He Pou a Rangi
Climate Change Commission

OIA Ref: 2021-037

Privacy

3 August 2021

Official information request for documents from Allen + Clarke

Kia ora Privacy

I refer to your Official Information Act (OIA) request of 25 June 2021 for:

> *"...a copy of the all of the correspondence that the Climate Change Commission recieved or sent to their consultant Allen+Clarke, since the inception of the Commission."*

As you know, on 1 July 2021, the Climate Change Commission (the Commission) emailed you, requesting that your clarify or refine your OIA request. On 5 July you responded, refining your OIA request as follows:

> *"Under the Official Information Act, could I please request a copy of the all of the documents that the Climate Change Commission received from their consultant Allen+Clarke, which is related to electric vehicles (EVs) or economic modelling since the inception of the Commission."*

The Commission has employed Allen + Clarke to carry out a range of services, but they have not done any work related to electric vehicles (EVs) or modelling. That said, they did record and distribute minutes from technical reference group meetings, which included information on EVs and modelling. These minutes are attached.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Kind regards

Privacy

From: s 9(2)(a)
To: s 9(2)(a)
Subject: Key points from the ICCC Heat/Industry/Power and Transport Technical Reference Group Meetings on 11th and 12th December
Date: Tuesday, 17 December 2019 2:19:04 pm
Attachments: image002.png
ICCC Heat Industry and Power Meeting Minutes 12 December 2019.docx
ICCC Transport Technical Reference Groups Meeting 11 December 2019.docx

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Good afternoon s 9(2)(a)

Please find attached the key point notes from the ICCC Heat/Industry/Power and Transport Sector Technical Reference Group meetings on 11th and 12th December 2019.

If you have any questions, please call me on s 9(2)(a)

Kind regards,
s 9(2)(a)

s 9(2)(a)
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ICCC HEAT INDUSTRY AND POWER TECHNICAL REFERENCE GROUP MEETING – 12 DECEMBER 2019

Introduction

The Facilitator, s 9(2)(a) , from Motu opened the Heat Industry and Power ICCC Technical Reference Group Meeting. s 9(2)(a) reminded sector members that:

- the meetings operate under a variation of Chatham House rules - the information can be used externally but without attribution;
- information should not be discussed publicly until it has been officially released; and
- if members share commercial information, it is helpful to clearly label this for Official Information Act purposes.

s 9(2)(a) from the ICCC provided an overview of the meeting agenda, noting the main purpose of the meeting was to provide feedback on s 9(2)(a) ' model – where it can be used and extended, and what other insights are needed.

s 9(2)(a) also summarised feedback from the November Technical Reference Group meetings, which introduced scenarios for 2025, considered options and actions to meet those scenarios and considered critical pathways for key technologies.

Feedback on these meetings included:

- noting the scenarios are helpful, but we need to be careful about how they are defined, and how we see the scenarios and modelling fitting together;
- the specifics of actions matter, e.g. how you might roll out afforestation and what the economic and social impacts might be;
- critical pathways are helpful in some sectors; and
- understanding the context and links between the sectors (s 9(2)(a) noted the ICCC are thinking about how they bring the groups back together).

s 9(2)(a) provided members with some further context to the Group's discussions. This included overview of considerations in the Climate Change Response (Zero Carbon) Amendment Act – understanding the mitigation options today and in the future, the economic costs and benefits, and the flow-on implications and distribution of costs.

Highlighting previous discussions, s 9(2)(a) noted the need for a balance between what is technically availably today and what is necessary to get to 2050. The work is split into four stages:

1. Evidence and assessment of technology and behaviours;
2. Potential pathways to 2050;
3. Understanding the overall impact and distribution; and
4. Understanding and making recommendations about the level of budgets.

The role of the whole-of-economy model is to provide insights, to help understand interactions between the sectors, economy-wide constraints and trade-offs in a coherent way. It was noted that all models have limitations, but that doesn't mean we shouldn't try to improve them.

In response to an attendee's question, the Secretariat confirmed that as far as possible, all models will be made public.

Whole-of-economy modelling for the CCC focussing on heat, industry and power

s 9(2)(a) (Concept Consulting) presented to the Group on a whole-of-economy model which attempts to simulate decisions that will be made that include New Zealand emissions outcomes to 2050.

Overview

Economic actors captured in this model include households, landowners, heat and steel industry.

Decisions are based on lifetime cost/benefit options (including capital), given price signals, and include, for example, what vehicle to use, how the land is used, investment in abatement technology and industry exit/change.

The model attempts to simulate decisions that result in the most economic outcome. It also tries to project how decisions will change over time (for example, as it becomes cheaper to buy an electric vehicle (EV)).

It is important that the model can test how outcomes may vary according to the range of uncertainties, considering the range of decisions people will make and both the public and private benefit.

s 9(2)(a) noted the model is for the whole economy, but the modular design seeks to capture sector-specific dynamics. Some sector linkages have important flow-on effects for the rest of the economy, for example:

- EV uptake will flow through to the demand for electricity; and
- if one sector doesn't reduce emissions as much, the rest of the economy will need to make bigger reductions.

Questions and comments from the attendees:

- Does the model reflect different costs of capital for different actors?
    - Discount rate to vary across situation, and in general.
- How does the model take into account the life of an asset (e.g. battery life)?
    - Assumptions are fed into the model, for example to what extent might batteries radically improve.
- Does the model assume 'full economic' or 'real world' rationality?
    - Ideally real-world rationality (e.g. through the effects of government policy).
- Attendees discussed the recent Guardian article, which reported UK households were paid to use extra renewable electricity over the weekend. This is an example of price flow – as the outcomes of one sector increase, the demand for electricity will change the price.

- s 9(2)(a) clarified that the model uses a general weighted, rather than annual prices; noting the price peaks and troughs are likely to get more extreme.
- Does the model have an internally consistent equilibrium? Are all the prices and quantities in equilibrium?
    - Everyone faces the same macro externalities. Effects of one sector flow through to the extent that they alter prices or quantities. All sectors have different options and choices – trying to determine within constraints, for a given objective, the decisions that will be made.
- s 9(2)(a) confirmed the model is agent-based.

s 9(2)(a) discussed the risk of making the model too complex and therefore the need to balance this with appropriate granularity in each sector.

- Physical dynamics and constraints
    - E.g. Variability of electricity demand and intermittency of some renewables
    - Physical limits on land availability, gas demand
    - Physical capacity constraints on some sectors (effectively integers)
- Economic costs and constraint
    - Capital component of cost, e.g. the rate of capital turnover
- Policy settings
    - Design of ETS and what that means for the effective prices different sectors face
    - Electricity and gas consumer pricing approaches
- Granularity
    - Geography important in some situations, e.g. land and road transport.

