Australian Government
Department of the Environment and Energy

COVER SHEET FOR SUBMISSIONS

Independent Review into the Future Security of the National Electricity Market

Overview

Please include this cover sheet with your submission on the Preliminary Report of the Independent Review into the Future Security of the National Electricity Market.

Background

The Preliminary Report outlines the Panel's observations about the current state of the NEM and offers questions on the major issues the Panel has identified. The questions are designed to elicit suggestions or answers that may help form the Panel's final recommendations.

The Preliminary Report serves as an issues paper for broad public consultation. As such, the questions and views will be subject to further consideration and discussion, in anticipation of the final blueprint being produced in 2017.

Stakeholders are encouraged to keep their submissions as succinct as possible, and include a one-pageexecutive summary.

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Submission Instructions

The submission period will be open until close of business on Tuesday **21 February 2017**.

All submissions should be emailed to the NEM Security Review at the mailbox: NEMSecurityReview@environment.gov.au

QUEENSLAND ELECTRICITY USERS NETWORK

"Advocating for affordable and reliable electricity in Queensland"

Submission
On
The Preliminary Report of the Independent Review Into the Future Security of the National Electricity Market

30 March 2017

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DISCLAIMER

"This project was funded by Energy Consumers Australia (www.energyconsumersaustralia.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas.

The views expressed in this document do not necessarily reflect the views of the Energy Consumers Australia."

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1.0 Executive Summary

Australia's food, economic and defence security, together with Australia's comfortable living standards, are all utterly dependent on affordable *and* reliable electricity.

Unless power bills are reduced the cost of living will rise, state and federal economies will weaken further and many more jobs will be lost. The first wave of job losses will occur in regional Australia as the trade exposed industries of mining and agriculture close or reduce production. The ripple effect will continue gaining momentum and strength until it hits the cities. Energy poverty and job insecurity is coming to a house near you unless power bills across Australia fall, not rise again. The root cause of the current electricity crisis is the National Electricity Rules (rules) set by the Council of Australian Governments (COAG).

This power crisis could have been avoided if COAG had taken into account the saying "the customer is always right" when the rules were set by COAG following the signing of the Australian Energy Market Agreement in June 2004. Instead the rules say "the customer is always right unless the product is the essential service of electricity in which case it can be milked for all it is worth."

The Finkel Review has constantly stated that affordability will be considered in their final recommendations. Affordability means different things to different customers. To alleviate the financial pain of exorbitant power bills individual COAG members have provided energy concessions to low income households or rescue packages to some large businesses deemed too large and too important to fail. COAG has failed to recognise that the pain of rising power bills is being felt by almost all customers including the engine room of the economy – small business- and by much of middle Australia that have no access to government energy concessions.

The fear is the Finkel Review is only considering engineering solutions that will "limit the increase" in power bills. This is the wrong starting point for the Finkel Review. Power bills are now at unsustainable levels and must be reduced for all business and residential customers. The starting point for the Finkel Review should be a reduction in power bills throughout the National Electricity Market of 16% for business customers and 8% for residential customers. This can be achieved whilst maintaining a reliable and secure electricity supply.

The reduction in power bills can start almost immediately if customers, particularly small business and regional customers, are given an equal voice at the energy policy table. Customer solutions will lessen the requirement for investment in multi-billion dollar long-life electricity assets. Customer driven solutions will increase the overall utilisation of existing network assets, drive down peak demand and still provide a pathway to a decarbonised electricity grid, principally through consumer education and tariff reform. This will require changes to the rules.

There is no doubt the transition to a renewable energy future has begun but the transition must be at a pace and delivered in a way that all customers can participate. The rules and renewable energy targets should not benefit early adopters and the proponents of renewable energy projects at the expense of the majority of electricity customers and a resilient electricity system.

COAG created this power crisis and ironically it is only COAG, working collaboratively in a bipartisan manner on energy and environment policies that can dig us out of this power crisis. The recommendations in this submission allow most customers access to affordable and reliable electricity from a system that will decarbonise as generation & storage technology evolves thus ensuring Australia's food, economic and defence security is not compromised.

2.0 Two Problems Addressed in One Review

The Finkel Review is essentially addressing two problems in one Review.

The first problem is how to maintain a reliable and secure electricity system now and into the immediate future. The Review is tasked with ensuring household lights are kept on and the wheels of industry are kept turning throughout the National Electricity Market (NEM). This is an onerous task as Australia is an island continent with no access to another country's electricity network/grid. Australia must be self sufficient in terms of the 'quantity' of electricity supplied and must also internally manage the 'quality' of the electricity supplied. The increasing integration of renewable energy to the network has caused 'quality' problems not experienced by networks elsewhere in the world. Australia's solution to the 'quality' of supply problem will be closely watched by other countries as they too seek to increase their renewable energy generation.

The second problem is integrally related to the first problem. In keeping the lights on and the wheels turning in the immediate future, the Review must ensure that the solutions to the first problem do not become a burden to the reliability and affordability of the electricity system in the short, medium and long term future.

Solutions to both problems hinge on COAG changing a number of National Electricity Rules and reaching bipartisan agreement on energy and environment policy. Some solutions will include the investment in multi-billion dollar electricity assets. However, the risk is that less obvious and less expensive consumer driven solutions will be overlooked in favour of engineering solutions.

