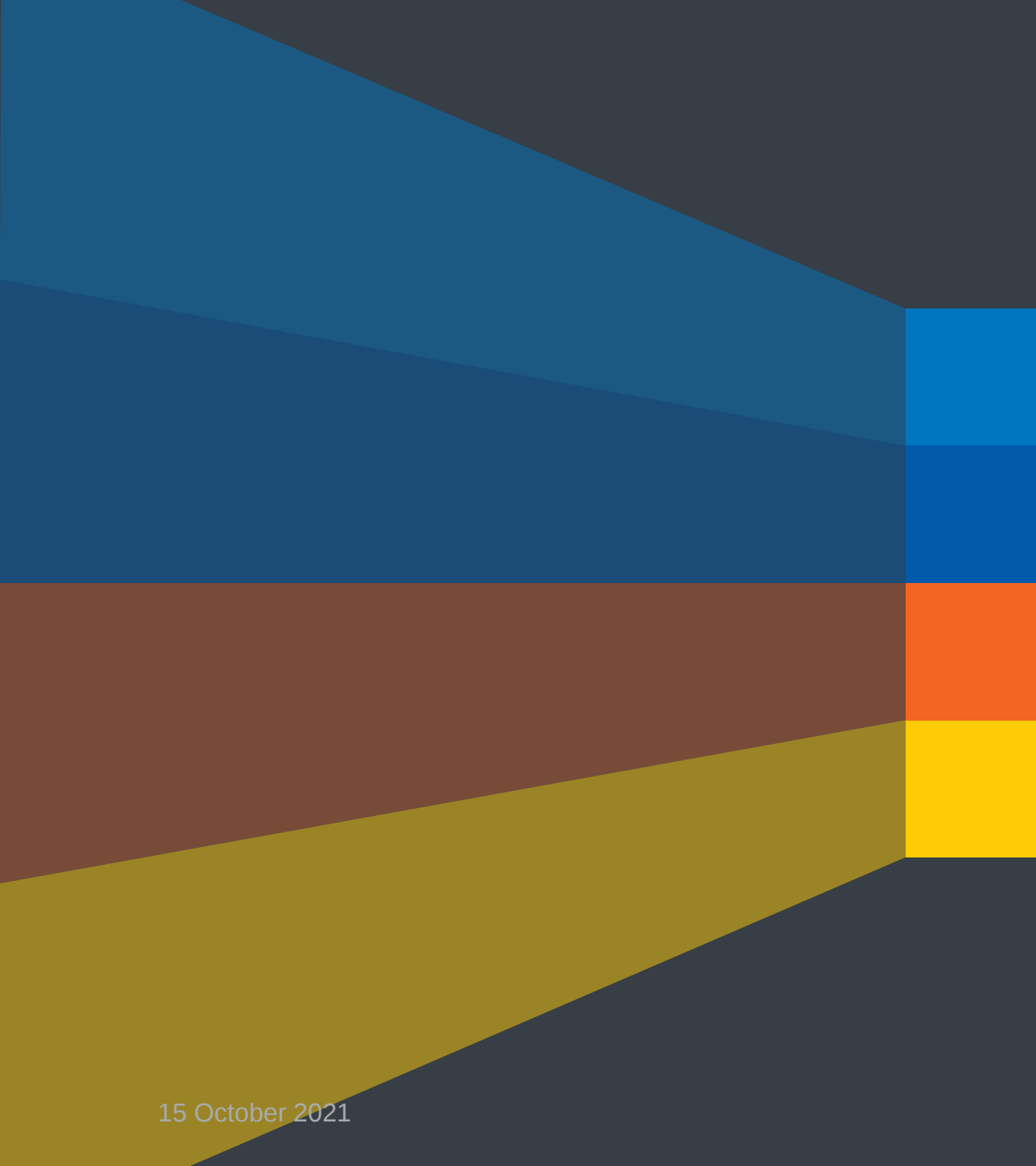


Gas Decarbonisation and 100% Renewable Electricity

Ben Gerritsen
GM Customer and Regulatory

Firstgas Group





Two topics:

1. Renewable gases (hydrogen and biogas) in New Zealand?
2. How do we ensure sufficient gas availability in the path to 100% renewable electricity?

