

Electricity Session

Following Jan Wright's presentation, questions of clarification were asked.

Questions:

- Last point – price affordability: Did the commission look at a different treatment for “merit goods”? E.g. household heating vs industrial; where industrial should pay more - good for economy. Did we have any thoughts on differential pricing?
 - Jan: No
- How far can we go on renewables? 96%? 99%?
 - Unsure. But we know that it gets harder and more expensive as you get closer to 100%
- Was nuclear explored?
 - No. Due to our geology, NZ has plenty of other resources.
- Point 3 re removal of gas – explain?
 - If we want to get rid of all CO₂, we need to get off gas
 - Can plant trees, but that will only get us so far
 - Predictions about climate change are becoming more confident and more gloomy
- Have you looked at where water storage could be further developed? E.g. flood flow in Rakaia could provide a lot of energy
 - Wind and geothermal are cheaper. We have looked at pumped hydro storage as dry-ear-y solution.
- We're an export-focused country so numbers need to be in context of global

What are the issues or opportunities you would like the ICCC to consider further before finalising the recommendations and report for April 30?

Table #1

EV availability

- How realistic is that amount of EVs? Discussion of Norway and incentives.
- What about heavy vehicles? Especially long-haul vehicles.

Converting process heat

- Biggest gain in converting process heat, so why only converting 1/3? Why not 50%? Discussion of challenges of process heat conversion, including Tiwai closure and the different temperature challenges of different types of process heat.
 - What are the best incentives to shift process heat/achieve conversion?

Whole of New Zealand transition

- Wider decisions/incentives across New Zealand that provide larger shift of decisions?

POLICIES:

What will encourage fuel shifting to electricity?

Electrical vehicles (EVs)

- Scrappage policies, transaction incentives, three stages (A point of entry; B how it's used, C to scrap it)

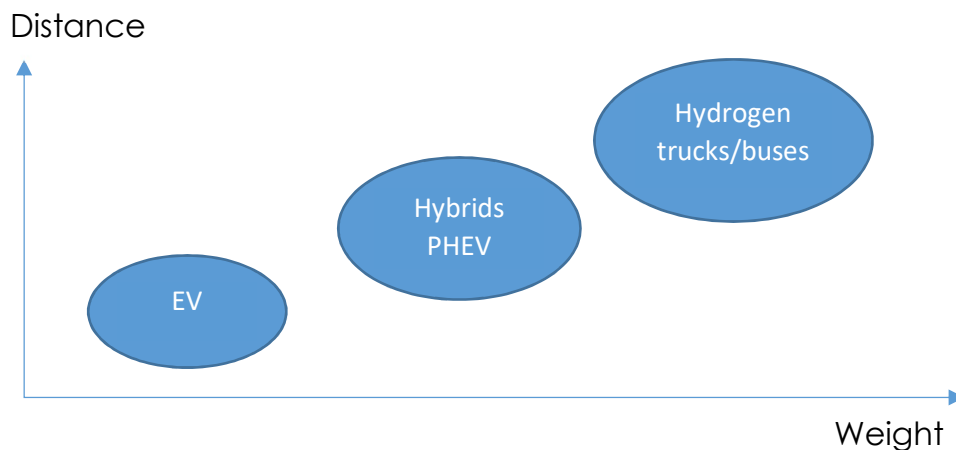
Process heat:

- Distort investment decisions to switch boilers earlier
- The RMA - give regional councils the power to consider climate change (e.g. discharge to air consent parameters) and so can't re-consent fossil fuel heat plant before end of plant life.
 - We need a clear message that emissions-related consenting will come.

The ETS reforms

- Supplemented with standards – think about all different ways
- Aggressive nature of emissions pricing.
- Need more carrots! E.g. tax breaks, capital allocation breaks (e.g. green bonus) – but can't just have one.

- Relative price of electricity vs. other fuels to convert process heat – keep it cheap enough to switch – regulation might be the only other way to achieve that
 - How to keep the electricity price low to be able to achieve this level of electrification?
 - Conflicting incentives e.g. New Zealand ETS price
- Offsets as a way of enabling conversion if other policy settings (e.g. New Zealand ETS) are not already working – timeliness issue, bring the emissions reductions forward.



New Zealand ETS Price

- Higher New Zealand ETS price e.g. Caygill review

Iwi/Maori access to electrical vehicles

- EV access for iwi/Maori especially households that already don't have good / any access to electricity – affordability and access to charging.
- Electricity costs - the transition must be affordable.
- Tail of ICE car ownership is immensely long – need targeted interventions to embrace the issue.
 - Purchase cost, charging, maintenance,
 - Iwi/Maori will embrace change faster than rest of population but only if they can afford it.
- Not all car companies are convinced they will solve the battery problem (energy density – range vs. power vs. weight) – hydrogen is another solution.

Table #2

- Our lakes are massive “battery” storage.
- Biomass economics don’t stack up – needs carbon price over \$100
- Challenges around competing use of water
- Hydro, wind and solar is the combination that makes the system work.
- How can you keep prices low while incentivising investment so you get to 100% renewable.
- Even with very low carbon price we’ll still get to higher renewable percent because of current structures/market
- New NPS on renewable generation would help
- Time around RMA is a problem
- NIMBY mentality needs to change
- Need to define the vehicles in the 2.2 metre category
- Focus more on biomass like the rest of the world.
- Community wind farms – do they have a future? It’s possible to partner with generators – but can take 10 years to get through consenting.
- Compromise is essential if we are to change to more economical and sustainable generation.
- How do you change the RMA to effect change? Ditto from iwi perspective
 - Tensions (iwi perspective) for pumped hydro

Table #3

- Affordable electricity: Relativity - every country has problem to decarbonise. New Zealand costs are lower, so will remain competitive.
 - Don't agree: cynical about whether world (e.g. US stance) will get to carbon zero.
 - Projections for coal/gas globally.
- Global context: Electricity price already high (but ETS price net up) – but even at \$150/tonne, coal still cheaper.
 - If want to reduce emissions – price is not going to fix it.
 - Renewable energy could be part of NZ brand for export.
- Clarification of regulatory settings review? Be explicit about what work is needed on transmission and distribution network?
- RMA challenge
 - Community – on-farm generation
 - Be good to understand more – get consenting right
- Climate changes key challenge: Scale. To offset 10% requires enormous amount of infrastructure.
- Electrical vehicles: How to ensure uptake is evenly spread – recognise challenge with fleet turnover subsidy.
- Dry-year risk: Affordable solution.
- Cost of 100% with electrification – massively expensive.
- Process Heat: Estimate lifetime emissions for gas vs. coal i.e. run coal plant bit longer, before switch to new tech, or build new gas plant earlier.
- How much thermal fuel do we need in mix? Cost
- Solar subsidise?
 - How to accelerate uptake? Regulatory settings.
 - Focus \$ on income support, not subsidise tech.
- New Zealand wind farm capacity?
 - Land use question.
 - RMA. Need discussions about national vs. local benefits.
 - Be explicit about trade-offs.
- Hydro
 - Social acceptability (certification overseas doesn't count as renewable)
 - Change attitude, or get easier
 - Restricted by consents etc.
- Public perception
 - Climate change and fossil fuels are becoming part of discussion at social situations
 - Should not underestimate public perception.
- Change demand
 - Efficiency – sounds boring but low-hanging fruit. If reduce first, then easier to electrify.
 - Demand response important but doesn't solve all limits.
 - Smelter could invest in new tech to manage their demand

- New Zealand has domestic winter night peak.
 - Transpower looked at Fonterra - doesn't process through winter.
- Home efficiency
 - Warm and dry homes would reduce peak demand
 - NZ should look at anything that would smooth/reduce peaks.
- General
 - How far are you going in terms of recommendations to make things happen?
 - Dry year solutions – expensive now, but who knows?
 - Don't overcommit infrastructure build. E.g. increase distance network capacity to house for EV charging.
 - Don't wait. Whole range of solutions.
 - No one silver bullet. Tech is not a get out of jail free.
 - Gas price?
 - Meat plant electrification?
 - Look at food carbon mile etc.
 - Transport: 1% of global emissions.

Table #4

- Transpower – 9 Gt to 18 Gt - does the modelling align
- Like using electricity to electrify and H generation
- Disconnect in electricity market - fundamental economic drivers
- RMA – tilt regime – public good of lowering decreasing emissions
 - How do you reconcile it with climate change objectives?
 - Policy statements to fix that
 - Challenge around already-consented sites that are coming up for renewal
- Need higher prices to get investment in new generation
 - Don't confuse the message of low emission prices as need that signal to invest.
- Process heat - investment in 30-year coal boilers
 - How to get around that
 - Expense and how it affects competitiveness
 - Biomass – issues with availability
- Tax incentives, R&D incentives to move away from coal.
- Cost of carbon / alter price to influence what boiler is put in.
- Innovation to increase efficiency of electrical boilers
- Need electrification for hydrogen etc.
- Not just policy but the investment cost
- EV in ambitious scenario – issues of getting there
 - Suppliers getting them into country
 - How to get the grid ready for it.
- Strategy for dealing with batteries at end of life
 - Can't just put into storage and wait until later
- Changing ownership structure of vehicles
- Autonomous vehicles - How to deal with higher price from that
- Government shouldn't pick winners with technology
- Demand management underestimated (particularly process heat)
- Focus on barriers
- Support electrification
- 100% renewable – have to build additional e.g. 105% to get there.
- Unintended consequences of electrification / intermittency.
 - Range of opportunities / don't be over-prescriptive
 - Get started – RMA – planning process takes far longer than build process.
- Foreseeable stakeholder upsets over building wind farms.
- Demand management - controlling when things run in households.