The Review must not lose sight of the need to reduce power bills. If the Review intends to recommend a solution that will increase one component of a power bill eg a carbon tax or emissions intensity scheme, it must look for savings in other components of a power bill to ensure that overall all customers are paying less for electricity now and into the future.

Commercial and self interest is rife at present. The Review must be certain that all their recommendations pass the national interest test of at least maintaining, if not improving, Australia's food, economic and defence security. There is a tendency for policies to support the choices and needs of residential customers at the expense of business customers. Policies favouring residential customers are destroying the viability and profitability of all businesses, small and large, that are captive to grid supplied electricity.

We disagree that the Review, through its recommendations on two problems, will provide a blueprint for the electricity sector. Tomorrow, research and technology could find a solution that would enable Australia to further decarbonise the electricity system and lower power bills. The Review should not lock Australia into an electricity system that compared to international benchmarks is neither affordable nor reliable. The Australian economy relies heavily on trade exposed industries and hence the volume of electricity consumed is dependent on their viability. The solutions to both problems must allow for a smooth transition to a renewable energy future.

The final recommendations must take into consideration that the future electricity system is designed to meet the needs of its diverse range of customers, not the interests of generation, network and retail businesses. In the past the customer has been captive and consequently has been heavily exploited. The customer is increasingly being able to access options, be it at considerable cost, and will vote with their feet if the product delivered is unaffordable and unreliable. A system not designed for the customer will result in an accelerated and uncontrolled death spiral as customers leave or significantly reduce their demand for grid supplied electricity. This will wreak havoc on Australia's food, economic and defence security.

3.0 Recommendations to Address the First Problem

3.1 General

The catalyst for the Finkel Review was the "system black" event that occurred in South Australia at 4.18 PM on 28 September 2016.

The blackout of an entire state understandably caused widespread physical and financial chaos. The effect of the disruption was compounded many times over as customers were given no warning of the impending loss of supply.

Australians have become accustomed to a reliable electricity supply and expect electricity to be available 24/7.The Australian Energy Market Operator (AEMO) must comply with the reliability standards as stipulated in the National Electricity Rules. Under the rules AEMO must ensure that demand is met 99.998% of the time ie supply can be at risk for 11 minutes per year.

Consumers expectation of 24/7 electricity is so high that even after a natural disaster Australians assume their electricity supply will be restored very quickly.

The electricity system is no longer supplying reliable electricity. In February 2016 AEMO issued notices of potential load shedding for South Australia and NSW. Queensland could have been load shed if the record demand experienced on 12th February 2016 had occurred on a week day instead of a Sunday.

To minimise the adverse impact of blackouts and load shedding on consumers throughout the National Electricity Market, the QEUN recommend the following to address the first problem:

RECOMMENDATIONS

- Implement a Traffic Light System of notification to the consumer of potential load shedding
- A rule change to ensure that networks carry adequate insurance cover for natural disasters in the form of either an insurance policy, or if self-insured, a locked reserve for natural disasters
- Collect statistics on the number of solar PV systems damaged by a natural disaster
- Collect statistics on the length of time to reconnect business consumers with damaged solar PV following a natural disaster
- Collect statistics on the length of time to reconnect residential consumers with damaged solar PV following a natural disaster
- Collect statistics on the number of reported incidences of illegal repairs to damaged solar PV following a natural disaster
- Collect statistics on the instances where the installation of roof top solar contributed to the structural and non-structural damage caused by a natural disaster

3.2Traffic Light system of notification of potential load shedding

The proposed Traffic Light System is a colour coded warning system for consumers across the NEM. The Traffic Light System (TLS) would notify consumers one week in advance of a potential need to load shed. The TLS would operate on the assumption that consumers that are forewarned are forearmed and therefore can prepare for a potential load shedding event. This would limit the physical and financial harm of unexpected load shedding.

Importantly, the TLS could reduce consumer demand to a level whereby load shedding could be averted, this should benefit consumers through lower power bills as a result of lower wholesale generation prices and lower network costs.

The Traffic Light System is similar to a system operating in Australian airports whereby stakeholders/consumers are given information regarding fuel availability at each major airport over the coming week via a colour code.

Under the Traffic Light System the AEMO media release issued at 10.17 am on 28 February 2017 would inform South Australian consumers that the State had been placed on an amber alert for the next four days. Should load shedding be imminent the alert would be red and a black alert would be issued when load shedding had commenced.

Australians are quite familiar with warning systems as they operate across Australia for cyclones and bushfires.

If the TLS was implemented consumers could prepare and this would minimise the physical and financial impact of load shedding. Actions taken could include:

- check the fuel supplies for the generator and test the generator under load
- change irrigation schedules for farms
- turn the air-conditioner up to 25 ^{o}C or turn the air-conditioner off
- buy steak and fill up the gas bottle for a BBQ in the backyard
- buy ice packs to keep essential medicines at the right temperature
- make sure mobile phones are charged
- make sure cash is on hand due to no EFTPOS

Ultimately the aim would be to refine the Traffic Light System from a state-wide alert to an SMS alert to an individual customer.

This would involve cooperation between network businesses and AEMO. For example, at present Queensland's Ergon Energy Network has an Outage Finder Map on its website. The Outage Finder Map splits Ergon Energy's outages into 'planned' and 'unplanned' and provides basic information to the consumer such as the roads affected and the start and fix time. We envisage the Outage Finder Map could be extended to include information on load shedding or the potential need to load shed over the next 7 days.

