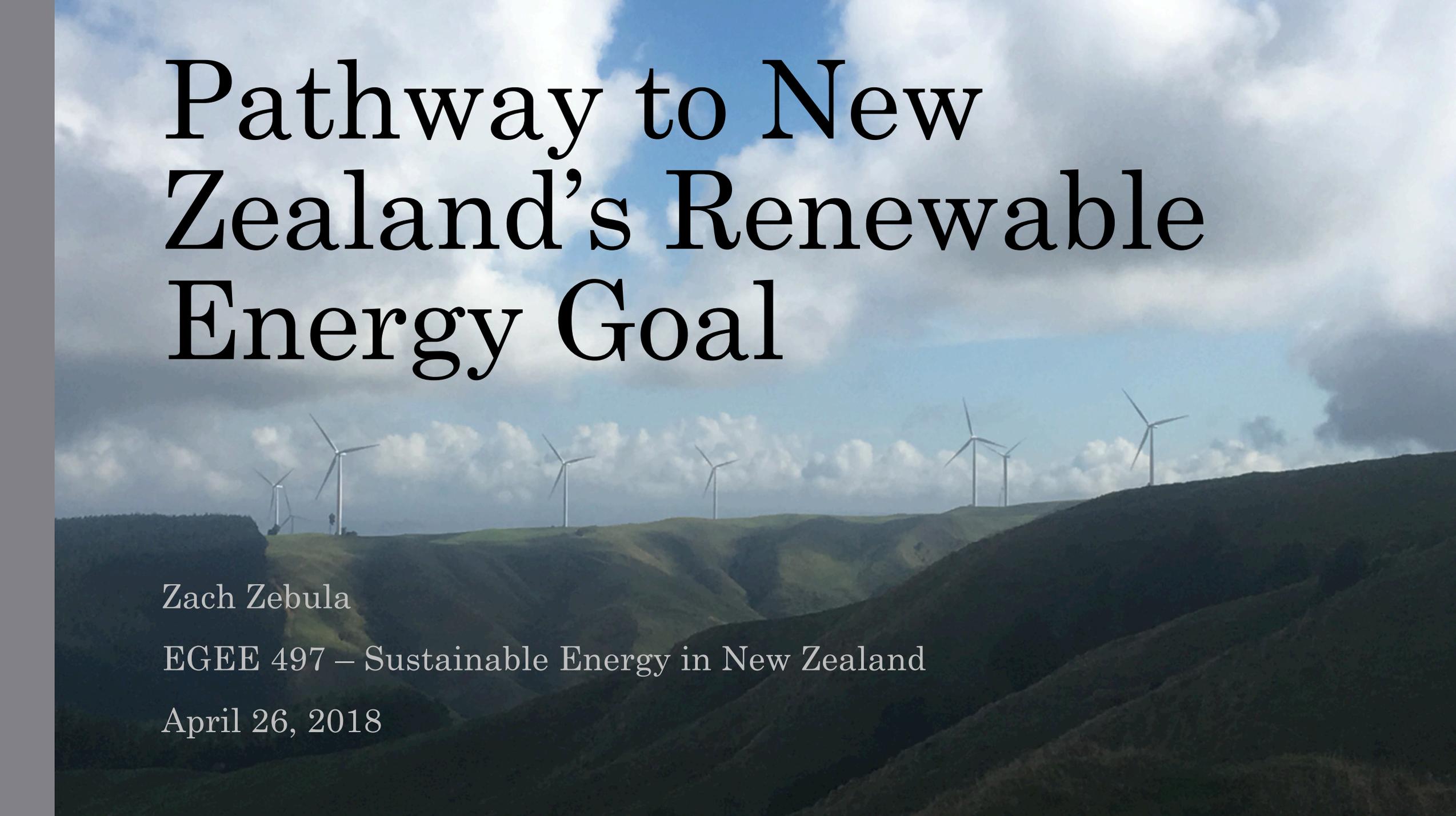


Pathway to New Zealand's Renewable Energy Goal



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EGEE 497 – Sustainable Energy in New Zealand

