

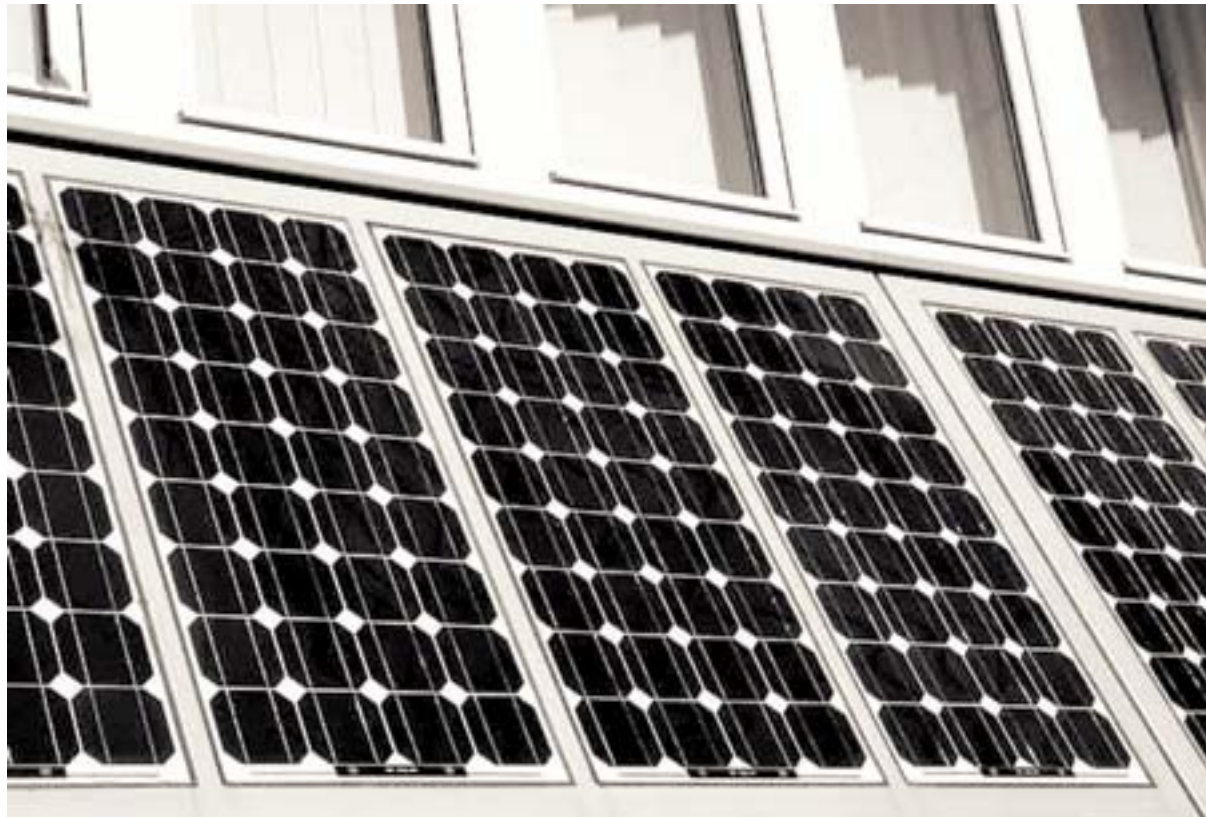
Distributed Generation Opportunities for New Zealand

Paper to the Energy Conference 2004

Sponsor Organisations



Mainstreaming DG



- ***The Case for Distributed Generation - electricity system modernisation***
- ***Evaluating the DG opportunity - the post Maui era***
- ***The NZ opportunity for DG - mainstreaming DG***

NZ Characteristics:

“niche supply for local needs: small-scale, local to the point of use, either embedded in the distribution network or a stand-alone supply (the supply-side option), and assisted by the advancement of energy conservation measures (the demand-side option)”

Today's Market Drivers:

