



The role of hybridisation in energy cost reduction

Contracts, uncertainty and capturing value

Dr Mary Stewart | 27 August, 2018

energetics^o

Agenda



1 Energy costs

2 Costs will remain high

3 The role of renewables

4 Where to next



What does your energy dollar buy?

Business Chart



What does your electricity \$ buy?



Retail charges

- Consumption (kWh)
- Peak, shoulder and off peak



Environmental

- LRET (kWh)
- SRES (kWh)



Network

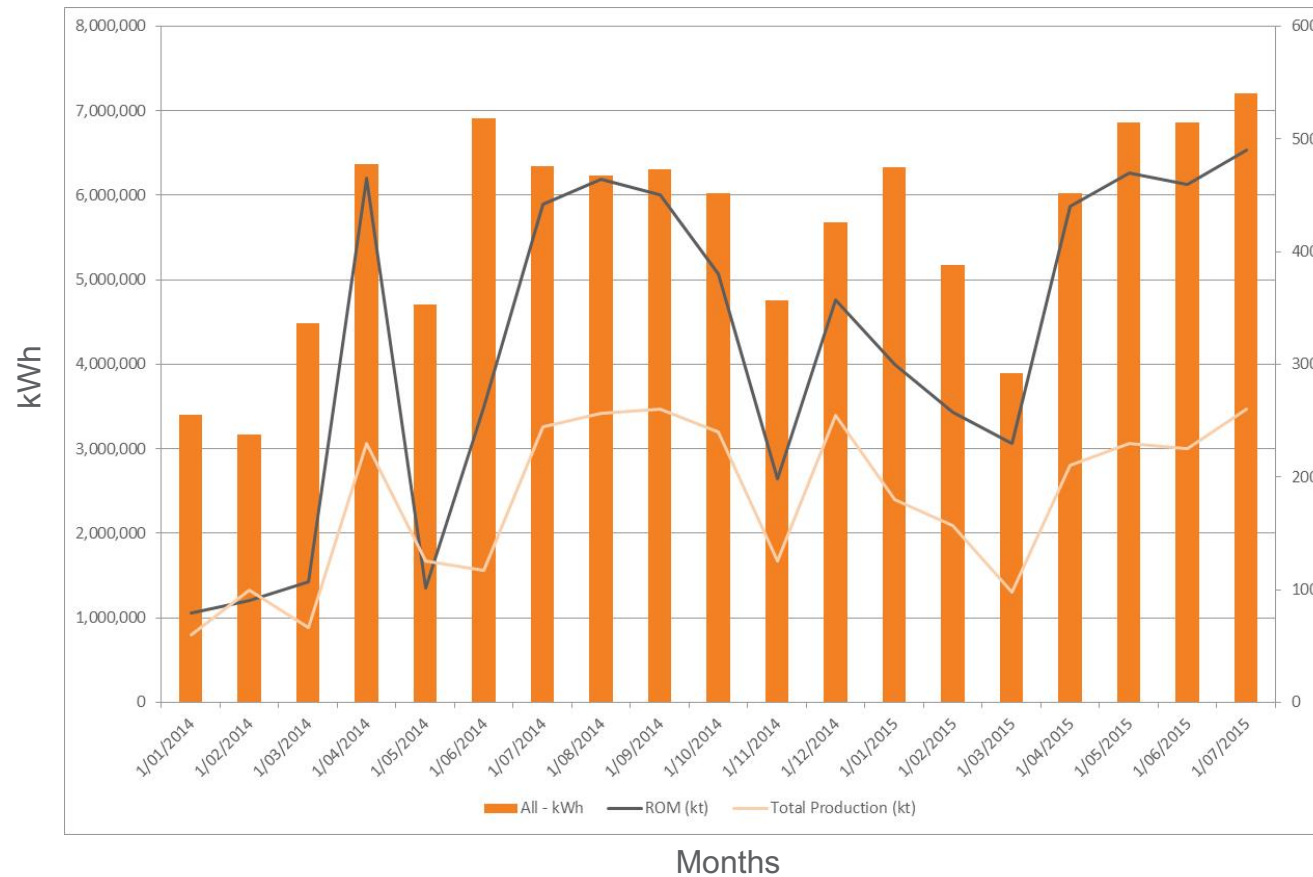
- Fixed (day)
- Capacity (kVA and rolling kVA)
- Demand (kWh)



