Adam McFerran

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Tuesday, 16 February 2021 1:24 pm
To: Sean Buchanan
Cc: Christopher Holland
Subject: RE: [UNCLASSIFIED] Network assumptions

Follow Up Flag: Follow up
Flag Status: Completed

Thanks Sean
I really appreciate you getting back to me - you've got lots on!

Based on your notes below, my gut feel is that

- Electrification means shifting the current diversity of fuel supply (gas, petrol etc) to electricity
- It feels optimistic (not conservative) to assume that this impact is absorbed into the electricity system with a BAU incremental impact from a timing or transition impact eg
    - if EV charging is done by a combo of public and home, the charging/network/IS etc infrastructure will be duplicated somewhat
    - we should expect demand from customers moving from gas to electricity to have some incremental
    - if there is higher PV/EV uptake this will mean addressing network visibility, automation, and targeted upgrades to manage the low-voltage (street level) network. Currently it can be operated in a simple way due to most consumers being predictable
- But perhaps the impact isn't material in the grand scheme of things eg
    - If the incremental impact on Powerco electricity network is ~$300m over ~350k customers, that's around ~$70/customer/year (+~10% on current annual distribution charge). Cost-reflective pricing means that charges would largely be fixed. A counter view is that this incremental cost is levied on the EV/PV users, in which case the individual amounts would be substantially higher (same cost, fewer customers to allocate it to).
    - If NZ gas customers have to incur ~$5k incremental cost to facilitate appliance switching (home renovation, incremental install costs) then this amounts to $2 billion for NZ's ~400k customers

Andrew

Andrew Kerr | Head of Policy, Regulation, and Markets | POWERCO
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From: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Sent: Monday, 15 February 2021 1:46 PM
To: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: [UNCLASSIFIED] Network assumptions

Hi Andrew,

Apologies for the delay coming back to you.

Good questions. Specific network constraints are beyond the scope of modelling so it will be good to get your take on the impacts of this suggested policy in terms of potential real world costs.

Just to clarify the model setting, we assume that all buildings built after 2025 have electric heating systems. For the buildings that already exist, we are assuming that heating systems are smoothly converted to electricity over a 20 year period from 2030 to 2050.

We have some calculations for total network costs. It is assumed that total network DX costs are driven by demand growth (energy) and increasing the number of connections (ICPs). We scale costs from a base year of 2019. The base year distribution costs are assumed to be 2.5x the allocated transmission costs. The allocated transmission costs are derived from Transpower's financials and known transmission pricing structure.

I have attached an extract from the model which compares costs with and without the mandated gas fuel switching settings. The difference should approximately reflect our modelled cost of the measure at the national level. This is the level of detail we have costed – hopefully this is useful for you?

There are then some assumptions around retail pricing structures to convert to variabilised costs for households and businesses (a move towards cost reflective pricing is assumed by 2030) . This variabilised price feeds back into the model and would influence the fuel switching decision dynamic for heating in new buildings and retrofits – however in this instance we are forcing an electric decision so this network cost doesn't really have any impact in the model. It is implicitly assumed that the network can be built and the costs are manageable.

This is a pretty messy and non-transparent approach for network costs. Some $/kW figures would be nice huh?! I can provide more detail if you would like, and happy to take any feedback on likely realism or better modelling approaches.

The commentary that we give on electricity bills does not hinge on these network cost assumptions. Nor does it hinge on our EV network assumptions. We recognise that we need to do more work to validate this network costing analysis, so instead we conservatively assumed that household electric costs (fully variablised) are the same as today at 29c/kWh.

Hope this helps, let me know if you have more questions.

Sean

[UNCLASSIFIED]

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Friday, 12 February 2021 10:43 am
To: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: RE: [UNCLASSIFIED] RE: Climate Change Commission modelling workshop

Thanks Sean.

