A First Look – BEC2060 New Zealand Energy Scenarios

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2019 New Zealand Downstream
Sky City Convention Centre

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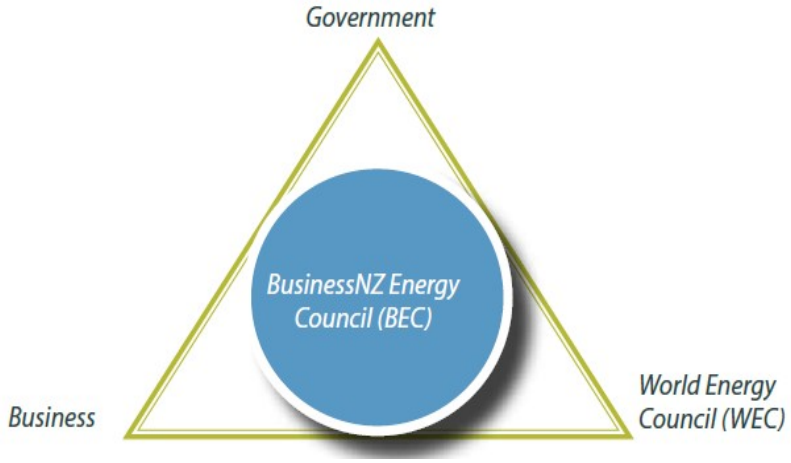
The BusinessNZ Energy Council

- the BusinessNZ Energy Council ('BEC'):
  - is an apolitical group of New Zealand organisations taking on a leading role in creating a sustainable energy future for New Zealand
  - brings together business, Government and academia
  - is the New Zealand Member Committee of the World Energy Council (WEC)



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We don’t know the future

“Prediction is very difficult, especially if it’s about the future”

Niels Bohr

Martin Cooper photographed in 2007 with his 1973 handheld mobile phone prototype

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Complexity + speed = uncertainty

- no longer one investment signal but many
  - still oil, but now multiple regional gas prices, carbon price, solar and battery technology prices
- no more 'slow' energy
  - short term was the life of vehicle fleet ~10+ years
  - the impact of US shale oil and gas, collapsing solar and battery prices, rise of the pro-sumer, blockchain, AI, machine learning, peer-to-peer trading….

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We're not short on 'scenarios'

- BEC2050 Energy Scenarios
- Ministry of Transport Scenarios 2042
- MBIE's Electricity Demand and Generation Scenarios
- Royal Society's Climate Change Mitigation Options
- Productivity Commission's Low Emissions Future
- Transpower's Transmission Tomorrow
- Vivid Economics (on behalf of GLOBE-NZ)

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What scenarios are, and are not

- they are plausible alternative stories of the future

- they are not
  - predictions/forecasts
  - answers
  - policy prescriptions
  - recipes to follow

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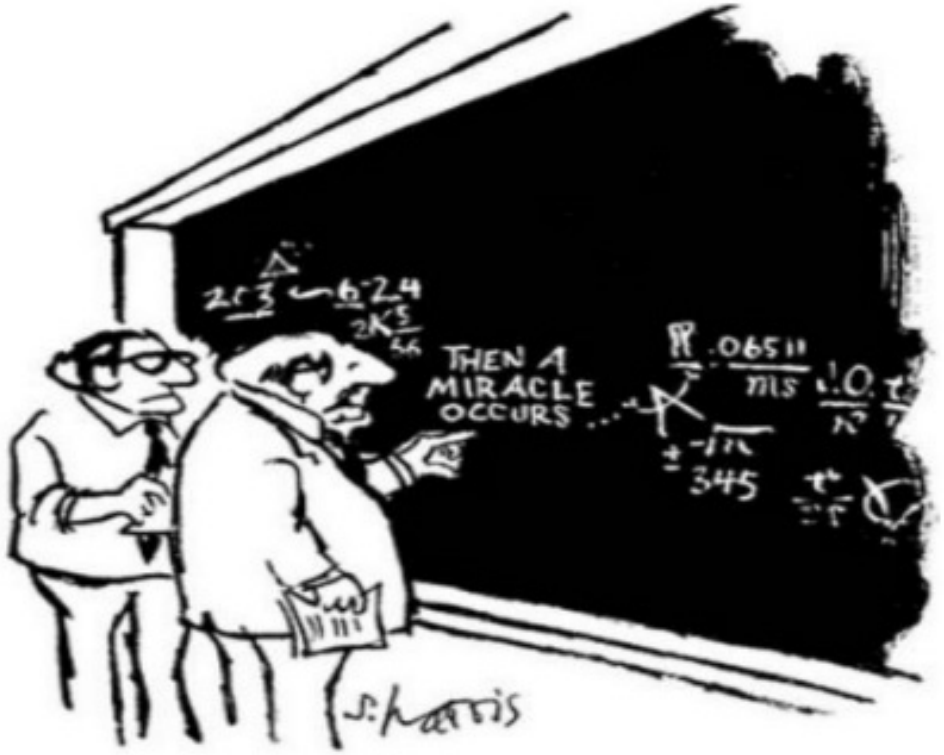
Otherwise we get this…