AEMO already advises the public via a media release of the potential need to load shed. The advice is ad hoc, not consumer friendly and delivered with little advance notice. The Traffic Light System of consumer notification would improve the current way AEMO communicates with the public.

To implement the TLS, COAG would first need to acknowledge that the power crisis of last summer was not an anomaly and the loss of the 1600 MW Hazelwood Power Station in March 2017 will impact on available power supplies going forward, especially next summer.

Importantly, the TLS has the potential to lower peak demand and therefore has the potential to reduce the need to spend more money increasing the capacity of multi-billion dollar electricity assets such as transmission and distribution networks. Lower peak demand should result in lower power bills. By having easy access to load shedding information consumers can adjust their demand during the periods at risk of load shedding and consequently play an important role in lowering their own power bills.

The proposed Traffic Light System could be implemented with minimum cost. We anticipate that changes to the National Electricity Rules for state-wide alerts would be minor and thus could be implemented almost immediately. An SMS alert to an individual consumer will take longer to finalise as it involves cooperation and investment by AEMO and transmission and distribution networks. The QEUN recommend the following to address the first problem:

RECOMMENDATION

- Implement a Traffic Light System of notification to the consumer of potential load shedding

3.3 Adequate insurance for natural disasters to enable timely restoration of electricity

The National Electricity Rules are silent on the time required to restore the supply of electricity to consumers following a natural disaster.

Any loss of electricity, expected or unexpected, has a significant financial impact on business. The state-wide blackout in South Australia on 28 September 2016 was estimated in a Business SA survey to have cost South Australian businesses $367 million. The loss would have been much higher had the blackout occurred earlier in the trading day rather than at 4.18 PM. The survey found that considering 70% of respondents had power restored within 24 hours the blackout still cost business in South Australia close to $120,000 per minute.

The changing generation mix in the National Electricity Market will cause consumers to be more reliant on electricity supplied by major generators attached to interstate sections of the national transmission network. The move to a more distributed generation mix will cause consumers to be more reliant on electricity produced by rooftop solar PV and transported to the national transmission network via state-based distribution networks.

It is therefore critical that each individually owned section of the national transmission network and each individually owned distribution network is operating prudently and efficiently and can supply reliable electricity to consumers located both intrastate and interstate.

It is imperative that when any section of the transmission or distribution network in the National Electricity Market suffers damage that the owner of that section restores the power supply as soon as possible. Historically the power system in Australia has been largely owned by state governments. Today the ownership mixture includes state governments, private companies and foreign governments such as China and Singapore.

Regardless of the ownership of the transmission or distribution network, consumers need to have confidence that the restoration time following a natural disaster will not be compromised by the financial resources of the owner.

Consumers do not want an increase in their power bills due to a successful claim for a pass through event from a transmission or distribution network.

A pass through event can be requested by a transmission or distribution network if the damage from a natural disaster exceeds one percent of their annual revenue cap. Under the National Electricity Rules, the Australian Energy Regulator (AER) is responsible for all decisions regarding the annual revenue cap and all decisions regarding a claim for a pass through event.

The following example demonstrates how the National Electricity Rules expose consumers to further financial pain through higher power bills long after the natural disaster has gone and the power supply has been restored.

The Queensland Government owned distribution network Ergon Energy, submitted to the AER as part of its 2015-2020 revenue cap the inclusion in its operational expenditure of a $66 million parametric insurance policy for cyclones. The Australian Energy Regulator refused to allow Ergon Energy to include parametric insurance as part of its operational expenditure and hence the parametric insurance was not included in the revenue cap. The AER cited in its decision that Ergon Energy had the ability to self- insure.

In the past Ergon Energy had self insured some cyclone events.

On 1st June 2011 Ergon Energy requested an extension of time within which to submit a written statement in accordance with clause 6.6.1 (c) of the National Electricity Rules seeking the Australian Energy Regulator's approval of a positive pass through amount following the occurrence of Severe Tropical Cyclone Yasi.

In the same letter it also noted that on 30 May 2011, in accordance with the Government Owned Corporations Act 1993 (GOC Act), Ergon Energy's shareholders had issued a written notice to Ergon Energy indicating that a direction under section 115 of the GOC Act may be issued to Ergon Energy to require it to *not* make such a pass through application due to the exceptional circumstances and impacts of cyclones and other natural disasters affecting Queensland over the course of 2010-11.

Severe Tropical Cyclone Yasi (STC Yasi) crossed the Queensland coast between Cardwell and Tully on 3 Feb 2011 as a Category 5 cyclone.

The impact extended from Cooktown in the north to Sarina in the south (a 785 km stretch of coastline) and west to the Northern Territory border. The cyclonic winds and heavy rain and the consequent flying debris and vegetation, tidal surges and flooding led to widespread destruction across Ergon Energy's distribution network. A total of 226,967 customers in the impacted area were directly affected.

Ergon Energy initially informed the Australian Energy Regulator that STC Yasi would materially increase Ergon Energy's costs of providing distribution network services and would likely meet the requirements of a general pass through event. The initial preliminary cost was estimated at $40 million. The final cost was $100 million but Ergon Energy did *not* request a pass through.

