required for the city to reach net zero, and the **action areas** for the DCC to support those shifts **have not changed**
  - **Unlocking shifts in transport** remains fundamental to achieving 'net zero carbon'
  - Current Central Govt policy makes achieving some key shifts/investment in some action areas more challenging (e.g. active/public transport)
  - Options include greater emphasis on **softer interventions** that influence/encourage others' action (e.g. education/support, partnerships, procurement)
- Despite headwinds, Dunedin still remains comparatively well-placed to achieve gross emissions reduction.
- **EMRP:** 9 year plan updates incorporated, otherwise BAU.

# Next steps

- Peer reviewed modelling will be presented to Council in May.
- An updated city-wide emissions footprint up to the end of 2024/25 will be calculated in the second half of 2025. This will provide detailed information on how Dunedin is tracking.
- Should Council wish to revisit the target, staff can support this with:
  - Information on technical considerations (e.g. budget windows)
  - Information on best practice (e.g. focus on gross vs net)
  - Modelling of additional/alternative scenarios (e.g. more emphasis on reducing emissions from x sector)