"I think you should be more explicit here in step two."

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Thinking about uncertainty

- while our focus is on the energy system, the process by which we discover critical uncertainties spans disciplines like geo-politics, technology, the economy, politics, psychology and history

- we think about critical uncertainties through the following lens:
  - economics/finance/trade
  - resource availability and access
  - energy system and technologies
  - consumer behaviour and acceptance
  - government policies

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Thinking about the future

- what are the critical uncertainties facing the New Zealand society and the New Zealand energy sector specifically through to 2060?
  - the question is based on what you think *might* happen by 2060 not what you *want* to happen by 2060

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A thought exercise

- think about:
  - what critical uncertainties would have been written down 41 years ago i.e. in 1978?
  - what changes have you seen since 1978?
- how many of those changes could you have anticipated?

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In 1978

- these things weren't yet invented
  - Apple Mac (1984)
  - GPS (1989)
  - Sony playstation (1994)
  - DVD players (1996)
  - MP3s (1998)
  - Google (1998)

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Emerging technology – a case in point

- Trivial or non-trival impact?
  - sensors / internet of things
  - artificial intelligence / machine learning
  - robotics
  - solar PV
  - energy storage
  - 3D printing / visualization
  - mobile internet & cloud
  - big data / open data
  - unmanned aerial vehicles / Nano-satellites
  - crypto-currencies / blockchain

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Integrated narratives and modelling

- most 'scenario' work collapses back to high/low cost, high/low technology uptake etc
- it's all too easy to get lost in the numbers/assumptions, especially if you're working back from a pre-determined end-point
- where scenarios can help business to amplify their actions is to move beyond a description of a desired outcome to a description of **why** we would do that

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Uncertainties are non-trivial

- We’re not talking about variables which have a prospect of only a minor variation

- Played out over decades, each of the uncertainties could produce a substantially different outcome
  - the presence of strong or weak climate change action globally
  - the compounding effects of growth in our major trading partners
  - the transformational potential of alternative transport on our energy system

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Our Goals

- Two goals, to
  - develop a set of “New Zealand energy stories”, narratives based on distinct policies and business practices,
  - provide country-specific quantified information to inform future policy and investment choices and trade-offs
- Work was informed by the scenario output of the World Energy Council, and its modeller, the Paul Scherrer Institute

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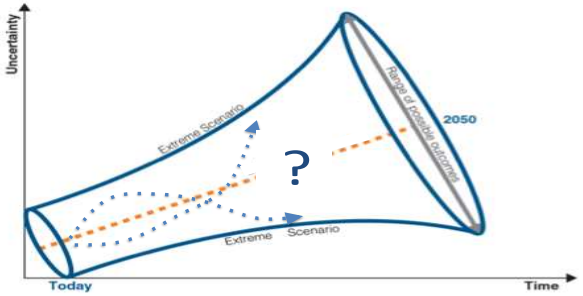
Our scenarios