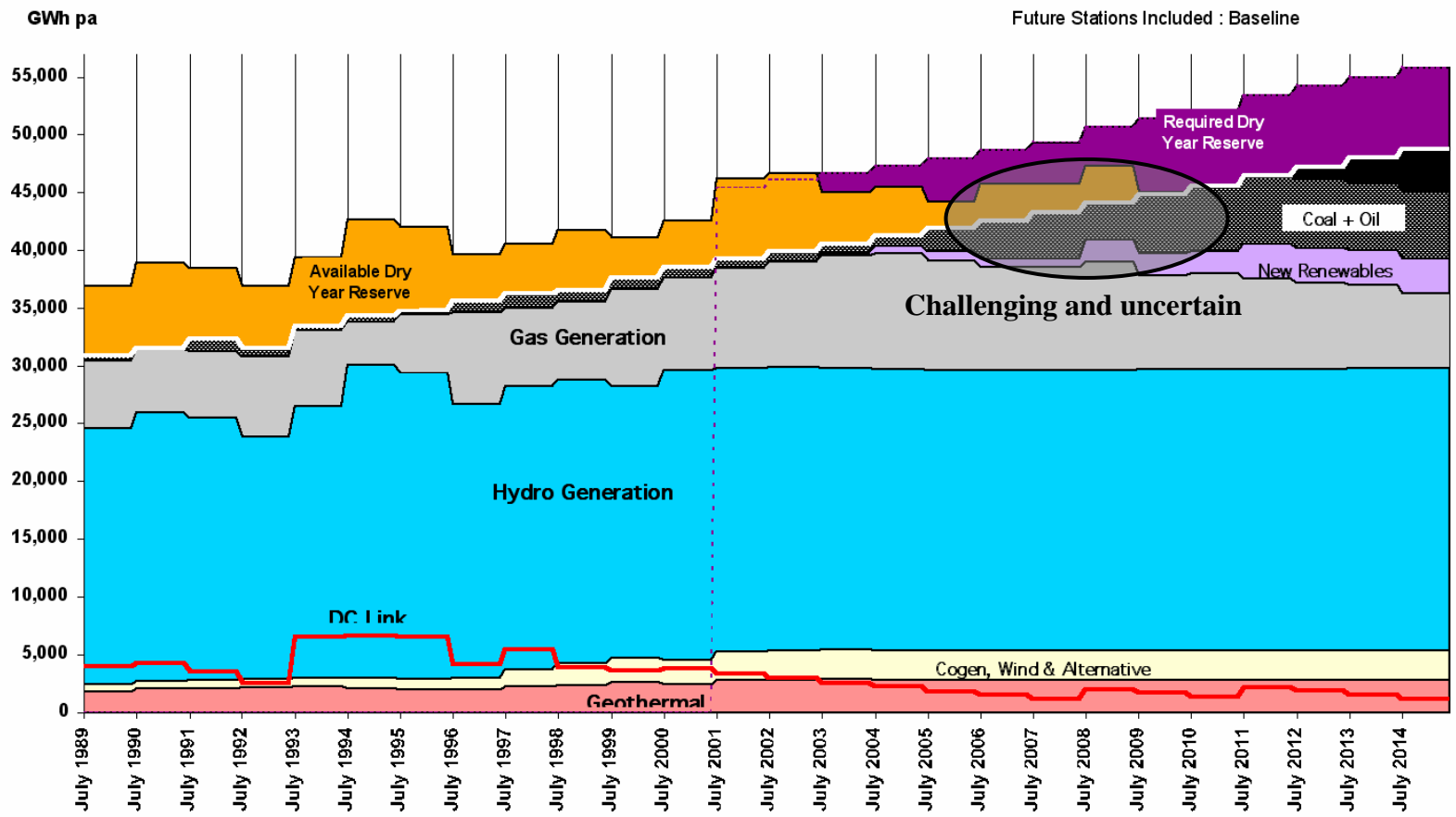
- *Electricity capacity and security*
- *Quality of electricity supply*
- *Need for grid reinforcement*
- *Deferred network investment*
- *Environmental benefits*
- *Revenue earning/price hedge*
- *Asset utilisation*