Table #5

- Big picture makes good sense, but needs thoughts on intermittency;
- Natural gas provides important transitional fuel, resilient price control:
- Don't lose hydro opportunities, especially hydro storage (existing) – what's total capacity to increase existing storage (raise lake levels)
- Pumped hydro is far more expensive, need storage at both ends – double RMA issue; chains of existing dams provide most options but doesn't provide "deep" storage.
- Present RMA and Maori/government partnership issues.
- Planning lead-in time for big projects – 2035.
- Importance of transmission – importance of removing constraints in grid; who pays? If user, how does this incentivise electrification? Socialise costs, but that means tax payer (including most vulnerable?)
- Differential pricing is an important option
- Consistency of regulatory frameworks (but joined-up thinking needs a clear goal – 3rd scenario is most plausible/attractive to engender joined-up thinking)
- What are going to be the hardest points to negotiate?
 - Who's going to most violently object?
 - Certainty for capital; who does the cost fall on?
- To what extent has demand side been modelled?
 - Overall efficiency; daily peaks: seasonal
- Grid access dependent on commitment to exit coal; but need that option to even just make business case regulatory issue; commitment is there but needs policy statement for Electricity Authority about facilitating this conversation.
- Changes in transport demand (shared, public); needs strategic social investment as well as commercial – agree with ambition but the scale of EVs if relying on individual transport is difficult to envisage.
- Demand modelling mainly relying on BAU trends (unsophisticated but solid); should more ambitious/sophisticated options be explored?
- Improve understanding of trade-offs (e.g. shut-down Tiwai; brown-outs?)
- Impact of disruptive technologies on demand side? (To what extent would this reduce trade-offs? Scale?)

Table #6

- Nature of the gas changes – e.g. baseload shifts to being peaker. Driver is the carbon price.
- Under electrification – how many peaking plants.
- How much generation and what sort under electrification and what ancillary e.g. transmission lines - forms part of the equation.
- What's the LCOE (includes moving and firming) rather than long run marginal costs?
- What are the scenarios under electrification under solar in homes - e.g. fully distributed to avoid cost on grid? Q: relative cost of solar as generation vs. cost of distribution?
- Distributed generation is okay, but what about winter? What about our understanding of how the home runs.
- Queried assumption about current technology in the model.
- How far have they gone about thinking about tech – e.g. – solar by region?
- Average lifetime of tech – e.g. implications of investment – geothermal lasts 100 years but only thought to 2035.
- Have we modelled to 2050 at least?
- What kind of tech makes an actual difference at the home scale?
- Loads of models – but once you get above 95% on current tech it gets very expensive.
- Putting electricity from vehicle into grid costs for the grid.
- Other biogas tech for fuelling vehicles costs \$100s.
- Climate Change Commission is going to do 5 year budgets – so why is 2035 so important? Importance of long term. Can you see 15 years out? 5 years is too short.
- Is the CCC going to set tougher targets in response to new info?
- Tweak or fundamental?
- Why is this question defining the budget now?
- How have the Committee thought about the variation through time? How will it interact with the 5 year budgets?
- Greater thought into guidance around the targets of electrification. Set of modelling assumptions vs. what it actually looks like - sector targets.
- Is there holistic modelling around the economic impact of the implications of this work? (ProdCom work is the best)
- ICCG has to be the experts around disruptive technologies – need to put a lot of resource into it and have a programme. Not a passive, leaving it to industry approach.
- At what point does the carbon price stop working? – when you run up against a tech barrier? If the LRMC for new kit is cheaper than running old kit then dump old kit - and carbon price is part of that. Needs to be \$50 - \$75 to get more switching. But social impact on cost will impact. Need an alternative that is viable or it just becomes a price.

- NB energy poverty. Think about mitigation, different pricing.
- Investment in distributed generation – still get distribution co. returns – so South Auckland paying for wealthier to go off-grid.
 - But don't want pricing signals to distort
- Lack of attention to building standards to reduce electricity use.
 - Ability as an investor to get the return. Desirability of the home – avoid buying obsolescence. Social premium in Australia.
- View that building standards would go up.
- New Zealand govt removed building standards – saw shift. Australia govt kept on - produced difference.
- Where is the demand side of the question?
- ICCC – assumed some efficiency
- Well-built home uses less electricity. Homes moved from 8-7 MWh – compare to European house – lots to do with construction – even temperature adjusted we're terrible.
 - Not building same quality of house.
- What would implications of increasing quality of stock do to housing stock – market rentals – social implications and broader ramifications.
- LRMC – but what about the retail prices? How far will it rise under the scenario? What is the political cost to a rising retail price?
- 97% looked achievable.
- Geothermal – how likely is that? 50:50 at the moment but will be offset with trees.
- Realistic cost of pumped hydro storage \$15 - \$20 bn.
- Storage at Manapouri is only ½ of what could be used. 500 GWh more is possible – but environmental implications.
- Wind and hydro assumptions + RMA consents.
 - How are you going to tackle local objections to a national target?
- Requires some form of local generation/costs are localised.
- No incorporation of rail electrification?
- Biggest saving is diesel truck to diesel train
- Think economy wide – rather than picking one sector.
- Concept of MACC notoriously fraught with difficulties but should be used.

Table 7

- What can be done to make better use of water that flows from rivers to sea e.g.; more storage in areas already consented for hydro generation, noticing also competing land use e.g. forestry.
- Implications of transmission constraints, especially inter-island
- Affordability issue is critical, as this is what matters most to people and therefore to the politicians e.g. differential pricing for vulnerable consumers vs. businesses.
- Cost-reflective pricing is coming from electricity distribution pricing reform
- Important that ICCC translates cost of overbuild into retail electricity prices
- EVs are important in decarbonisation, but not generally affordable especially for vulnerable communities – intervention needed so these communities can play their part and not be left behind?
- Support ICCC looking at separate question of electrification i.e. reducing emissions rather than just 100% renewables
- Opportunity to improve efficiency through “green buildings” (note; this is for existing and new building stock), but this needs better standards, capabilities in building sector and capital.
 - Has this been explored in ICCC analysis?
- More generally, important to look at demand side, not just supply.
- EV may not need to be traditional ownership model, but a service and new business models
 - Has not been incorporated in ICCC consideration.
- Many solutions around decarbonising e.g. EVs, appear urban/focused, but not well suited to regions where, e.g., little public transport.
 - This is a challenge for local government as well as central government
- If we want gas to go further, we can stretch its life by taking hydrogen component out of natural gas as a stored energy source (steam reformation, H₂, ammonia) and/or blending H₂ into gas to displace methane).
- Has tidal generation been considered in the mix?
- How are daily peaks managed without gas peakers – and what will be the implication for electricity retail and wholesale prices?
- Improving efficiency is very often better than building generation.
- Addressing peaks in demand can be addressed with local smart networking e.g. micro storage/buffering.
 - This could play bigger role in future e.g. distributed energy exchange, gifting of energy.
- What is the plan in 100% renewables with no gas in dry/still period – non-supply?
- The climate is changing, and this may affect in-flow and wind patterns in the future – has this been considered in the analysis?

Table 8

- Different way of demand side response - very important
- Demand interruption from Tiwai very costly hard and slow
- Other industries have more flexibility
- New tech from Aluminium smelter DSR – not commercially viable
- All of these things are massive cost, and if it's a massive cost it may be worth subsidising
- In Australia, there is law to compel large industries to switch off, but there is compensation
 - New Zealand does that in gas sector
 - Just taking off a couple hours can manage it
 - A lot of opportunity in North Island
 - Massive constraints grid upgrades for getting power
- Have the ICCC done enough work on the demand side of the equation?
- A lot more education for New Zealanders to see how they can reduce demand
- Given Japan and Korea want lots of hydrogen
 - What are the economics of exporting to 4 out of 5 years
- What happens when Methanex leaves? How is that factored in?
- Methanex is best placed to risk-share, buy, they take about ½
- Education/indoctrination is fundamental for public willingness for the changes
- People being proactive, a way of thinking as well as act of doing
- Tuaropaki is a company in process of converting to hydrogen plant; well worth being informed
- Demand prices
 - Energy hardship
 - Electrification
 - Keep large users in economy to get extra supply built
- How can you change mind-sets about generation
 - Consider hydrogen in transport and process heat
- End up within short term, day, week, month, season, between years
 - Demand side – role in short term
- There is potential with Tiwai, Rio Tinto are talking hard with others
- If domestic gas isn't going to be able to play that flexibility role to 2035, have ICCC looked at all those different dimensions of demand-side
 - Has ICCC looked at importing?
- Amount of gas needed, not much but when needed must run harder
- Upstream gas industry isn't set up to provide the flexible load - a fundamental change
- Interested in whether Methanex is assumed to continue
- Hydrogen is challenging for most countries
- Hydrogen has containment issues
- Using coal to make hydrogen does not make sense

- Japan is very different from us. Education issue to show hydrogen not for New Zealand
- Overbuild and hydrogen – need business case
- Would you have enough pressure to store hydrogen?
- Would you be talking about hydrogen if it wasn't trendy right now? – it's a diversion.
- We've got rivers – but turbines in fast flowing rivers? – environmental issues
- Tidal as well?
- The issue is cost with Kaipara, maintenance costs are huge – wind is cheaper.
- Inheriting technology from rest of world. Wind is way cheaper.

Table #9

- Differential pricing – “merit goods” to people vs commercial interests facing “real” price
 - Political decision, but valuable question
 - Social needs on both sides, just transition
 - Jobs and income linked to ability to afford electricity
 - Productivity is key
 - From economic perspective, cost is cost – valid focus for ICCC
 - Who pays is a separate, valid, question
- Industry more efficient with use of process heat e.g. some are net exporter, moving to EVs (free charging)
 - Has committee looked at how this may change in future, and opportunities here?
 - Network-based, collaborative, clustered uses – one person’s waste, another’s feedstock/energy
 - Incentives? Wholesale, feed-in price a disincentive
- Availability of electricity – market doesn’t guarantee supply availability and reliability
 - Lag time is a problem
 - Important that grid (transmission etc.) is upgraded to maintain reliability – value of distributed for reliability
 - Could variability of pricing be used
- Biomass? Upfront capital cost is high even though 20-year cost is comparable with coal
- What are the mechanisms to incentivise demand management
 - E.g. impact on system of lots of EVs
 - Incentivising industrial electrification
 - Reliance on fossil fuel for backup (electric costs backup)
 - If low cost, already there. Total cost important
- Central planning with market flexibility
 - Need for more strategic direction to push to long-term goals
 - Large generators see market as effective – efficient but timing is the issue
 - Transitioning from existing infrastructure to a greater distribution contribution
- No natural gas? Why invest in improving gas infrastructure if no future investment
 - How to keep fossil fuelled energy supply through transition as investment incentive decreases
 - Acknowledge need for transition and recognise incentive for incumbents
- Should ICCC consider CCS possibilities for natural gas emissions – in addition to natural gas, and tree offsetting