- What we strive for our scenarios to be:
  - *plausible* – not a prediction, but a believable scenario about the future
  - *distinct* – to succeed, the narratives have to be different
  - *coherent* – the narratives have to be internally consistent (especially for interconnected sectors)



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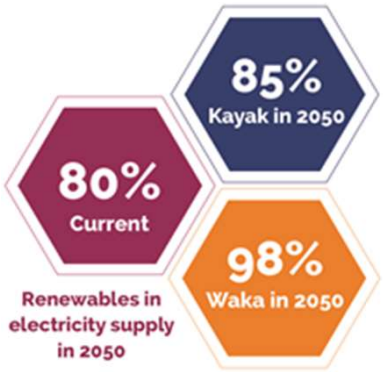
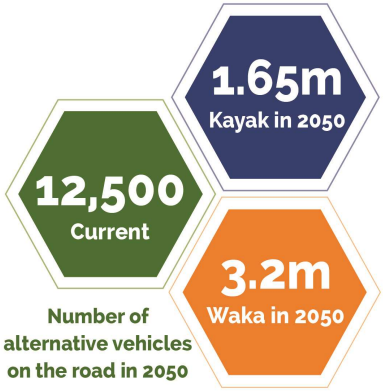
A recap - BEC2050 insights

- heavy interplay of electricity, renewables, transport, emissions reductions
  - further emissions reductions in electricity possible, but……
  - transport can leverage renewable electricity and achieve significant emissions reductions
  - relativity of oil, electricity price, carbon price and technology (battery, solar) costs crucial
- but it's more than just EVs….





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BEC2060 scenario project investors

Our new critical uncertainties

- climate action – where New Zealand places climate action on its list of priorities c.f. rest of the world
- whether New Zealand society's decision making is cohesive or not
- the price of NZUs relative to carbon pricing in the rest of the world
- preparedness to adopt new technologies
- the health of the oil and gas sector
- NZ's economic structure – balance of primary v manufacturing v services/tech
- prioritisation of GDP growth

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Our new narratives

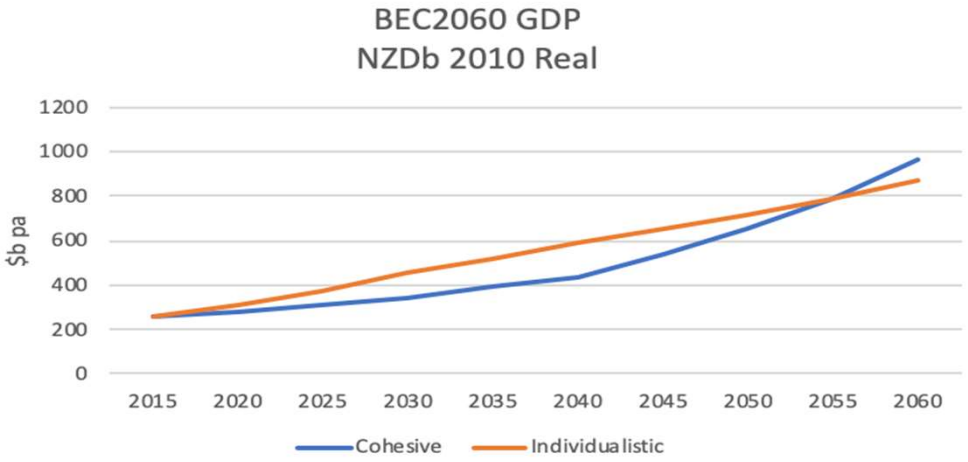
- climate change emerges as the most important priority for NZ
- communities, businesses and governments prioritise emissions reducing actions, sometimes beyond "traditional" economics
- New Zealand joins other nations leading the fight against climate change, transforming the economy in the first 20 years, with strong growth in the latter part of the scenario period
- we are a high adopter of technologies which drive lower emissions or energy consumption