Critical characteristics of the DG market:

- ***Matching network demand and supply capacities***
- ***Providing specialised energy products and services directly to the customer***
- ***Suppling the market with overall more fuel efficient and lower capital cost plant***
- ***Taking up fuels opportunities that are essentially free***
- ***Serving a non generation need (eg technology demonstration)***

New Zealand Generation

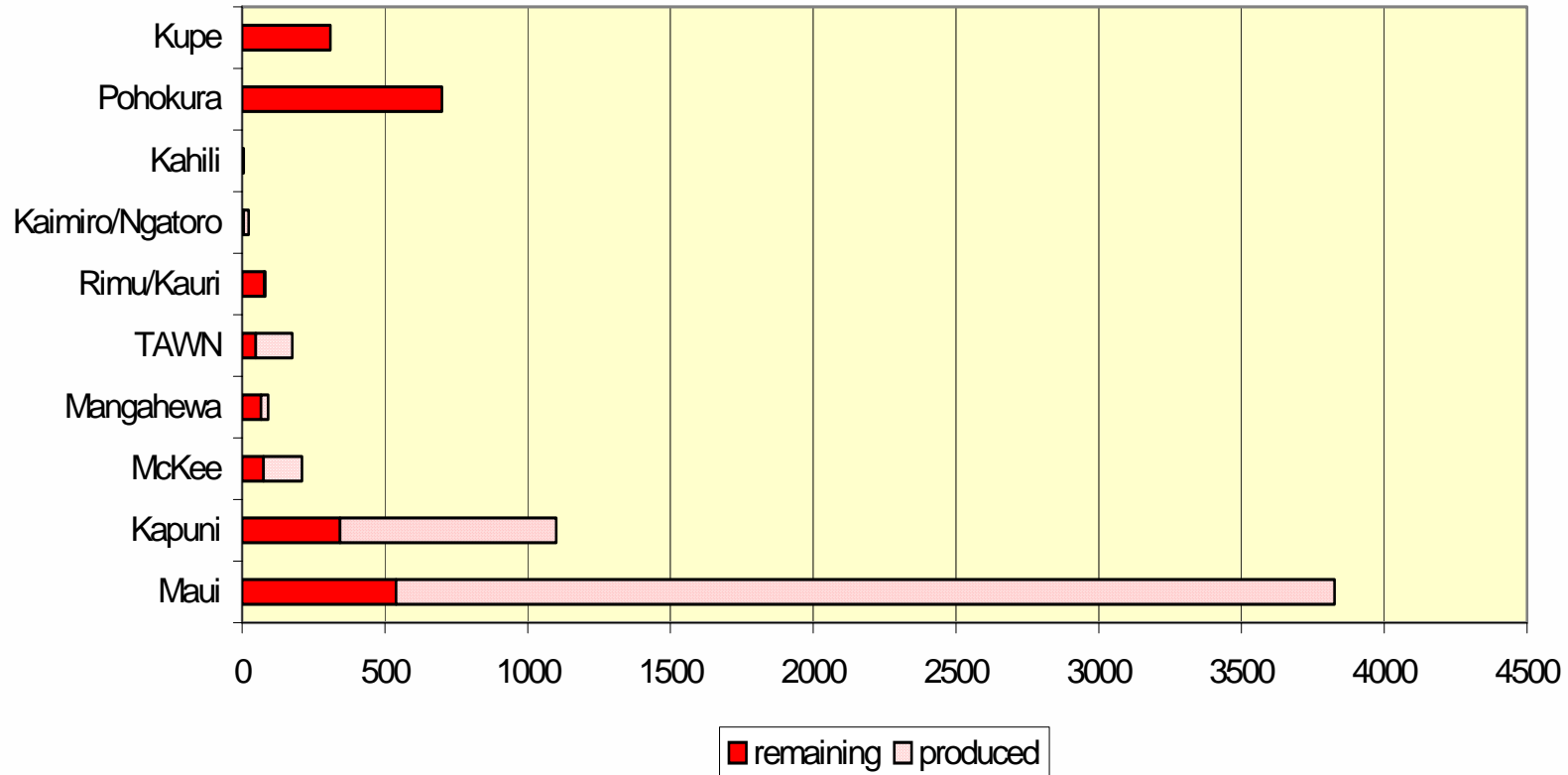
Normal Year
Shortfall



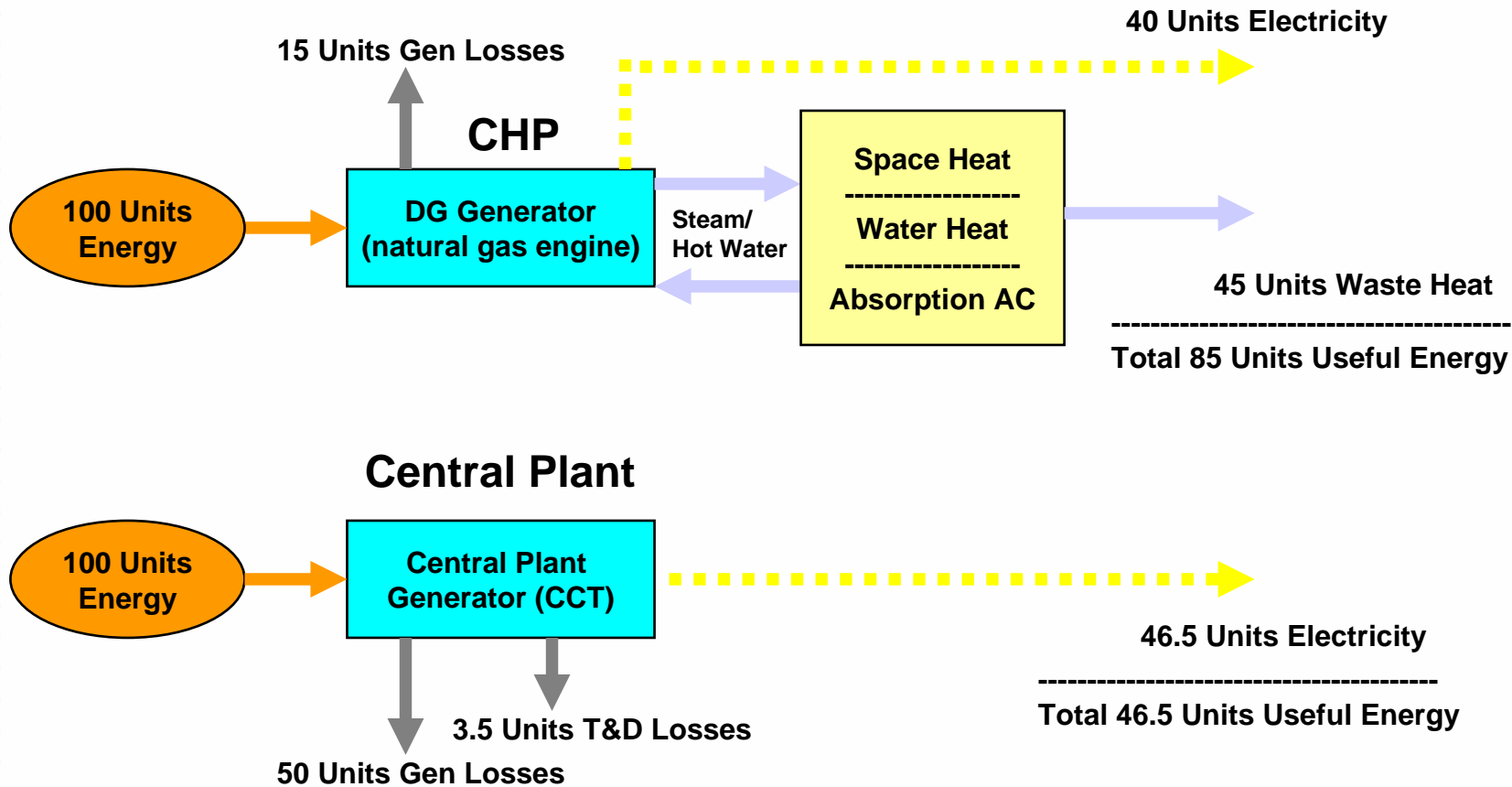
Uncertainty manifested by:

