

Huntly Power Station in transition

Scott Westbury
GM Power Schemes

New Zealand's Energy Trilemma



EMISSIONS

RENEWABLES ARE
VARIABLE

ACCELERATING
RENEWABLES ADDS
COSTS

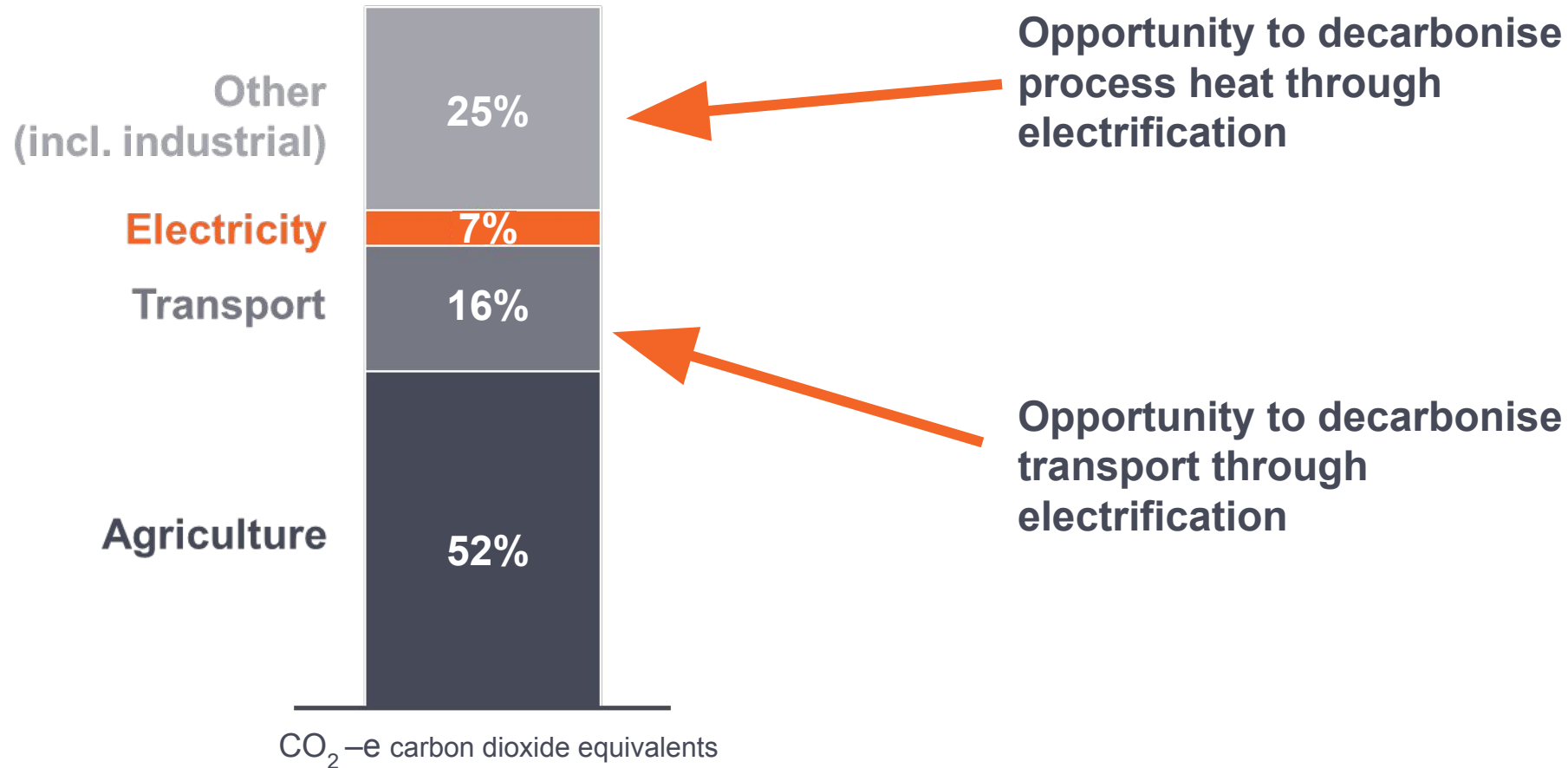
SECURITY