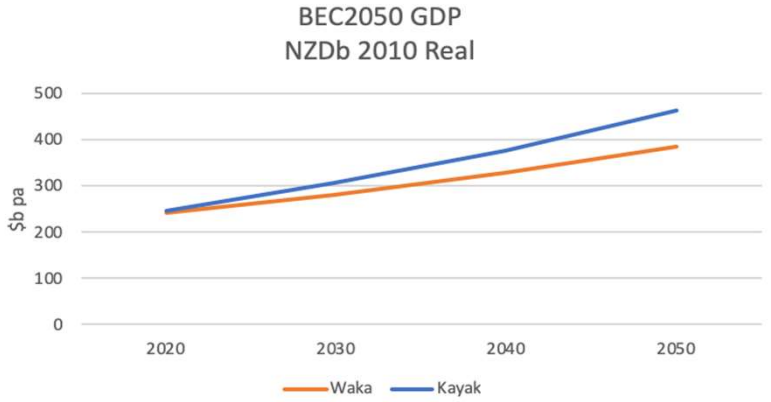
- climate change is just one of a number of competing priorities
- the diversity of views on priorities leads to a "wait and see" approach by communities, businesses and government and maximising GDP by relying on its traditional wealth drivers
- in doing so, the country deliberately lags the RoW on climate policy, waiting to see what works and what doesn't
- there are only incremental advances in the costs of emissions/climate related technologies

Modelling

- from a modelling perspective, these narratives drive assumptions in a number of key ways:
  - changes in demand for energy services – growth or contraction in activity: GDP and subsectoral shifts, population, how far we drive
  - the available technology and fuels to meet these demands, and the costs of these technologies
  - available technology/fuels and costs may be driven by underlying assumed policies (e.g., limits on size of windfarms) and – importantly – an assumed carbon price
- the modelling outputs are a function of these inputs

What's happening in the economy?





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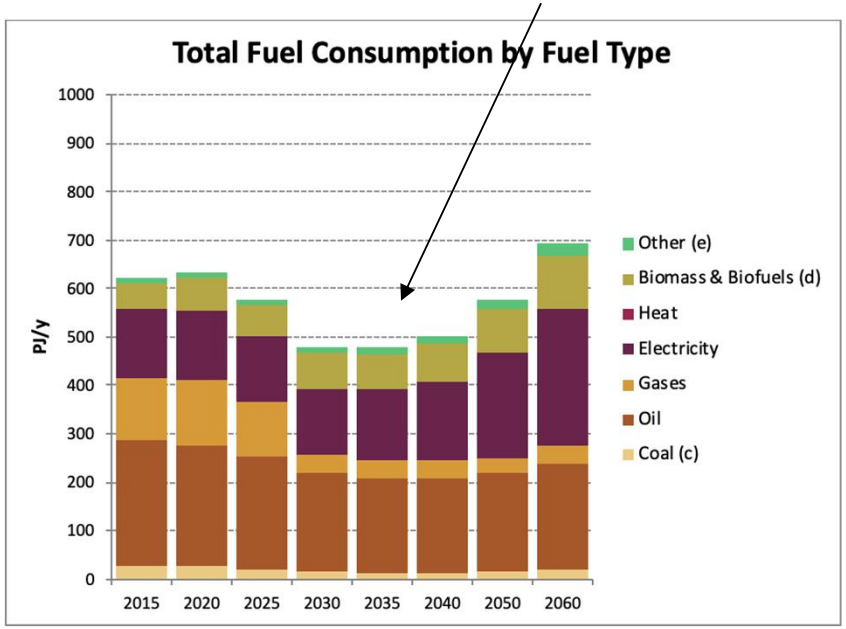
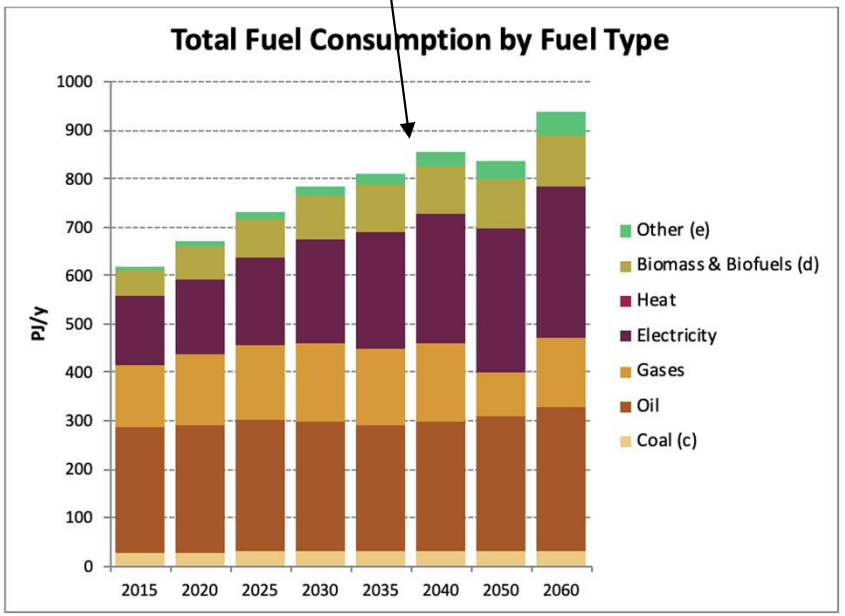
Energy?