Questions and comments from the attendees:

- Confirmed rail is included in the model.
- How does the model take affordability into account (e.g. EVs are not currently affordable)?
    - The Motu/LINZ work on distribution impacts is the best place to look; some outputs of this model will feed into that.
    - The model will be used to understand the scale of these impacts, how they vary according to different pathways and what policies you could put in place to redistribute some costs.
- Confirmed the model includes something for incremental (grid and EDB?) costs.
- What are consumer decisions based on?
    - Electricity is LRMC-based – considering issues such as a higher proportion of wind on the system.
- Will there be a high-granularity model to test the outputs?
    - Part of the TRG's purpose is to identify the extent to which you can have complementary models cross-checking.
- Noted the importance of getting broader stakeholder buy-in and understanding and comparing the model with projections from other agencies.

Specifics of HIP Industries

s 9(2)(a) presented a graph of 2017 New Zealand emissions for a high-level discussion of specific sectors.

Food Processing

Within the model there is a highly simplified Marginal Abatement Cost Curves (MACC). As the carbon price changes, it moves up the cost curve. If prices faced by the sector rise to e.g. $100, the model assumes abatement options up to that cost are taken up.

There are big opportunities in this industry – about 30% change from energy efficiency, and fuel switching opportunities to biomass or electricity.

The range of the carbon price that would be required to be cost effective to switch to an alternative fuel considers the capital cost as well as the cost of replacement.

Questions and comments from the attendees:

- Does the MACC have some learning curve assumed?
    - Yes, this is an assumption that needs to be exposed and tested. There is an underlying assumption that if electricity prices increase, the MACC of switching to electricity also increased.
- Is there a business mortality rate baked into the model? [Family-owned] SMEs might have different natural lives than big industries or go overseas.
    - In a sense. The model has linked, for example, the demand for process heat to how much meat and milk are produced in sectors. SMEs' average life might already be part of the economy.
- Another attendee noted the importance of scale – that changes to SMEs will impact jobs and other economic metrics but will not be big from an emissions point of view.
- s 9(2)(a) noted that for food processing, there is currently no functionality to consider carbon leakage. The model includes an assumption for the international carbon price.
- Does the model have a global average carbon price?
    - Currently yes, but likely to become more sector specific. Noted the need to test how material this is likely to be.
    - Another attendee noted it might be worth keeping this outside of the model to avoid it determining a wrong outcome.
- Is there work being done to look at firms on international benchmarks?
    - Not yet but noted this could get a good estimate of where they are on those curves.
    - Attendees noted the issue of confidentiality with sharing this commercial information, but that it is in the best interest of the big users to know where they sit, and for the model to incorporate a better understanding of their current costs.
- An attendee noted issues with security of supply and recommended direct dialogue with the large entities.

Industry – Petrochemicals

s 9(2)(a) noted this industry is largely made up of methanol and some urea.

The MACC work identified relatively modest options for abatement. Outcomes in the chemical sector are largely driven by physical gas position, and the design of the ETS has significant outcomes. We are seeing a decline of petrochemicals in New Zealand as they are progressively shut.

Gas is an example where the physics is important to capture.

Questions and comments from the attendees:

- Noting the significant domestic use of gas in the North Island – if this was turned off would there be a large impact on electricity?
    - Yes, as people would move to heatpumps. This wouldn't be a significant relative to EV uptake.
- Attendees discussed green and blue hydrogen.
- Would you turn off electricity to maintain gas, or the opposite?
    - Both – turn off CCT.
- An attendee noted the most efficient use of gas is to burn it at home.
- Methanex provides economies of scale – would the whole industry shut down if it closes?
    - This is only true for offshore fields. Currently our gas is made up of big offshore fields. If and when petrochemicals exits, can't have offshore industry.
- Noted hydrogen gas is not currently included, but there is a standalone study looking at using existing gas pipeline infrastructure. It is not clear whether incurring the large transition cost is lower than people buying heatpumps. This is an area to investigate more.

Other industries

s 9(2)(a) noted that there's just one plant for each bar of process emissions and few options. One of the issues is what the rest of the world is doing in these industries – there's growing interest in both New Zealand and the rest of the world of moving to low carbon construction materials. The carbon price that would be needed to move to a different furnace technology might be higher than the price at which Glenbrook would exit.

One attendee noted that steel is still used in new technology, and while there are new materials entering the market it's unlikely that there would be a decrease in these core engineering materials.

Another noted that while a smelter might shut, it could be reopened by someone else.

The Commission needs to be aware of wider policy issues, for example how the trigger price of carbon might vary depending on other government policies.

An attendee noted the need to find ways to make it more economic to electrify.

Other areas

Little work done to date on this part of the model, mostly made up of diesel as the fuel used in mining. The current gross assumption is that the cost effectiveness of heavy machinery will be similar to that of heavy trucks. Attendees discussed the likelihood of heavy machinery being electrified, and the comparatively high price of biodiesel to regular diesel.

Energy production

Four parts of the sectoral model focussed on this.

1. Geothermal
    a. CCS is the only abatement currently.
    b. Emissions intensity of new options a lot lower than existing.
2. Fossil
    a. Part of the whole electricity system.
    b. The initial step is to project demand going forward:
        i. Changes in demand for underlying services.
        ii. Additional services electricity assumed to be providing.
        iii. Electrification of process heat.
        iv. Exit in the industry.
    c. Next is projecting demand changes and then the least cost mix of generation to meet demand
        i. This was approached through a simplified duration curve, which captures the differences between different technologies, with the main difference being cost structure.
        ii. Variability is the other dynamic, for example wind prices change depending on how windy it is.

3&4. Fossil fuel production and refining

    d. Modelled simply, abatement opportunities from the act of producing oil and gas, with the assumption that if producing less, emissions fall proportionately.
    e. In the long-term the demand for petroleum does significantly drop off.

Questions and comments from the attendees:

- Does the model use endogenous gas costs?
    - The model projects finite as costs, as we start to run out of gas, the time at which we will need to import LNG is getting closer (i.e. moving up the demand curve).
- How are climate change impacts themselves incorporated?
    - They aren't incorporated, but there's likely two factors:
        - Affect relative disposition of winter heating and summer cooling demand; and
        - Hydro generation to the extent that it gives a more extreme summer/winter or dry/wet year demand.
    - An attendee suggest that s 9(2)(a) talk to s 9(2)(a) and s 9(2)(a) s 9(2)(a) about the NIWA models, which are available on the NIWA website.
- An attendee asked how the model takes account of reservoir optimisation depending on substitutes and the price of gas and carbon charges.
    - Taken account in a crude fashion. Whilst reservoir optimisation is affected by what pricing wastewater against, there is a significant amount of variability

driven by dynamics in reservoir – pattern inflows, size, RMA constraints. Storage technology is relative resilient in terms of patterns of release. Example of running a hydro-therman optimisation model very complex in itself.