- ***Delays in expansion commitments for new generation***
- ***Government underwriting of e3p Huntly project***
- ***Rising electricity prices***
- ***Coal imports***
- ***Demand destruction within the NZ primary industry sector***

New Zealand gas reserves



The Depletion of NZ Gas Reserves during the Maui era



- Main driver – Environmental issues
 - ‘Free’ on-site wood waste
 - Need for boiler replacement (emissions)
 - Natural gas used for load swinging
- Third Party Ownership does not appear to be real issue
- Relationship with lines company (UNL) for minimising TP charges for both, UNL & CHH; via
 - Load management within CHH
 - Load-shedding in Tokoroa and site in event of generation plant trips



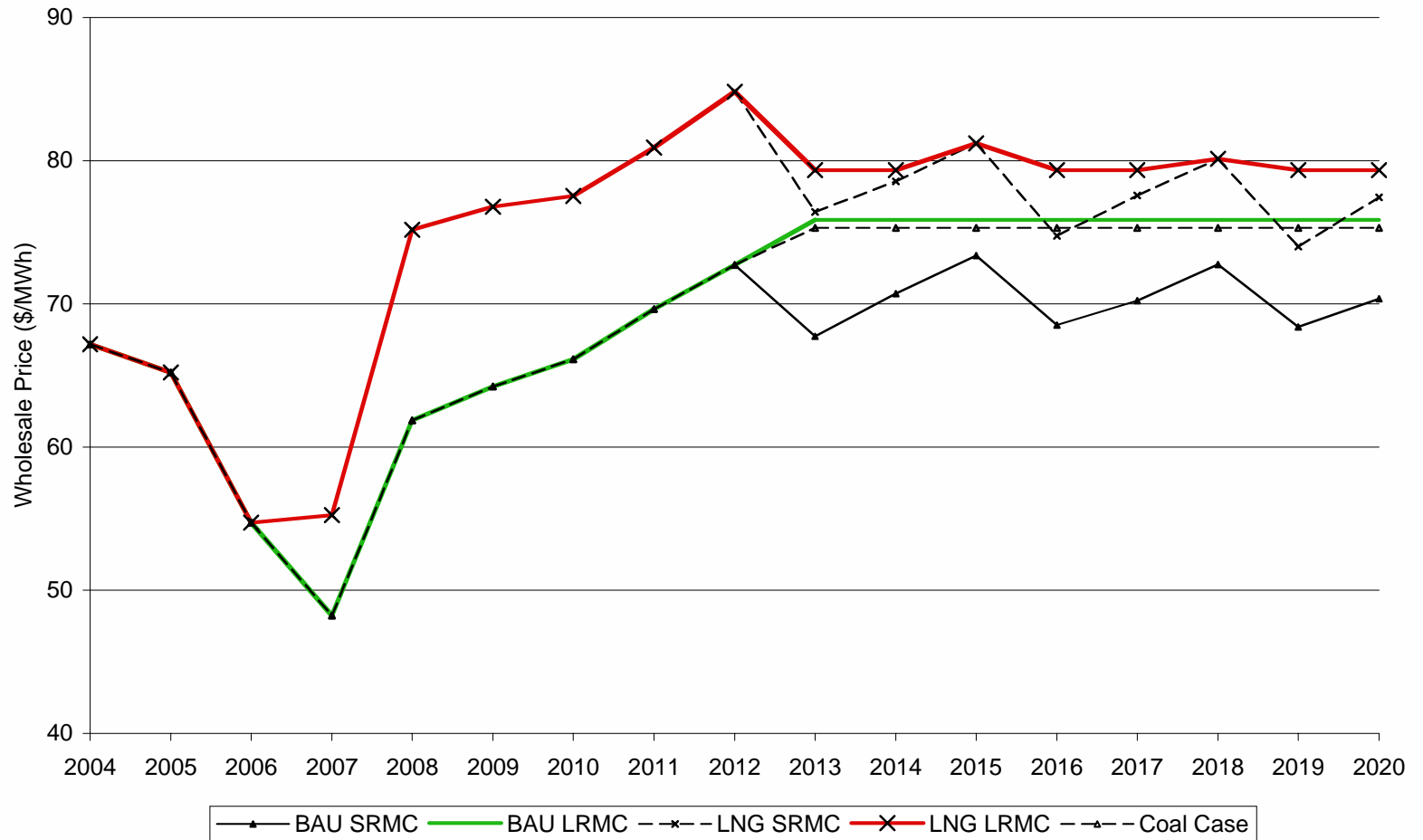
The challenge:-

- Changing to a new set of optimal outcomes threatens the commercial interests of existing players
- Ability to extract value is related to market dominance - resistance to change
- Balance the interests of investors with national benefit - industry rules
- Solution has technical, commercial and regulatory cross-coupled components also needing system optimisation



What price pathways....

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Applications can include:

- ***Co-generation plant at industrial or commercial sites***
- ***Standby generation using diesel, gas, coal, geothermal and other fuel sources***
- ***Generation plant supplying directly into distribution networks***
- ***Micro-grid (islanded) operation***
- ***Electricity storage devices to meet demand peaks***
- ***Fuel-switching at times of system peaks***
- ***Demand-side management systems.***



Contribution to 2015

The Technology	Current and assisted routes	Engineered market route
reciprocating engines	20 - 40 MW	250 MW
gas turbines	0 - 20 MW	50 MW