On regional: No need to pursue the regional issue. I was interested in anything to translate the modelled changes to gas use to the practicalities of regions/customers affected by fuel switching.
On network: Trying to get a handle on speed of change and location for electricity networks to respond to fuel switching, which will be regionalised. As an example:

- alternatives to electricity help defer a major (I think it's 250m) upgrade at Frankton. If the Queenstown region converts to electricity, does that bring that forward.
- Greater Wellington has a high concentration of gas users, so the impact of meeting that load with electricity will be specifically met by Wellington Electricity.

Transparency of the system cost modelling would be really helpful as a sense check on the commentary about electricity bills. I don't expect a change to cost impacts will affect the policy settings, though it will affect the narrative and expectations about the practical impacts of electrification.

Andrew

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From: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Sent: Thursday, 11 February 2021 6:04 PM
To: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: [UNCLASSIFIED] RE: Climate Change Commission modelling workshop

[UNCLASSIFIED]

Hi Andrew,

Hope you are going well and thanks for the input yesterday.

In terms of regional detail:
We have regional energy/emissions detail for food processing and large single site industries. I can provide you the food processing dataset. We have deliberately aggregated some large industries (refining, petrochemical, steel etc) in the data file provided. Let me know where your interest is.
We have modelled transport and building heating at a national level. So I can't provide a regional split unfortunately.

I will come back to you tomorrow on network cost modelling as it will take a moment to translate – but again it is at a national level. Our network cost assumptions factor into a modelled fuel switching decision for building heating – however, the settings are not critical as the gas reductions are imposed exogenously in the pathway modelled. They are of course important for system cost which we have not reported on.

Cheers
Sean

[UNCLASSIFIED]

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Thursday, 11 February 2021 3:28 pm
To: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: RE: Climate Change Commission modelling workshop

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Thanks Chris
A couple of questions

- Is there an ability to get results disaggregated geographically in some way?
- Can you expand on the assumptions/modelling of electricity transmission & distribution costs in regions where there are concentrated gas connections (bottled, reticulated)?

Andrew

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Out of scope

Document 2

Adam McFerran

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Wednesday, 10 March 2021 5:32 pm
To: Sean Buchanan
Cc: Christopher Holland
Subject: RE: [UNCLASSIFIED] RE: 9c

Thanks Sean – that first point about 'heating' covering all systems is great to get clarity on. Thank you.

It was what I was assuming (and is consistent with the CCC modelling/document), but I had a pause moment a few days back when asked.

Andrew

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From: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Sent: Wednesday, 10 March 2021 5:16 PM
To: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: RE: [UNCLASSIFIED] RE: 9c

[UNCLASSIFIED]

Hi Andrew

On the 9c rec, the intention was that 'heating systems' covered space, water and cooking using natural gas and bottle LPG. The 'where feasible' was to not force applications where fuel switching is really difficult – I would imagine that commercial kitchens, large buildings, remote batches fit this category.

This is how residential energy/gas use is modelled:

1. There is a very basic building stock model which has existing buildings and new buildings. The demand for useful heat for these building classes can be reduced through exogenously specified efficiency improvements.
2. New buildings and existing buildings undergoing a retrofit make a fuel selection between gas and electric based on the relative heating costs (fuel and capital). As of 2020, these costs are pretty similar and so the model gives a roughly equal share of heating types. You can see in the current policy reference that residential gas increases in the short – medium term. Gas fuel costs do not materially change in this projection.
3. For the modelled scenarios, there is a bit of natural migration away from gas as fuel costs increase (carbon + network). You can see this downturn in the headwinds and further technology scenarios before 2035.

4. All scenarios and the current policy reference have a forced ban for new builds and a phaseout for the remaining stock which are not cost driven. These settings override the fuel switching dynamics described in 2 and 3.
5. The ban date setting (2025 in the central pathway) prevents the selection of gas heating systems for new builds.
6. The phase out profile (2030-2050 in the central pathway) transitions the remaining gas use in a smooth manner. We think that 20 year period would capture natural capital replacement. We have not modelled in any more detail this fuel switching dynamic.
7. The above applies to space and water heating with separate fuel selection dynamics for both types. There is no linkage around sharing fixed costs for 2 heating types.
8. Gas use for cooking simply assumes gas/LPG for cooking has the same market share as for water heating, and so it follows the same phaseout profile.