Table 10

- Biomass only works as a complement to other fuels at the moment – and too expensive
- Government policy alignment on biomass is needed – government agencies pushed to replace coal boilers etc., but government won't invest in the capital needed.
- The biomass resource exists – but transport costs are high to processing plant.
- Need to look more carefully at increasing lake sizes/storage capacity
- How to shift demand profile to the geographic and seasonal generation capacity?
 - What's the opportunity to explore that?
- Key demand side shift would be getting large industrial plants out of using the electricity
 - This is why the supply side is where all the attention goes
 - It's otherwise very doable to manage demand from households etc. (cost changing etc.)
- Why doesn't each industry take care of its own issues rather than allowing people to offset across sectors?
- Are we carbon zero or net carbon zero? This will frame the spectrum of options
- It has to be net – therefore gas remains an option
- If carbon zero – would have to turn off geothermal as well (but geothermal has been a huge driver of reducing emissions overall by pushing out thermal generation)
- There is a range of geothermal emissions rates – can we be careful to only invest in geothermal with low emissions rates?
- We should focus on how to change behaviour that drives emissions rather than try to achieve targets through offsets
 - Worst case of this is that we would just chuck some trees in and avoid having to make any real changes to our behaviour
- What is the price where it becomes worthwhile to invest in the technology rather than pay for the offset?
- Needs to be net across all of economy
- Could have a situation where, if we have high ETS price plus trading across sectors, it drives large amount of agriculture out of economy and destroy rural communities
- There's huge opportunity to sell electricity in New Zealand
- Carbon leakage overseas an issue / but also across sectors domestically
- If pushing electrifying process heat but still using fossil fuels to produce electricity – could have worse result for emissions overall due to inefficiency in the system and transmission losses (rather than just using gas for the process heat to begin with, more efficiently)

- Hydrogen – this is the worst in terms of efficiency – worse efficiency than petrol, it will be a disaster (despite all the hype that it is a panacea)
 - Might be worthwhile for export if Japan really wants it, but not good for domestic use
- Investigate electricity poverty further
 - How to balance with industrial use of electricity
 - Protecting New Zealanders
- Demand side of the conversation – how to rejig communities/social engineering
- Many renewable sources are climate-dependant – we need to think about extremities not just averages – our energy system is reliant on our climate and future climate change could affect this.
- Where does biomass fit in to all of this? What are the opportunities there? Unless clear that will be part of system, no one will make the effort to do it
- We already have two tier electricity pricing system/market – retail customers have fixed prices rather than pay \$200 at the margin like commercial/industrial users.
- Prices (especially carbon prices) are a trigger for a conversation rather than the real driver of behaviour change

Table 11

- Carbon sequestration. Carbon in USA.
- Can use raw natural gas (biomass/coal)
 - Looking to develop for New Zealand via 8 Rivers
 - Pilot 60 MW pilot – will scale significantly
- Language
 - Renewable will become low carbon emissions
- Effect of climate change. Bold to think hydro will stay the same. We may need more capacity for extended dry years. What's the relationship between water and electricity? Manage the peak.
- EVs
 - One EV is equivalent in capacity to 6 houses – demand on the network
 - How does distribution network manage that demand?
 - Don't want old technology for new assets
 - Build more capacity – drive up the price of electricity for everyone so that the rich can drive new cars [fairness issue]
 - Vector has a 'green paper'
- Network resilience
 - Risk that transmission could be interrupted in a natural disaster if NZ is dependent on one energy source
 - Mitigate in business
 - New Zealand dependant on grid transmissions
 - Batteries etc.
 - Microgrid. Energy reliability and co-resilience
 - Only 6 weeks in hydro
 - Norway
 - Vulnerability
- MBIE on hydrogen strategy and hydrogen fuel cells
 - 20-30 years. Being lodged tomorrow.
- Increase in power grid will impact on Maori land owners. If grid is extended – where will it go? Maori should not carry additional burden
- RMA fit for purpose? Doesn't balance national energy market structure - ComCom. Equality through new policy
- Waves/tidal technologies. Wind farms may be marginal
- Who decides – what's the process for deciding?
- Need the legislative piece but zero carbon
- Modelling shows \$100 at least
- There will be some organisations who just pay the price
- Role of the commission going forward. Can we put in a decision making body? Maori often marginalised.
- New Zealand lead. Opportunity for workforce realignment. Skills workplace reinvention.
- Prod Comm – technological change impacts on workforce
- New Zealand fleet is getting older. Most cars come in 2nd hand.

- Renew/recycle – batteries.
- Other problem re disposal. Circular economy.
- 2020 on NZ will have an electronic stability standard on all used car imports. It's expected that used-car importers will double volume prior, so emissions peak still to come.
- We don't want to be a dumping ground for old tech.
- Social issue – as otherwise driving old unsafe cars.
- Public transport too time-consuming.
- Insurance – current position not sustainable.
- Pick up pieces when things goes wrong
- Signal in taking seriously what we can do to lessen
- Could signal – especially re-insurance companies
- Stay for long term as making a change
- How do you incentivise the transition to electric vehicles affordability with insurance?
- Biggest risk is flood risk in New Zealand. Adaption.
- Can we sustain all the assets?
- Support communities
- Big trends to redesign urban areas and generational shift. Young are happy [not to drive].
- Change in mobility, fewer people with licenses
- Vehicle ownership will change.
- Placing structures on Maori. Ownership of water
- Maori relationship to resource. Whole system together to combine. Storage issue dovetails.
- Land taken to put lake on for electricity generation.
- Some renewables – structures/amenity etc. will impact Maori (wind)
- Geothermal – under the rules 'renewable' but still 1.8 million tonnes emissions.
- Will Stefan runs an executive sustainability course. Updated research. 1-2 years to make decision about carbon and only 8 years of carbon budget left. Is this fast enough?
- We need to take action now.
- What's the appetite?
- Hard to do with RMA.

Table 12

Carbon capture

- Understand uncertainties in this space, but needs to be kept on the table, e.g. for geothermal emissions
- How far has carbon capture and storage been considered?
- Recognise it is an economic question but lots of work going on in world on CCS
- If focus is on CO₂ removals – it should be a valid consideration

Energy efficiency

- Low hanging fruit – most economic?
- Ambitions of assumptions in modelling questioned?
- Physics is promising but ability to deliver challenging
- LEDs cheaper than a wind farm

Bang for buck

- Driving electrification for emission reductions clear
- No one in sector will disagree
- Challenge is in conflicts
- How does the industry collectively support government to make scenario 3 happen
- A lot of investment, and risk in making it happen in regulated environment
- Can't leave it to the commercial/market to deliver
- Needs leadership and clear policy direction from government.
 - Takes risk out of being first mover
 - Need certainty around carbon prices – if it stays low for too long economics do not stack up
- When do you pick a technology? – risk you pick electricity when hydrogen fuel cells could be the next thing
- Fonterra faces massive costs to convert to electrical process heat
 - Who should bear cost of that?
 - Some suggestion it should be Fonterra themselves
 - Also challenges with getting transmission lines in place
- Good for report to spell out assumptions that sit under the model
 - E.g. assumption that we need to keep producing milk powder – is this the right assumption?
- Supplying electricity to a Fonterra site - capacity needs to be significantly higher.
- If agriculture emissions are to be reduced, is electricity infrastructure that lasts 40 years for processing milk products the right thing to invest in?

- Finding a landing place for Ministers – what will it take to get a win in the electrification scenario in the next 12 months?
 - Importance of the sector playing a role in this
 - Lots of support but who would have ear of government that is independent (not vested interest)
- Double edged thing about affordability
 - Cost important to facilitate transition to reduced emissions – relative costs
 - Should regulators of electricity pricing have sustainability objectives? – concern that regulators don't have expertise to do that well.
 - Should leave it to external carbon price to drive decisions (not internal to regulators' decision making)
 - Regulators can choose project priorities and influence that way.
- Anyone using fossil fuels at moment– costs to electrify cost prohibitive – won't happen under current economic framework – electrifying for no extra benefit (profit)
 - What's missing:
 - Practical investment
 - Only theoretical ideologies
 - Lots of little things we can do – baby steps
- Chicken and egg –
- Everywhere else in the world gas is seen as a transitional option:
 - Methanex can underwrite the costs of having gas in New Zealand
 - If it falls over at the big end of town how does that play out at the domestic end – can no longer afford gas to heat homes.
 - Need to understand wider impacts on New Zealanders.
- Half of Methanex products go into reducing emissions globally – needs to be considered in the wider picture
- What chunk of trees needed to deal with gas – very small for gas.
- Challenge of looking at different pieces of the GHG emission puzzle in isolation.
 - How all the different parts of economy fit together
 - What investment is needed in modelling to be able to do that well?
 - Should be easy to justify investment in those models given size of impacts for the economy.

Agriculture Session

Following Harry Clark and Suzi Kerr's presentation, questions of clarification were asked.

- If faced with a greenhouse gas levy some will choose to plant trees to hedge their liability anyway, which kills your argument about the ETS as it will be cheaper to be in the ETS.
- On farms there is currently 1.4 million hectares of native forestry, some farms could be carbon neutral at the current farm gate, have you thought about netting off?
- Why not proportional allocation?
- Have you thought about the implementation of about 25,000 farm environment plans?
- Challenges when talking about animal efficiency because there is a fixed relationship between intake and output.
- Maximise overall wealth concerned with the 95% earns, it's cheaper to do raw than processed what will this mean for investment and processing?
- Have we thought about disrupters e.g. synthetic protein? We need policy to help us prepare for the long term.
- Did we think about differential treatment of gases?
- Did we consider complexities with TTWMA?
 - Have you taken this into account as an impediment?
- Mechanisms are in place to recognise carbon from regeneration or existing native bush with biodiversity benefits?
- 85 % of our primary production is exported, are NZ farming efficiencies similar to those overseas?
- Have we looked at the regional impact of the allocation methods?
- RMA in regional councils – can't change farming practice from one to another, need coherence across regulatory mechanisms.
- Offsets from dairy will be a key driver for afforestation.
 - When considering a levy or an ETS what will be more efficient to drive afforestation?