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Outline

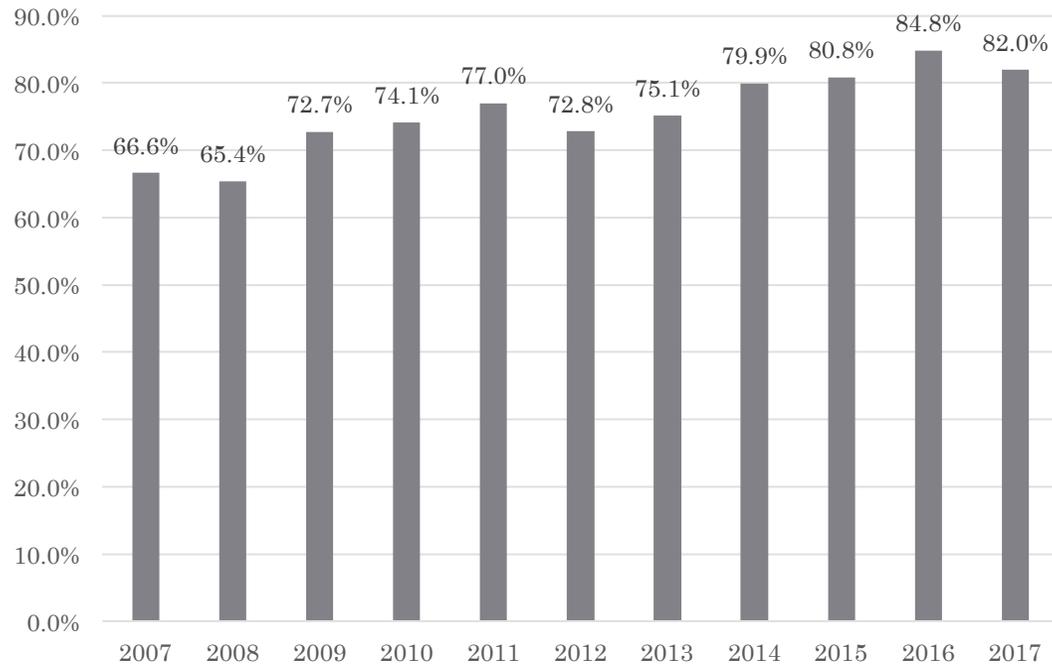
- Introduction: What is the goal?
- Current State of Energy in New Zealand
- How did they get here?
- Feasibility and challenges of obtaining the goal
- Pathway to 2025 Goal
- Next goal: 100% renewable by 2035
- Future Goal: Zero Carbon by 2050

Introduction: What is the goal?

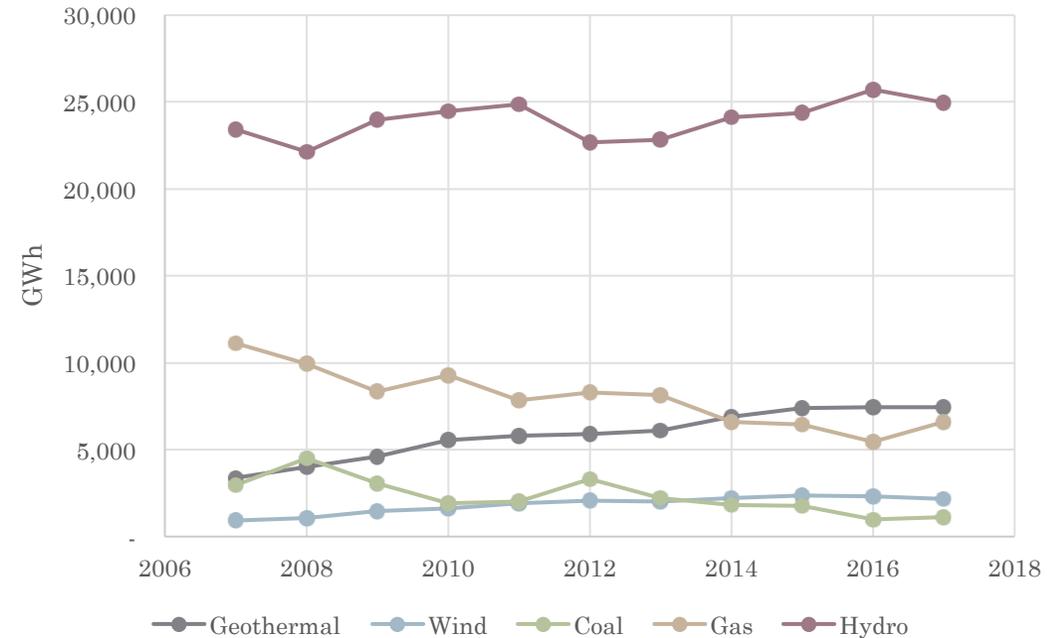
- The goal for New Zealand is to generate 90% of its electricity from renewable energy sources by 2025.
- First put into place in 2007 and was updated in 2011.
- Goals of the plan
 - Diverse resource development
 - Environmental responsibility
 - Efficient use of energy
 - Secure and affordable energy
- Will use gas plants as need to bridge the gap during this transition.
- Government plans to change from importing to exporting energy and provide a lot of support for developing renewable energy.
- With hydropower resources almost fully utilized, New Zealand will turn to wind and geothermal to meet this goal.