- s 9(2)(a) asked an attendee if there was value in doing this at a granular level.
    - They said it could be done quite simply and to look in an environment with a high degree of inflow uncertainty.
- Does the model have a fixed aviation fuel output?
    - One of issues is to what extent to include biojet, and one of the challenges is if you change the proportions of the refined product, the cost efficiency also changes.

Graph on peaking generation for seasonal and dry year support

- s 9(2)(a) noted that while the magnitude was easy to establish, the timing was uncertain, and even in a high carbon price future, 'only' 97.5 renewable would be achieved.

Questions and comments from the attendees:

- Does the model have physical constraints for generation?
    - Fossil generation – none, gas – yes, geothermal cost supple curve, wind assumed (very large) finite amount, solar – limitless, hydro – not much new.
- An attendee questioned whether the gas assumption was because of government policy, no new exploration, or because there actually is no more.
    - Government policy feeds into it, potentially if offshore opens up again. Gas is limited to Taranaki and it's not cost effective to build pipelines between the north and south islands.

Direct use of fossil fuels e.g. heating home

- Fuel switching and energy abatement options.
- The smaller the load, the higher the degree of capital intensity. Capital recovery is a proportion of providing useful heat and the cycle of capital replacement is an important dynamic when choosing to switch out.
- Electric space heating has an emissions rebound effect.
- The treatment of network costs is an important dynamic, and the network cost impacts will be different for different types of heating.
- Consumers are driven by significant non-price factors, such as quality (e.g. no running out of hot water if you have piped gas).
- For off-road vehicles and machines, the model assumes the dynamic of moving to battery electric vehicles is similar to heavy trucks.

Refrigeration and waste

- This is a crude model and currently not tied to land use.
- The model assumes a profile lagging 10 years following the Kigali commitments.
- For waste, biostabilisation* for landfills is a material opportunity, but this is also an area of big uncertainty, where we're not sure how much New Zealand emits.
    - *Biostabilisation is when waste arrives at the landfill, it undergoes a process of accelerated aerobic digestion for a month before it is put in the landfill. As a result, there is significantly reduced anaerobic digestion.

Final session: balance between individual detailed feedback and critical points

Attendees were asked to consider the following three questions and write their answers on post-it notes. Attendees then went around the room and shared their one (or two) key point(s) for each question.

#1. How could the model be improved (either directly with data or assumptions, or indirectly by taking results of other models)?

- Several attendees commented on data sharing considerations, including that:
    - data in the model should be made public;
    - there should be a cross-government protocol for sharing data; and
    - large emitters should validate the data/assumptions that relate to them.
- Several attendees suggested comparison with the TIMES-NZ model.
- Solid and gaseous fuels can be used – at what cost?
- There needs to be more rigorous benchmarking – internally with companies and sites and internationally.
- How can modelling incorporate firm expectations/decision making? When the future changes people change their thinking.
- Exit conditions for manufacturers dependent on international market prices – we need better data for this and should not be overoptimistic about others following us.
- Exit – is the model carbon price in an upward line, or does it go up and down? Is there anything in the model that smooths that out and is it realistic?
- Need an appropriate level of detail around industrial free allocation.
- Overall cost to the economy with or without international offsets.
- Carbon price supply and demand response.
- Shock scenarios e.g. if lithium batteries are banned, how does the model respond.
- Model driven by price, but the remit of the Act is to set targets – are we focusing on targets or pricing (noting the tension between price to drive change and regulation)? Targets can cause the price to shift, which means less certainty for businesses.

s 9(2)(a) noted the following in response to attendees' comments:

- The price/targets comment highlights a key tension in this process. This model attempts to determine a pathway to get from A to B. The Land Use TRG discussed how the speed at which changes happen will affect the cost the economy incurs. The cost of moving too slow and the cost of international offsets is an important assumption.
- The model uses carbon prices as a basis for determining the relative cost effectiveness of different options across the country – want an emissions outcome at the most cost effective option.
- The model will hopefully consider some of these implications, including the price trajectory and the possible reality of facing higher prices earlier rather than later.

- Attendees discussed whether the model should assume that the rest of the world takes action. The Secretariat noted that the Act is about domestic economy emissions, and the approach to assess the best way for New Zealand to meet these targets – a hope for the best and plan for the worst approach. The Secretariat also noted that the Act makes provisions to amend the targets if there are fundamental adjustments to settings.

#2. What other analysis could the results of the modelling be compared with to understand any difference?

- Understanding the different fuel and process heat costs for different sectors, especially around fuel switching.
- The long-run marginal cost of electricity doesn't reflect the risk of industry market power – actual costs will be much higher. Suggest cross-checking results with e.g. s 9(2)(a) model.
- Opportunities around combined heat and power.
- Factoring downstream impacts, lines costs, transmission costs.
- Understand what transmission investment is required to unlock decarbonisation; regulatory work in advance is essential.
- Complement this model with an optimisation model – get form A to B at the least cost if it had a command and control system.
- Risk and uncertainty – agents are risk averse and will need a higher premium to make investments is they see risk. The structure of reducing risk is an important part of the story.
- Some of the findings of the BEC2060 model (based on the TIMES-NZ model) might be useful. Suggest having a discussion with s 9(2)(a) .
- There's merit in having granularity in the electricity sector part of the model. Other sector modelling is about resource capability.
- Hydrogen lakes are an incredible asset – Transpower modelled solar coming in. No one has gone to the level of granularity to see if we can use them as peaking plant factories.
- CGE model electricity price impacts – good to have convergence.
- Consider is there are enough time lags – based on past experience on getting approvals, the CCC will have to be very strong in communications to the government to move things along quicker.
    - Noted that the model has temporary constraints.

s 9(2)(a) noted the following in response to attendees' comments:

- Electrification is a huge component and investment to unlock. The model assumes that if it is cost effective to build renewables and transmission then it will happen, even if this might not be consistent with out current regulatory settings. This is addressed to an extent by imposing constraints in the near term.

#3. Where could the modelling be complemented with other forms of analysis?

- Modelling the effect of risk aversion on behaviour, noting that agent-based models are dependent on assumptions of how agents behave.
- A decision that says you might exit will in turn crystallise the need to remediate, which for some sites will be astronomical.
- Comparative emissions of not making these changes (status quo) – it is possible that cross border flows will need to be considered.
- Regional spatial analysis of supply and demand around process heat fuels and electricity, noting that some regions are isolated so have no lines capacity because there's no demand, and vice versa.
- Acknowledging the short timeframe, it would be useful to see how other parties use the data to make their own models.
- Analysis about where process heat will occur; effect on transmission lines etc.
- Modelling on the supply of EVs coming into New Zealand.
- Internal demand for key infrastructure materials e.g. steel and cement.
- Other countries' budgets, models and cost curves.
- Factoring in real-world behaviour change to costs and policies; how do we incorporate a sub-optimal outcome?
- Business decision factors – is the carbon price the primary driver, is the PFG offsetting the carbon price? Check in with some of the larger emitters.
    - Price seems to be a more significant driver for industry than households (who may be willing to make uneconomic decisions to reduce carbon).
- Could have a companion model that sets the target and shows actions as a result.

