

MEMO

TO RPS Working Group

FROM Jake Roos

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Options for Setting Regional Greenhouse Gas Reduction Targets – Technical Memo

1. Introduction

Greater Wellington Regional Council (GWRC) is preparing a new Climate Change chapter as part of a change to the Regional Policy Statement for the Wellington Region (RPS), identifying climate change as a significant resource management issue for the region, recognising that almost all local government roles and responsibilities are in some way affected by climate change and/or could influence the achievement of desired climate change outcomes¹.

The RPS is an important regulatory vehicle for establishing clear strategic priorities and a statutory framework that drives the integrated management of those aspects of natural and physical resources that can be addressed under the Resource Management Act to support the mitigation of, and adaptation to, climate change.

GRWC has requested advice on options for setting a greenhouse gas emission reduction target for the Wellington Region, along with an evaluation of the associated pros and cons, and an explanation of the key terms and concepts associated with greenhouse gas reduction methodologies.

2. Approaches for setting greenhouse gas reduction targets

There are three main approaches for setting greenhouse gas reduction targets:

- 1) Top down. These are objective-based. These objectives can be derived from values or necessity. The target is then set at whatever is required to satisfy the objectives, values or necessity. In climate change policy, such top-down targets are often described as ‘science based’, in that they align at a global level with what is required to limit global heating to bounds set by the Paris Agreement. The language of being ‘science-based’ is somewhat misleading as the targets are still values-laden. For example, they ignore differing levels of responsibility for historic emissions, they make a judgement

¹ “How climate change affects local government: A catalogue of roles and responsibilities” Local Government New Zealand, June 2017
<https://www.lgnz.co.nz/assets/Uploads/b1225adc8d/44476-LGNZ-How-climate-change-affects-localgovernment.Pdf>

on the acceptable level of risk associated with an emissions pathway (since an emissions pathway only gives a probability that heating will be within a given limit), and they also implicitly condone the values embodied in the Paris Agreement itself.

- 2) Bottom up. These targets are based on a summation of estimates of everything that those drafting the target think can be achieved, given a certain set of assumptions. The target may or may not align with a desired real-world outcome, such as limiting global heating to within a certain boundary. While arguably this process will result in more 'realistic', attainable targets, they are not necessarily fit for purpose in that they could be insufficient.
- 3) Arbitrary. These targets are not based on anything other than what is expedient for those setting it, and marketability. They do not require any complex analysis to set, but they usually do not serve any purpose other than to give the appearance of action and concern.
- 4) Hybrid. These targets use a combination of the other three approaches described.

3. Considerations for Setting Greenhouse Gas Reduction targets

This section provides explanations of key considerations for setting greenhouse gas reduction targets, explaining some of the key terms and concepts and responding to questions raised by GWRC officers and councillors.

Selecting a base year

A base year refers to the year against which emission reductions will be assessed.

Selection of a base year can make a difference if targets are set in percentage terms relative to that year. If emissions in the base year were high relative to emissions in the present, it can give an illusionary 'head start'. It is illusionary because it is absolute emissions that consume the global carbon budget and cause warming, not percentages. Also, climate science tells us that net emissions must go to zero globally as soon as possible, and be approximately halved from what they were in 2020 by 2030 to limit global heating to 1.5°C with no overshoot. As the global carbon budget is finite, if emissions did not peak and decline rapidly after 2020, emissions will need to be halved sooner to stay within this budget. In short, it is the pathway to net zero from where emissions are currently that matters, not what occurred in the past. That is, if the objective is to get to zero, rather than achieve some other percentage reduction, the choice of base year doesn't matter.

Gross-net accounting

New Zealand's 'Nationally Determined Contribution' or NDC, our international emissions reduction pledge, is a 50% reduction in national emissions by 2030 compared to 2005. It is calculated using so called 'gross-net' accounting. This means that government has not included emissions removals by forestry in its base year (making them 'gross'), but has included them in all subsequent years, (making them 'net', hence the description 'gross-net'), meaning they are considerably lower than the base year. There is no good reason from an accounting perspective to use this approach, it is not an 'apples with apples' comparison, it is not logical, and few other countries in the world use it. The Climate Change Commission uses 'net-net' accounting (that is removals by forestry are included in all years including the base year) for determining its recommended national emissions budgets.