Ergon Energy has also been affected by Cyclone Larry in 2006 and Cyclone Marcia in 2015. Ergon Energy sought and received a pass through of $43 million for Cyclone Larry. This means Ergon Energy self-insured for Cyclone Yasi ($100 million in 2011) and Cyclone Marcia ($32 million in 2015).

Over 10 years from 2005-6 to 2014-15 cyclones in the Ergon Energy distribution network area have cost $175 million or $17.5 million per year compared to a parametric insurance policy rejected by the AER for $13 million per year.

The Queensland coast was hit by three category 5 cyclones in 2014-15. As per Ergon Energy's Asset Renewal submission to the Australian Energy Regulator's Preliminary 2015-2020 Determination "*It was fortuitous that these cyclones made landfall and weakened considerably before impacting major quantities of Ergon Energy infrastructure*."

In the same year i.e. 2014-15, the Queensland Government extracted a dividend of $1.925 Billion from Ergon Energy which far exceeded the performance target of $473 million. To fund the dividend payment Ergon Energy increased its borrowings.

In 2015-16 the declared dividend from Ergon Energy to the Queensland Government was $476 million.

In both 2014-15 and 2015-16, the dividend exceeded 100 percent of Ergon Energy's Net Profit after Tax and necessitated a drawn down of retained earnings.

Ergon Energy's gearing ratio (debt to fixed assets) has risen significantly to 67.5 percent since the dividend payment of $1.925 Billion in 2014-15 (see Table 1). This does not reflect the 60/40 split used by the Australian Energy Regulator to calculate the Weighted Average Cost of Capital (see Table 2). More borrowing costs caused by an adverse change to Ergon Energy's credit rating will, as a result of the capped revenue, leave less funds available for operational expenditure, particularly to self-insure for a cyclone event/s.

Table 1: Ergon Energy Financial Performance Targets

Table 2: Financial Performance Targets							
Quarter 2015/16					2014/15 Budget	2014/15 Est Actual	2015/16 Forecast
Sep	Dec	Mar	Jun				
242.3	294.6	337.4	217.3	EBIT (consolidated)	1,187.4	1,300.7	1,091.6
128.8	155.2	180.5	95.9	Net Profit After Tax (NPAT) – Consolidated ($M)	590.7	693.0	560.4
-	-	-	-	Return on Assets[1] – Consolidated	9.7%	11.3%	9.2%
-	-	-	-	Return on Assets – Regulated	10.7%	11.5%	8.0%
-	-	-	-	Return on Assets – Non-Regulated	16.0%	13.9%	17.2%
-	-	-	-	Return on Assets – Group excluding EEQ	9.1%	9.4%	8.0%
53.0%	71.8%	70.0%	67.5%	Debt to Fixed Assets[2] (%) – Consolidated	48.1%	51.8%	67.5%
74.0%	78.3%	76.5%	79.4%	Debt / (Debt + equity (including reserves)) – (%) Consolidated	57.1%	74.6%	79.4%
-	-	-	-	Fixed Asset Turnover[3] – Consolidated	0.2	0.2	0.2
5.7	5.3	5.4	3.9	Interest Cover[4] (EBITDA Times) - Consolidated	4.7	5.4	5.0

Notes:

1. Return on Assets (%) = [EBIT/Average of opening & closing assets]. (Assets = "Total Assets")
2. Debt to Fixed Assets (%) = Debt/[Net PP&E]
3. Fixed Asset Turnover = [(Sales + grid services revenue)/Average PP&E]
4. Interest Cover (EBITDA Times) = [EBITDA/(Finance Charges]

Source: Ergon Energy Statement of Corporate Intent 2015-16

Table 2: AER – Ergon Energy distribution determination – 2016-17 return on debt update

Ergon - Cost of Capital Parameters - DNSP PTRM - version 3

Year		2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Inflation Rate	Constant	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Value of Imputation Credits (gamma)	Constant	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Proportion of Equity Funding	Constant	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Proportion of Debt Funding	Constant	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Post-tax Nominal Return on Equity	Constant	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%
Post-tax Real Return on Equity	Constant	4.88%	4.88%	4.88%	4.88%	4.88%	4.88%	4.88%	4.88%	4.88%	4.88%
Corporate Tax Rate	Varying	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%
Nominal Pre-tax Return on Debt	Varying	5.01%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%
Real Pre-tax Return on Debt	Varying	2.45%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
		Formula approximations of WACC									
Nominal Vanilla WACC	**Varying**	**6.01%**	**6.04%**	**6.04%**	**6.04%**	**6.04%**	**6.04%**	**6.04%**	**6.04%**	**6.04%**	**6.04%**
Real Vanilla WACC	Varying	3.42%	3.45%	3.45%	3.45%	3.45%	3.45%	3.45%	3.45%	3.45%	3.45%
Post-tax Nominal WACC	Varying	5.47%	5.49%	5.49%	5.49%	5.49%	5.49%	5.49%	5.49%	5.49%	5.49%
Post-tax Real WACC	Varying	2.89%	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%
Pre-tax Nominal WACC	Varying	6.54%	6.57%	6.57%	6.57%	6.57%	6.57%	6.57%	6.57%	6.57%	6.57%
Pre-tax Real WACC	Varying	3.94%	3.97%	3.97%	3.97%	3.97%	3.97%	3.97%	3.97%	3.97%	3.97%
Nominal Tax Allowance	Varying	1.08%	1.08%	1.08%	1.08%	1.08%	1.08%	1.08%	1.08%	1.08%	1.08%
Real Tax Allowance	Varying	1.05%	1.06%	1.06%	1.06%	1.06%	1.06%	1.06%	1.06%	1.06%	1.06%