Current State of Energy in New Zealand

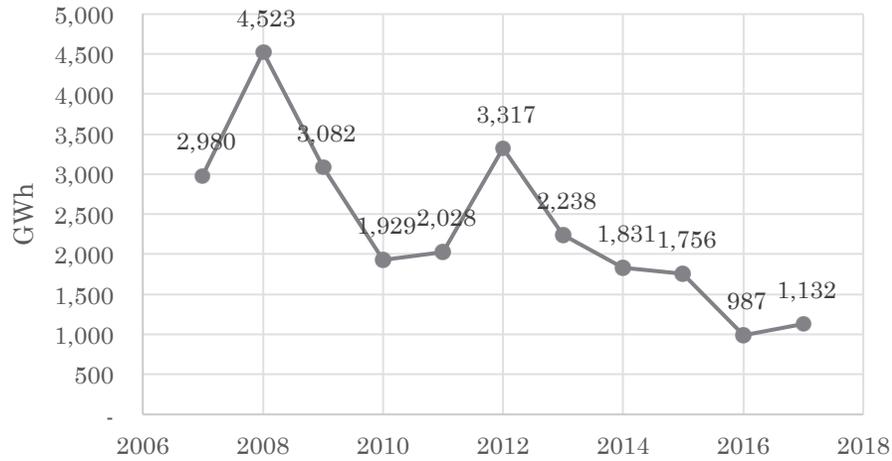
Renewable Energy Share (2007-2017)



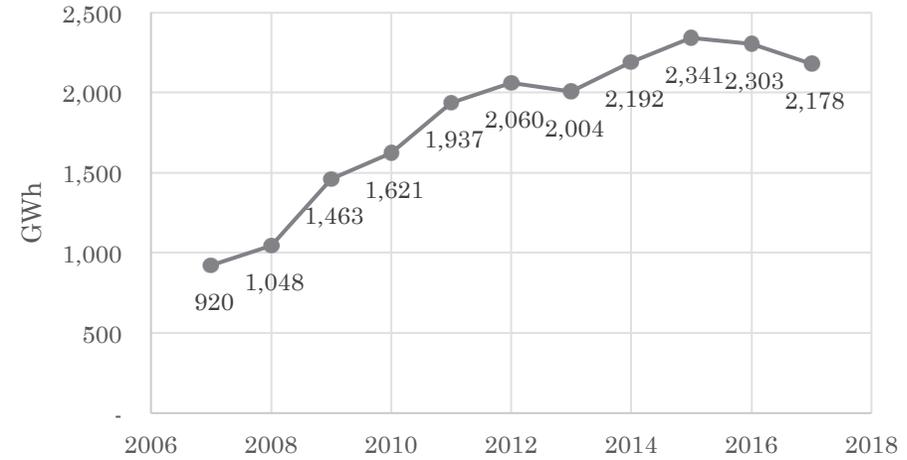
Net Generation (2007-2017)