RELIABILITY HAS
A PRICE

COSTS

Maintaining the security of supply of electricity is vital

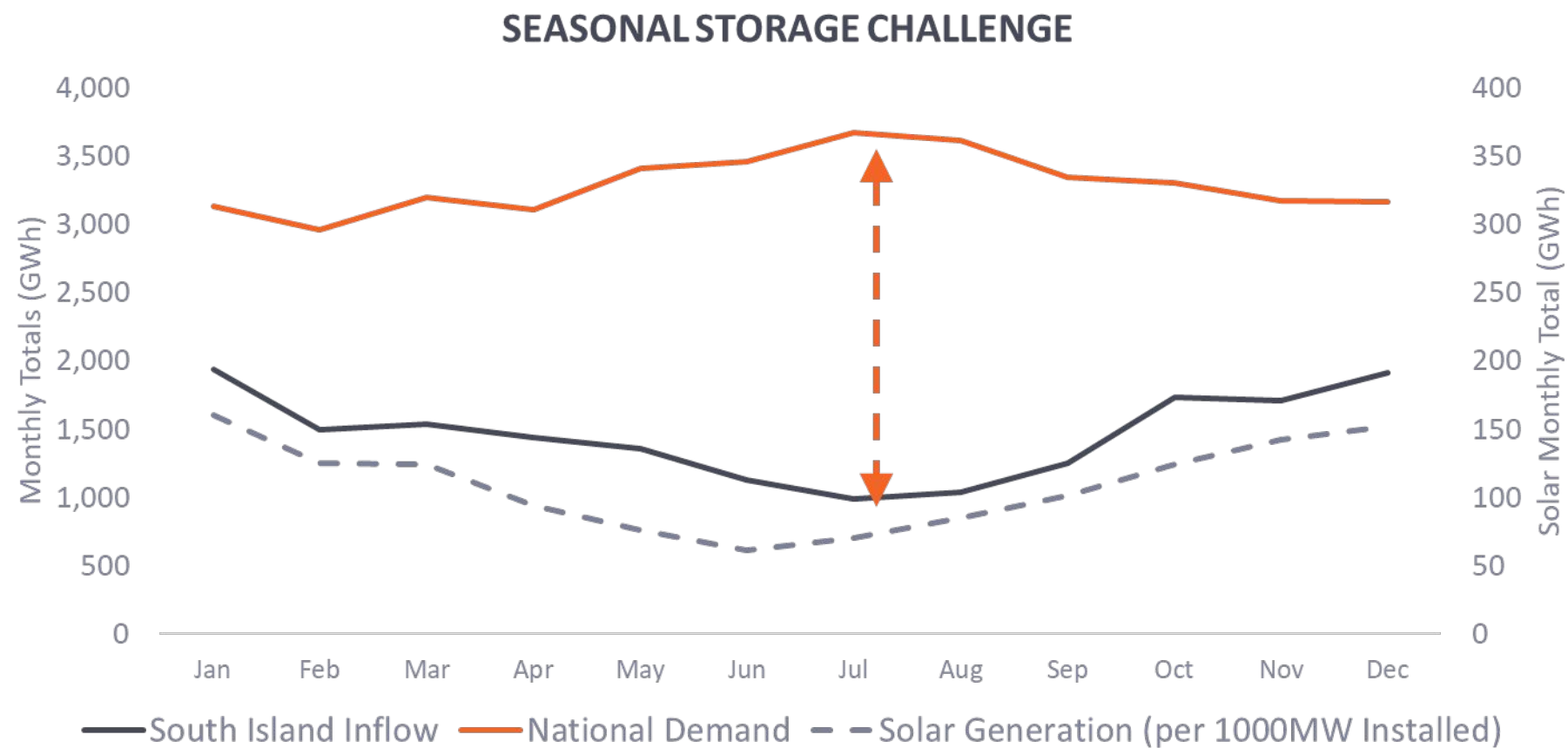
We need a system that is resilient to shocks and protects our economy and decarbonisation efforts



