Ergon Energy

- Regional Queensland
- ~ 1.7 million km² service area
- > $10 billion in assets
- > 720,000 customers
- ~1 million poles
- >170,000 km route length of line
- 33 remote island power stations
- Highly radial & sparse network
  - 70% zone subs & 50% feeders are radial
  - 4.5 connections per line km (Aus average 24)
- Texas fits inside Ergon’s territory
Ergon Energy SWER Network

- +65,000 km of SWER line
- ~25,000 customers
- Predominantly built in 70’s and 80s
- Ergon’s supply area covers 44% of the National Electricity Market (Qld, NSW, Vic, SA & Tas)
- Yet we have only 7% of the customers
Emerging Challenges to consider

- Increasing costs in delivering power due to ageing & stressed assets
- Market/Policy intervention eg FiT’s QLD 44c/kWh ~$2b pa
- Climate change issues eg. Carbon pricing, asset restoration after natural events (storms, fires, floods)
- Changing customer and stakeholder expectations
- Mitigate peakier loads to improve supply costs capital spend and asset capital efficiency
- Integration of intermittent renewables ***
- Increasing customer expectations for affordability, service and choice (esp. information on and management of energy use/cost)
- Electricity industry is subject to more external pressures and scrutiny than ever before
- Pro customer regulatory change is coming (Ergon revenues reduced by ~30% by AER 2015-2020)
- Network utilisation dropping significantly
- New Market entrants with new disruptive business models
Challenges (and opportunities)

Distributed Energy Resources

- Queensland has one of the highest penetrations of rooftop residential solar in the world
- Ergon has around 1GW of distributed generation out of a 2.4GW peak
- Ergon has 700MW of load on control tariffs
Distributed Energy Pilots & Insights

**Distributed Generation**
- Enable integration of renewables to maximise their benefit for energy and demand reduction
- Mitigate the barriers and issues (voltage and power quality) to enable customer connection of distributed energy
- Enable influence over policy and standards.

**Distributed Storage**
- Peak demand reduction
- Reliability and power quality improvement
- Facilitate renewables and customer choice
- Extends the life of aged and stressed networks.
- Other value!

**Energy Management**
- Energy and peak demand reduction
- Facilitates renewables and customer choice, load knowledge and control (energy use and cost)
- Extends the life of aged and stressed networks
- Mitigates the barriers to load control including customer acceptance.

**Electric Transport**
- Gain knowledge of use and charging of EV and its network impacts
- Mitigate impacts and maximise opportunities
- Boost network energy use with out peak demand
- Influence community awareness, understanding and norms and public policy and standards
Storage costs dropping fast .... .... and becoming cool thanks to Elon ☺

Estimates of costs of lithium-ion batteries for use in electric vehicles

2014 US$ per kWh

- 95% confidence interval, whole industry
- 95% confidence interval, market leaders
- + Publications
- □ News items with expert statements
- * Log fit of news, reports, and journals: 12±6% decline
- X Additional cost estimates without clear method
- Market leader Nissan Motors, Leaf
- ○ Market leader Tesla Motors, Model S
- ◇ Other battery electric vehicles
- - Log fit of market leaders only: 8±8% decline
- Log fit of all estimates: 14±6% decline
- ▲ Future costs estimated in publications
- <$150 per kWh goal for commercialization

Björn Nykvist and Måns Nilsson, 2015
Batteries:
Enabling electrification of transport and putting downward pressure on Network costs.
Ergon Energy residential solar @ ~22% detached housing … past the tipping point

Solar PV penetration based on 1% NMI growth and achieving 1,000,000 systems by 2020

Existing penetration

Penetration to double in 5 years
GUSS – The story

• Designed, developed and proven by Ergon from an initial concept in 2006, the GUSS units are an advanced, cost effective technology solution that will improve the quality and reliability of electricity supply to rural customers on constrained single wire high voltage distribution voltage lines, known as SWER (Single Wire Earth Return).

• "Traditional augmentation solutions to constrained SWER lines where demand on that line is exceeding its capabilities can cost in excess of $2 million"  
  Ergon Chief Executive Ian McLeod

• "GUSS units are not only a quicker solution than traditional network augmentation, but the money we can save will ultimately put downward pressure on electricity prices."

• Additionally customers on constrained networks who have had to limit their demand due to the available capacity may be able to access additional supply.

• Ergon finalised a successful trial of prototype GUSS units in Far North Queensland last year and will now roll the systems out strategically to sections of SWER network.
They will provide 25kVA and 100 kilowatt hours nominal capacity per unit, enough to power the average home for up to five days.

The units utilise a total of 50 Lithium-Ion type batteries and were developed by a team of Ergon engineers. Trials of the system since 2011 have proven the concept on Ergon's SWER network.

In a further bonus for other new technologies, GUSS units will also help Ergon's network interact with customer solar PV installations more effectively and help avoid costly issues sometimes created by exported power from rooftop solar.

"This is a first for Ergon and Australia," said Ergon Chief Executive Ian McLeod.

"This technology has been proven and made ready for real-world deployment without subsidies to Ergon which is also unique for this kind of technology.

"Using a battery-based system in place of traditional network augmentation will not only deliver better value for Ergon and customers, it will help drive similar technology and integration on the electricity network," Mr McLeod explained.
GUSS Overview - Video

https://youtu.be/RYUonOYqy-4
Grid Utility Storage System (GUSS)

GUSS: Product

- Battery
- Switchboard
- Inverter and Control
- SAFT Syerion 24E Lithiated nickel-cobolt Aluminium oxide Cells (NCA) Lithium-ion batteries
- 121kWh (172Ah @ 705.6V), 588-790Vdc
- 56 modules in 26 Series x 12 parallel strings.
Isolating transformer

ac Switchboard

dc Switchboard and Master BMS
Residential Storage - Value Stack

- Customer retention
- New products/new revenue streams
- Market load curtailment
- Data and analytics
- Reliability and resiliency improvement
- Demand management and demand response
- Energy management
- Reliability and resiliency improvement
- Cost saving (solar / load shifting)

Illustrative
Collaboration and sharing are critical in reducing costs and time to market!!