- Bringing in the processor means agriculture takes a price faster
- Should we have a price corridor in New Zealand?
- Need to get to farmers – farm level
- Policies “fighting” – misaligned
 - Next generation – need pace, but need profit to change.
 - Price signal asap.
- Don’t be distracted by detail – need awesome leadership
- Speed – consensus around urgency – to get gains
 - 95 % too high
 - Need land use change
 - Adaptable sector
 - Increase research and level
- Integrate “all these strategies” together
 - Much longer conversation
 - Top-down direction to solving issues market can’t
- Interim – key option in all = farm plans. Need resourcing from processor funds.
- When farm subsidies removed, supply chain slow to react (e.g. ports). What other businesses will be impacted by these proposals: opportunities if understand ETS market. Where liability lands – important, plus how measured matters.

Almost 50% of New Zealand's emissions come from the agriculture sector. We have talked about a farm level price around 2025 via an on-farm levy with an option to introduce a processor ETS/levy in the near term. Are there smarter ways of achieving emissions reductions in the agriculture sector in the near term?

Are there other opportunities or issues that should be considered by the Committee when answering the questions it has been asked to address?

Table #1

- Simplification important – and shouldn't be a compliance cost but should be a reward for getting it right (more sustainable farming practices overall)

Interim options

- In favour of voluntary option. Because of education and awareness-raising aspect; although aware it won't drive enough change.
 - Integrated farm environment plans to achieve balance across different objectives (e.g. cross-benefits of the different on-farm activities).
Example of feed packs being good for water leeching but bad for N2O emissions.
- Processor level to get \$ while levy coming in 2025.

Integrated issues and clear signals

- Observation of difference between ag and electricity sector – clarity of pathway to get up to the objective of reducing emissions
- Question on tax on fertiliser and effect on changing behaviour at farm level
 - Trending back to more sustainable use of land
- Needing integrated assessment of different issues facing farmers e.g. water quality

Optimum production

- What about New Zealand's optimum production? What could or what should it produce? (what kind of agriculture/food supply sector do we want and solve for that?) Constant trade-offs vs. different factors e.g. employment etc.
- Questions re. value consumer will get from low-emissions future

Leakage

- Emissions leakage

Maori owned farms

- Maori owned farms in class 6, 7 and 8 land

- Maori farms only just getting back into Maori hands, so policies have to recognise that these farms are not yet profitable – recognise huge debt, lack of flexibility of different farming land classes

Future analysis and support

- Funds analogous to EECA's low emissions (at interim phase) funds to farm advisers and valuers
 - Very difficult to value a farm given policy uncertainty
 - Need info on emissions on farm.
- Need “futuristic” farm advisors – advise the change that's happening 10 years+

Health

- Veganism – shift in the world to understanding more about how food influences bodies.
- Agriculture needs to work with the medical world more than ever before, and think at a higher level about what type of food sector New Zealand wants to have

Spatial analysis

- More strategic analysis of spatial planning in New Zealand of land use – what's the potential e.g. a dairy farmer then becomes a dairy/manuka/wind farmer.
- Look at land scale what should we do, then add social layers etc.
- New Zealand was a low-cost producer and needs to change mindset – kiwi industry good at this
- Some banks doing spatial planning
- Adaptation for climate change another critical layer
- New Zealand Productivity Commission should do this spatial analysis
- Analogous to the insurance sector – national risk approach (bring together climate, flood, economic risk etc.)
 - Central government model available to all to make good decisions (for individuals and to give information to regional councils).
- Trade-off between top down and bottom up decision making
 - But climate change too much a commons issue to do solely bottom up (know there will be huge resistance though)
- Concept of analysis to action

Table #2

- No short-term options to decouple food from emissions
- Drawback of producer-level is that efficient farmers are not rewarded.
 - Is it sensible to put a levy on New Zealand milk production when we are the lowest emitters?
 - Ag is going to come in... New Zealand public is tired of ag's excuses
 - Doesn't think levy (producers) is useful
- Contrary: Producer-level levy would be a signal that change is happening
 - Pressure is going to increase by society (New Zealand and global) for ag to reduce emissions
 - Better to allow the sector to retain the % of the levy that this tool would collect – the sector is better able to help farmers make incremental change
 - Need certainty about baseline – size of woodlots, utility of manuka
 - This is not a massive impost, the industry has a perception problem, time to get on and do it.

Opportunities

- Slow release device in water
- Grasses with less impact on methane-producing bacteria

Table #3

- Agriculture emissions should be in
- Need lowest cost de-carbonisation – economy-wide.
- Long-term frameworks
 - Can you move to an ETS over time (from levy-system)
 - Gives options as price to manage convert/trade best land use
 - mechanism will come in to simplify
- How to estimate emissions?
- GM grasses? (constrained?)
 - Non GM
 - Rye grass etc. dairy farms can only take about 5%
 - 2-10 % decrease in emissions could be achieved if all farmers were operating at the level of the best farmers.
- Think levy based on limits (declining). Likely methane target will be a set % decrease – should align with this objective.
- No ‘one size fits all’
- Farmers need to internalise cost.
- Price must go on farm. Favour levy.
- Commission will be setting 5 year budgets – will look at free allocation as mechanism
- Timing? (Why so long)
 - Dairy easier to measure emissions. One main processor.
- Harder to estimate emissions for beef and lamb
- Interim measure (are there any unintended consequences?) – put on processor – no signal to farmers, but pool of money and makes a start (2 benefits).
 - Need to get allocation method “right” so it evolves over time
- Biggest issue – globally traded – don’t wipe out farmers’ ability to export.
- Free allocation (could be phased out) – political
 - Interesting different approach between workstreams (\$1b)
 - Remember ag didn’t get into ETS last time.
- Horticulture – change at fertiliser level (small quantities)
- What’s missing?
 - Offsets – forestry – too big an issue to skirt around
 - Lots of reviews etc. going on
 - Local and central government consistency – land use change
- Levy vs. ETS – possible that using levy shuts out opportunity for farmers to buy/sell international ETS units.
- Good that:
 - Ag coming in
 - Farm level
 - Interim measure proposed
- All of New Zealand milk could have emissions reputation as good as ‘organic’

- Don't get hung up on transaction costs.
 - Complexity of ETS may not be as good as problematic new service providers – aggregate etc. To take away farm management capability issue. Transaction costs may not be as high.
- Allocation issue – re farmer obligation
- Farmers came up with combo idea
- Any modelling on price impact on fertiliser? (once in ETS)

Table #4

- Voluntary option is best – put role on sector to get it to farm level
- Sector put money in equivalent to ETS funds through commodity levies
- Sector socialises benefits through different suppliers
- Do what we can based on science
- As efficient, could just move offshore and increase emissions
- Process in transition – steps for putting in place method for calculating emissions
- Changing from current use to new use – LUC
- Some farmers could trade, but some farmers can't even do NAIT
- 10% labour shortage – could further push production off shore
- Recycling idea is good

Table #5

- Smarter ways can't be applied easily across the sector as a whole; Synlait ambition and demographic is quite special (lead with pride; avoid PKE). Being a cooperative makes this hard.
- Balance self-regulation vs. regulation – what's impediment to self-regulation? DIRA, but also inert 20% constituency.
- DIRA amendments important to limit dairy conversions; but could also support minimum standards. This is hard to achieve.
- How much does this rely on improvements to Overseer?
- Have conversation with ETS forestry folks in MPI re compliance
- Do-ability of robust calculations
- Complexity of demonstrating funds from processor level ETS
- Would processor level levy be more acceptable? Want to ensure reliable fund/revenue?
- Profitable processors can afford to invest, but bulk of industry is not in as good a space.
- How do you reward early adapters before 2025?
 - Role of fund
- Desire to have on-going ability for processors to work with farmers even when farm level levy is in place (e.g. use NZUs held); by processors to provide levy assistance.
- What are ways to sensibly bring less engaged farmers along?
- Political risk of inaction due to delay? Danger of talking only to highly engaged farmers; develop realistic, actionable benchmarking.
- Underscores need for Climate Change Commission
- Developing incentives to farmers via processors – can we learn more from water examples e.g. Canterbury irrigation schemes?
 - Benchmarking, regional best practices - talk to ECAN.
- How do you balance multiple objectives?
 - GHG policy focuses on one issue only
 - Does the policy sufficiently line up with other policy objectives?
Regional objectives and development strategies (region, catchment...)
 - Need pictures of what solutions look like (integrated)
- Where are maximum pain points?
- Any role for local government would be problematic
- Make sure the principle of on-farm reporting is actually viable in principle - talk to MPI with experience in regulatory farm-level activities/auditing

Table #6

- Levy easy to understand - Maori perspective – simpler and easier to manage. People in the board room – can factor into their business.
- Cultural issue – people don't like not knowing beforehand how much they're going to have to pay.
- Levy should be held by a farmer-led group. – do the biggest farmers have the biggest say? How do you consider how you use the fund?
 - Is it a tax that get spent by government? Or a levy that gets spent on target?
- With processor-level c.f. ETS – How would it go back to farmers – people don't understand how it works – don't get hypothecation.
- Worry that if going to buy offsets or grow own forest then going to have transaction costs anyway
- Is it true that transaction costs are going to be high with tech change?
- Small transactions but high number
- Tension at processor level – admin costs of sending it to 25,000 outweighs benefits
- But people think they're better than smeared average
- Dangerous strategy to jump chasm in two leaps – won't do the second step.
- Point at where you want to end up
- Levy can be applied and collected at farm level – or at processor level.
 - Interim at farm level
- Outputs and measuring of gases – kg of milk solids. Only A2 that lets them see clearer. In gas conversation what if they shift line – are the signals there to shift to good behaviour? As in ag – shifted behaviour earlier. Buying carbon at \$0.15. People will understand signals and operate appropriately
- Pleased levy would incentivise afforestation. Based on GHG footprint
- Not all feeds are the same
- Will reduce intensity
- Potential to game the system to minimise exposure. E.g. take infrastructure and wetlands etc. off total farm, so of total land only 50% is classified as productive land
- Levy – not all farms are same
- How is whatever happens applied fairly across all the different types of farm?
- Cost of administration
- When and who measures and audits? Every 5 years?
- Cost of being involved
- Annual basis? Price of carbon fluctuates. What does it do to behaviour? Will it require getting someone else involved in the business – an accountant? Don't want to need an external consultant.
- How do you send signals and incentives to send right behaviour?
- When do you end up being backed into land use change? Or de-stocking