*Source: Stats NZ, 31 May 2023, 2007-2021 industrial and household data

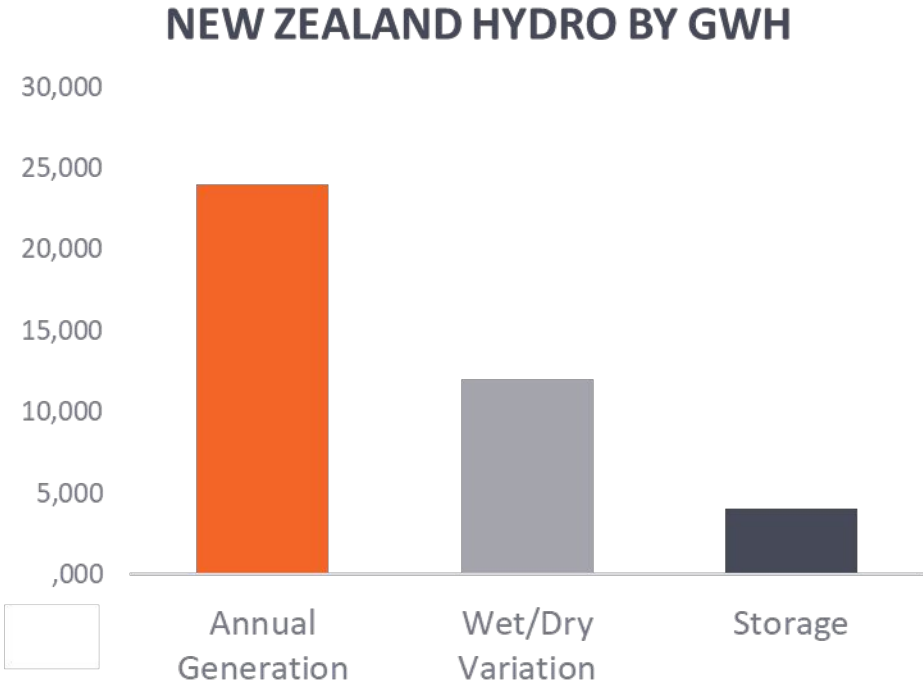
New Zealand's unique seasonal demand challenge

Demand is highest in winter, when southern inflows are the lowest

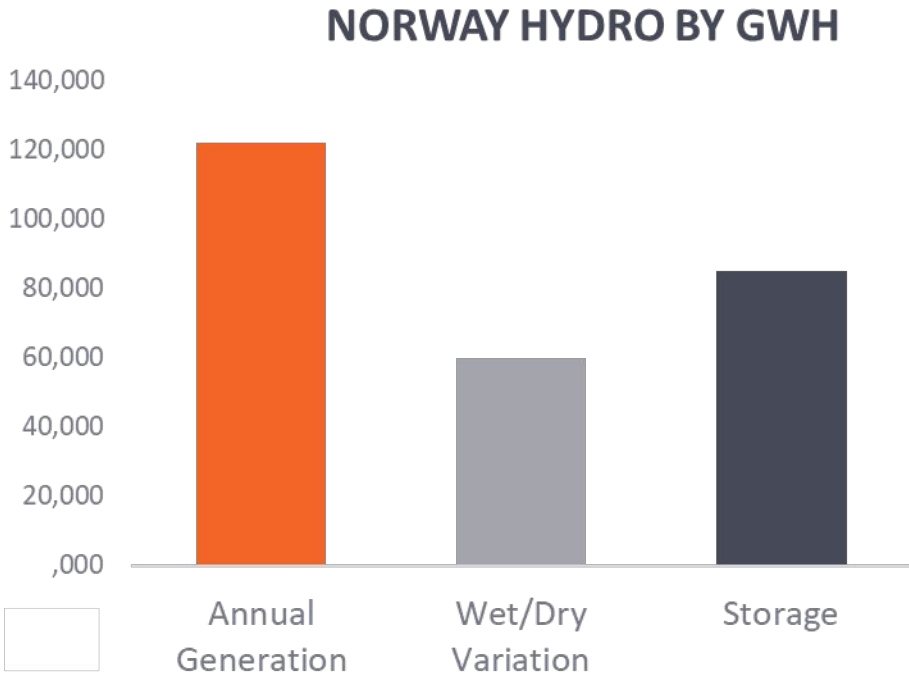


NZ's hydro storage is too small to manage droughts

Even with 4 times the relative storage and with EU interconnector, Norway is still only 98% renewable