Wrap-up

The ICCC Secretariat noted the next meeting will be held late-February/early-March 2020; confirmed details will be sent out before Christmas. In the meantime, the Secretariat will spend time incorporating attendees' feedback, develop the model and do more analysis. s 9(2)(a) noted this will also be a period of transition from the ICCC to the Climate Change Commission.

ICCC TRANSPORT TECHNICAL REFERENCE GROUP MEETING – 11 DECEMBER 2019

Introductory session

The Facilitator, s 9(2)(a) , from Motu opened the Transport Sector ICCC Technical Reference Group Meeting. She reminded the transport sector members that we are operating under Chatham House rules.

s 9(2)(a) summarised feedback from the November Technical Reference Group meetings.

Feedback on these meetings included:

- The electrification of road transport; an incentive to accelerate vehicle update especially the charging infrastructure which might not be optimised.
- The linkages with other sector groups regarding reliability of electricity grid; many looked at hydrogen fuel cell vehicles (aiming for 2030s/40s timeframe) – not immediate but relevant later.
- A number of you talked about clean internal combustion engines, a few of you talked about security of supply.
- Some of you talked about mixed land use – reducing carparks and transportation between urban and rural.

Questions and comments from the attendees:

- Very heavy on producing carbon intensity – good to call out land use. Especially for cities and also freight.
- Issue was potential devaluing of existing carbon-based industry – the value of their cars falls greatly – you remove a great deal of wealth from New Zealand.
- Freight mode shift – moving from road to rail and coastal shipping. Look at the entire system.
- Does regulation allow this flexibility?
- Regulation will challenge it; it is more than just regulations – issues with behavioural aspects and people's expectations around convenience and cost to improve rail and coastal shipping to match road but right now everyone goes for the cheapest and easiest option which is road. Our existing networks aren't robust enough. Not enough coastal ships going often enough to allow overnight delivery etc. We don't as a country value rail benefit.
- Regulations struggle to keep up with technology developments.
- An education piece too. We built the supply chain carbon calculator; people just aren't aware.
- It is a convenience thing. If we try to shift from road to rail we need to understand we will increase emissions to improve overall emissions. Definitely an education piece.

s 9(2)(a) from the ICCC provided an overview of the meeting agenda, noting the main purpose of the meeting was to provide feedback on s 9(2)(a) ' model – focus on nature and structure of the model and opportunities for improvement.

Considerations in the Act:

- Need for emissions budgets that are likely to be technically and economically achievable.
- Consider existing technology and anticipated technological developments, including the costs and benefits.
- Analytical approach = commission assessment of evidence and literature (Phase 1), use models to understand the potential pathways to 2050 (Phase 2), use models and other analysis to assess the impacts of potential pathways (Phase 3) and advise on budgets and directions of policies (Phase 4).

Economy-wide models help to look at consistency of interactions between sectors; economy-wide constraints; learning about sensitives, trade-offs etc.

Questions and comments from the attendees:

- Given that there are two different models being run – will there be any data sharing in input and constraints between the two different modelling approaches? Answer = yes. S 9(2)( ) can give details. We are still building the CGE.
- Does the ICCC role include providing advice on emissions price under ETC? Answer = yes, it is likely to. Two answers – 1) yes, through the budgets work we will touch on prices and 2) a discussion on ETS reform at the moment – so likely we will end up with some roles.
- I know the ICCC has bipartisan reform, but have you done work in case of change of government? Answer = the first thing is the Commission doesn't exist yet. The plan is they will be established before Christmas. Keen to interact with the parties. Being independent the Commission has discretion to how they develop their approach. But they want to be as open as possible with reasons for their approaches laid out. We advise on the budgets and the emissions budget plan, and the Government has discretion to accept budgets.

Whole-of-economy modelling for the CCC focussing on transport – s 9(2)(a)

s 9(2)(a) (Concept Consulting) presented to the Group on a whole-of-economy model which attempts to simulate decisions that will be made that include New Zealand emissions outcomes to 2050:

- Simulating decisions by economic factors (households, industry, land- owners) which will affect emissions outcomes such as fuel-switching, investment in abatement tech, land-use change, industry entry/exit.
- Decisions based on lifetime cost-benefit of options (including capital costs) given price-signals faced by decision-maker.
- Seeks to simulate extent of altered outcomes based on changes in key factors, such as technology prices, commodity prices, carbon prices population growth, policy settings.

Strong focus on the economics of this. There is a capital element in lots of this especially for transport.

Seeks to simulate extent of altered outcomes based on change in key factors, seeing as we are facing lots of change:

- Technology.
- Commodity.
- Carbon prices.
- Population growth.
- Policy settings.

Trying to simulate decisions made by individuals which is based very much on prices. Also need to think of the whole of New Zealand impacts. Externalities might be relevant.

Questions and comments from attendees:

- How will the private-public benefit distinction play out e.g. if there's only a small private benefit? Answer = then the model won't be invested in. Trying to inform potential policy responses.
- Different sectors of economy have different drivers. The model tries to simulate all these models in a way reflecting the specifics of each sector. All the sectors are linked to varying degrees. Especially when we have a whole of economy objective. So, if transport sector can't reduce emissions other parts of the economy will have to reduce their emissions. Transport is increasingly linked with electricity part of our economy with major implications due to update of electric vehicles. This will increase electricity prices, impacts on industry etc - importance of linkages between areas of the economy. Need to consider economic bases on a consistent basis. e.g. exchange rate. Hence whole of economy should give more realistic…
- Link between land use and transport - how to factor in the implications of spatial planning? Answer = very little - we are talking heavy transport I take it?
- What's the rest of world in the diagram? Answer = this is things like costs of carbons, international commitments, assumptions around technology costs.
- NZ has a very high car per household number - if there's more intensification without cars in mind - this will drop - so could be a big impact on the overall fleet - not replacing car with a car, maybe car sharing. If this is a driver it needs to be pushed or we will keep doing what we do.
- How do climate change impacts get included in this? Some of our infrastructure is quite vulnerable. Answer = this would be taken into account through an exogenous assumption scenario. e.g. where land modelling potential changes in productivity - could model changes in heating and cooling demands. This is the purpose of today - to identify potential issues.
- We often think about the physical impacts of climate change e.g. sea level rise. We are thinking of future infrastructure - costs and how we build it will be very different - would be useful to have this in the model. Embodied carbon emissions - from building infrastructure - are significant. Answer = the model doesn't include embodied or imports/exports - should consider whether we need this future-proofing - Commission might want a more holistic, global perspective.
- Transport doesn't include international aviation? Answer = yes it does, but current modelling of aviation and marine is quite simplistic.
- Do we have enough wood to support all these biofuels for hard to electrify things? Consideration of how much forest estate we have.