- Riparian planting and hedge lines not counted in ETS – farmers not rewarded for positive behaviours. How can it be taken into consideration? 10% of the total land. Can it be in the levy – but not in the international commitment? Does the rest of the public carry it?
- How do you capture the methane? Has to be a big farm – over 2000 cows before it's worth it. Bio-methane for electricity
- What about soil carbon?
- Looked at tech – role of venture capital?
- Role of partnerships between Westpac/Super and DairyNZ
- Liked ICCC engagement with farmers
- Banks can help but can't do it all themselves
- Tools – people using Overseer – but doesn't send right signals anymore. Plus it's private. What tools are in the public domain that can help? Role of CRIs to help – currently misaligned.
- Nature of conversation has changed over time
- Whether boards are incentivised to make changes. It's going to become normal to have carbon on your balance sheet.
- Maori saying they don't want to plant trees – liability sitting with land owners – if trees get cut down. Lack of knowledge about separation of land / trees / carbon credits. If you lease land who does carbon credit belong to – all a contract issue. Can train farmers to understand how to incentivise via leasing arrangements – to move to lower carbon. Consultants can help with this too.
- 4% of Northland farmers understand monthly cash flow
- Banks – education, infrastructure – e.g. environment plans (won't provide a loan if not RMA compliant and have call-in rights)
- How do you flex the peak so that you move production to the shoulder of the season? Does that help?
- Increasingly customers (e.g. overseas buyers) want to look at what's going on on-farm
- No immediate return to story – but there will be over time. 5 year road map for supplying dairy farmers to get farm environment plans, with incremental steps starting with year 1 objectives
- Ticket to trade but also going beyond
- Value from the pool of milk
- Specialist application
- Can you stamp products to say carbon neutral? Is that better than 'organic'?
- An ag-specific carbon unit – to stamp food with? Air NZ – Ngati Porou deal
- NZ carbon units?
- Green NZ status. Maori – value to it?

Table #7

- The 95% shield weakens the signal e.g. for alternative land use but it is a start
- It would be useful for ICCC to recommend that 95% slides down over time so that the signal is strengthened over time
- It would be useful to identify a harder target and glide path to get there; and to signal this ahead of time so farmers know and can respond.
- The 95% shield is a subsidy funded by others, and there is a need to know sooner rather than later what will happen to that subsidy over time.
- These issues need to be considered in context of comparative global food production effectiveness, food transport
- New Zealand is relatively efficient by international standards, but does this translate into a premium on our product internationally through branding?
- New Zealand being a leader internationally is not a bad thing, but we have an opportunity to demonstrate to the world with our farm system changes.
- Issues around incentives for changing land use - when and how
- Maori land and Maori land ownership structures especially from settlement agreements create particular difficulties/constraints, especially in the transition to different land use. Costs and compensation issues arise.
- Farm indebtedness and access to capital is a barrier, particularly banking/lending constraints – status quo is sticky for farmers/landowners.
 - ICCC could recommend active engagement with banking sector to remove constraints and improve incentives to make changes needed, and also to ask banks to recognise the changes in policy settings and their implications.
- Possible opportunity to work with farmers to educate them about attitudes to debt and implications for change
- Issues around wealth transfers with changing land value resulting from changing land use.
 - This could relate to the 95% subsidy, for instance money going to government to offset cost of 95% subsidy when there is a wealth transfer
- Challenges with being able to communicate back to shareholders and landowners and all New Zealand, what the implications are for land use, the need for change, what the outcomes will be across the country.
 - Role for ICCC to help with communicating this in a way all New Zealanders can understand and assimilate.
- Transition requires changes that have costs and social implications (employment, education) and these perhaps ought to be socialised in whole or part e.g. expanding “Just Transition” unit.
- Regional authority and local government approaches vary across New Zealand – more consistency would be essential
- Regional authorities and councils need to play their part in delivering/enabling the changes needed.
 - They may need stronger direction to do so.

- Lack of joined-up thinking across government agencies and central/local government
 - Who is leading this? Is there a risk of silos?
- Role for increased mitigation measures to reduce cost and investment needed
- Observation that this agriculture session was very qualitative/policy based, whereas the electricity session was very quantitative/analysis based.
 - Seeking more quantitative analysis and research to support the agricultural work.

Table #8

- We have the ETS - take opportunity to put in at processor level right now – no more delay, not perfect but get going.
- Carbon-leakage – wouldn't want to face price before international competitors.
- Everyone should be in
 - Needs to be really good research into how to reduce emissions on farm
 - grass, land use change, changing global preferences
 - Opportunity for farmers to change
- Should go in. Money gathered through levy used to support farm mitigation.
- Farmers getting so many levies – see it as another tax. Just put it in ETS now.
- Idea of going now is great. But challenge around measuring, particularly when technology is lagging.
- Might actually be thrashing around in the water with no go and so put people off.
- Something should happen straightaway
 - Always going to have winners and losers
 - Cowboys are going to carry on. Those who are making an effort not rewarded.
- Political thing, once it is in 5% it will be very hard for them to get out.
- Capital allocation – one of the inefficiencies because ag didn't go in, inefficient allocation of capital into ag – heightened level of risk, exacerbated by “subsidy” like 1983.
 - Political lock-in problem – impressive lobbying.
- Fonterra could have an incentive to encourage farmers to change. It may be small but it's still something.
- Good farmers can get a 10% premium if overall sustainable practices - finding relationship through milk supply contract. For large producer – harder job. Systemically big organisational challenges. Smaller companies are already doing a lot of that. Provide learning to bigger companies.
- Could provide very strong incentive at processor level. Individual should be able to opt out and deal directly with ETS (big farms).
- Complicated where there is a lot of competition between meat processors. Very different than dairy.
- Different level of leadership of ag, around survival of plant/sustainability.
 - Life on the land, life under water
 - 17 Sustainable Development Goals
 - Land welfare, economic welfare etc.
 - (change in conversation everyday focus around goals).
 - On-farm systems drive the most change
 - Stick with producers means proportional allocation
 - Farm-level incentives can have more incentives
- It needs to start at processor level, skin in game to start conversation with farmers
 - Some processors have already

- Name and shame
 - Young, educated farmers can be change agents
- If allocated per kg of protein, do you drive any change?
- What can you do on a farm level to actually reduce emissions? (same with aluminium – is farming the same?)
- A lot more research around on-farm practices.
- Given there's not a lot, producer level makes sense?
- 1980s
 - good farmers got through, bad farmers lost
 - huge social cost
- \$ 1 Billion/year – is that subsidising emissions?
- Because it's been a very heavily subsidised sector, we've got a big dairy sector
- Comes down to land use change
 - Alternative proteins – legumes etc., reduce risk even if just on marginal land
 - Part of mindset change
- Everyone went into dairy because capital gains
- What is our primary production strategy as a nation?
 - E.g. growing quinoa, change eating habits
 - What we are growing now may not be what we will be in 10 years
- Where is the leadership?
- \$ 1 billion – originally scheduled to reduce allocation.
- There's a double taxation on other sectors
 - Can end up with carbon efficient competing against carbon inefficient, and the efficient pay another tax
- Aluminium isn't competing against glass, but against other aluminium producers
- Properties of material or price difference?
 - Carbon fibre could be similar to aluminium
 - Not perfect substitute
- Use carbon pricing to drive most efficient
 - Don't want to put low-carbon New Zealand producers out of business – carbon leakage
 - Selling our story is what we need to do
 - If believe in global trend, theoretically productions shift. Otherwise just exporting emissions.
- Yes is leakage, mitigated by branding but no need to have countries show leadership
- New Zealand in great position if we take global leadership
- None of aluminium competitors are facing price. (Rio Tinto changed direction in last few years.)
- From Rio Tinto's point of view – multinational stop carbon pricing
- Now divesting coal assets
 - Understand low carbon.

- Need to mine more minerals to build renewable generation
 - Almost driven by shareholders. Big superfunds
 - Norway overexposed, now Stat Oil still investing
 - Critical driver of rethinking strategy of Rio Tinto
- Proportional allocation – 5% going to all
 - If allocate not on output
- Per hectare, given allocation
- Low intensity emissions – Maori land
 - Euphemism that it sounds really good
 - Only because of history
 - stop tech

Table #9

- Soil carbon
 - Can it be measured and managed, in time?
 - ICCC needs to address, comment on
- 50% assumes certain gas conversion factors
 - Issue is Paris used GWP100, matters a lot for New Zealand
 - Should we use GWP20 instead?
 - Should focus be on short-term (methane) v long-term benefit (NO_x and CO₂)?
- Are we too focused on “leadership” rather than real contribution to mitigation
 - Risk to leadership value if seen to be shirking
- Will social licence lead land/use change?
- Should incentivise farmers to use existing tools, now – e.g. nitrification inhibitors
- 95% free allocation should be questioned.
 - Why are we still tolerating over-generous allocation? Do we need to signal reduction from 95% now?
 - Debate about degree of urgency to mitigate and 95% major level/signal to drive
 - Contested political space
 - Some farmers will pull out (or convert) with marginal signal but farmers also adaptable
 - Transition risks with high protectionist policy like 95%
- Big concern with urbanisation of prime soil land
- Debate about harder, faster (<95% free allocation) v. leakage and economic cost.
- Landfill methane is in, livestock methane is not
- RMA barriers to low carbon land use changes
- Framing the sector:
 - Farmer with farm-based business (capital intensive, employees, etc.)
- How will capital gains tax effect incentives to intensify?
- Research support for diverse land use change options – honey, nuts, not just trees or common hort crops.