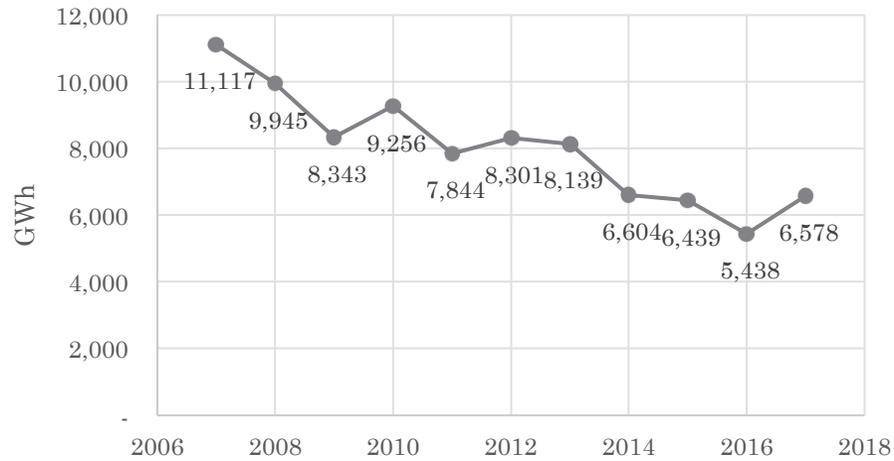
Coal (2007-2017)



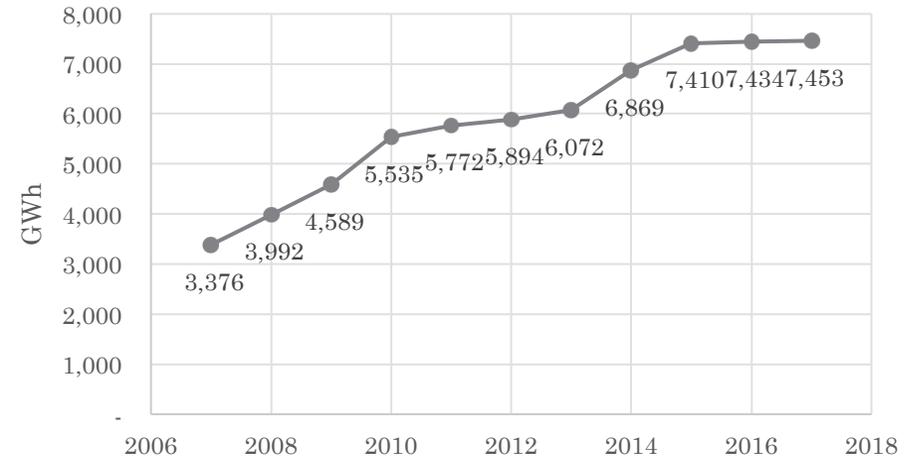
Wind (2007-2017)



Gas (2007-2017)



Geothermal (2007-2017)



Coal down 75% from peak
Gas down 40%

Wind up 42%
Geothermal up 55%

How did they get here?