Source: Australian Energy Regulator

The dividend policy in Ergon Energy's 2015-16 Statement of Corporate Intent states that:

"The board will ensure that Ergon Energy's dividend policy also takes into account the return its shareholders expect on their investments. Ergon Energy's policy is to recommend and pay a dividend amount equivalent to 100% (or the percentage approved by shareholding Ministers, if different) of Ergon Energy's adjusted consolidated profit for 2015/16. The Board adopts such a policy on the basis of its shareholders agreeing to provide the necessary funding for projects which have received Board and shareholding Ministers' approval or for the maintenance of Ergon Energy's approved capital structure or for ensuring the operational viability of Ergon Energy. Ergon Energy's Board undertakes to adhere to the dividend policy."

The Australian Energy Regulator has made it clear that the 60/40 split is only a guide and therefore cannot force Ergon Energy to reduce its borrowings. The AER has also confirmed that once a final decision has been made regarding the capped revenue of a distribution network, the owner can spend the revenue cap as it sees fit.

For the 2015-2020 regulatory period, Ergon Energy is laden with debt and is continuing to experience falling overall consumption and a need to service increasing peak demand from its regional Queensland customers. Ergon Energy's ability to self-insure has been severely compromised.

Forget temporarily that the Queensland Government owns Ergon Energy. Instead focus on the decision by the AER to rely on the owner of an $11 Billion distribution network to have the financial resources to self-insure instead of taking out a parametric insurance policy worth $13 million per year.

The Bureau of Metrology's Tropical Cyclone Outlook for 2016-17 predicts a near average season which could result in 4 tropical cyclones on the east coast of Australia, with a 58 % chance of more tropical cyclones. About a quarter of tropical cyclones on the east coast make landfall.

The cyclone season runs from November to April. Until Cyclone Debbie hit Queensland on 28 March 2016-17 the cyclone season had not seen one cyclone develop on the east coast of Australia. However, late season cyclones can be as destructive and expensive as those that occur earlier in the season eg Cyclone Larry on 20th March 2006 cost $43 million. To put this in perspective, Ergon Energy's annual revenue cap for 2016-17 is around $1.5 billion therefore any cyclone with a damage bill of more than $15 million can be a pass through event that ends up on consumers' power bills.

The South Australian blackout in September 2016 was a reality check in terms of consumers understanding how reliant they are on the interstate and intrastate transmission and distribution networks. As the generation mix changes it is critical that all sections of the network can provide reliable electricity. This requires all sections, regardless of the ownership, to have adequate insurance cover to enable timely restoration after a natural disaster.

The insurance cover needs to be in the form of:

- an insurance policy or
- if self-insured a locked reserve for natural disasters.

Without these safeguards consumers are at risk of network businesses inflicting another rise in power bills due to their successful application to the AER for a positive pass through eventfor aa natural disaster such as a bush fire or cyclone.

If Australia is to be the subject to more extreme weather events, distribution and transmission networks may find themselves making a choice between delving into their financial reserves (resulting in lower dividends to their shareholders) or instead requesting the AER for a pass through event.

To enable consumers to have confidence that a network owner has sufficient financial resources to deploy the necessary physical resources to restore the network in a timely manner following a natural disaster, the QEUN recommend the following to address the first problem:

RECOMMENDATION

- A rule change to ensure that networks carry adequate insurance cover for natural disasters in the form of either an insurance policy, or if self-insured, a locked reserve for natural disasters

3.4 Lessons need to be learned from Cyclone Debbie in relation to energy security

Cyclone Debbie is a Category 4 cyclone that made landfall in regional Queensland on 28 March 2017. The cyclone was a slowing moving cyclone and was immediately preceded by major rainfall across the impacted area. This means the structural damage to buildings, vegetation and infrastructure will be much greater than expected of a fast moving cyclone with little rain.

Regional Queensland has one of the highest penetration of rooftop solar PV in the world. The huge uptake was encouraged by two government schemes:

- the Queensland Government's Solar Bonus Scheme which offered a feed-in tariff of 44 cents per kWh and
- the Federal Government's Small-scale Renewable Energy Scheme (SRES).

The Queensland Productivity Commission (QPC) estimated in 2016 that based on average solar PV system prices, the level of SRES subsidy is between 2.8 and 2.9 cents per kWh generated or around 7.1 cents per kWh in terms of energy exported.

According to the QPC the Solar Bonus Scheme is estimated to cost all Queensland electricity consumers over its life (until 2028) around $4 Billion.

The Queensland Productivity Commission stated in its 2016 Solar Feed-in Pricing Inquiry Report "*while some low income households own solar, the overall distributional impact of solar PV is to transfer income from non-solar households to solar households and to raise the cost of living for those on the lowest of income*."

The overly generous 44 cents per kWh feed-in tariff was the major driving force for the massive uptake in rooftop solar PV and is evidenced by the pattern of monthly installations of solar PV systems in regional Queensland (see Figure 3).