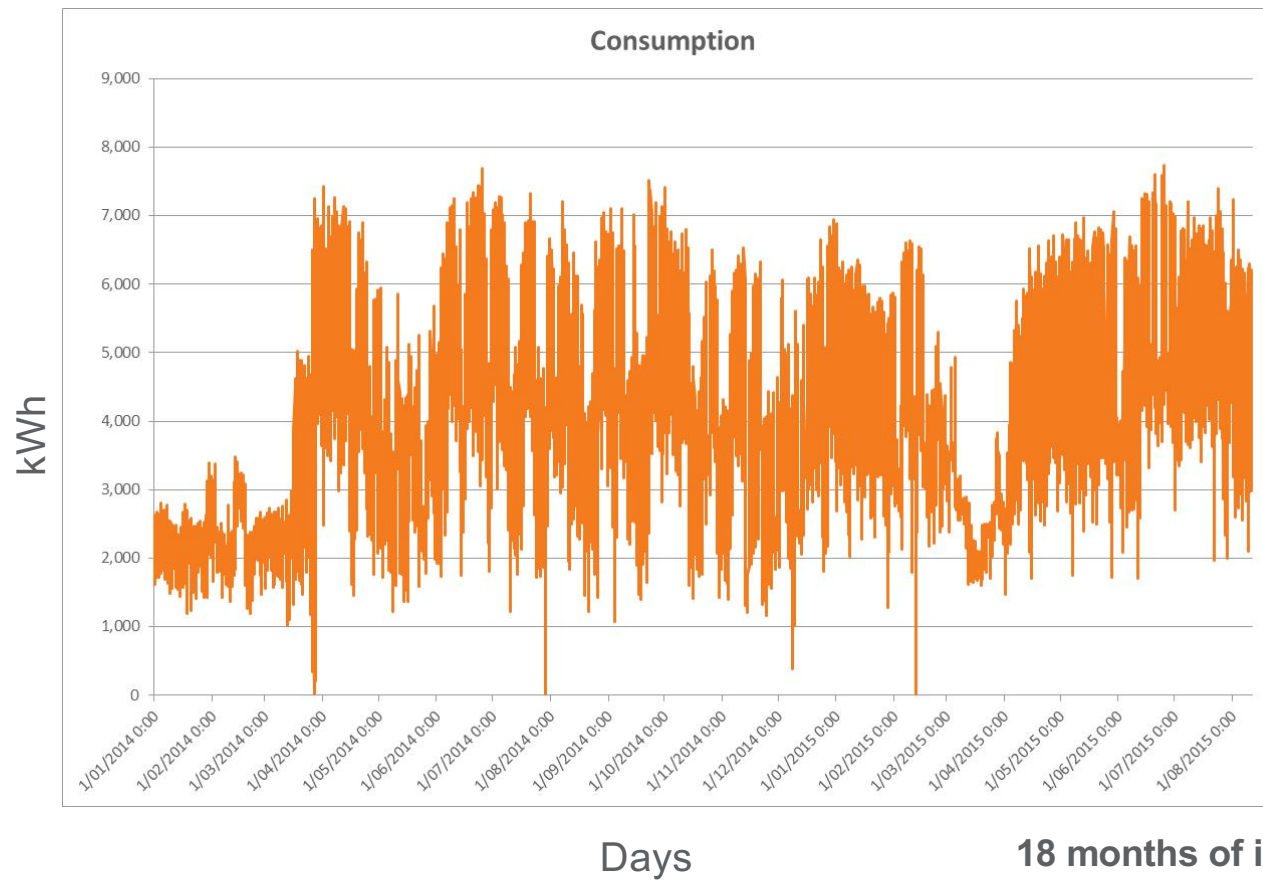
Other contestable

- Market (kWh)
- Metering (day)