One of the challenges with modelling is that models can become huge and complex when trying to model the whole economy and this can be a real challenge. Have to work out what matters and what doesn't:

- Need consider variability of electricity demand and intermittency of some renewables.
- Physical limits on land and gas.
- Physical capacity constraints on some sector output.

Economic costs and constraints:

- Capital turnover – impact on ability to go fully electric.
- Network costs e.g. electricity network costs will be key for transport.
- Policy can have big implications.
- Ability of people to face carbon costs. A lot of decisions are affected by non-price factors – consumers might not value benefits which are 10 years out.

Granularity of situations. Should we model the specifics of situations? Geography for e.g. Southland vs Hawke's Bay. One attendee suggested that it is important in the transport context to think of Auckland differently. s 9(2)(a) noted this is where your input is needed to distinguish whole of New Zealand and not.

Unnecessarily modelling things which are second order isn't good. It can lead to increased risk of errors, can take longer run times – if you have to delay it will constrain your ability to look at issues and potentially false accuracy.

Questions and comments from attendees:

- It is a great challenge to consider whole of economy - seems you will use scenario approach - which sort of scenarios will you develop - different scenarios per sector? Answer = e.g. population growth will need to feed into things like transport. The extent to which this alters electricity demand will need to flow through. An issue with this exercise is, what are the scenarios. At the next meeting we will discuss assumptions. *[showing a diagram]* continuing effort line - with no brainer options, essential etc - things on one side being on track, things on other side not being on track - we haven't done assumptions here.
  s 9(2)(a) people in land sector say if you shift from pastoral to forestry this isn't good - but the implications are then that we have to reduce gas use, but then the gas people don't like that... trade-offs.
- How you deal with growth of population especially in the transport context. It is about managing demand, reducing emissions and acknowledging that reducing things in growth context is a real challenge.
- Is there room for intensity metrics? Answer = the target is a point in time target - to what extent does it result in perverse incentive
- You can have that point as an absolute target, but when measuring performance, you need an intensity metric to track progress; over the next ten years, the productivity of the country will go up, population will grow – you need a metric to check improvement. Answer = we did work for the Parliamentary Commissioner on the implications of a net target - if you get to it through forestry, you may get to net zero then get back because you need to plant again. These issues, rate of travel - do we go harder earlier or later?
- The intensification of housing next to transport - heading us to right pathway - if we aren't making improvements making transport more accessible will be hard to get mode shift.

Being able to see behind a result is important. This is like a telescope to look into the future but what additional microscopes do we need? This isn't the only model - Ministry of Transport does their own modelling. Compare and contrast models, understand why there are differences.

Transport - land and transport emissions on the graph are high. The other modes are much less so, to extent that you don't include international travel etc. Consider the extent to which New Zealand neds to consider international elements.

How my model focusses on the road sector:

One of the starting things is trying to project demand for the service, the basis for this is projections based on historical series. One of the issues is how to capture potential changes in urban form - not quite a mode shift but it alters demand for transport in the first place. How may the current proportions of demand for services be affected going forward? The model currently only simulates private travel, it doesn't show the shift between road and rail for freight - an obvious area where you might want insights from other areas. Basis for mode shift is Ministry of Transport figures. Scenario-based. Mode shifting is situation specific - modelling in this model failed the complexity/trade-off test. Probably more useful to have specialist modelling tool to feed in.

Comparing single occupancy versus shared travel is a parameter. I don't attempt to model what will drive the shift from A to Z. If we are able to increase public transport journeys, I don't model what drives the shift, but there's the ability to understand that if the shift happens these will be the implications. We need tools to consider if the mode from A to Z is realistic, how different will Auckland be to others, etc.

It is easy to model the implications of mode shift, but not what drives it. The outcome of stages 1 and 2 is demand from vehicle travel. One of the key factors is then modelling the change in vehicle fleet as fleet is turned over. One aspect of this is potential changes in vehicle scrappage rates. What if we could increase these rates? What if care sharing/leasing takes off and vehicle ownership falls? What are the implications of car ownership falling? It may just change ownership not overall numbers of vehicles.

Aviation, marine and rail - project demand for these services - simplistic- there is a price elasticity assumption for domestic and international aviation. One of the challenges using price elasticity going out 30 years is the extent to which the relationship observed over the past 10 years will hold. For business travel, there may be increasing substitutes e.g. video conferencing.

Questions and comments from attendees:

- Do we need to consider the types of vehicles? There are examples where some manufacturers aren't reducing carbon e.g. Holden not selling any more cars, only SUVs. Some leadership might be required e.g. Singapore does it. Signals need to be given that it isn't just the number, also type of vehicles. This is reflected in vehicles entering the fleet, which is treated as a weighted average.
- There will be impacts if the model isn't detailed enough.
- Considering policy to affect the shift, what this might mean in changes to weighted averages of vehicles entering fleet - there's more than one way to skin a cat.
- We don't need to go into types of cars necessarily, can look at emissions per vehicle. If you run EV, consider carbon from electricity or biofuel. One way to look at it would be an emission factor per vehicle, then get individuals to choose how to lead carbon efficiency.

- Not sure about info gathering. Ministry of Transport has a lot of this data. I know you have a meeting in Auckland about mode shift. You enter territory where no one has done any work.
- EV uptake could both reduce carbon and uptake of new vehicles.
- Does the model include cost of product stewardship? The total cost of ownership for an individual doesn't include this but this could be a potential cost to be taken into account more so. Answer = this isn't considered yet.
- Battery recycling isn't considered - but costs of this could be put on to owners in future
- There are lots of non-financial considerations which influence decision-making. We have gaps in knowledge in terms of how important things are.
- Could get lifecycle analysis of different vehicles.
- You are only capturing scheduled air services for capturing services and freight - not rest of general aviation industry e.g. military, agriculture.
- Technology choices are more limited for rail than for road. Coastal marine electric looks promising. For any vehicle which is stationary overnight consistently, electric is very good.
- S 9(2)(a)
- There's an organisation called Good Fuels which provides biofuels for ships.
- There will be a mix of LNGs, methanol, ammonia, potentially hydrogen - I can't understand why we aren't making more use of biofuels, at the very least as a transitional resource. Not just for forestry - other stocks too; renewable diesels produced by Nestle.
- With transport, interest in the network effects of refuelling. With international, you might have biofuels here, but Australia does something else. Planes need to be able to refuel in multiple places.
- What has stopped aviation taking up biofuels? Answer = the cost. There are a lot of trials around the world. Potential for alternative sustainable fuels. Challenge is the cost and scaling, uncertainty around long-haul flights.
- For aviation you use highly refined fuel whereas for shipping you can use the dregs. Shipping is a great place for uptake.