Split gases

The 2019 'Zero Carbon' amendments to the Climate Change Response Act has enshrined a 'split gas' approach to domestic emissions targets in New Zealand law. This means greenhouse gases with a long (100 years+) residence time in the atmosphere, such as carbon dioxide and nitrous oxide have a separate target to biogenic methane, a gas with a relatively short residence time (12 years on average). Biogenic methane is distinguished from fossil methane (commonly known as the fuel 'natural gas'), that comes from leaks in fossil fuel extraction and distribution systems. The warming effect of different gases can be put into the common currency of 'carbon dioxide equivalent or CO₂e' using multiplication factors of their global warming potential, or GWP for short. Most carbon reduction targets and NDCs concern all greenhouse gases expressed in a single total in units of CO₂e. This is not the case for Aotearoa's domestic emissions target.

Under New Zealand law, while long lived gases must be brought to net zero by 2050, biogenic methane, which mainly comes from enteric fermentation in ruminant animals, their effluent, and from landfills, does not. The Zero Carbon Act says that long lived gases must be brought to net zero by 2050, and biogenic methane must be cut from 2017 levels by 10% by 2030 and by between 24% and 47% by 2050.

The Paris Agreement is written on the basis of all gases being brought to net zero, essentially meaning residual biogenic methane emissions must be compensated for by CO₂ removals from the atmosphere. This has created a disconnection between NZ's NDC, which is evaluated from an 'all gases' perspective, and the domestic targets. While NZ's targets for long-lived gases may well be 1.5°C-consistent or close to it, when coupled with the dead weight of our residual biogenic emissions, the combined national target is much weaker. This is illustrated in Figure 1 below.

Figure 1: Aotearoa NZ emissions MtCO₂e

ERP budgets by sector (MtCO ₂ e)	2019	ERP 2031-35 yearly average	Reduction
Transport	16.2	11.4	30%
Energy and Industry	21.4	12.7	41%
Agriculture	39.6	36.6	8%
Waste & F gases	5.1	2.5	50%
Forestry	-7.4	-16.3	-121%
Total	74.9	46.8	37%
Total without agriculture	35.3	10.2	71%

The government's separate, different treatment of biogenic methane is based on the fact that reduction in the rate of methane emissions can bring about global cooling, all other things being equal, by virtue of its shorter atmospheric residence time. The New Zealand government considers the projected cooling effect from achieving its biogenic methane targets to be sufficient. But from a global, 'all-gases' perspective, this is not a sufficient contribution to limiting global heating to 1.5°C.

This gives rise to the situation of NZ supposedly needing to buy offshore mitigation (international carbon offsets) to meet its NDC, but not needing this to meet its domestic targets/budgets.

Relationship between sectors

Sector targets for emissions reduction can be traded off against each other at a national or regional level. It is not necessary for every sector's target to follow the science-based reduction pathway for the county's combined target to be science-based. Instead, authorities may choose to have one sector reduce more and another less for strategic or practical reasons, for example if a sector has more potential for lower-cost abatement than another.

Source inclusions

National greenhouse gas inventories are constructed on a geographic basis – sources emitting from within a country's borders are included. International aviation and shipping are excluded. Great pains are taken to avoid double counting emissions, which is reasonable as global emissions totals are determined by adding national inventories together. However, this approach neglects the influence that different players around the world have on emissions. Often responsibility for emissions is shared between its supplier and purchaser, who are often located in different countries. And clearly emissions from international aviation and shipping rests somewhere, not nowhere.