combustion/steam turbine	40 - 80 MW	100 MW
geothermal	20 - 80 MW	100 MW
small scale hydro	10 - 30 MW	80 MW ¹
biomass systems	0 - 5 MW	10 MW
wind	5 - 20 MW ²	160 MW ²
Maximum projected installed capacity	95 - 275 MW	750 MW

1 Not fully constructed by 2015.

2 Annual capacity factor output, i.e. up to 3x these figures in terms of maximum rated output.

DG Marketplace in the period 2004~2015



The DG Marketplace	The Opportunity	The Technology	Current Market	Future Market
	Current trends	reciprocating engines gas turbines combustion/steam turbine geothermal	asset utilisation system security	asset utilisation system security price hedge
	Assisted renewables	small-scale hydro biomass systems wind solar water heating	embedded systems (local)	capacity contracts system security (national)
	Engineered market	smart metering real time pricing ICP switching remote control integrated energy management systems	emerging market	open access provider contracts and customer manager

Industrial and Commercial

- Initiatives for CHP, embedded generation, renewable generation
- Recognition that many DG technologies relate to heat supply with large efficiency benefits
- Growth of importance of reliability and quality integration of DG with industrial operations
- Management of transmission connection costs
- Value of relationship with Network company
- Value of demand management
- Waste disposal



Energy 21:

- ***An independent `collaborative programme for modernisation of NZ's electricity system***
- ***Contributing through the delivery of policy-level research that acts to promote system improvements***
- ***Aim is to lead and inform public debate around strategies for improving energy security.***
- ***Active work streams providing expert energy services directly to the customer***

Projected Production: Existing & Discovered Reserves