Economy undergoes a "transformation" away from CO_2 which has significant economic consequences during the transition



Cohesive

Economy plays a "wait and see" approach, but runs into headwinds in later years

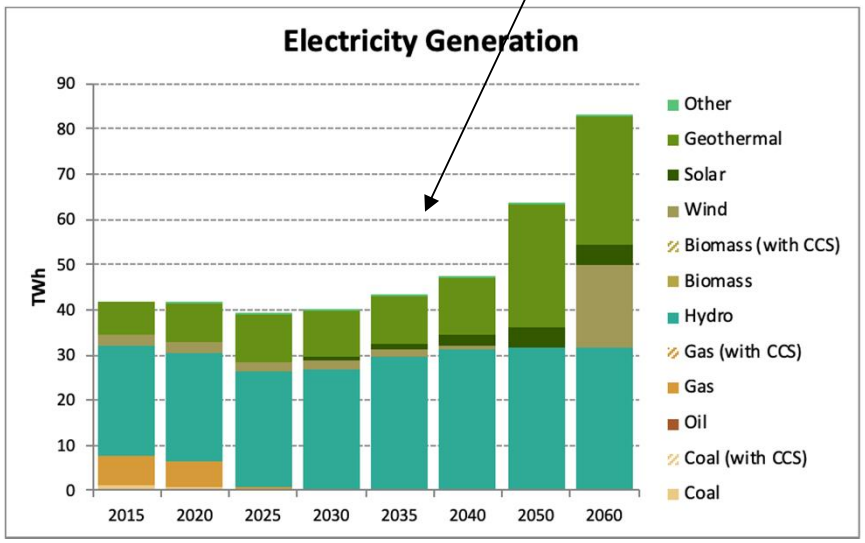


Individualistic

Electricity?

Electricity system is 100% renewable (in an average year) by 2030, and chooses solar over wind….until 2050-2060