The model is pretty high level and does not make any allowance for situations which are difficult or costly to electrify. It's also limited in technology without biogas. The recommendation 9c gets around these short comings with the 'where feasible' and 'bioenergy' options.

Apologies that this detail is not clearer (somewhere) in what we have already published. The phase out profiles, heating technology costs and modelled fuel costs are all available in the technical assumptions sheet we published. **https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Technical-assumptions-in-ENZ-energy-and-transport-2021-02-18.xlsx**

Let me know if you have any other questions.

Sean

[UNCLASSIFIED]

From: Andrew Kerr <**Andrew.Kerr@powerco.co.nz**>
Sent: Wednesday, 10 March 2021 3:32 pm
To: Sean Buchanan <**Sean.Buchanan@climatecommission.govt.nz**>
Cc: Christopher Holland <**Christopher.Holland@climatecommission.govt.nz**>
Subject: RE: [UNCLASSIFIED] RE: 9c

Hi Sean/Chris

Following up on the email chain below about 9c, can you explain or point me to how residential gas use is modelled? Sincere apologies if I've missed it as part of our earlier discussion.

Why I'm asking

- 9c refers to "no new gas heating", though not "no new gas hot water or gas cooking"
- But residential gas demand drops to near zero.
- So….*I'm not* clear on how the timing/quantum of customers switching from gas to elec is modelled – **is it an assumed switching rate or based on economic trade-offs of the costs, or something else?**
    - *Eg 13.3 says "The transition away from natural gas may mean that, over time, many households would benefit from replacing gas appliances. This could happen as households naturally need to replace appliances and heating systems, reducing the cost to households."* Is this the impact that is modelled too?

Any insights would be very helpful.

Andrew

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From: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Sent: Monday, 1 March 2021 10:14 AM
To: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: RE: [UNCLASSIFIED] RE: 9c

[UNCLASSIFIED]

Hi Andrew,

The intention is to enable electric heaters, wood burners and biogas systems and to prohibit expansion of, and new connections to the natural gas network. The rec is also intended to prohibit bottled LPG for building heating, and network LPG although it is not clear in the wording.

The rec does not enable biogas as a network blend.

Can you send me the Sapere paper on monitoring of distribution networks? Thanks for sharing your thinking here.

Cheers
Sean

[UNCLASSIFIED]

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Monday, 1 March 2021 9:57 am
To: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: [UNCLASSIFIED] RE: 9c

While I've got you – can you remind me what was meant by "bioenergy" in 9c?

9c - Setting a date by when no new natural gas connections are permitted, and where feasible, all new or replacement heating systems installed are electric or bioenergy. This should be no later than 2025 and earlier if possible

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From: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Sent: Monday, 1 March 2021 8:49 AM

To: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: [UNCLASSIFIED] RE: info: Jemena's project

[UNCLASSIFIED]

Hi Andrew,

Thanks for passing this on. I'll check it out. I have come across the vivid study before – it's a good one.

We are doing some extra work on network costs, whenever we can make find some time. I might come back to you with some questions around that, if that's ok?

Did you get from me all that you need in order to understand what we've modelled? The assumptions sheets are all online now, as are outputs for network costs for consumers. We also did a session on our wholesale price modelling on Friday – this should be online soon if you missed it.

Cheers

Sean

[UNCLASSIFIED]

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Saturday, 27 February 2021 10:11 am
To: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>; Christopher Holland <Christopher.Holland@climatecommission.govt.nz>
Subject: info: Jemena's project

Hi Sean/Chris
We got this through the EEI – thought it might be of interest if someone in the team is interested in this space, especially if you are looking at the costs of different pathways (something Vivid economics did in this study https://www.powerco.co.nz/news/gas-research/ back in 2018).
Andrew

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The Future of Hydrogen: Jemena's Power to Gas Trial

Tuesday, March 16 | 9:00AM Melbourne, Vic, Australia | Check Local Timezone

Join Frank Tudor, Managing Director of leading Australian energy infrastructure company, Jemena, as he explores the potential of hydrogen and other renewable gases in the energy system of the future. Frank will share insights gained from Jemena's industry-leading hydrogen gas trial, the Western Sydney Green Gas Project, which will produce and test the application of green hydrogen in residential, commercial, and transport settings. Australia is leading the charge globally in the development of a hydrogen and renewable gas sector, with hydrogen promising to help Australia reduce its emissions at half the cost of fully electrifying the energy system. Throughout this webinar, Frank will reflect on how best to realize hydrogen's potential, as well as the importance of working with the community, government, and other stakeholders as we move towards establishing a viable renewable gas sector.