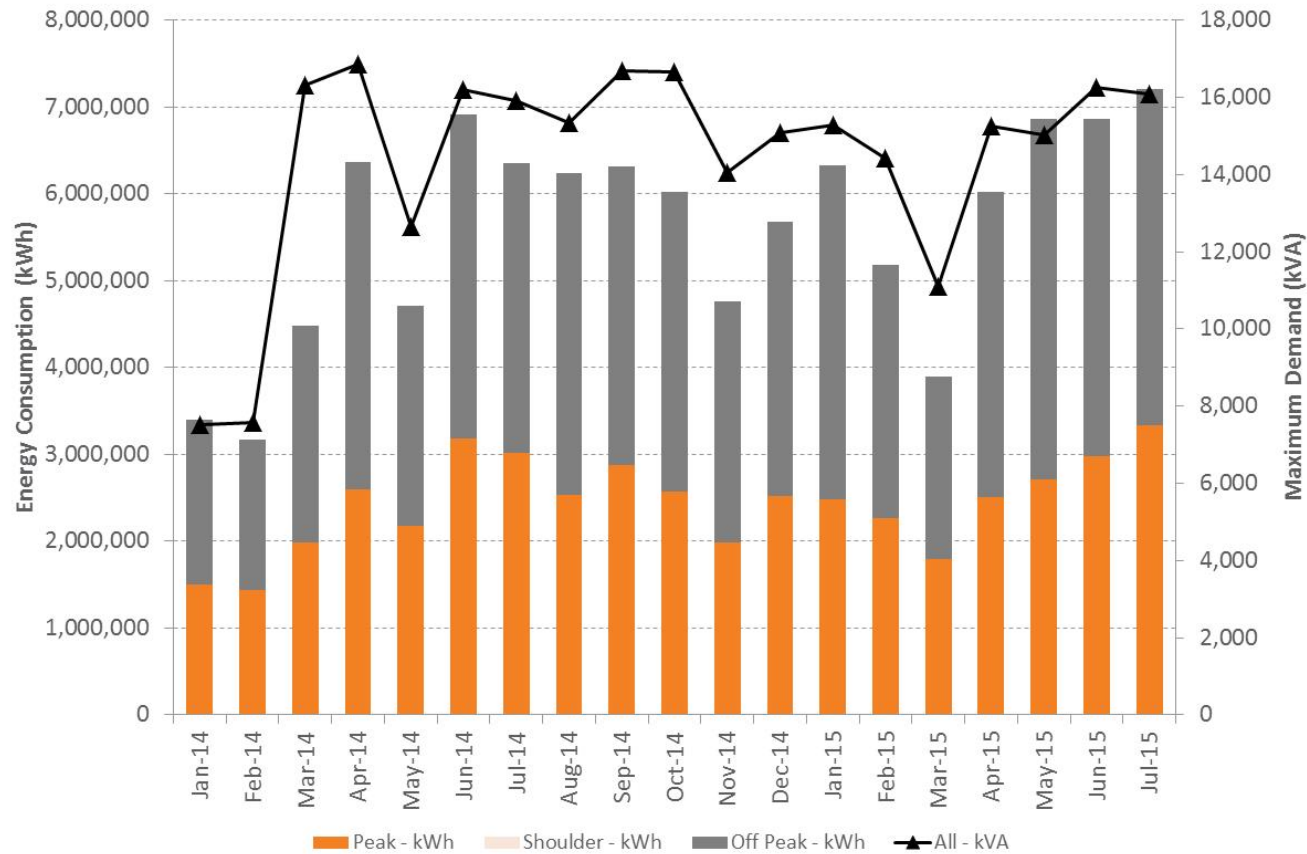
Applying this to an open cut mine



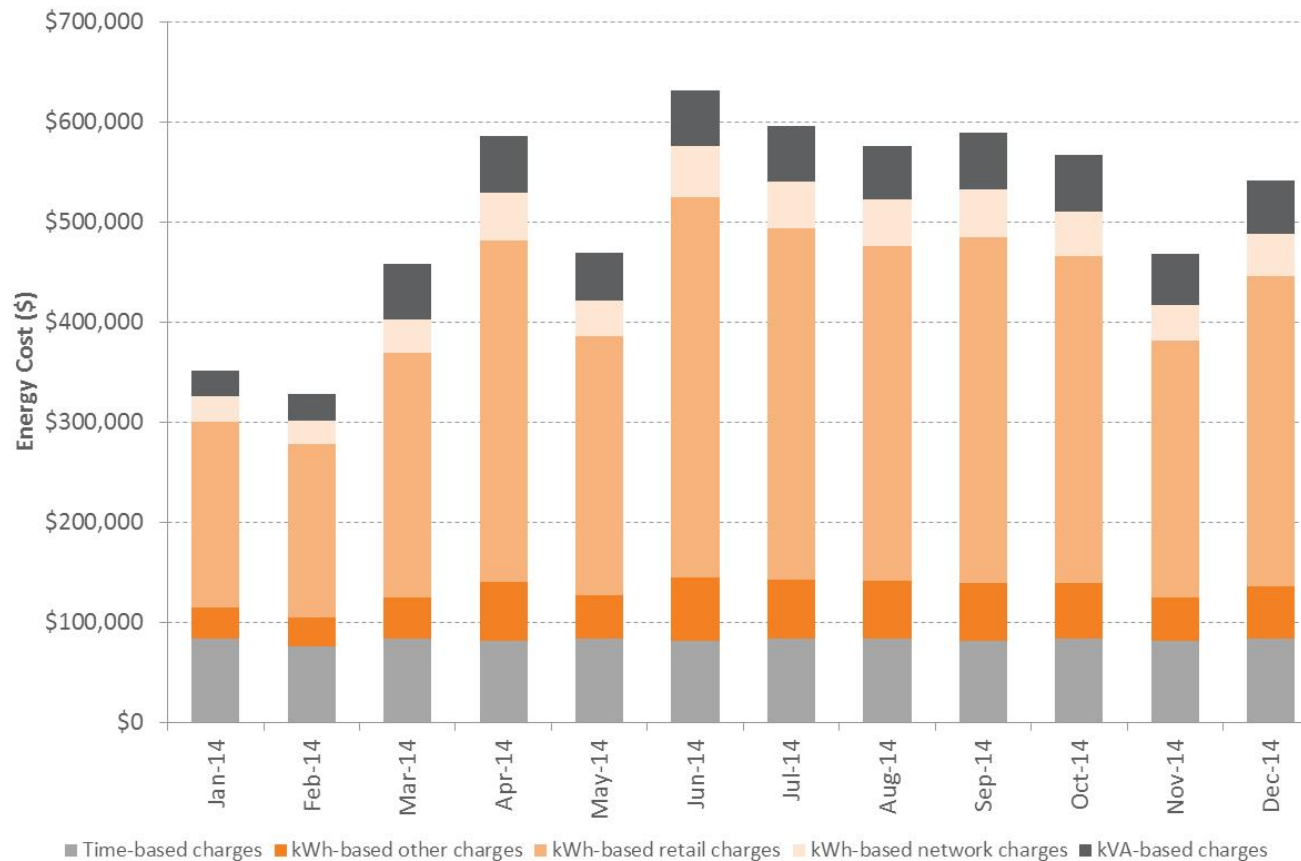
Based in 15 minute interval data



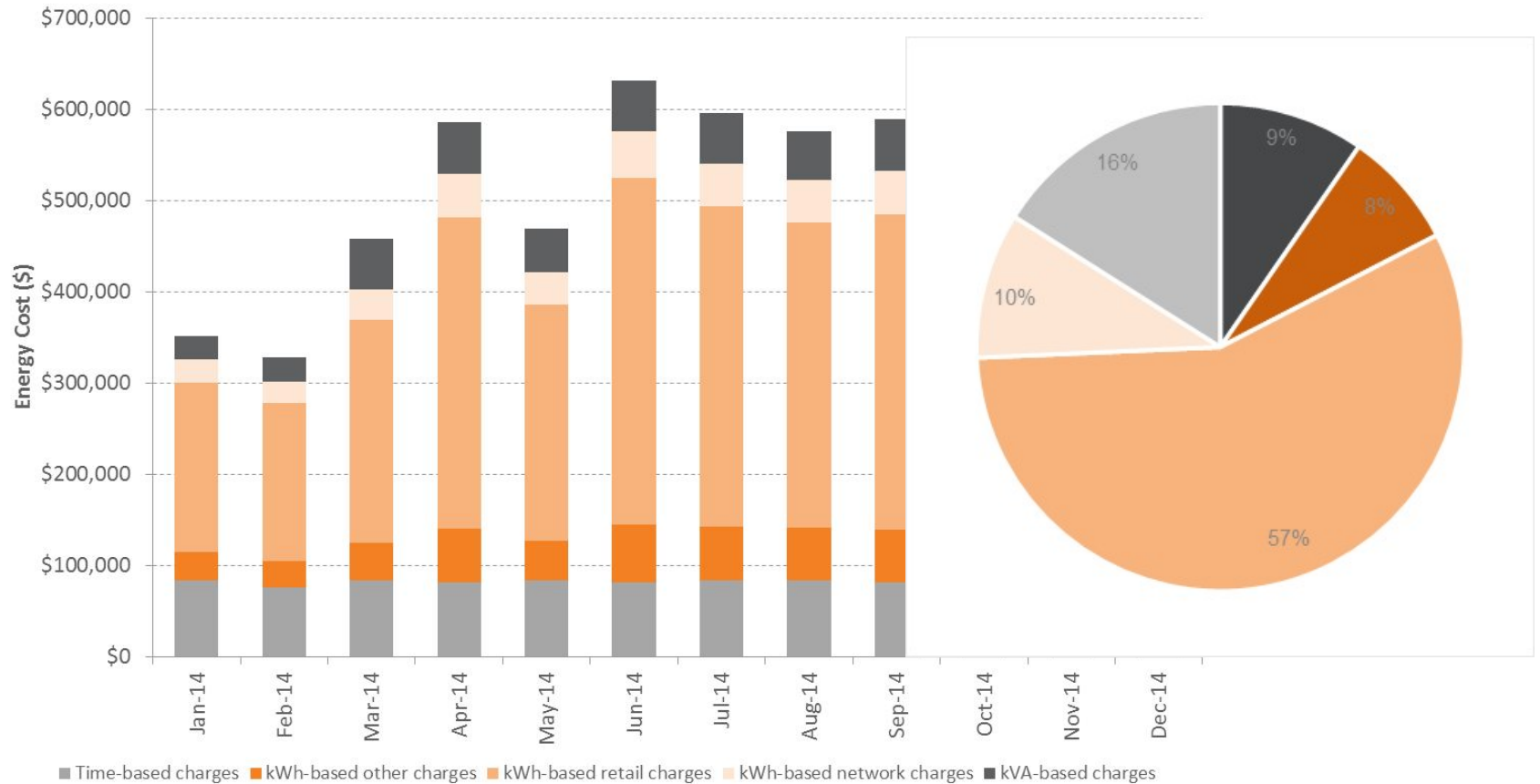
Breaking down time of use



Applying differential costs

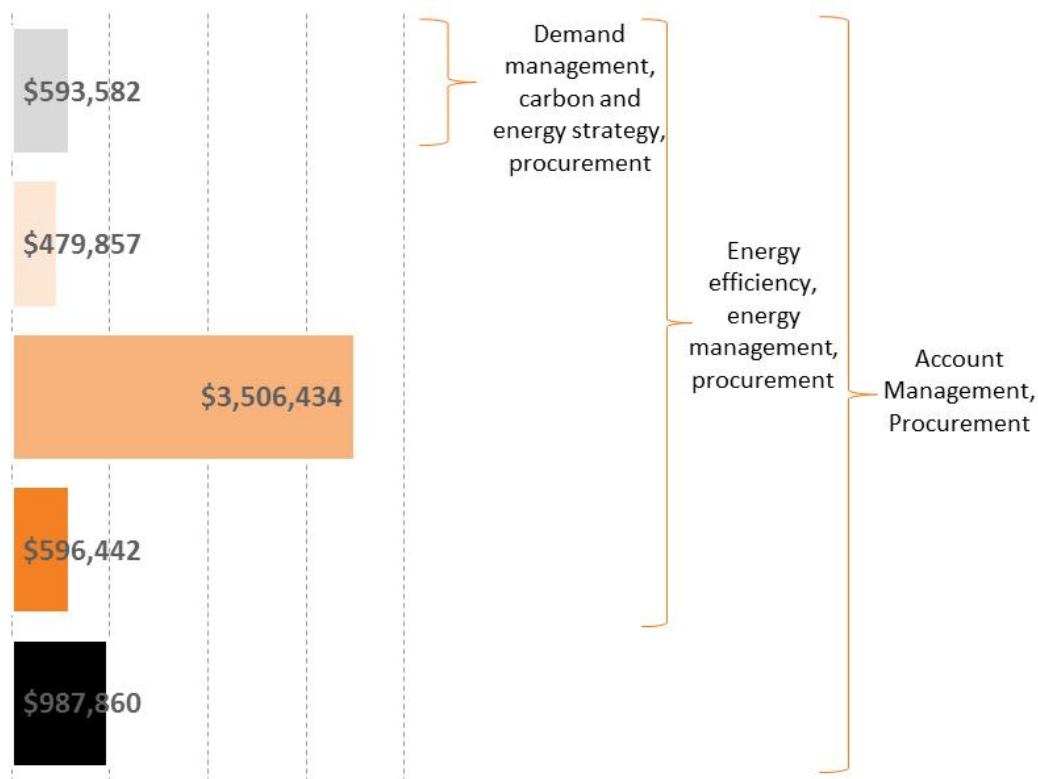


Applying differential costs





How can this be improved?



- Time based charges
- kWh based other charges
- kWh based retail charges
- kWh based network charges
- kVA based charges

The bigger picture



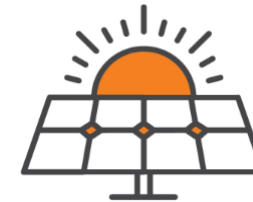
Lower total energy demand has multiple benefits:



Reduces the size of any installed site generation capacity



Reduces demands on aging reticulation equipment and associated connection costs



Improves the case for renewables on site

Changing the energy cost profile over time can extend mine life



The site challenge

- Energy savings are typically under-estimated when treated as a fixed cost: \$ per kWh
- Consider impacts of reductions in:

↙ kVa

power draw, start up power

↙ kWh

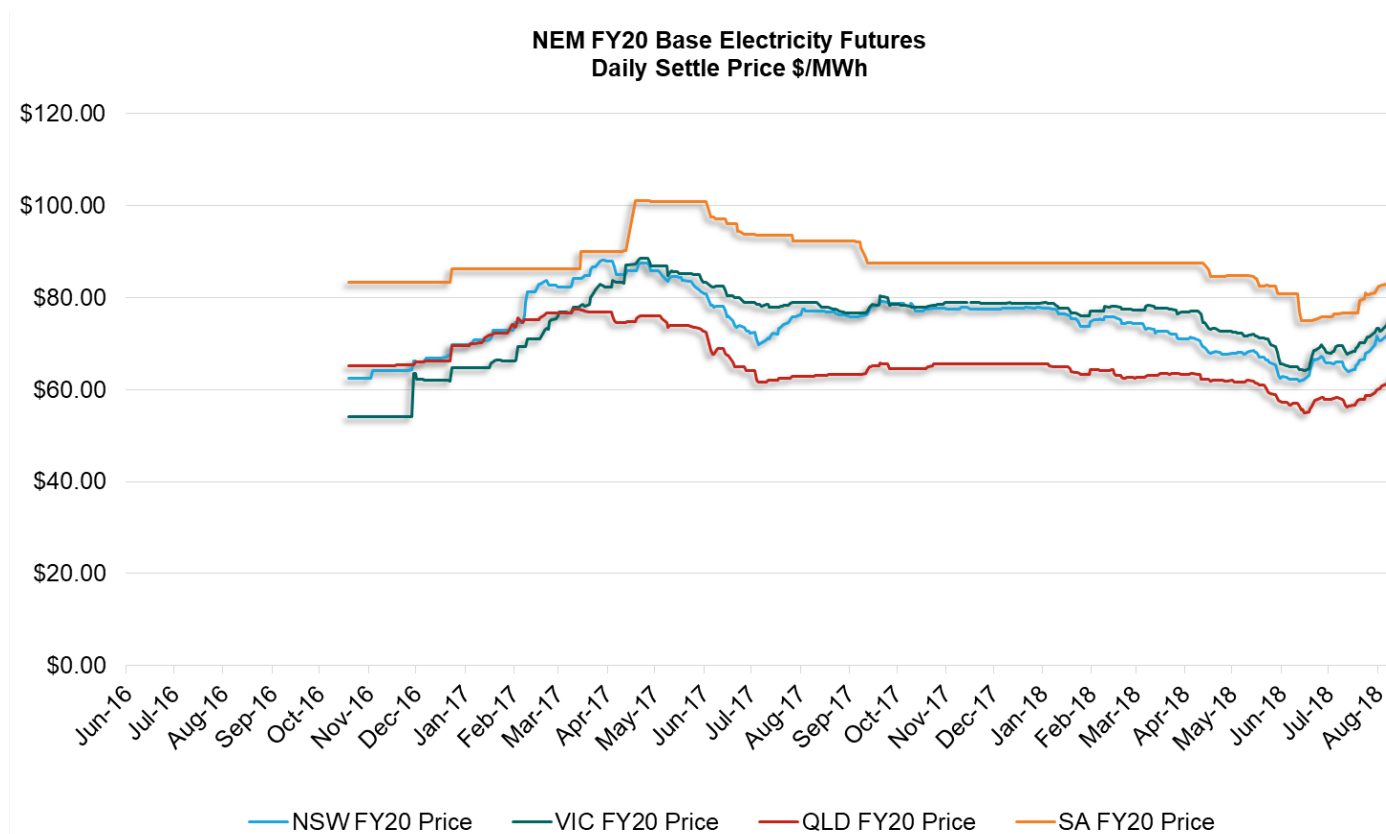
as well as shifting time of use

- Energy costs should be encoded as non-linear functions in business cases and optimisation
 - Time
 - kWh
 - kVa