System chooses geothermal and coal + CCS over wind



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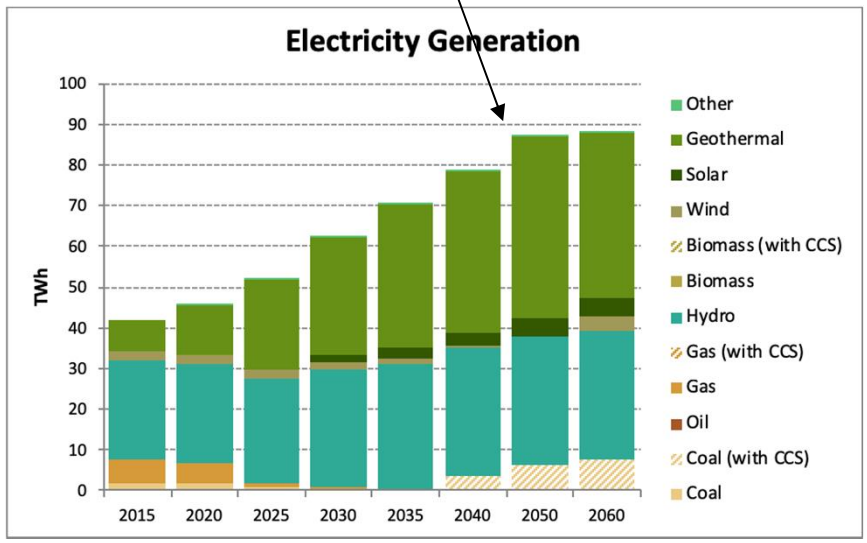
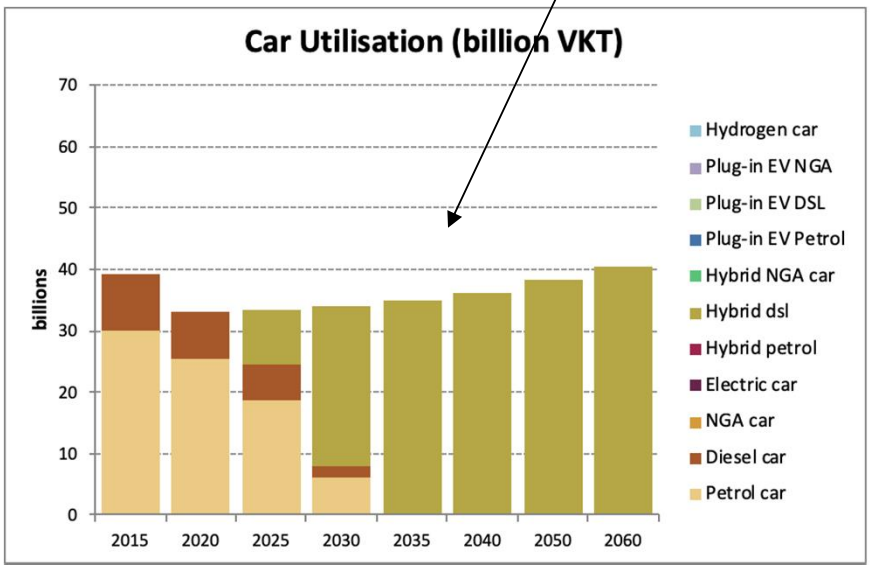


Individualistic

Transport?

Both scenarios move completely to non-plugin hybrids – either diesel only, or a mix of diesel and natural gas.