The Solar Bonus Scheme closed to 'new applications' in July 2012, however successful applicants were allowed to install their solar PV systems after July 2012. Since the close of the Solar Bonus Scheme to new applicants, the number of solar PV installations has been less than 1,000 per month in regional Queensland since December 2014. Energex reported 20,071 solar PV installations in 2015-16 which is an average of 1,673 installations per month.

The monthly installations of solar PV varied between the six Ergon regions (see Figure 4).

By January 2017 there were a total 122,781 solar PV installations in the Ergon area with the highest penetration being 29,342 in the Wide Bay region (see Figure 5).

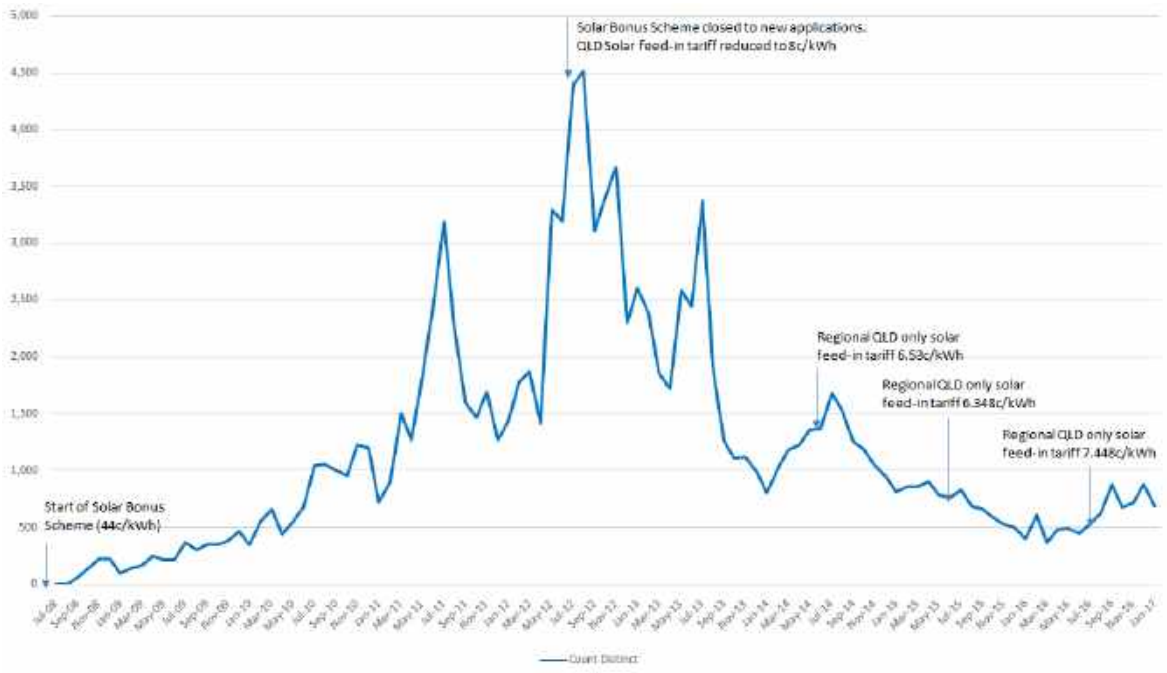
If Cyclone Debbie had hit the Wide Bay region there would have been 29,342 homes and businesses with rooftop solar PV at risk of being damaged.

The QEUN urgently request that the Finkel Review recommend the rules are amended to allow for the collection of statistics following a natural disaster (eg Cyclone Debbie) to inform decisions around energy security from a national electricity system dependent on distributed solar generation:

RECOMMENDATIONS

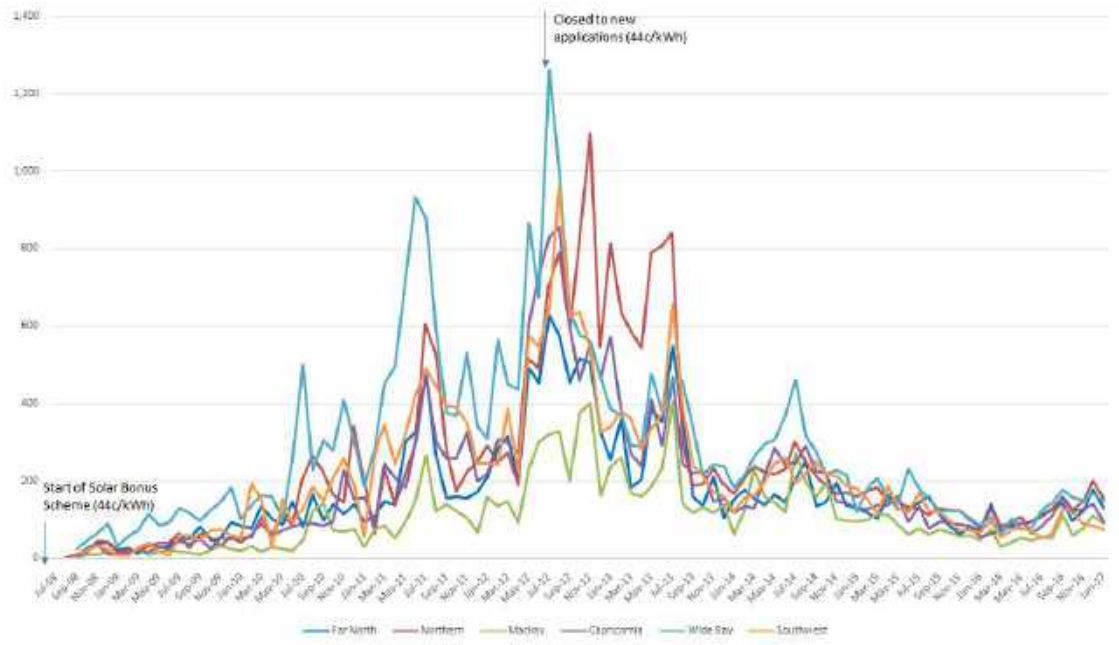
- Collect statistics on the number of solar PV systems damaged by a natural disaster
- Collect statistics on the length of time to reconnect business consumers with damaged solar PV following a natural disaster
- Collect statistics on the length of time to reconnect residential consumers with damaged solar PV following a natural disaster
- Collect statistics on the number of reported incidences of illegal repairs to damaged solar PV following a natural disaster
- Collect statistics on the instances where the installation of roof top solar contributed to the structural and non-structural damage caused by a natural disaster