The prospects for renewable gas to support 100% renewable electricity

Firstgas Group

15 October 2021





Zero carbon gases

- Hydrogen
- Biogas
- Methanation / bio-synthetic gas





Biogas

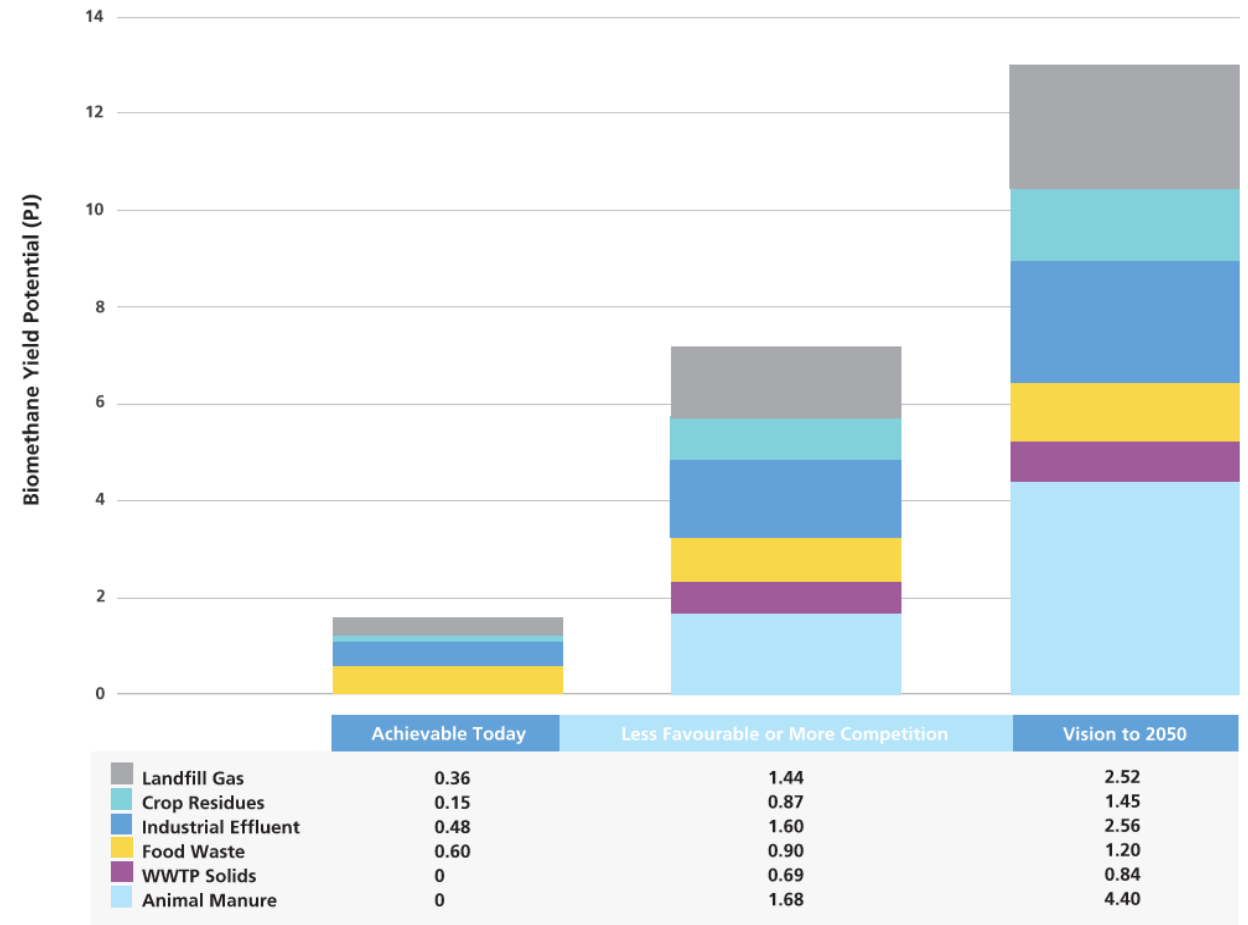
- Produced from organic wastes (food waste, dairy waste, food processing waste, landfills, wastewater treatment)
- Potential > 19PJ / per year
- No change required to appliances





Scale in NZ

- Commissioned work with Fonterra to understand the 'size of the prize'
- Focusing on biogas to biomethane upgrading and grid injection
- Working with biogas project developers to create bankable projects that optimise:
 - Waste disposal revenues
 - Renewable gas revenues
 - Other value streams (digestate, CO2)



[Biogas | Gas is changing](#)



Hydrogen

- Source of storage for variable renewable electricity generation (wind, solar)
- Massive international R&D program underway
- No change required to appliances for up to 20% blend





Network Conversion Pathway

[Hydrogen Trial Results | Gas is changing](#)





Methanation / Power to X / Sector Coupling

- Gas assets well suited to other flexible solutions, especially as hydrogen production scales up
- Methanation combines H_2 and CO_2 to create synthetic (zero carbon) natural gas (CH_4) and water
- Biomass gasification is another option showing promise (e.g. REN Energy – Fortis BC in Canada)
- Provides avenue for energy storage at scale (e.g. Ahuroa)

15 October 2021





Why renewable gas may be the best solution

Advantages

- Directly compatible with existing infrastructure (pipelines / generation)
- Draws on existing expertise from conventional energy industry
- Lower capex, more modular and scalable than other solutions
- Avoids impacts of building new infrastructure, battery disposal
- Could capture CO₂ from hard to decarbonise industries & biomass