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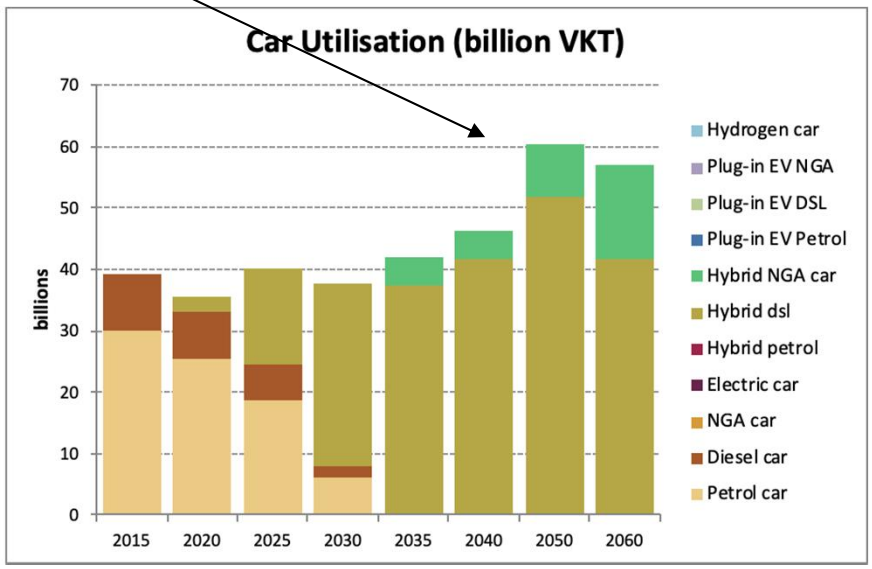
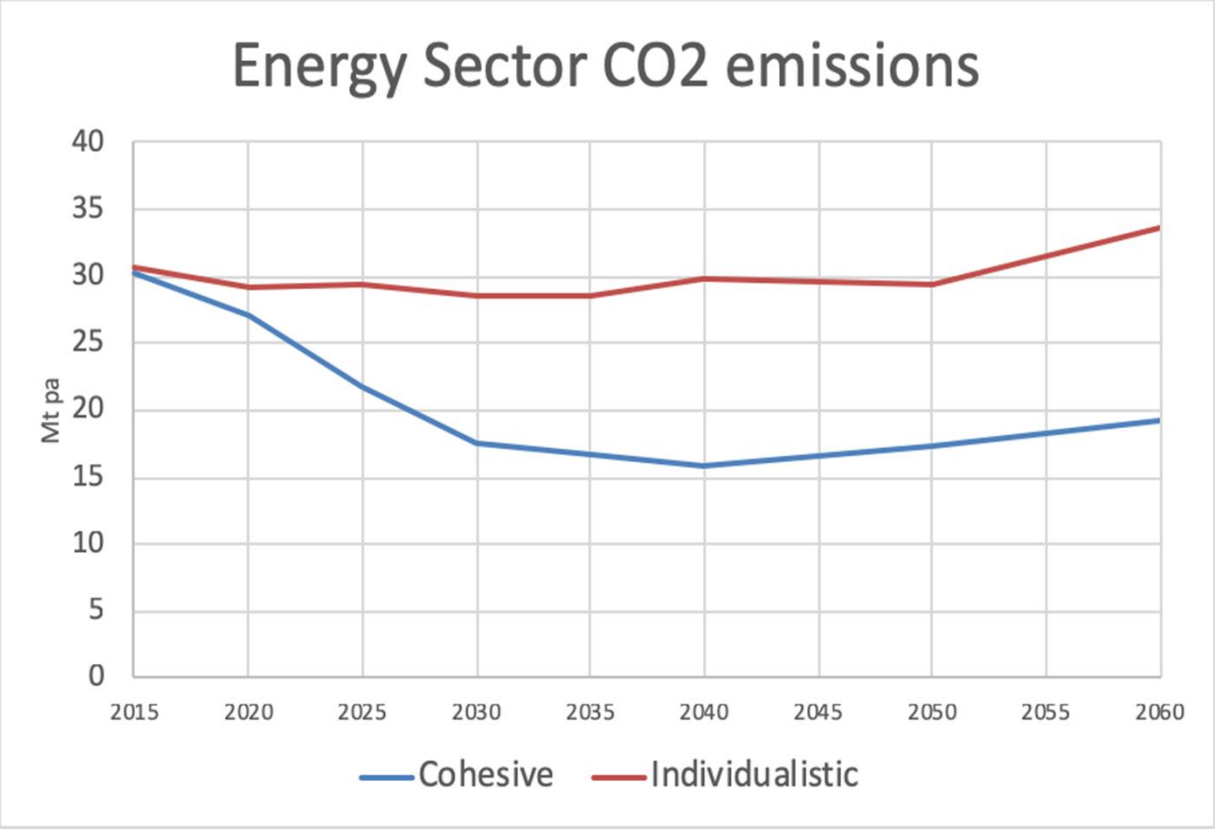


Individualistic

Emissions?



- cohesive makes deeper initial cuts, as a result of transformation
- but both scenarios trend upwards towards the end – diesel vehicles!

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What next: BEC2060

- modelling – reviewing thousands of spreadsheet cells to make sure we have the right assumptions and that results fit the narratives
- narratives
  - working hard to tell a story about what New Zealand's competitiveness story is out to 2060 and the role of energy and technology in that
  - bringing the narratives in line with the results
- Looking to launch the work mid-year

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Thank you

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