**NZ has 2 months hydro storage
(85% renewable)**



**Norway has 8 months hydro storage
(98% renewable)**

Dry year support is the hardest to provide

None of the emerging technologies will help address this problem

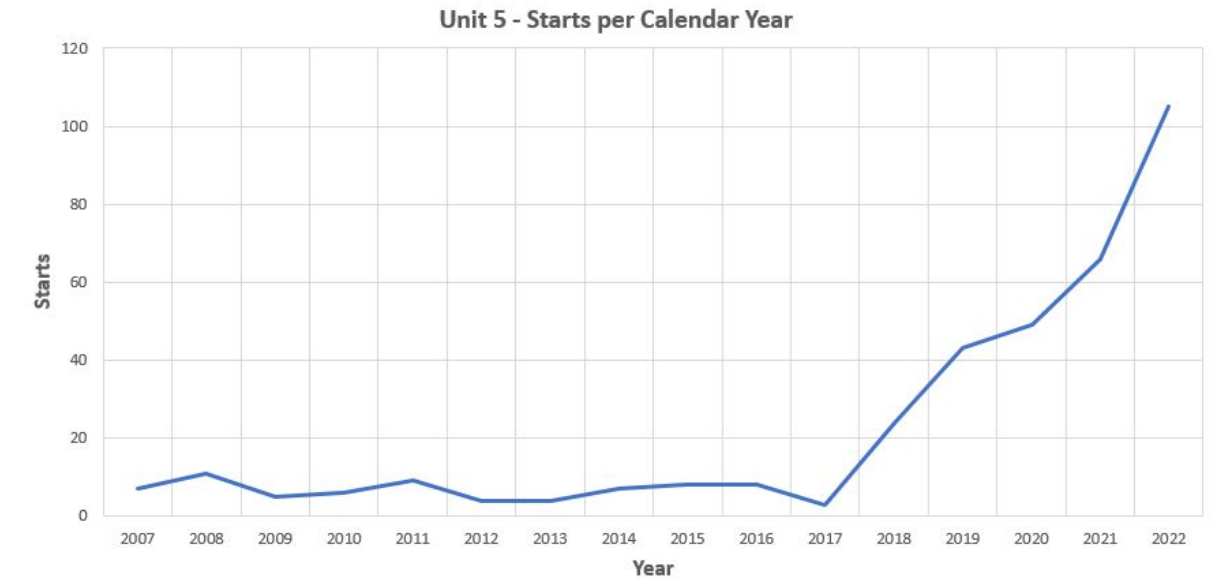
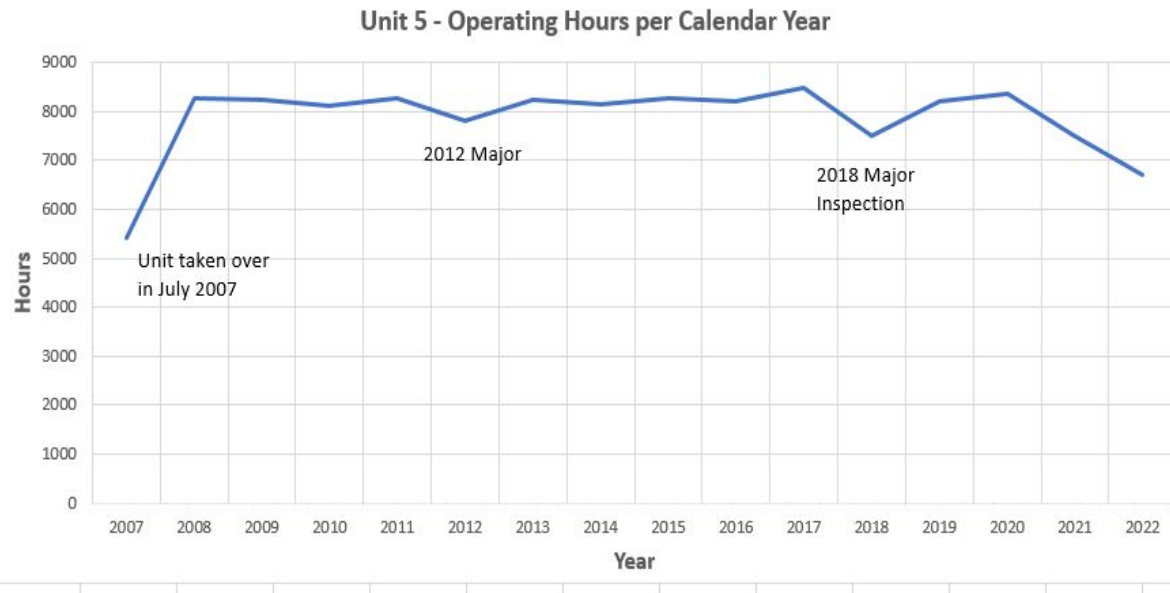
GENERATION ROLE	THERMAL (GAS OCGT)	THERMAL (GAS CCGT)	THERMAL (COAL)	HYDRO	GEO-THER MAL	WIND & SOLAR	BATTERIES
BASELOAD							
DAILY FLEX							
WEEKLY FLEX							
DRY YEAR SUPPORT							