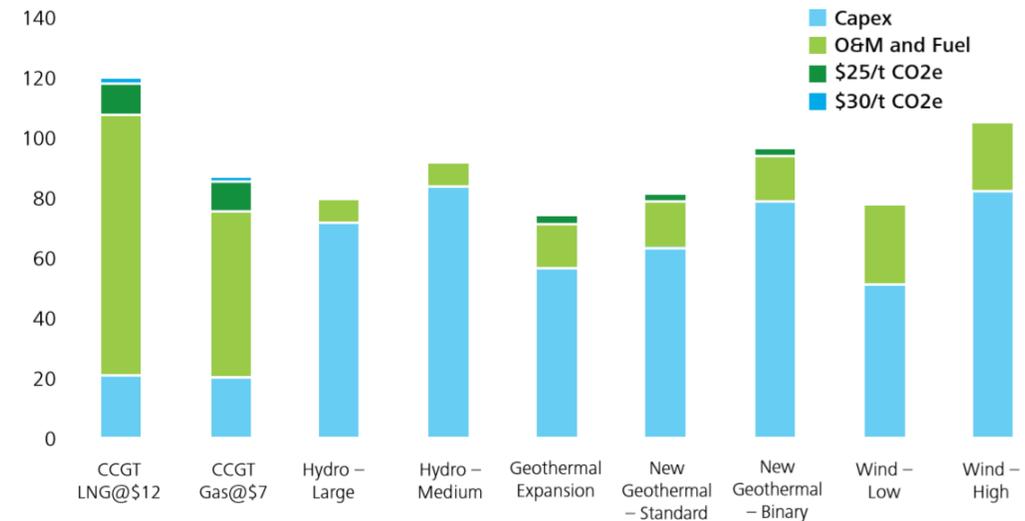
- With the addition of new renewable sources, plants run on fossil fuels were either retired or running at less than capacity.
- Two plants that were decommissioned were the Southdown and Otahuhu thermal plants at the end of 2015.
- Additions of Geothermal include
 - Nga Awa Purua 140 MW (2010)
 - Ngatamariki 82 MW (2013)
 - Te Mihi 166 MW (2014)
- Additions of Wind include
 - West Wind 142.6 MW (2009)
 - Mahinerangi 36 MW (2011)
 - Te Uku 64.4 MW (2011)



Feasibility and challenges of obtaining the goal

- Taking advantage of developing technology to make renewable energy more affordable
- Utilizing government incentives and public support to push these projects forward
- To help in offsetting the costs of energy the government has placed an upper limit on the price at \$25.
- Maintaining energy diversity until the goal can be comfortably achieved.
 - Finding the balance between low cost ways to reduce peak demand while exploring cleaner energy options during periods of low demand.
- Costs and utilization of effective energy storage.
- Uncertainty of the global energy landscape, what will happen next?
- Overall, this is a very realistic and achievable goal.

LRMC – 2010\$/MWh

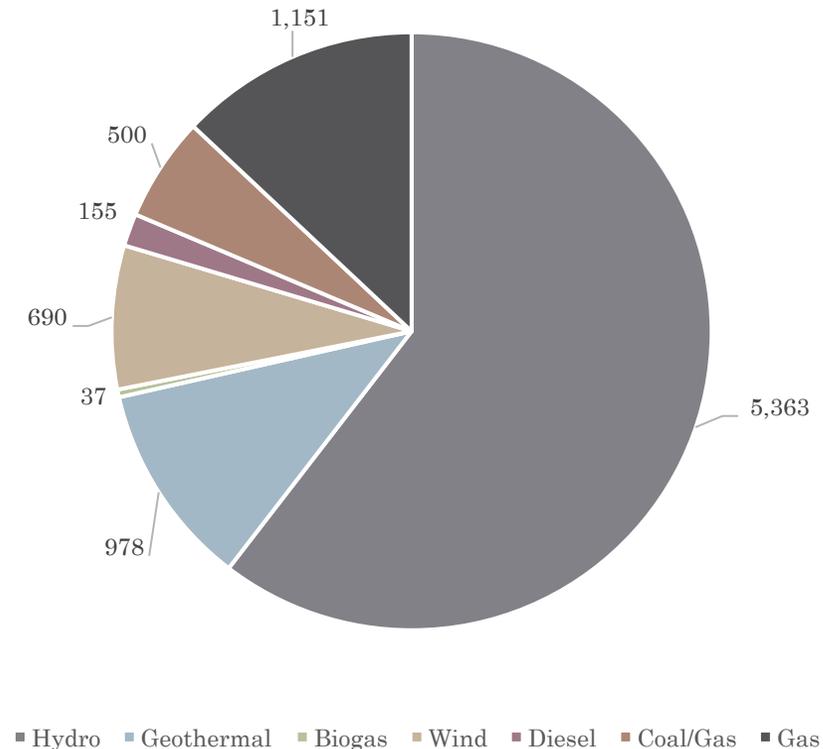


Source: Meridian Energy, Deloitte analysis

Pathway to 2025 Goal

- Tauhara 2, geothermal plant 250 MW, will be completed after 2020.
- Smaller geothermal plants such as Rotoma and Ngawha of 35 and 50 MW respectively.
- Some wind projects to be added are Waikato 504 MW, Hawke's Bay 273 MW, Wellington 221 MW, and Southland 240 MW.
- Once these plants are added, the older thermal plants can be retired.
- With these additions, this would be one pathway to 90%.