Table #10

- How does forestry in ETS relate to the ag GHG levy?
- Complexity will kill any policy
- Government should co-fund the Ag. emissions fund – so can get \$100 million pa to spur action
- But I just want that money (maybe \$10,000 for my farm) to spend on my farm on mitigations.
- All about education and extension with farmers
- Want to get farmers to think about whole farm business.
- No one will do anything unless they know what the rules are.
- One on one engagement opportunity with farmers is what works – put all the money onto that.
- \$50 million is complete overkill for what is needed to be done over next 5 years.
- We've known about climate change for a long time but sector has dragged its feet
 - If we keep pampering the sector we won't get the change we need – policy should start.
- Deeply concerned about all the land which will go to trees – could be good family land – and what will happen to rural communities
- We want both trees and investment in on-farm mitigation
- But nothing to drive ag behaviour change as long as these gases are outside of regulation.
- How to get farmers to buy into this? No one disagrees with notion of making reductions – but don't know emissions now.
- Farmers have been pampered – 95% free allocation too soft
- Not fair for this sector to opt out and hold rest of country to ransom.
- Want on-farm plans and farmers knowing their emissions
- Underlying assumption – a price will change emissions
- What's missing – when 95% goes to 90% and to 80% over time
- Huge traction in rural community to do something – act now to capitalise on that
- Emissions going up in New Zealand – altruism is dead – need a price/policy that bites.
- Get sector bodies to align with each other – processor-level policy could help with that.
- People need to understand the story – look at plastic bags and how that's started a conversation
- Price will drive farmers to think about change
- Need policy that drives behaviour change

Table #11

- What's the definition of a farm?
- Consider reducing 95%
- Everyone has stranded assets – energy sector too
- Systematic disadvantage e.g. land class especially 80% of Maori land is 6, 7, 8 (Quick win re trees)
- Take a good look at pricing policies.
- Test underlying assumptions re Maori economy, and the ability for training industry to support Maori landowners
- Collection of levy will support everyone
- Smart application of levy
- Nutrient limits are also restricted. Vegetables leach more nitrate than dairy. Do we want to import our veges from China?
- Lot of “don't worry, tech will help” is naive. Transformation on land.
- Can already put things in to increase efficiency. Nitrate leaching 90% urine patches.
- DCD – traces in milk. Nitrates in rivers over levels in milk.
- Social change
- Lever – decrease food per hectare.
- Unless society decides to support tech.
- Gene-splicing. What do we want?
- Organic – 2 choices – 90% of people in world calorie production can feed the world. Or turn all forests into food.
- NZ ag – most efficient thing to do would be to put cows in a shed and bring the feed to the cows.
- Proposal to initially bring in processor levy would put unfair burden on processor, and unlikely to change behaviour.
- N fert price variance in one season is huge. They won't know if price is from market forces or ETS/tax.
- Only true if we assume that what people eat doesn't change.
- Hill country – not many options to change – manuka. Sheep good grazers. Carbon sink.
- Government can do stuff if it wants.
- System to collect info and data.
- Infrastructure set up.
- Processor only – move to farmer or behaviour won't change
- Changing behaviour. Levy provides signal from outset
- Put them in NAIT? Can track and trace.
- Challenge if we migrate from dairy – how we transition is important. We're rich because of exports
 - Make sure we maintain income while we achieve objectives.
- Farmers making money also have high environmental standards
 - Tax working group suggested environment or natural capital tax

- How much thinking about disincentivising nitrates and carbon capture in soil?
 - Disadvantage. Soil in NZ has high organic matter to start
 - Soil organic matter 0.5-1% global average - New Zealand 5-6% average.
 - Blessed with high organic matter and on dairy farms deep root growth and high microbial activity
 - Starting point quite high and technology not there yet to measure it
- Tools available on farm and help work out how to look at the farm in an integrated way
- McKenzie central pivot system. Those farms are very well managed.
 - “The land is there I will develop it” seems to be acceptable for farming
 - Yet if I wanted to build a fertilizer factory I couldn’t
 - City is zoned – what’s the science behind how you would classify land?
 - If we had zoning at a macro level, would we get more bang for buck?
 - Dairy good for dairy. Should it be a dairy farm, or better as something else?
 - Another issue is at play
 - Dairy kind of right “zones”
 - Classification (I can) and suitability (but should I?)
- If you could map New Zealand.
 - Can do a headcount stock take
 - Food production impacts
 - On 2 degrees or 3 degrees warming China and Europe foodbowls are predicted to be gone
- Climate refugees – massive population shifts. What if everyone wants to come here?
- Risks previously classified as environmental now seen as economic. Water is now moving towards political risk.
- Challenge the speed of our response
- If going to make change needs to be sustainable change
- Got to do it sensibly
- All exports depend on good electricity price. If electricity increases they’ll need to pass on the cost
- Politics – to get out of coal - need to move to gas – intention/transitional.
- Incentivise gas and coal disappears.
- Challenge in servicing debt during the transformation
- Overlays of increasing regulation on this industry. Impact of asset value on community.
- Trees – jobs to create but then gone.
- Forestry (pre-1990) – no value for landowner.

Table #12

- Most farmers want to make a contribution to climate change – what needs to happen in the mainstream ag sector bodies to support that change?
- How conscious are the farmers of the equity hit that is going to happen?
- If we are trying to do this quickly - why not just get Fonterra to reward good farmers?
- What is end goal for agriculture?
- Climate change is one of many issues for farmers – it is a physical possibility that all the things need to happen – dairy ceases to exist profitably.
- How long can we keep a competitive advantage? How much should we worry about something that is a sunset industry?

Questions around land vs. output-based allocation

- Ideal would be to make consumers pay.
- How could free allocation reduce over time?
 - Important to consider costs impacts on food.
- Going from good to great in terms of emission efficiency in food is really challenging. New Zealand is great at growing grass but we have significantly modified environment in some parts of New Zealand to enable growth e.g. Canterbury.
- How do you create the incentives to get land use change and efficiency gains in the short term?
- Is there a whole pile of administration being put on the farmer for little gain?
 - Some barriers other than cost to changing emissions.
- New Zealand will now be in a situation where we are not exporting food
- Interim option
 - What you trying achieve?
 - All new dairy farms exposed to full price?
 - Shadow pricing
 - Focusing on big emitters e.g. Fonterra
 - Less efficient farms get paid less
 - Still need emission calculation ability
 - Could be rough and ready and achieve its purpose
 - If Fonterra were driving it there would be less delay in implementation
- Pay farmers to reduce their herd: \$X per cow.
- Bulk commodities not good for environment:
 - Shift from milk powder – baby formula
 - Some profit for 10% of production
 - Mix optimisation
 - But:
 - Value-add products have byproducts (what to do with rest of product?)
 - If Fonterra could sell value-add they would

- 85% NZ ag production is exported – New Zealand farmers are going to want to stay competitive
- If we reduce dairy – land still can be used for something but does that “other land use” play to our competitive advantage?
- How do you get successive governments to tie their hands?

- 1.A) Do you agree that biggest bang for buck is pursuing electrification of economy including EVs and transport infrastructure, rather than focus on 100% renewables?**
- 1.B) ICCC is likely to recommend that electrification of transport and industrial (process) heat will be essential to achieving zero emissions by 2050. New Zealand needs to invest in non-fossil fuel generation, process heat and transport infrastructure. What critical initiatives (private sector and policy) will be required over the next 10 years to make this happen?**

Plenary thoughts from the floor:

- Relative costs of fuel types
- Absolutely focus on electrification not 100% as compromise and costly.
- Think of wider aspect of transport, e.g. tractors, etc.
- But what to do with cars coming into country – strategy for used car imports?
- Exit strategy – remove vehicles from road?
- 4 international standards for EVs need to be met, and China EV manufacturers don't necessarily meet them.
- Service models in terms of EV charging/network support
- Trouble getting EVs.
- Somehow need signal so suppliers are confident to supply New Zealand
- Norway – “taxing pollution”
- Business case stacks up in New Zealand for businesses already
- Common feeling that the big picture is process heat = need access to market for people to make that change.
- What are signals sent to regulators so that access can be made more affordable?
- Curious about manufacturing – capacity to access New Zealand?
- Businesses could encourage staff to take up EVs
- Accessibility to EVs but if no lower cost EVs then get multi-tiered social structure

Table #1

- Free public transport (including buses etc.) – electric transport
- Tax breaks for capital investment in climate change investments/ infrastructure
- Lower level of renewable electricity to tackle the process heat opportunity / think about price of electricity to electrify process heat – timeframes impact and sequencing
 - Electricity should go on a renewable pathway
- Get rid of coal
- Investment in transmission: need to get transmission pricing sorted (certainty)
- R&D on electrification of process heat options
- Information to process heat users e.g. schools, hospitals etc.
- Reserve bank rules on financial stability perspective – if lending for climate activities banks should be allowed to hold lower reserves
- Hurdles: vehicle dealers and getting vehicles into the market.
 - Government needs to provide incentives to increase the supply, then pull incentives back when EVs are sufficient proportion of the fleet
- Think more broadly about rail electrification and other types of transport e.g. lime scooters and public transport, autonomous car sharing, buses etc.
 - Think about transport needs for 2025
 - Build better public transport infrastructure
- Not enough demand yet to have enough vehicle maintenance devices
- Big trucks a challenge
- A ban on the sale of petrol cars by 2040 like the UK/France etc.

Table #2

- Right track for this morning's session
- EVs
 - Need for infrastructure – do you wait for demand or build and they will come
 - Incentivise the purchase of EVs
 - Will take a long time.
- Public transport
 - need better infrastructure from regional councils to support public transport companies
 - Low socio-economic and Maori will not be able to afford new EVs.
 - What about heavy transport? Road vs. rail.
 - What do communities need/want in terms of public/private transport?

Table #3

- Affordable
 - Coal will not be available as an option
 - Gas?
- Pursue electrification cost?
 - E.g. Te Mauri Hiko
 - New wind farms and transmission infrastructure
 - Why, when we have gas infrastructure?
- Start with lower hanging fruit
- Transport
 - Most challenging issue = social (“cheap” mobility has been game changer)
 - EVs will become more affordable, but aged fleet. How to get poorer people into EVs?
 - Mobility as a service
 - Rural areas challenge.
 - Utes highest selling vehicle – no EV alternative
 - No emissions standards!
- Electricity needs to be cheap?
- Spend \$1B on subsidies instead of e.g. free allocation
- Shooting for 1.5 degrees – need to prepare for larger scale disruption (WW2 like?)
- What needs to change to get fleet electrified?
 - Ban ICE imports
- Fonterra – how comfortable if electric and dry year
- Have to have reliability
- All strategies are risky
- Third world energy use – coal to gas / solar, but without inertia and infrastructure
- Social divide in New Zealand.
- Currently have diverse fuel mix. Once we electrify we’ll need more batteries etc.