Challenges

- Some of the processes involved have significant efficiency losses
- There is competition for feedstocks (wood, waste etc)
- Not yet clear which combination of technologies will solve energy storage needs (globally and in NZ)



Key Questions for MDAAG to Consider

- Will commercial deployment of renewable gas solutions happen in time for 100% renewable electricity ambitions / net zero emissions targets?
- How does the scale of renewable gas solutions compare with the need for firm, dispatchable energy:
 - In a normal hydrological sequence to meet capacity shortfalls (e.g. low wind/solar)?
 - In a dry hydrological sequence to meet energy requirements?
- What are the other uses of renewable gas (outside electricity generation) and how might these influence available (e.g. industrial process heat, building heat, etc)?

Ensuring sufficient gas availability in the meantime

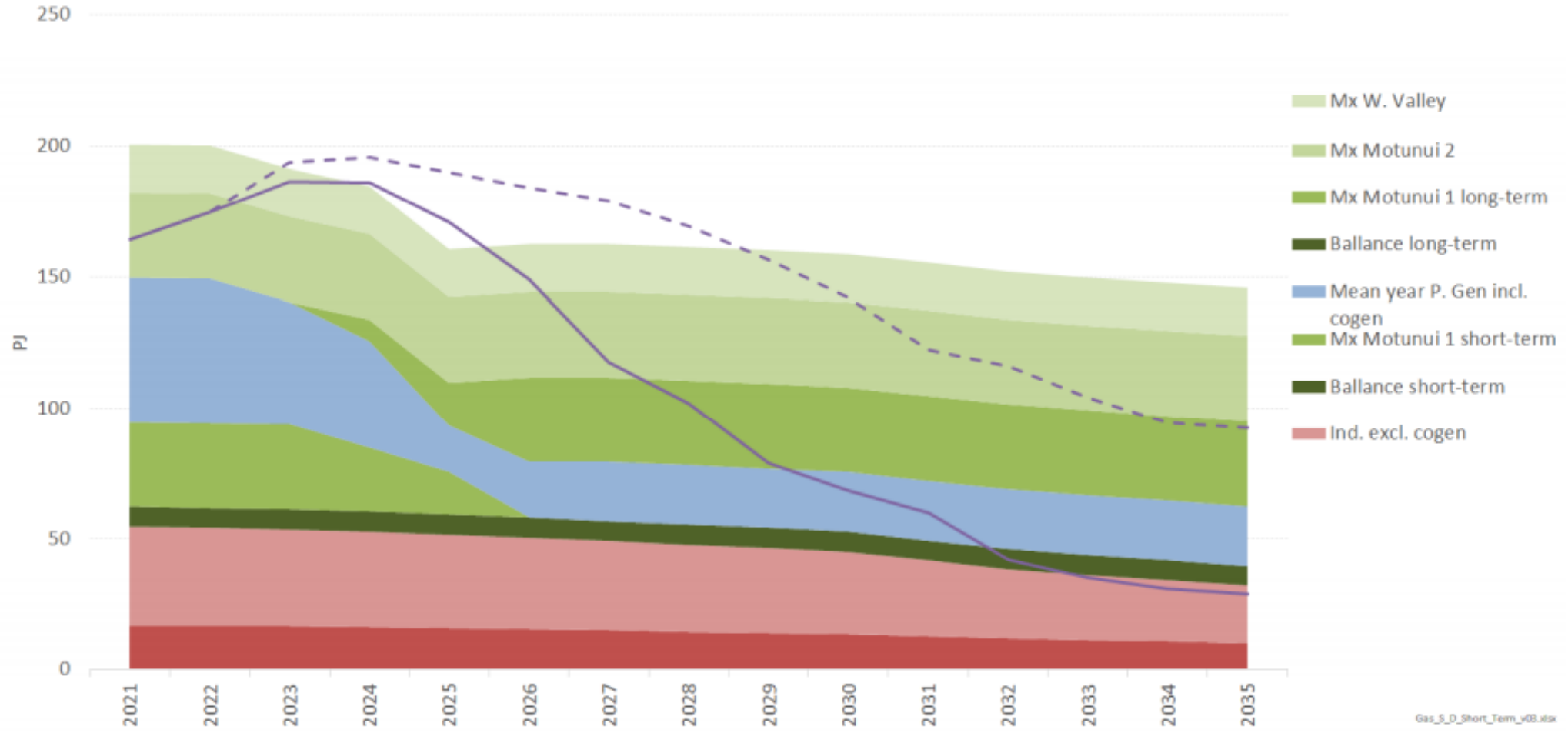
Firstgas Group

15 October 2021





GIC Market Settings Investigation





Range of Possible Interventions

Figure 1: Assessment of possible interventions in gas market