Group Exercise – Review and critique of the concept model

Attendees were asked to consider the following three questions and write their answers on post-it notes. Attendees then went around the room and shared their key point (s) for each question.

Thinking about the task of the Commission and the matters it must take account of:

- How could the model be improved (either directly with different data or assumptions or indirectly by taking results of other models) (One)
- What other analysis could the results of the modelling be compared with to understand any differences (Two)
- Where could the modelling be complemented with other forms of analysis(Three).

Questions and comments from attendees on Question 1:

- Comparing your assumptions and modelling with those of organisations such as Kiwirail; geography - looking at where freight hubs could be relevant and social aspects; technology

uptake rates will be quicker in North Island. The modal shifts - road to rail. Complimenting with offsetting.

- How detailed could or should policy considerations be for driving change.
- Urban design impacts of the model - e.g. more local working.
- Urban delivery and long-haul shipping.
- How you factor in consideration of growth.
- Given that NZ is a tech taker, the data we see around international technology supply constraints.
- Considering the international effects of late/early adoption of EVs and impact on domestic values.
- Not sure what's in the model, liquid biofuels can get complicated, all have different cost thresholds due to differing costs of production - how does improvements in biofuel improvements flow through?
- Climate impacts comment - need to ensure we factor in climate adaptation around infrastructure build in particular.
- Total cost of ownership was mentioned - what is the total cost of ownership? Most Kiwis just look at the price. We are tech takers, but could we become an assembler of vehicles again? Importing pieces with added value which could save carbon miles in terms of shipping cars. Like a circular economy.
- Whether we need to think of cascading priorities e.g. where biofuels are the only option for aviation if they are more economical for shipping?
- Agree with circular economy.
- Making sure we capture industry knowledge.
- Not how to improve the model - about entering new territory, building on knowledge as a country.
- Off-road diesel not transport in a true sense - manufacturers said they would never consider electric due to costs. These machines are essential.
- S 9(2)(a) [redacted]
- Level of complexity of the model
- Where you are relying on historical norms - but what if there are fundamental changes to the economy - avoiding mental lock-in to how we think the economy will be.

Question and comments from attendees on Question 2:

- Someone did study called the New Zealand biofuel model - we got lots of info from this - would be interesting to compare – it was recent.
- Times NZ model - phase to is a BEC -EECA collaboration.
- Times stack 2 is still underdevelopment - we will be able to do transport models per sector. Based on IEA. The way it splits phase 2 is in 5 breakdowns.
- OECD Moles Model - multi objective environmental sector model - lots of stuff done in Auckland for Auckland Transport aligning project, and work for Let's Get wellington moving - these are geographically limited but might still be useful.
- EV update projections by other countries.
- Is there another country around the world we could do some comparisons with? In terms of agriculture etc in Latin American countries, they seem to be aligned with us.
- Air NZ is part of this - has forecasts for what airlines will be doing through to 2050.
- Technology Kiwirail is doing internally.
- Adoption of EVs and hydrogen vehicles especially from UK and Japan.
- Check in with organisations which have already done forecasting and emissions roadmaps - Auckland Council do a 6 yearly shipping emissions inventory - now the water-based emissions inventory - vehicle emissions to within 3 miles of Auckland.

- Benchmark against what other countries are doing - develop a plausible forecast reference.

Questions and comments from attendees on Question 3:

- Some spatial analysis around supply and demand for electricity, solid fuels and gad (?) - particularly around EVs and demand. Can figure out where increased demand for EVs will come from and where new electricity generation will come from. Talk to s 9(2)(a) and s 9(2)(a) at MBIE.
- How does the location of forestry impact biofuel production? Is this significant?
- Forecasted externality effects of climate change and where industry will be positioned and how this will make up how we tackle it.
- Global EV outlook which the IEA publishes. Also, the efficient world scenario modelling energy efficiency policies.
- EECA lifetime analysis of electric vehicles (compared to petrol).
- RMA reforms especially spatial planning elements - extent to which they consider emissions reductions associated with transport; national infrastructure planning and how it considers emissions relating to transport.
- Total cost of ownership - yields to elasticity in some - also cross elasticity.
- The International Maritime Association work on international shipping - their decisions impact us here. They have may working groups producing detailed analysis on things. States can do a voluntary action plan on aviation and they are creating a national action plan for maritime now too.
- Materials from Boeing, Airbus and X (?) on aviation point of view - lots of material on disruptive tech such as drones. Another series on the future of distribution, they gave us an understanding of the tech we will see in 15 to 20 years' time.
- Electricity and energy interactions with distributional impacts modelling - a low income household are more exposed, will act differently. Again, it's a matter of how granular you want to get.

s 9(2)(a) noted there are some things he wasn't aware of. Getting input from other agencies is key. There is the potential for one on one meetings with key agencies next year.

Wrap up

The Transport Sector Technical Reference Group meetings will be continuing in 2020. Next meeting in early March. We will send out a doodle poll with options.

We will be working with s 9(2)(a) over the next few months to develop the model. We will be testing the assumptions before we run the model. We will also be working on some of the other analysis in the next month or so.

From: s 9(2)(a)
To: s 9(2)(a)
Cc: s 9(2)(a)
Subject: Minutes from the transport and land use technical reference group meetings on 3 March
Date: Friday, 13 March 2020 7:50:24 am
Attachments: image001.png
CCC Transport Technical Reference Groups Meeting 3 March 2020.docx
CCC Land Use Technical Reference Group Meeting 3 MARCH 2020.docx

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Hi s 9(2)(a)

Please find attached the key note minutes from the transport and land use technical reference groups on 3rd March.

If you have any questions, please call me on s 9(2)(a) .

Kind regards,
s 9(2)(a)

s 9(2)(a)
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CCC TRANSPORT TECHNICAL REFERENCE GROUP MEETING – 3 MARCH 2020

Introductory session

The Facilitator, s 9(2)(a), opened the Climate Change Commission Transport Sector Technical Reference Group Meeting.

Update on the Commission's establishment

s 9(2)(a) from the Climate Change Commission provided an update on the new Commission. The new Commissioners are:

- Dr Rod Carr (Chair),
- Lisa Tumahai (Deputy Chair),
- Dr Harry Clark,
- Dr Judy Lawrence,
- Catherine Leining,
- Professor Nicola Shadbolt and
- Professor James Renwick.

There have been 3-4 meetings so far. Work from the Interim Climate Change Commission (ICCC) has been picked up and endorsed i.e. the modelling approach.