Figure 3: Solar PV installations/month in the Ergon Energy area, July 2008 to Jan 2017



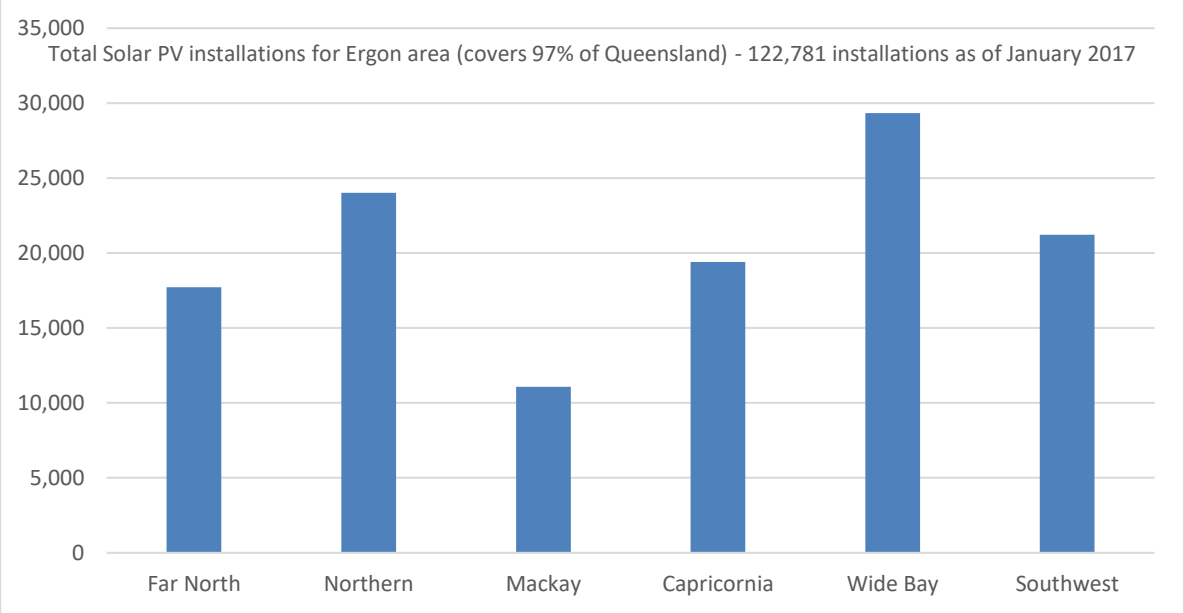
Source: Compiled from Ergon data

Figure 4: Solar PV installations/month by Ergon region, July 2008 to Jan 2017



Source: Compiled from Ergon data

Figure 5: Solar PV installations by Ergon region as of January 2017



Source: Compiled from Ergon data

4.0 Recommendations to Address the Second Problem

4.1 General

The Council of Australian Governments (COAG) signed the Australian Energy Market Agreement in 2004. Thirteen years later Australia is in the midst of a power crisis. The solutions to the immediate crisis (the first problem) should not place at risk Australia's ability to provide affordable and reliable electricity in the short, medium and longterm (the second problem).

The root cause of the crisis is the failure of COAG's National Electricity Rulesto uphold the National Electricity Objective.

The National Electricity Objective, as stated in the National Electricity Law, is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to –