Speakers: Frank Tudor, Managing Director, Jemena; Lawrence Jones, Vice President for International Programs, EEI (moderator)

Register

Plumbers, Gasfitters and Drainlayers Board meeting – 1 April 2021

Main concern is how it impacts apprenticeships

Maintain and decommission existing gas

If new industries do come online, will we have the people with the skills

2023 certifying gasfitters – highest level

918 trades gasfitter

Journeymen gasfitter 260

Trainees 2127 – good number, quite a lot, if this dropped away to half or less would be a concern for the future in terms of having the skills for maintaining existing gas infrastructure and decommissioning, or for building up hydrogen or biogas industries

563 exemption under supervision

Handful more where employer holds license – not a lot – work done in a workshop environment

Vast majority will be plumber and gasfitter

Very few will only be a gasfitter

H2 – most realistic future is for large industry or heavy freight, not so much domestic use

What this means for these gases of the future

Existing gasfitters – new training would be needed as H2 different gas properties etc – before developing any training on new gases, industry would need more certainty about these techs coming on and what they are being used for as that defines what the training needs to cover

Existing workforce – training for H2 might involve creating an endorsement on their license once they've completed a H2 training course

30-40% in Auckland

Rest throughout country

More north island as where reticulated

Commission not saying natural gas completely shut down

Document 4

Adam McFerran

From: Greg Wallace <gwallace@masterplumbers.org.nz>
Sent: Monday, 19 April 2021 3:39 pm
To: Briana Yee; Karen Lavin; Alexandra Aimer-Seton
Subject: Low carbon pathway
Attachments: Low carbon gas pathway chart April 2021.pdf

Good afternoon Briana

Thank you for meeting with us on 6 April.

As we have been doing some further work with the gas industry with transferring to low-carbon gas energy sources, I thought I would send you a quick graph showing our plan to transition to low-carbon gas.

Please let me know if you have any questions or if we can provide any other information that would be helpful.

We have had a lot of questions from consumers relating to transitioning away from LPG and natural gas; I would say they are quite shocked at the cost to transfer for existing users.

We are confident that the gas industry can meet the Climate Change Commission requirements for low-carbon fuels into the future.

Regards,

Greg Wallace

D S 9(2)(a) | P S 9(2)(a) | M S 9(2)(a)

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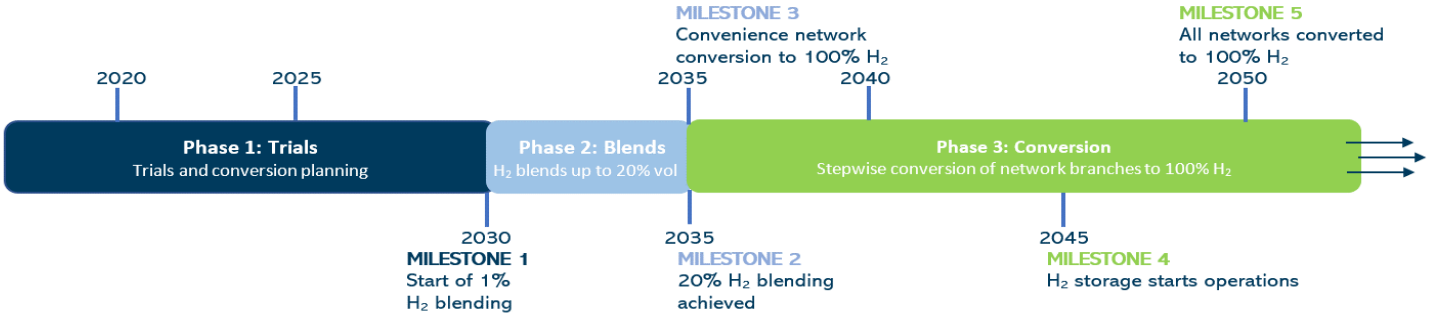