There are a few changes in emphasis. One of the first things we discussed was how to approach our work:

- Lens – New Zealand Perspectives and Te Ao Māori Perspectives as well as considering te Tiriti o Waitangi.
- Values – Manaakitanga, Tikanga, Kotahitanga.
- System – ecology/environment, individuals/households, social and economy.
- Dimensions – people, place and time. Use to frame our advice so it is as inclusive as possible.

The tricky bit is how you make those choices and trade-offs. There is going to be judgements about who bears the costs, who gains, who transitions quicker etc.

Timeframes:

- March to May = technical engagement with stakeholders around the country.
- Last Quarter 2020 = Commission will consult publicly on its draft emissions and emissions reduction plan. Originally wanted to consult before the election but not possible with the delay in setting up the Commission.
- 1 February 2021 = Commission advice on first three emissions budgets and associated emissions reduction plan.

Given these timeframes we are considering when the best time is to hold Technical Reference Group (TRG) meetings to have the greatest impact. We might space out these meetings – could be 6-8 weeks' time rather than monthly. The Commission will come back to TRG members about the timing and content of meetings.

The role of TRGs is to support the production of the first emissions budgets, help the Commission develop its analysis and test the robustness of results and conclusions. We want you to challenge our assumptions and help shape our work. Challenge us and be challenged. We are not after consensus or agreement.

Chatham House Rules apply in this meeting. Keep information confidential until published by the Commission. Respect the independence of the Commission's work. Be mindful and respectful if anything is commercially confidential.

Mitigations workstream update

The Climate Change Response Act is our founding document. It requires the Commission to consider how the emissions budget and 2050 target may realistically be met.

Each workstream is focused on understanding the potential mitigation options in each sector, including technologies and practice changes, that could be used to reduce emissions.

Includes an assessment of:

- Emissions reduction potential of each mitigation option.
- Indication of the capital and operating costs, key risks, and uncertainties.

Key questions we would like your help with:

- What are the best data sources to draw upon?
- Do you agree with what we have found so far?
- What other evidence sources we should consider?

We prioritised gathering evidence based on …

- Mitigation potentials?
- Public interests?
- Modelable?
- Are others doing it already?

We will be discussing the full list of mitigation options we have identified so far shortly. They are many and varied. There are six items that struck us as needing detailed consideration if we are to significantly reduce emissions in the transport sector. We call them "the 6 BIG rocks"

First big rock: An inefficient light vehicle fleet:

- Newly imported light vehicle (new and used) entering NZ fleet in 2018 averaged about 176g CO2/KM compared to 2018 standard. NZ doing far worse than other countries, particularly compared to the EU.

- NZ one of only three developing countries to have no regulations, or meaningful incentives, to influence the fuel efficiency of light vehicles entering the country.

Questions and comments from the attendees:

- This is something the Ministry of Transport is already doing work on and have made proposals to government around this. Internal data sources and industry are helping shape this. It's actively happening. Got to get through the hoops of what the standard will look like and with government.
- Is a very old vehicle fleet a different rock? Answer = no, it's this rock.
- People with lower incomes will be the most effected.
- No policy in place to stop making them more inefficient.
- Is it manufacturers data? Answer = it is official ratings, not real world.
- Do not test for emissions at WOF currently.
- Can you privately take your car to get an emissions test? Answer = believe you can.
- Tax incentives. Looking at the fabric of how business in NZ operates. Incentives for double cab Utes. The tradies like using Utes as it lets them get product to the building sites when they want it rather than subcontractor delivering to them. Makes economic sense to them.
- Standard in Europe this year is down to 95 grams of C02 and then will be down to 75.
- The challenge is lowering the age of our vehicle fleet.
- Good to align ourselves with the UK. Can learn from the UK. Might be a bit of copy and paste.
- Evidence from a behaviour point of view – where is the genuine evidence base of why New Zealander's have chosen to buy the cars they buy.

Second Big Rock: Slow uptake of electric vehicles:

- NZ has no incentives to buy electric vehicles unlike many other countries.

Questions and comments from attendees:

- Need a clear vision of what the future fleet will be and work backwards.
- FBT is a strong incentive for Utes currently, need to be on the same playing field.
- Need to find ways to change our tax system or rebate.
- Who are you convincing to buy, who is the policy aimed at? Doesn't seem to be sustainable at the moment.
- Most car purchasers in New Zealand are male. EV's are seen as less masculine. No one wants to uptake, don't like the look of them. Tesla trying to make them appeal to blokes.
- Nobody knows what their emissions profile is. Some kind of emissions testing to educate people on what their emissions profile is. If they find out their car is a dirty car they might consider a different purchase in the future.
- Disincentivise – whack people with higher registration fees etc. if they keep buying dirty cars.

- What does our fleet look like in 2035 and 2050? We could allow no cars over 7 years of age in and then in time no cars over 5 years of age.
- Need some political will to do this. Does not need to be done today but it does need to be done.

Third Big Rock: High Carbon Transport Fuels:

- NZ has no standards or incentives for lower carbon transport fuels across light and heavy vehicles, domestic aviation, diesel rail, and domestic shipping.
- Alternative lower-carbon fuels exist, including biofuels, renewable electricity, synthetic drop-in fuels, carbon capture and storage, or hydrogen, although they may not exist in NZ or be currently economic.

Questions and comments from attendees:

- This is a good one. Fuel standards sit with Ministry of Business, Innovation and Employment not Ministry of Transport.
- If it takes Civil Aviation Authority 12 years to change a rule in aviation, we are looking at decades to do this. Average age of general aviation fleet is almost 49 years. Engine's need to be certified by manufacturer.
- General aviation is the old fleet and what mostly flies in NZ. Commercial aviation fleet is much more modern.
- Bio-fuels can be done in aviation. Why is it not being done?
- Lot of effort put into making some bio-fuels for aviation in Texas last year. The bio-fuel made was enough to fuel a 747 flight for two hours.
- Airlines need a push to do it. If all airlines were required to do this no airline would be at a disadvantage.
- One member said they will provide some pricing on renewable energy to CCC and another member said they will provide data sources.
- Warehouse group have worked out international shipping is 30% of their carbon footprint.

Fourth Big Rock: Lack of funding and planning priority for alternative modes:

- It has been estimated that in NZ 79% of trips are by light vehicle drivers or passengers; pedestrian transport was 17% of trips; public transport 3% and cycling 1%.

Questions and comments from attendees:

- Could argue that proportionally a lot more is spent on public transport and cycling.
- A lot of driver behaviour puts people off from cycling. How do you start shifting and changing drivers views around cyclists so people feel more comfortable doing it?
- You have to invest the money in people feeling safe so they will cycle.
- In Christchurch more people are cycling and walking.