Subnational greenhouse gas inventories - for states, regions, cities and organisations - are less concerned about double counting (essentially as it has no consequence) and include a greater variety of emissions sources based in part on their influence, responsibility and control over them. The commonly used methodology for states, cities and regions is the Global Protocol for Community Scale Greenhouse Gas Emissions Inventories (GPC). This method includes most geographic emissions sources, but also includes the emissions from electric generation allocated on the basis of electricity end use, the emissions of waste disposal on the basis of waste tonnages collected within the region and a 50% share of international aviation and shipping, for journey legs starting or finishing in the region. However, all other imported emissions (for example from the production of materials, food and manufactured goods) are excluded.

Sweden has become the first country to commit to measuring, reporting and managing its imported emissions, estimated to be an extra 60% on top of the country's total determined using a geographic basis. This shows it is possible for an entity, even a country, to have different sets of emissions accounts that are used for different purposes.

Appropriateness of using regional emission inventory report measurements by sector to measure progress towards achieving RPS targets

The GPC methodology² used for the regional greenhouse gas inventory report relies on assumptions made relative to the quality of the available data. For example, there is no regional-level data on the use and loss of refrigerants in the IPPU (industrial processes and product use) sector. The results for this sector are the national figures scaled by population. Changes to the reported emissions of this sector for the region will be in response to nationwide initiatives, rather than specific actions taken within the region. Changes to electricity emissions will be in large part in response to actions taken outside the region by large generators, but also to do with conservation and electrification actions made in the region. Others like reported agriculture, transport and forestry emissions will be closely linked to what happens within the region. Because of this, it may be appropriate to set sector-specific targets for the RPS.

² The GPC methodology is a greenhouse gas protocol standard for cities that provides a robust framework for accounting and reporting city-wide greenhouse gas emissions.

'Fair share' targets

'Fair share' targets for reducing greenhouse gases take account of historic emissions. This is a complex formula based on total anthropogenic greenhouse gas emissions from a country over its history, and its population. Those that have been emitting more per person and for longer (developed countries) have a smaller portion of the remaining global carbon budget associated with limiting global heating to a certain level, and therefore must cut deeper and faster than developing countries. This recognises the benefits developed countries have gained by using fossil fuels; benefits that developing countries would otherwise need to completely forgo. Climate Action Tracker³ has determined that NZ's fair share target would be a 61% cut in emissions by 2030 compared to 2017. There is no obligation under the Paris Agreement for countries to take a fair share approach to setting their NDCs (targets) and none have done so.

Further, more specific questions:

1. Discuss what fair share means for regional targets as compared to national targets? E.g. National target of 10% reduction in methane – does it equate that the Wellington Region should then seek a 10% reduction or should a regional target be based on an assessment of the region's contribution to the national emissions?

Relative targets for a particular gas downscale easily to the regional level. There is no reason to think it will be any easier or harder to cut biogenic methane by 10% in Wellington Region compared to any other region. The exception to this might be if a region had a significantly greater proportion of its biogenic methane emission coming from landfill relative to agriculture compared to other regions, such as in the Auckland Region.

There are no national level sector specific targets, just recommended levels of reduction set out by the Climate Change Commission. If these are treated as targets, the percentage reductions can be applied at the regional level 'as is', unless there is a reason to think the make-up of the sector in the region differs significantly from the one of the country. However the relative size of the sectors in the region might mean the summation of these sector targets gives a different grand total target to that of the country. This is not necessarily a problem in that it would reflect a 'fair share' of the national effort for that region.

2. Respond to the common rhetoric re the difference between reducing warming versus reducing greenhouse gas emissions (e.g. Some claim that agriculture contributes more to GHG emissions but less to warming, therefore any objectives or targets should refer to reducing warming.)

This is discussed above. Reducing the rate of methane emissions can cause global cooling, all other things being equal. Globally, it has been judged bringing all greenhouse gases to net-zero is necessary to prevent dangerous climate heating, essentially meaning residual biogenic methane emissions must be offset with

³ The Climate Action Tracker is an independent scientific analysis that tracks government climate action and measures it against the globally agreed Paris Agreement aim of "holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C

CO₂ removals from the atmosphere. The NZ government has instead decided and codified in law that this is not necessary and that biogenic methane emissions only need to be reduced, not offset.