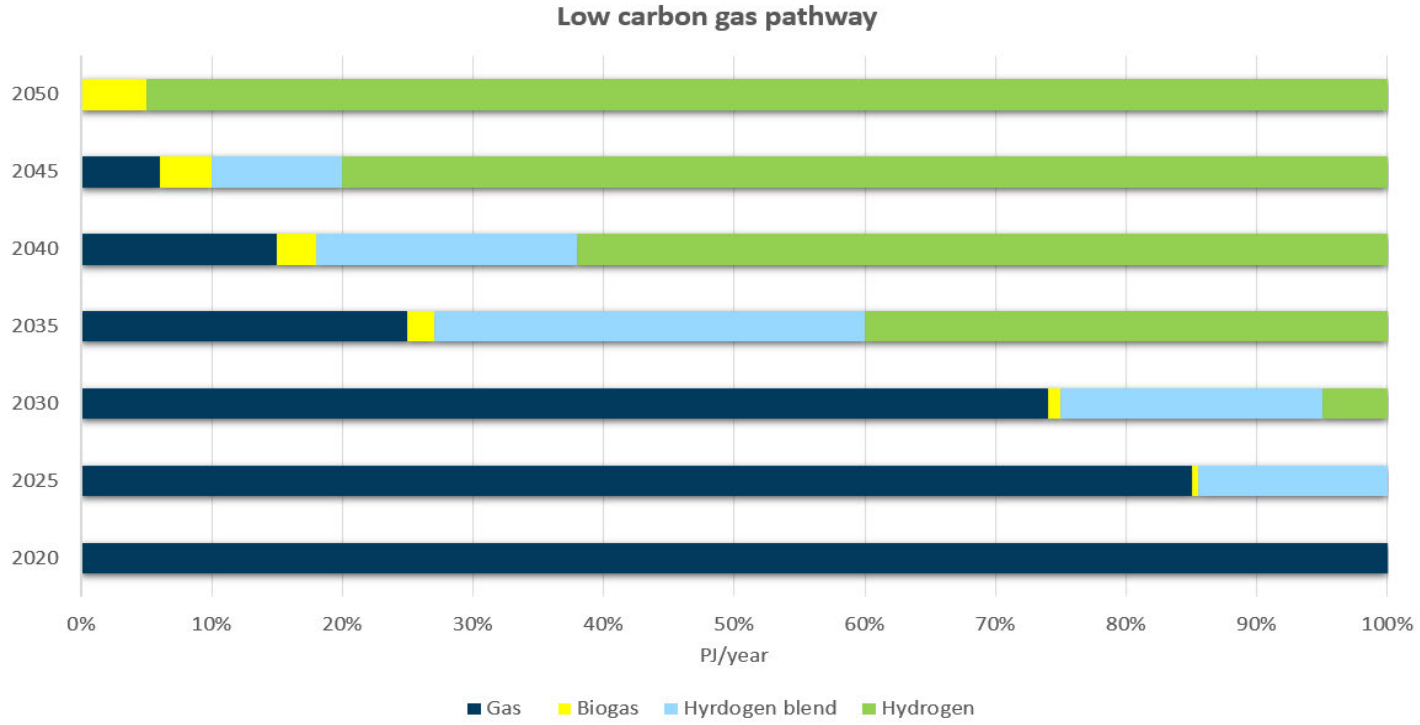

Document 5

Adam McFerran

From: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Sent: Monday, 17 May 2021 10:48 am
To: Sean Buchanan; Christopher Holland; Simon Coates; Paul Young; Scott Scrimgeour
Subject: RE: [UNCLASSIFIED] RE: questions on electricity modelling

Hi CCC team + Scott at WE*

We've revised our estimate of the impact of moving Wellington's gas use to electricity to ~300MW (was 250MW).