Electricity Generation by Capacity (MW)

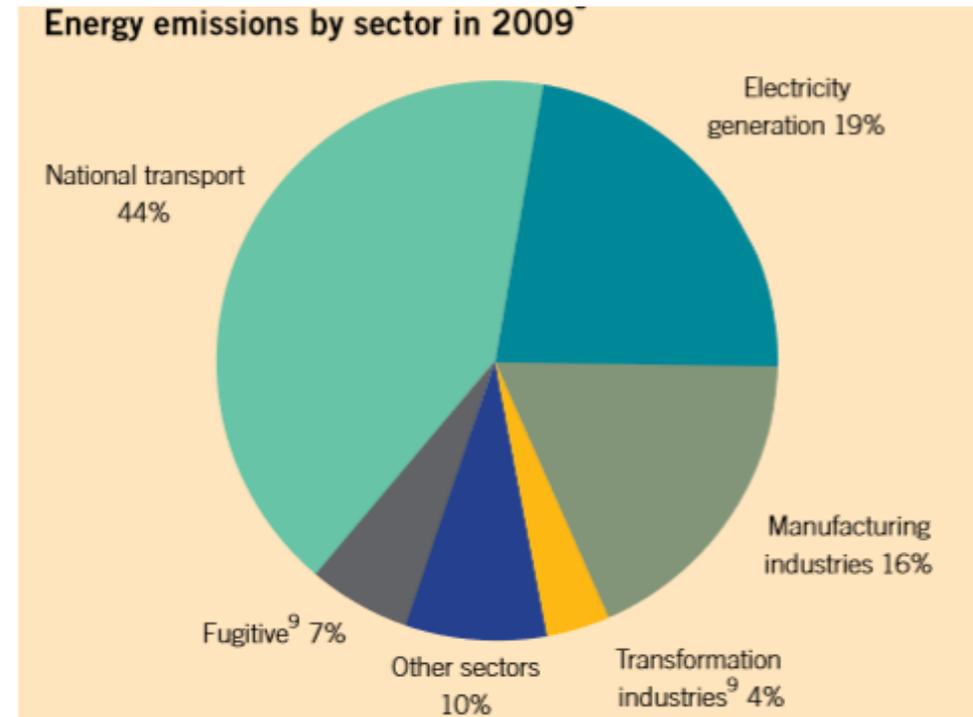


Next goal: 100% renewable by 2035

- New Zealand also has a goal to go completely renewable by 2035.
- Due to the rich renewable resources of New Zealand, this goal is achievable.
- If no new coal/gas power plants are built, then by 2035 the existing plants will have reached the end of their economic life cycle and will need to be retired.
- Of the 4,125 MW of proposed generation, 2,535 MW is wind, 553 MW is hydro, 355 is geothermal and 460 MW is gas.
- The best potential places for wind are Waikato, Taranaki, Hawke's Bay, Manawatu, Wellington, Central Otago, and Southland where each location at least has a proposed project under way.
- The biggest challenge will be implementing large scale energy storage sites that are economical and efficient.

Future Goal: Zero Carbon by 2050

- To achieve zero carbon, there are more sectors than just electricity that have to cut back on emissions.
- This goal can be met by:
 - Reduce fossil fuels/increase renewables
 - Smarter energy grids, storage
 - Low carbon transportation (electric vehicles)
 - Energy efficient buildings
 - Innovation in industrial energy use
 - Technological advances in agriculture
- These actions must take place as soon as possible in cooperation with the government to enact the right policies
- The Emissions Trading Scheme (ETS) is one example that puts a price on emissions



Sources

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