4. Options for Greenhouse Gas Reduction targets

There are four main options for targets.

Option 1) Replicate national target set in the Climate Change Response (Zero Carbon) Amendment Act and government's emissions budget and targets.

The Zero Carbon Act takes a split gas approach, requiring long-lived gases to be brought to net zero by 2050, with interim targets in line with national emissions budgets. Biogenic methane is to be reduced by 10% from 2019 levels by 2030 and by between 24% and 47% by 2050.

Pros:

- As efforts will be made by government to achieve these targets, regional players will need to cooperate and play a supporting role, but in theory will not run into the problem of having a shortage of powers or central government support.
- May be easier to defend as the targets are aligned to the national level of ambition

Cons:

- Not aligned with the Paris Agreement or limiting global heating to 1.5°C, even less so when considered on a global fair-share basis. As the Paris Agreement is written on the basis of all gases being brought to net zero, the approach in the Zero Carbon Act essentially means that residual biogenic methane emissions must be compensated for by CO₂ removals from the atmosphere in order to meet New Zealand's international commitments. While NZ's targets for long-lived gases may well be 1.5°C-consistent or close to it, when coupled with the dead weight of our residual biogenic emissions, the combined national target is much weaker. From a global, 'all-gases' perspective, the emission reduction targets are not a sufficient contribution to limiting global heating to 1.5°C.
- International aviation and shipping excluded in 2030 by necessity to allow like-for-like comparability with the national emissions budgets.
- Sector targets derived from Climate Change Commission work, if applied to the region, will not necessarily add up to the national target(s).
- Global Protocol for Community Scale Greenhouse Gas Inventories does not include emissions embedded in imported goods.

Option 2) Adopt a science-based target, all gases (50% reduction by 2030 compared to 2019)

Pros:

- Aligns with the Paris Agreement, this is a science-based target of what is required to limit global warming to 1.5°C with no overshoot, with a reasonable safety margin. This is within the range (34-

60% reduction from 2019 levels) calculated by the Intergovernmental Panel on Climate Change as being required to give a 50% chance of staying below 1.5°C with no or limited overshoot⁴.

- More aggressive reduction efforts sooner may increase preparedness for bigger changes that may be required by government later and may give first mover advantage to the region in key areas, bringing economic benefits later.

Cons:

- A fair-share target that recognises NZ/Wellington Region's responsibility for historic emissions would be closer to a 61% cut by 2030.
- Regional government has limited powers that it can use to accelerate change further relative to central government. This may mean the rate of emissions reduction set in the target cannot be achieved.
- No target for biogenic methane, therefore no focus on the need for agriculture to reduce (34% of Wellington's GHG emissions).
- Agriculture sector may not be willing to go faster than the pathway adopted by central government. This would mean the target could only be achieved by deep cuts in other sectors and a large increase to the amount of forested land in the region.
- Global Protocol for Community Scale Greenhouse Gas Inventories does not include emissions embedded in imported goods.

Option 3) Adopt a 'fair share' target, all gases (61% reduction by 2030 compared to 2019)

Pros:

- Aligned with the Paris Agreement and limiting global heating to 1.5°C.
- If other developed nations follow suit, it creates more 'headroom' for developing nations to improve standards of living for their citizens.
- More aggressive reduction efforts sooner may increase preparedness for bigger changes that may be required by government later and may give first mover advantage to the region in key areas, bringing economic benefits later.

Cons:

- Lack of additional powers available to regional government to accelerate change further relative to central government efforts may mean rate of emissions reduction desired cannot be achieved, even more so than a 'science-based' target.
- Agriculture sector may not be willing to co-operate with efforts to go faster than the pathway adopted by central government.

Option 4) Develop a 'bottom-up' emissions reduction target

Pros:

- More likely to be achievable

⁴ https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

Cons:

- Unlikely to align with Paris Agreement objectives.
- Will take a significant time and resources to develop (info gathering, calculations, scenario development and gaining commitments from key players), when time is short.
- Likely to be conservative because of the assumptions required to construct a projection, this will not foster or drive innovation.