Table #4

- Don't make a technology bet – use all options whether electric, hydrogen, biomass
- Pursue EVs as one option – don't preclude other options
- In Scandinavia – tax incentives were what got the uptake increasing
- Purchase price is the barrier – upfront cost
- Don't repeat CNG – a tax incentive – EV might not be the solution
- Is the kick start in supply side? Lowering electricity prices would incentivise EVs as lower charging cost
 - As well as hydrogen and biomass
- Use government procurement processes to stimulate
- Start targeting cars with more emissions
- Hardest push at moment is from corporate sector
- EECA whole of life of EV – good work

Table #5

- Decision about decarbonising specific process heat fossil fuel sources not necessarily made just based on cost/price, but constrained access to capital (and distribution system)
- Policy stability critical for capital flows
 - Transpower grid
 - Commerce Commission, EA need to have climate change become part of their mandate
- Agreement in general to maximise electricity penetration rather than chase 100% renewables.
- EV issues:
 - What's the role of pushing for more fuel-efficient petrol cars?
 - Supply constraints to EVs at scale?
 - EV retrofitting – scale? (Does the world have enough EVs?)
 - Business fleet as driver for demand
 - FBT specific to EVs
 - Travel demand (VKT) management
- Address demand for SUVs, utes
- Behaviour change focusing on convenience.

Table #6

- Import tariffs on high emitting vehicles
- Get in queue to get EVs – needs govt signal to take punt
- Get people off cars into public transport
- Feebates
- Most people live in cities
- Charge for congestion
- Regulation of vehicle emissions to stop dumping
- Change consumers' behaviour
- Govt fleet – show leadership - all electric
- CEO fleet change to EV too
- If you're going to buy a car make it intuitive to be an EV – systematic
- Industry – cooperation – turbo-charge
- Scrappage scheme – seek to remove cars
- Both remove ICEs and public transport / alternative
- Electric motorbikes
- Impact on lower income households – or make public transport the alternative
- No trucks on the road in daylight
- London – congestion charge – strong policy signal
- Electric buses – can't have enough to run Auckland
- Why can't more people work from home? Change working patterns to reduce load
- IT, urban design, less individual car ownership. Change by generation. Millennials have lower car ownership
- New apartment blocks without parks but with car sharing
- But still need to be able to get to sports field
- Companies reporting info on people's mode of travel and CO2 emissions
- Rural component
- Garages with charging points
- Access to capital across transport and public transport
 - Infrastructure and tech
- Electricity not available to convert gas to electricity
 - Tatua – Morrinsville – connecting to network

Table #7

- 1a – yes, absolutely agree.
- 1b
 - Need cost-reflective pricing all the way to the EV owners
 - Distributors need visibility of where the EVs are
 - Need incentives for EV owners to give control of charging to distributors, ideally also to allow distributor to use energy stored in EV battery a few times a year to avoid distribution network investment
 - Need coordinated approach to developing charging infrastructure nationwide
 - If government adopt new EVs into its fleet, then that would create a step-change increase and seed second-hand fleet in New Zealand to assist with affordability and availability.
 - Look to what worked overseas e.g. Norway and adopt relevant policies and actions here for New Zealand
 - Consider \$ injection to lower capital cost of EV and get it back over life of vehicle

Table #8

- Policy progress – do you agree with our analysis?
 - Yes agree with analysis – affordability
 - Transport policy – EVs are important. But where are we going to put them? Not replacing cars with cars.
 - Not about infrastructure, about people buying.
- Better to put \$1 billion into transport and process heat than in ag.
- Can't get past the 50% from agriculture.
 - Needs to be an AND
 - Everyone keeps going to EVs.
- EVs are an easier social change than other options. Only difficult social change if not subsidised by government
- Very much about looking at the long term infrastructure.
 - Access so can charge
- Aviation is also important
- Half of the infrastructure – EV trucks?
- Easily fix - electrify rail – why not used better?
 - Trucks in town ok, need to upgrade rail.
 - Half AC current, half DC current, rail gauge.
 - Auckland rail network
 - Had to campaign to save it
 - Had to campaign to electrify
 - 5-10 years will get very good
- Wellington has just taken trolley buses away
 - Interesting/weird decisions at regional level
 - Why not government fleet?
 - Kiwirail almost going to diesel
- Why are we still making decisions like that?
- Only country in world with biodiesel plant without subsidy
- Kiwis don't replace cars often and don't buy fancy cars – subsidies
- Have to change hearts and minds
- New Zealand has high per capita compared to overseas
- New Zealanders don't take to being told how to drive more efficiently
 - The trick is the second hand fleet
 - Government opportunity to take leadership, relatively low cost, purchasing (DHBs, government departments - all end up on government)
- Young people are moving away from cars, going to help
- Generation-side – transporter modelling solar/batteries is big feature
 - Government role leadership in around solar/batteries.

Table #9

- Do we agree with likely recommendation? EV focus?
 - Yes.
- EV uptake barriers
 - Cost over time versus cost up front (essential for poor uptake)
 - Avoid middle-class subsidy
 - How have Scandinavian countries with high uptake overcome inequity to poor?
 - Shanghai example converting petrol scooter fleet to electric
 - Corporate fleet import turnover to 2nd hand fleet quality
 - All of government purchase and turnover requirement
- How to subsidise? Across-board or targeted?
- Fleets conversion – regulate private sector fit-for-purpose purchase and turnover
- Servicing infrastructure, recharged infrastructure keep up with demand
- Distribution network capacity and demand management control
- Some electric heavy vehicle opportunities

Table #10

- Efficiency assumptions about process heat in analysis/modelling are skewed - thermally efficient gas boiler will be better than electrification
 - Electrification of process heat only worth doing once we have an excess of renewable generation.
 - Need to look at this more carefully in the modelling
- Agree transport is major opportunity
- Where do we put our focus – supply or demand? Do we need to fundamentally change our behaviours around transport and consumption?
 - Look at more public transport avoiding the travel to begin with (workplace connectivity), how is society going to shift or change in this way?
- Biomass – not everyone has the luxury of gas (South Island)
 - This can be a good alternative in these places.
- Light vehicles – biggest share in energy sector – big opportunity
- Heavy transport electrification would be important shift.
- Marine – electric boats
- EV tractors are hard (John Deere – trying to do them but still running cables)

Table #11

- Agree with reframing the questions - not 100% renewables but low carbon process heat very important
- Ammonia/urea 4% of total gas on one site. Converting to electricity is naive.
- Assumed geothermal
- 387 cars sounds like Kiwibuild
 - How do you get there?
 - Not enough to do demand
 - Need to get another country's EVs. We are a standards taker.
 - Will ramp up. Market available for them to come
 - Accelerate market.
- Zero emissions increase quality of lake – clean the rivers. Deal with what's in there, e.g., standards on petrol car/transport fleet.
- 50/60 duty – 0 for electrics. No road tolls.
 - Preferential packing. Electricity free.
 - Mkt jumping.
 - Banned combustion
- Interest in electric infrastructure and drive the average household is 3 kw use - Nissan leaf battery 27 kw. Capacity issue for peak. Euro increase.
 - The greater the kw, the more efficient the vehicle
- Rural communities infrastructure
 - 100,000 tractors, 80,000 ATVs
 - Challenges for rural communities. But for urban dwellers (including some with young families), some don't own car. Don't need it. Would rather the city functioned without citizens needing cars
 - In urban areas generational shift.
- Not the same train/tram infrastructure.
 - Auckland spread out
 - Increasing growth in public transport
 - Concentrations in high rise.
 - Charging – if need to charge how does that factor.
 - Energy intensive areas – heavy trucks, trains, factories
 - Won't convert quickly.
- Tesla new truck. Proterra e-bus 800 k's one charge.
- Small scale spread out
 - Won't achieve unless govt major regulatory changes
- Robust and level playing field – Norway example: road user charges but not on electrics.
- Socio economic – i.e. those who are rich can drive EVs.
 - Scrapped differential charges on ACC for vehicle type
 - Look at that for social equity
 - Some can't afford.

Table #12

- All agree that 100% renewables is not the right target and need
 - Focus on electrification of transport and process heat
- Need to look across economy to see what actually is best bang for buck
- EVs pay for themselves
- Different types/spectrum of process heat – should focus on EVs. How do we make it happen:
 - Getting supply for EVs in New Zealand is challenging
 - 1000 years to mine for lithium needed if entire globe went to EVs
 - Address range anxiety
 - education e.g. EECA drive electric
 - batteries
 - change infrastructure
 - focus on short distance level
- Why haven't I bought one yet?
 - cost
 - current car not ready to be replaced yet
- Higher fuel prices
- Higher upfront tax on petrol/diesel engines
- Change from ownership to leasing model
- Power companies should be pushing EVs because they are the saviour of the sector

2. How can we ensure the transition to a low emissions future is fair – what are the key principles in determining this? How should New Zealand manage the social impacts?

Plenary thoughts from the floor:

- Research project re low emission. Runanga think in terms of 8-10 generations. Example of North Dunedin:
 - Engage with communities – takes time to work through issues, resulting in getting good number of resource consents for housing etc.
 - Open to discussions with electricity companies. Already have had conversations with oil and gas exploration companies.
 - Engage with next generations
 - Want to lead and be involved, not just be given policies.
- Find out what Maori and other communities want
- Definition of “fair”
- Elements will cost money
- Transition = opportunity for New Zealand
- Circular economy – New Zealand has head start.
- When we talk about change/challenge, should focus on opportunity, not just cost.
- Perspective of young people
 - End game = net zero emissions
- The longer we mess around, the more costly and challenging it will be. Do we undertake transformative changes today?
- Inclusion of Maori in process
 - Big fail already – transition hub etc. – no Maori
 - Climate Directorate contracted in 2 Maori specialists – 1 of them is white
 - MPI has no Maori
 - Just Transitions unit – have decided only dealing with one Iwi
 - Blinded by whiteness
- Lobbying
- Climate change needs to be dealt with locally
 - Local government needs to step up. Also recognise contribution Maori make in emergencies e.g. opening marae
 - Marae and Maori coastal properties at risk

Table #1

- Fair from whose perspective?
- Norway had massive reserves of oil and therefore \$\$\$!
- Sharing electricity load
- Lower electricity price good for fuel switching and for consumers
- Distribution and retail networks should introduce time of use pricing.
- Socially rational EV incentives – challenge of how to do it
 - Feebates
- Demand side for electricity – e.g. rental housing standards (but noted reverse consequences – potential unintended consequences)
- Have to tax bad things to subsidise the good things we want!
- Remove scrappage fees for old freezers at the tip etc., subsidise better heating
- Think about how people live, rather than how the people making the policy live e.g. \$200 fridge vs \$1600 fridge. Unless free some people can't do it.
- Luxury car tax
- We need to be for more comfortable with carrots and sticks and dealing to the extremes; not just sitting in the middle and focusing on the average.
- Q from table: why did the afternoon only focus on electricity? Why not agriculture?