* Requires flexible gas (e.g. large scale gas storage)

ALWAYS		SOMETIMES	
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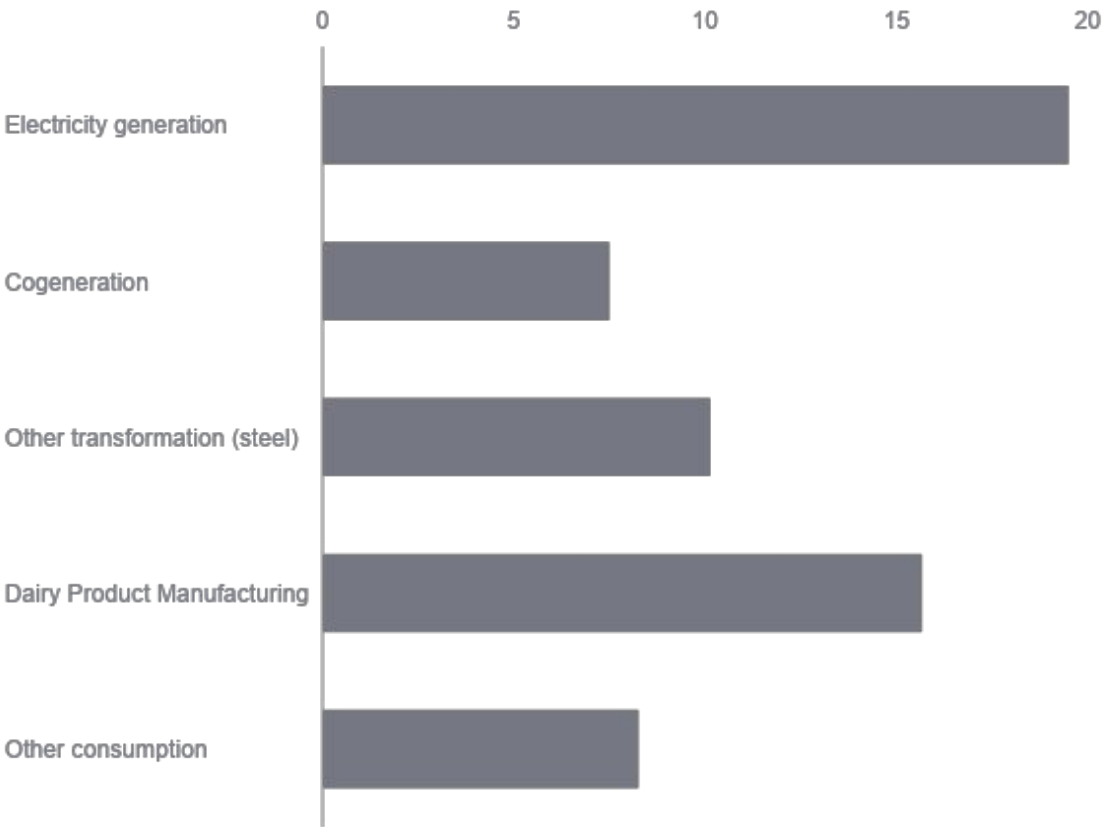
Impact of more renewables already being felt