- The difference comes from including an estimate of the impact for Todd Energy's customers. They are in Wellington, but not on Powerco's gas network and consist of commercial/industrial customers.
- For context, in our submission we said:

  …Powerco has over 65,000 residential and commercial gas connections on the Wellington Electricity network. Our modelling estimates a full transition would add about 250MW[1] to Wellington Electricity's peak demand relative to 500MW today. This translates to a potential cost of $575 million and equates to $30m per year or a 33% increase in charges for Wellington Electricity's residential consumers relative to the ~$91m they pay today.

- So that 250MW should be 300MW, and the $575m more like $690m. Then would need to add WE*s estimates of residential and commercial EV load impacts.

Hope May is going well for you all.

Andrew

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From: Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Sent: Thursday, 25 March 2021 12:01 PM
To: Andrew Kerr <Andrew.Kerr@powerco.co.nz>
Cc: Christopher Holland <Christopher.Holland@climatecommission.govt.nz>; Simon Coates <simonc@concept.co.nz>; Paul Young <Paul.Young@climatecommission.govt.nz>
Subject: RE: [UNCLASSIFIED] RE: questions on electricity modelling

[UNCLASSIFIED]

Hi Andrew,

We have been improving and reviewing our network modelling for our final advice. I'm wondering if you have any feedback on what we have already shared with you which would be useful for us to consider?

Cheers
Sean

[1] This 'incremental' approach assumes that the network is already right-sized for existing demand and forecasts that were made without anticipating a wholescale shift of gas users on to the network

Out of scope

From: S 9(2)(a) @toddenergy.co.nz>
Sent: Wednesday, 11 August 2021 12:04 pm
To: Briana Yee <Briana.Yee@climatecommission.govt.nz>; Sean Buchanan <Sean.Buchanan@climatecommission.govt.nz>
Subject: Catch up

Hi Briana and Sean,

Realise it has been a while since I touched base, figured you both probably need a well deserved rest after what mush have been a very busy 1st half of the year for you both. Also congratulations on the Final Advice, appreciate you would have got a lot of strong (and likely conflicting) feedback as I am sure you expected, but it is an incredibly important piece of work which will form the backbone of all your future work and you deserve a lot of credit for achieving so much in such a tight timeframe.

Keen to catch up over a coffee when you are both free. I have an interest in the bioeconomy (e.g. biogas) as well as CCS so be interested to see what you thoughts are as appreciate you wouldn't have put all your thinking in the Final Advice. My calendar is pretty good for the rest of the month (excluding this coming Wednesday) so let me know which days a catch up might work for you both.

Todd is also keen to set up a meeting with the CCC to discuss some of the CCC recommendations (especially in the CCS and how to deal with dry year risk) to make we understand your thinking and recommendations, so expect someone will be in touch with Antonia in due course.

Hope all is going well and do let me know when a catch would suit

Cheers

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Document 7

Adam McFerran

From: S 9(2)(a) @toddenergy.co.nz>
Sent: Thursday, 26 August 2021 4:26 pm
To: Antonia Burbidge
Subject: Catch up between the Climate Change Commission and Todd

Hi Antonia,

I hope lock down treating you well, and also hoped you had a well deserved holiday post the release of the Final Advice to Government.

Realise this is terrible timing in regards to trying to arrange a meeting, but Todd would be keen to arrange a meeting with the CCC to discuss some of the recommendations that came out of the Final Advice. We have a few areas that we are interest in including how best to manage dry year risk and the role of CCS. Appreciate the CCC has done a lot of engagement but we are keen to dig a little into the detail, and I suspect it would be useful to discuss what has happened in the energy sector over the last 8 months noting that we have faced both a dry year and a peak demand event resulting in a power cut.

Could you let me know who I would be best to engage with from your side to set something up. I was hoping that we could get Jo Hendy along so am I correct in thinking that Anne Jonathan might be the best person for Todd to e-mail?

Thanks

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