Table #2

- Define what the likely social impact might be
- North Dunedin has done lots of social impact assessment – conclusion – no point in doing a top down. Instead engage with the communities – what are they thinking? What do they need? Iwi has a number of initiatives underway to address the social impacts of climate change - not asking what are the infrastructural changes needed in order to manage the adaption. Emphasising the importance of engaging with the next generations. Iwi wants to lead as designers of their future and the decision-making.
- Respect what communities want and need. What does “fairness” mean to that community?
- Dividends from having effective engagement in a diplomatic way

Table #3

- 95% free allocation – one decision about one sector, but need to look across economy
- Social divide – don't make wider and if we can, start to close. Don't create more inequality
- Awareness of potential to lock in current paradigm (e.g. re land use, technology)
 - Innovate
 - Enable
 - Adopt
- Transition time
 - Certainty/signals for investment
- “just transition” concepts
- Engage.

Table #4

- Social impacts – more impact on Maori
- First step, what are likely impacts on different socio-economic groups? Then deal with it by tweaking measure you are trying to address, or address through other means (social welfare payments)
- Electricity and fuel prices directly impact households (adding in emissions price)
- Electricity – acceleration to 100% renewables will cost \$, and this will cascade on poorer communities
- Ag – impacts from higher food prices and on employment
- No other country skipping gas as a transition fuel
- Ability to be able to respond – education – e.g. to changing electricity prices across day
- The stronger the price signal, generally the greater the inequity
- Agriculture – transition to forestry (jobs), free allocation (land area basis helps to benefit underdeveloped land)
- How to address social issues? Doesn't have to be built into intervention itself.

Table #5

- Does protecting losers automatically dilute the signal for change?
- Differentiate marginal price from cost
- Where does penalty cost fall?
- People who are worst off tend to be the people who are always worst off
- Principles: transparency, equity, “fairness” always fails because of behaviours
- Incentivise those who can actually change; provide safety net through general government policies rather than by weakening/changing free allocation/price incentive.
- Target support to those most vulnerable
 - Rural? Maori? Pacific?
 - Subsidies can create perverse outcomes
- Fairness: those who can bear the cost should bear it
- Don’t necessarily flinch from hard consequences
- Fair tax system underpins a fair transition

Table #6

- Steady and well signalled and prioritised.
- Foresight and forecasting where costs fall and knock-on impacts.
 - Get as clear as possible on unavoidable costs.
- Transition in right order:
 - Transport – public transport to get to and from work
 - Subsidies and welfare.
- Technology disruptors – social benefits and costs.
- Individual social costs:
 - Property standards and electricity costs
 - High emission cars
- Sectoral and regional costs
 - Such as employee lay offs
 - Transition (fair?) – new jobs
 - Steel (old vehicles recycling?)
 - Land use:
 - Farming communities
 - Horticulture
 - Forestry
- Not 100% renewable electricity but as close to it as can.
- Electrification of transport vs Property standards
 - Consider how to protect low income earners
- ETS – cross industry including agriculture (in some way)
- Get the sequencing of actions right. E.g. gas out of the system vs. aiming for electricity.
- Heavy emissions (industries), regional impact, towns
 - Supply chain impacts
- Whether we act ahead of the rest of world or not – depends on CO2 price compared to trade competitors.
- Manage distributional impacts in a more sophisticated way - complex interdependencies.
- Known unknown
- Retraining - Skills. Micro-credentials, lumpy. Couldn't be retrained. Too old – moved to benefit. More vibrant skills/education/training system
- Prioritisation
- Need reality checks around price of carbon - e.g. \$150 = \$0.10c per litre of milk
- Look at inelastic items – unavoidable spend – is there an alternative for them? E.g. is public transport an alternative? How do you solve the remainder through subsidies and alternatives?
- Understand where impacts are going to fall and where that will be most disproportionately
- How quickly should we move?
 - Steady and well signalled, or in line with overseas

Table #7

- Sub-question: fair over what timeframe for the transition?
- Sequencing of the transition is critical to ensure the right things are happening at the right time and in a sensible order
- Need to recognise regional differences but accommodate these in a consistent national framework
- Signals are important so people can see what is coming and respond e.g. land use capital
- Recognise that some communities will be bearing greater costs and/or consequences in a transition and some have greater opportunities
- Treaty obligations and principles very important given that tangata whenua may bear greater costs and consequences in the transition
 - Seeking joined up approach across government (national and local)
 - Fairness and equity across regions is important
- Joined up thinking is critical including just transitions
- Managed transition to avoid price shocks and deliver confidence and trust
- New Zealand needs to not just see itself as an island nation but part of the Pacific community and global community

Table #8

- What's fair?
- Apply to process heat
 - Accelerate depreciation to go electric
- Is the tax system or direct subsidy easier?
- Layers on transitioning
 - Electricity has to remain affordable for small and large consumers
 - Large processes can transition in a way without going out of business
 - Hard for low socio-economic to buy tech (solar and tech)
- It gets so hard, sometimes easier to do nothing and let inequity ride
 - Never assume we are all starting at the same point, big conversation at fundamental level
- Transport and electricity sector will pass on costs, and this will hit those who can't afford to buy
 - Tax break e.g. FBT could be mechanism to stimulate
- Rule-based and means-based subsidies are undesirable
- Ag – have to manage social impacts
 - Removal of subsidies in 1980s ripped communities apart
 - Corporates absorb costs better than small units
 - Unintended consequences
 - Future-proofing on policies
 - Hopefully those already on the pathway will still be viable.
- Role that Maori have played, or could play
 - Acknowledge economic participation
 - Connection with land
 - Social cohesion
- Some have great social equity
 - Make walking, cycling, public transport easier
 - Make solar and batteries available for poorer schools, social housing.
 - Home insulation – warm homes – reduces sickness
- Subsidised investments go to those who can afford it
- Equity – air quality

Table #9

- Avoid policy that disadvantages those least able to respond to an incentive
 - Where unavoidable, always complement with fairness mechanism
- Where possible target for effectiveness and fairness
- Valid to raise revenue to support redistribution and incentives to achieve low-carbon goals
- Can advantage some without disadvantaging others
- Avoid getting stuck in like-for-like electric substitution
 - E.g. it's about mobility, not cars
- Workforce planning crucial; and education and skills training equipping people for future jobs
- Plenty of opportunity and advantage – chase it!
- Capital cost barrier is surmountable

Table #10

- Inclusion
 - Need Maori to be involved all the way through and ordinary people – not just emitters/big business
 - Officials can't say that it's our fault – don't feel comfortable contributing in such settings where always in minority or in a Maori "ghetto"
 - Very few Maori in all these events and also government ministers' meeting schedules
- Polluter pays – and you could widen the differential by adding an incentive to those who choose not to pollute.
- Acknowledge that we can/should manage social impacts through welfare system rather than distorting markets
 - Electricity
 - Or urban markets
- As we make food production reflect true cost of pollution, we will need to have similar conversation about social impacts (and assisting people through welfare system).
- More transparency around the costs of carbon/emissions so people can make more conscious decisions.
- Focus on the market has eroded social capital.
- Look to Canada/US examples where use carbon pricing revenue to give rebates to households.
- Fastest transition opportunity in New Zealand is land use change within farming model. Farms need to be judged on where they have come from, not national average.

Table #11

- Incentive not penalty. Wealthy are first adopters.
 - Penalising internal combustion penalises the poor. If you incentivise uptake you get better trickling down.
- Will it move fast enough?
- Even if decreasing vehicles now – have enough stock to trade up.
- Fairness. Many trees on Maori land planted pre 1990
 - Sitting on land and carrying liability
 - Offsetting – Maori carry burden.
- Low income tax additional rebate to lower households. For example the electricity subsidy to senior citizens.
- Tax free threshold
- Intergenerational equality
 - Fixed end game
 - Net zero
 - Prod Comm – ‘the more we delay, the more expensive it is for our kids and the less possible’.
- Subsidies: is it so bad to subsidise if it makes it happen?
- Help others cope.
 - What do we give up if we do that?
- How much is it a priority? How do we redistribute the tax?
- Local authority will face costs too.

Table #12

- Is definition of 'fair' the ability to pay?
- Allocate fairness?
- 'User pays' at odds with some ideas of fairness
- If people lose equity, has it been socialised (compensation in some way) or do they bear the lot?
- Always a risk that the world will change
 - Does it matter if concentration of loss is on a few?
- Impact on regional economies – types of jobs affected by this – welder can't become something else straight away
- Has to be a rate of change aspect to it – as slow as possible but still achieve outcome
- Is it fair to:
 - look after poor?
 - look after most impacted?
 - share evenly?
- Exacerbating inequality is bad.
 - Created through allowing wealthy to do a wealth transfer.
- Fair process – if you can influence the way you are exposed.
- Giving time to transition – doing nothing isn't going to work.
- What would be unfair:
 - Political manipulation
 - People with wealth benefiting by buying their way out of problem, leading to cost increases for the less wealthy.
- Tiwai Point – won't be transition, will be a sudden cliff.
- E.g. Taranaki – not compensation but support for re-training
- Key principle – this is a normal business risk.

3. How can New Zealand extract value from its efforts to take a leading role in developing a low emitting economy? What is required to get us there? What are the business opportunities around value over volume; is there realistic potential to develop a zero emissions brand? What societal changes will be needed?

Whole of Plenary discussion:

- Of course we should lead. Everyone is waiting for someone else to go first. NZ has a history of going first
- Research is on the way e.g. vaccines/inhibitors. Find solutions, take them out to the world. Investing in science can have a diplomatic dividend
- There's value in our story. Opportunity to create and sell the best food for and in the world. We don't get the same sense of urgency as our competitors in Europe, US and China. They're taking this story from us.
- We need to stay in top bunch and rise to the challenge. New Zealand doesn't feel the urgency aspect
- Maori and Ngai Tahu are leading in this space. We are all now feeling the urgency.
- Calibrate our expectations on ourselves with leadership that is already happening. Take stock of others' leadership: School strikes; indigenous leadership; Pacific and less-developed countries. Two years ago 47 of the poorest countries pledged 100% renewable energy