- Needs to be public awareness around spending money on cycling.
- One problem is that people actually like their cars.
- Not just how much money you spend. Whole heap of stuff that needs to come into play such as behaviour change. Things outside of the transport system i.e. changing facilities, land use planning.
- If you build more roads people will use them, build more cycle ways or better public transport and people will use them.
- Could be some way of incentivising planners to consider carbon emissions when planning new roading.
- There is a requirement in all cabinet papers now about the climate impact. Auckland Council papers to go to counsellors have to include a climate impact statement. Not filtering down to business cases yet but a good start.
- When targets are being come up with someone needs to be held accountable for achieving those targets . A challenge to government around policy evaluation.
- When you have a limited budget, evaluation slips off the end. Not currently seen as essential but it is.

Fifth Big Rock: Traffic congestion is driving up emissions:

- According to Tom Tom Traffic Index, Aucklanders spent 31% more time travelling due to congestion.
- Congestions adds to fuel use through idling, inefficient low speeds, and start-stops.
- Congestion pricing schemes can reduce or eliminate congestion and further reduce emissions by encouraging the use of alternative modes.

Questions and comments from attendees:

- Need to be careful about the way it's articulated.
- I am aware you are making an argument for a congestion pricing scheme but it could be interpreted by some people as needing to build more roads. Need to be very clear.
- Need to have better alternatives i.e. public transport, working from home etc.
- Small amount of congestion is actually good.
- More effective use of GPS will help elevate congestion as the fleet modernises.
- Road user charges can price for a whole lot of things, not just congestion pricing. Could include low emissions zones and link to the same system.
- NZ considered a leader in low emissions charges at the moment i.e. diesel charges.
- Politically not difficult either.
- Number of data sources available from Transport and international data from global ITS networks.
- There are advantages to refresh the fleet to achieve some of these things rather than building more roads.

- Needs to be a more wholistic view of mobility and how they fit together. Deloitte UK has done a lot of work on this.
- A lot of work already going on in government around these first four rocks. Would be good to link this into the Commission work.

Sixth Big Rock: International aviation and international shipping are significant:

- Not covered by the UNFCCC framework or Paris commitments.
- International aviation emissions is equivalent to 23% of our transport emissions. International shipping to 6%.
- International aviation emissions have been growing rapidly, more than doubled since the year 2000 and expected to keep rising.

Questions and comments from the attendees:

- There is a carbon offset reduction scheme called Corsia. New Zealand has committed to being part of Corsia.
- Steering group for international shipping - various policies the sector is looking at but haven't committed to any yet.
- New Zealand finally sign up to Marpol 6 so will finally have more obligation to do more.
- Is there no obligation to look at international transport under Paris agreement? Answer =yes, that's right. At the moment it is to the side.
- Air New Zealand have been working with Ministry of Transport around Corsia.
- Global sulphur cap has come in. New Zealand will sign up to it at the end of next year. Cost of low sulphur fuel will start to be transferred onto consumers. Coronavirus is also having a big effect.
- Very wide range of shipping incentives schemes available. Working on a report about this and will share the report when it's ready. There are 10 or so globally that we have been looking into. Shipping companies can choose to sign up to these schemes. Looking at how you can promote the shipping lines with what they are doing internally.
- Local air quality emissions is an issue in the shipping industry at the moment.

Climate Change Commission staff will send out a long list of mitigation options to attendees in a couple of days. Would like feedback two weeks from when the list is sent out. Some questions to consider are:

- Do you agree with the mitigation assessment?
- Do you have sources of information?
- Public interest assessment would also be good to comment on.

Climate Change Commission staff will send the questions out with the list of options. The 6 Big Rocks are the first cabs off the rank.

Useful information on policy, impacts and behaviour change would also be good to provide as well as things that can be modellable.

Question and comments:

- It does not address growth i.e. population growth etc.
- It does not address other things such as the fuel we spoke of earlier and urban design.

Technical engagement plan

s 9(2)(a) at the Commission, spoke about the technical engagement plan.

The Commission is planning to publicly consult in Quarter Four, approximately mid October.

Kick off our engagement around the country this month. We are very much in the listening phase at the moment.

Types of engagement we are looking at:

- Technical reference groups.
- Wider technical workshops (part of a roadshow).
- Iwi/ Māori hui.
- Impacts and opportunities.
- Consultation.
- Leadership engagement.
- General communications and engagement.

Two specific transport workshops have been put together - Christchurch technical workshop on 23 March and Taranaki on 30 March. Invitations will be sent out this week.

There are a few conferences happening around the country such as the ITS conference. Please let us know if there are any other opportunities where the Commissioners could come and speak.

Climate Change Commission staff will send TRG members a list of upcoming workshops.

Questions and comments from attendees:

- What does the agenda look like at one of these workshops? Answer = we are developing this but will be similar to TRG 1. We will also ask some questions around businesses transition to a carbon zero economy.
- Can contact regional transport committees and contact the Chair of the Committee to ask for someone to attend these workshops.
- Do you have a separate agenda for Māori /hapu engagement? Answer = yes we do, we are working on that at the moment. Would it be useful for us to do an update on this at a future TRG? Yes, it would.

Wrap up

The Facilitator, s 9(2)(a), wrapped up the Transport Sector Technical Reference Group Meeting by asking attendees to provide one insight from the meeting or suggestion for how the process/running of TRGs could be improved.

Questions and comments from attendees:

- Still a bit concerned there is an assumption that the rest of the population is coming along with us and that it is a given but I'm not sure they are. TRGS are very solution focused.
- Was impressed by the analytical framework put up at the start. The group needs to consider how they are applying that framework.
- Kids seem to get climate change, not sure that adults do or really care.
- City inequity is growing around the world. Need to really aware of lumping costs onto everyone willy nilly. If your city is becoming poorer it is a hard sell to people. The environment is the first thing to throw over the wall when things get hard. It seems like a nice to have rather than a must have in that situation.
- Worry about the lower economic society and how these regulations will play out for them – necessity versus nice to have. Need to consider the social side as well as technical side.
- Still have quite a scientific Western approach. Need to think about things from a Māori approach as well.
- Insight that international freight is not included in anyone's carbon assessments. How are they going to be accounted for in the future?
- Little bit surprised the Commission does not have a really solid inventory of carbon emissions. Answer = basing most of our analysis from inventory produced by government. Inventory is helpful but hides insights you want for policy recommendations. We might not have everything we need but can identify what we need for the next time around.
- The insight I've got is the challenge. Got a number of technological issues hitting industry from different directions. Environment is just one of these issues. The challenge is putting this into a wider context. More aware of the complexity of the task, not the simplicity of the task.
- Good that the 6 rocks were not surprising, they are things government have been looking at for awhile.

The Climate Change Commission thanked the members for giving their time and insights. They advised they will be in contact with members around setting up the next transport technical reference group meeting.