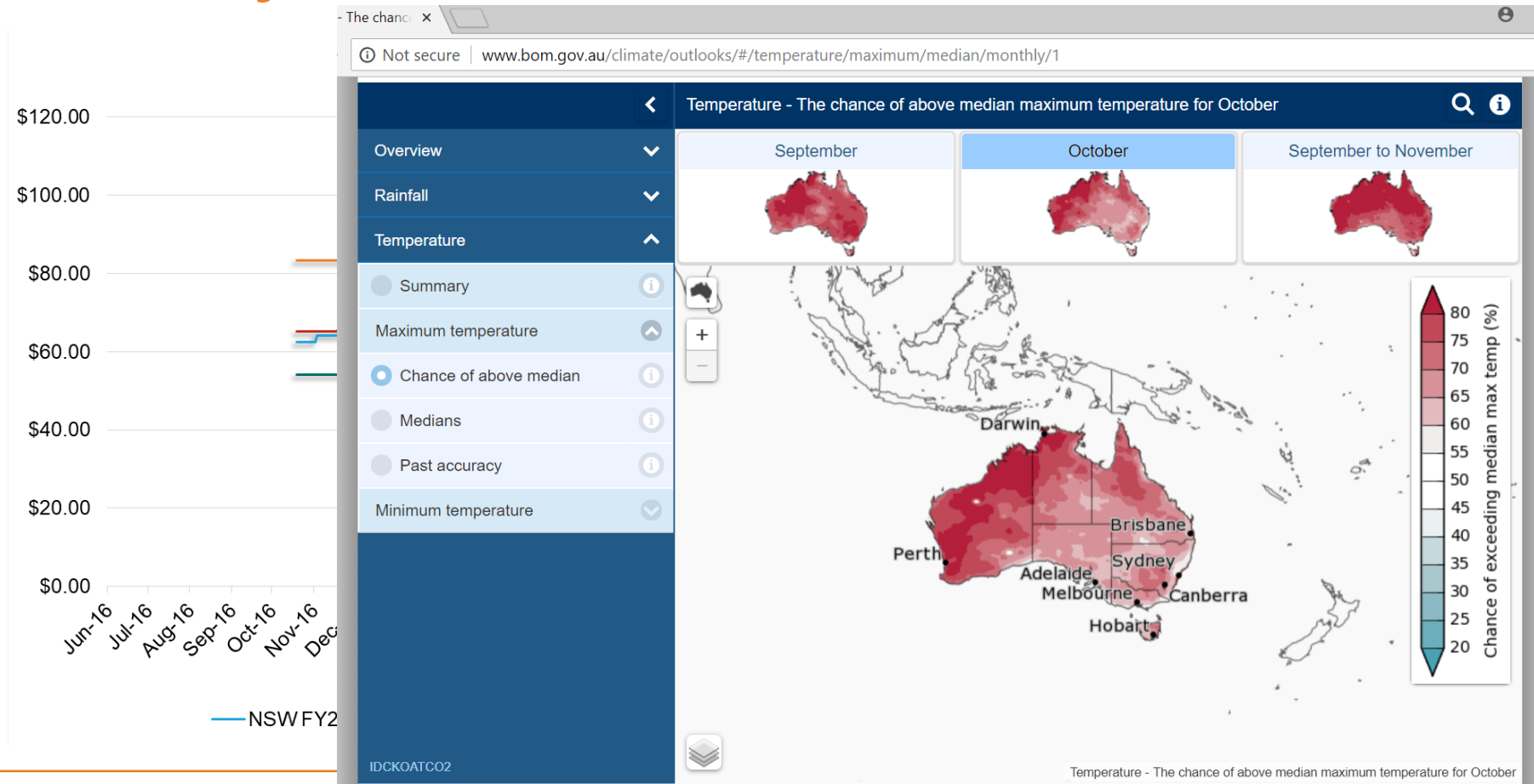
A blurred office scene with people working at desks. In the foreground, a person's hand is visible holding a pen over a document. The background shows other people working at desks with various office supplies and a bright window. A semi-transparent dark grey box is overlaid on the center of the image, containing the text "Costs will remain high" in white.

Costs will remain high

Energy futures contract prices for 2020 delivery



Energy futures contract prices for 2020 delivery



Market drivers



Drivers	Description	Impact
Supply factors	Availability of inputs, constraints in existing generating assets, fuel costs	Mainly inflationary
Demand factors	Demand from other sectors (industrial and manufacturing reducing), uptake of behind the meter solar	Deflationary
State regulations	Changes to environmental certificates, support for renewables projects	Deflationary
Federal regulations	Changes to RET, energy and climate policy TBC	TBC

The image is a composite of three parts. The top part shows a sunset sky with orange and yellow clouds against a blue background. The middle part shows two wind turbines silhouetted against the sunset. The bottom part shows a large array of solar panels in a field. A semi-transparent white banner is overlaid across the middle section, containing the text "The role of renewables".

The role of renewables



Incremental hybridisation

- Secure long term prices for part of your load
 - Manage Environmental costs
 - Additional funding sources (CEFC, ARENA)
- Flatten site load, reduce or shift peaks
 - Reduce total consumption and total price
 - Role of site reticulation systems
- Batteries prices are tumbling, will enhance uptake of renewables
- Additional benefits
 - Increase life of mine
 - Asset remains post closure