Thermal generation providing an important backup role

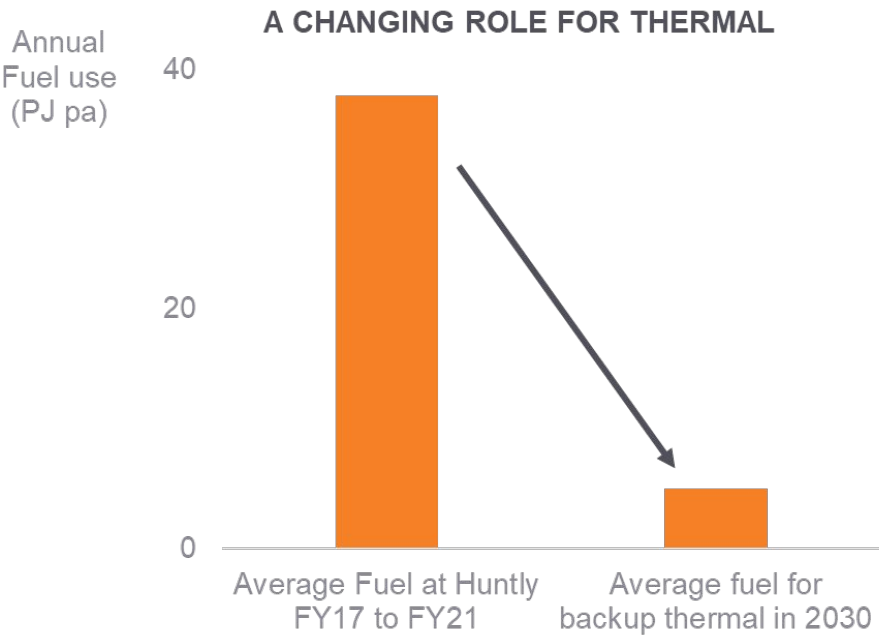


New Zealand Coal Use

MBIE/EECA data - coal use in 2020 (PJ)



High coal use in 2020 and 2021 due to gas market and hydrology challenges.



Pellet comparison

White pellets

- Mature technology
- Established commodity with robust spot market and long- term contracts
- Coal to white pellet conversions are proven but with high CapEx and some operational challenges
- Hydroscopic nature requires covered transport and storage
- Significant safety issues due to dust generation and self-heating
- Technology has stagnated with no opportunity for improvement in pellet characteristics

Black pellets

- Superior properties can enable a low CapEx approach to a coal-biomass conversion
- Higher energy content and grindability can improve unit capacity, operability and economics
- Many different technologies but pellet standards do not provide comprehensive guidance
- Energy industry struggling to understand and compare properties
- Global supply is small and underdeveloped

Next steps

A viable local supply chain?