Sandfire/DeGrussa case study

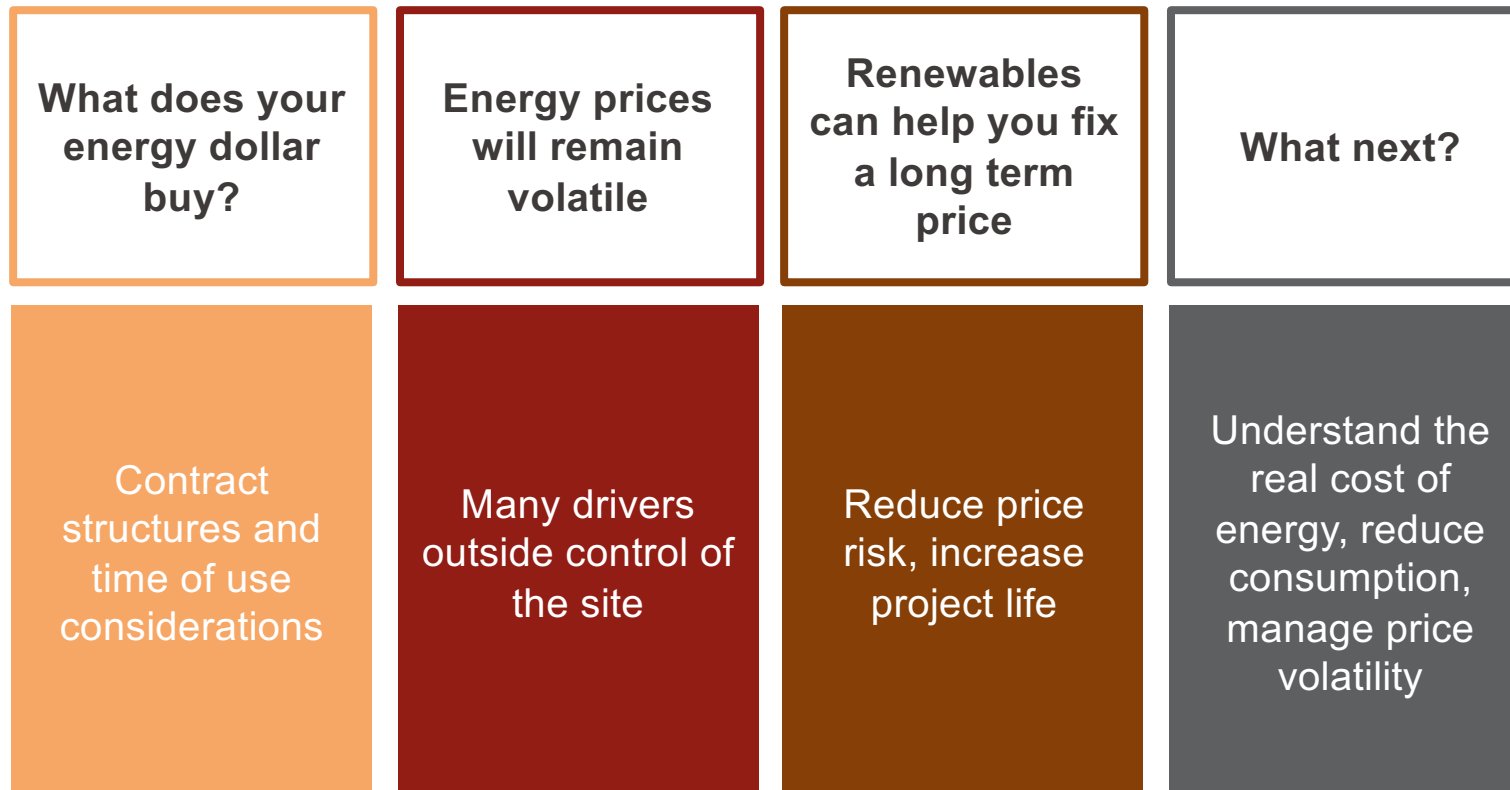
- The site
 - 19MW diesel gensets
 - Average load: 11MW
 - Average power usage: 100 GWh per annum
 - Average diesel consumption: 25,000,000 l/a
- The project
 - Commissioned in 2016, 5.5 year PPA with the site, 20 hectares, +34,000 panels
 - 6MW lithium-ion batteries (smoothing, ramp rate control)
 - \$41 million (\$20.9 from ARENA)
 - Supplies 15-20% of site consumption, 21 GWh per year, reduces diesel by 5,000,000 l/a



A blurred background image of a person writing in a notebook with a pen. The person is wearing a patterned shirt. The image is overlaid with a solid orange banner at the bottom. The text "Where to next?" is written in white on the orange banner.

Where to next?

Summary



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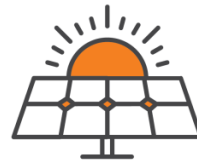
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Energy markets: electricity, gas and renewables

We develop risk managed energy solutions tailored to the individual needs of our clients. Our advice spans a range of flexible and fixed price contracting options and analysis of the risks and opportunities for investments in large scale energy generation.



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The economics of on-site power have swung in favour of renewable energy options. Energetics can size, scope and develop robust business cases to ensure that any investment delivers broad energy productivity benefits.



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Increasing scrutiny of climate risk management strategies demands expert reporting across mandatory and voluntary schemes. With experience working for large, complex businesses across all sectors, we ensure that your reports add value to your business' brand.

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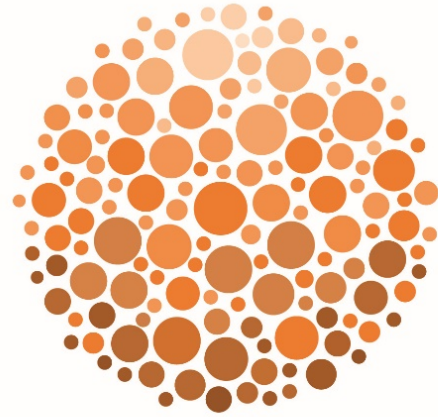
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