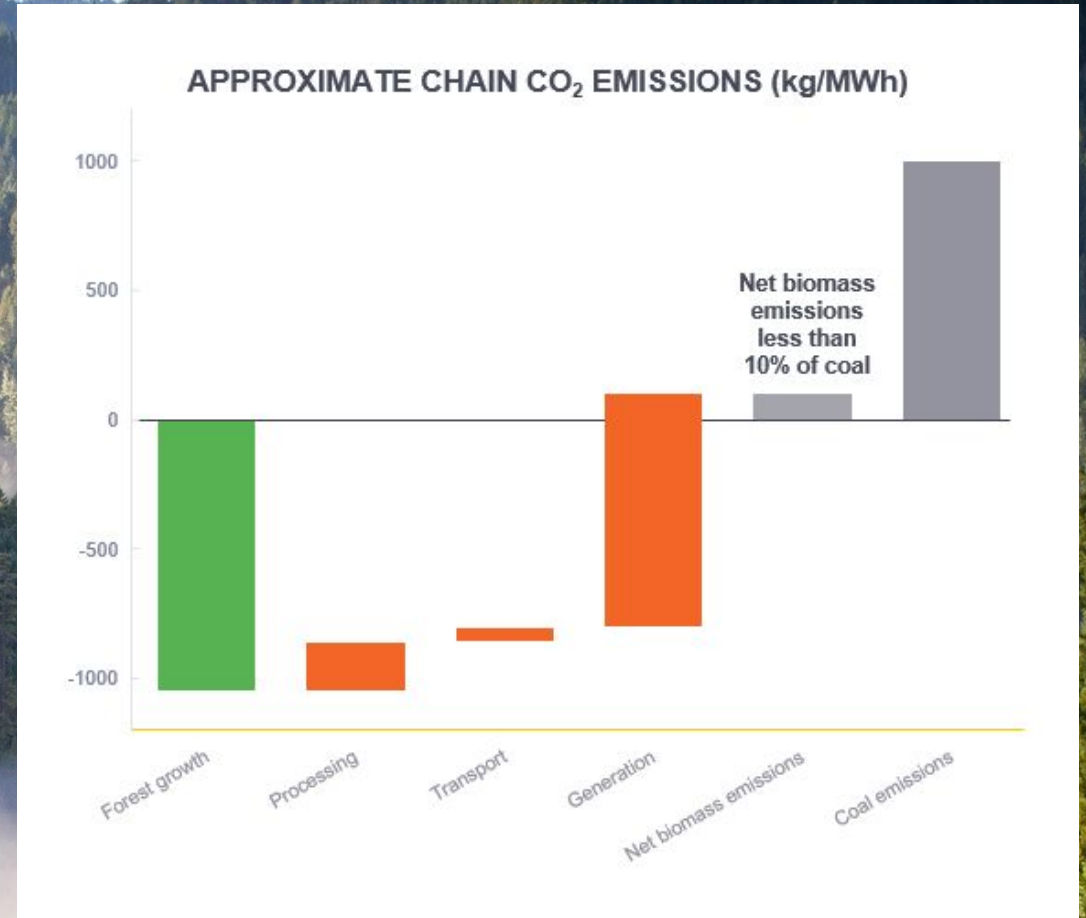
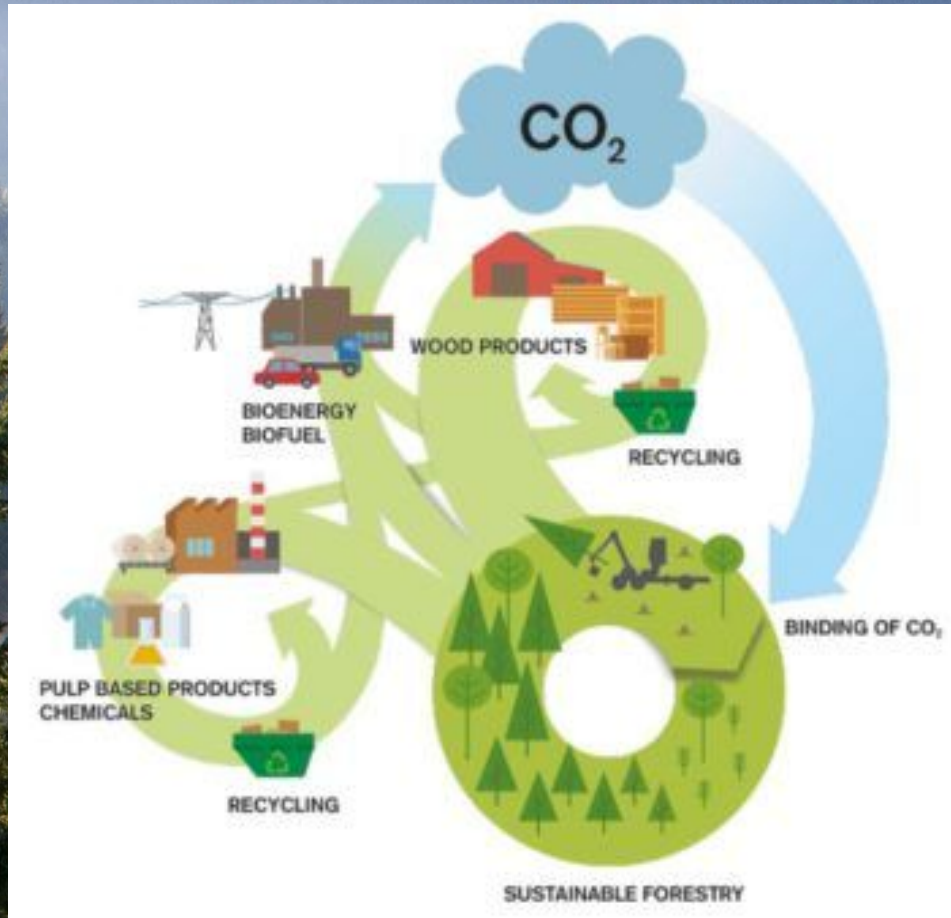


Dairy for life



and others ...

Sustainability considerations





The future of Huntly

Thank you