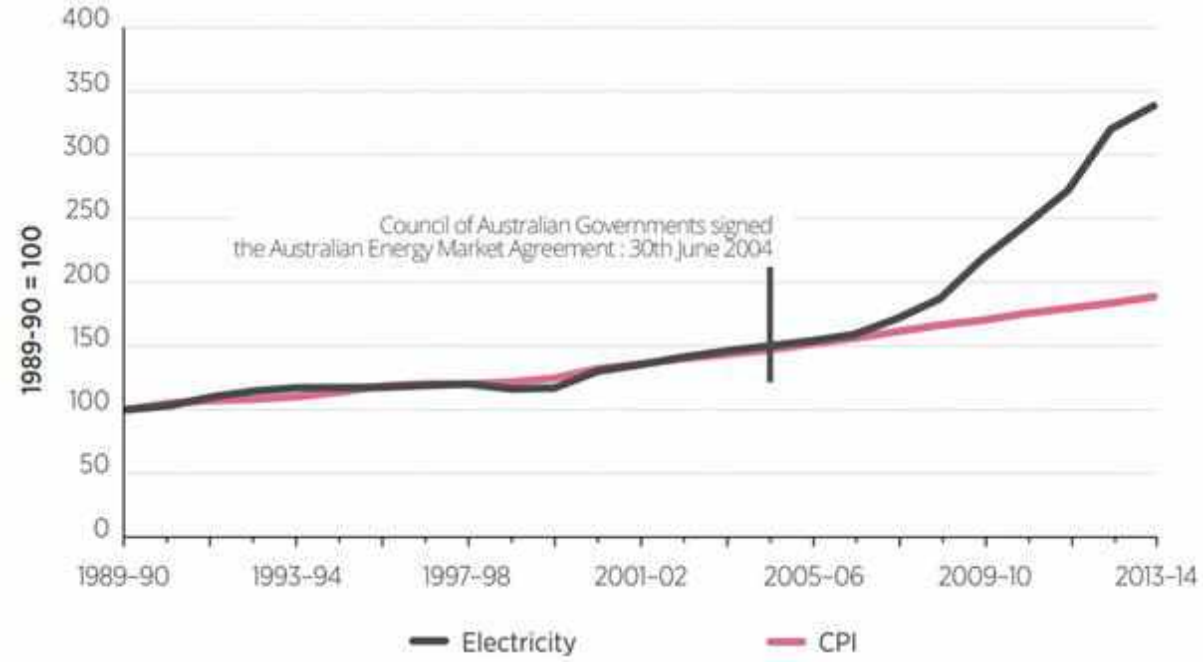
(a) price, quality, safety, reliability, and security of supply of electricity and;

(b) the reliability, safety and security of the national electricity system.

As the purpose of the rules is to ensure "consumers do not pay more than necessary for their electricity" there can be absolutely no doubt that the National Electricity Rules have failed. The rules were introduced on 1st July 2005and as per Figure 6 below, electricity prices have experienced a steep upward trajectory since the rules became law.

Importantly, Figure 6 clearly shows that the rules have allowed electricity prices to have no correlation to the Consumer Price Index.

Figure 6: National retail electricity price index, 1989-90 to 2013-14



Source: Australian Government Energy White Paper, April 2015

The doubling of power costs since the rules were introduced would not be possible if the components of a power bill; generation, networks and retail, operated in a competitive market that is purported to exist under the National Electricity Rules.

The rules have also encouraged a change in the ownership of Australian electricity assets. Historically Australia's electricity system was largely owned by state governments. Today the ownership mixture includes state governments, private companies and foreign governments. Ironically, South Australia which is the catalyst for the Finkel Review is considering reinvesting in electricity supply assets in South Australia and legislating changes to override the Australian Energy Market Operator in relation to the despatch of electricity into the South Australian market. This will mean the South Australian Government is assuming AEMO's responsibility of ensuring that supply meets demand 99.998% of the time in South Australia.

Apart from the South Australian Government assuming that renationalising parts of the supply chain will solve the reliability issue, the majority of the intense interest in owning all or part of an electricity asset is being driven by the guaranteed exorbitant returns allowed under COAG's National Electricity Rules. For example, from 2010 to 2015 the rate of return for Ergon Energy's network assets was set by the Australian Energy Regulator at 9.72% for 5 years and despite record low interest rates globally only fell to 6.01% in 2015-16 and 6.04%in 2016-17. Such lucrative returns guaranteed by COAG's rules has attracted intense interest from foreign investors prepared to bid up big to secure Australian electricity assets. For example, an international consortium paid $10.3 Billion for the NSW's transmission network. The purchase price is reported to represent a generous multiple of 1.6 times the regulated asset base, well above the around 1.3 times that listed regulated businesses are trading at.

Electricity assets whether privately or government owned are expected to return a dividend to the shareholders. In the past two years consumers throughout the National Electricity Market have watched with absolute dismay, the number of challenges lodged with the Australian Competition Tribunal pertaining to the revenue of networks. Consumers are essentially locked out of challenges at either the Australian Competition Tribunal or the Federal Court (for tariff challenges) as consumer advocates have neither the financial nor human resources to mount a multi-million dollar challenge involving legal advice at the level of a Queens Counsel.

Instead of viewing electricity assets as essential infrastructure necessary to grow the entire Australian economy and jobs, electricity assets are now viewed as lucrative money earners or an asset to be wholly or partially sold to prop up state government budgets. The Federal Government has fully supported the sale of state government owned electricity assets through its $5 Billion Assets Recycling Initiative (ARI). All governments signed the National Partnership Agreement on ARI at the COAG meeting on 2nd May 2014.Queensland was one state that did not benefit from ARI due to the Queensland Government's policy of no electricity asset sales.

However, the debate on who should own and who should receive the exorbitant returns extracted from electricity consumers as a direct result of COAG's rules continues in Queensland today. In a March 2017 media release the Queensland Treasurer stated "*That means taxpayers losing an income stream of about $2 billion a year, workers at GOCs losing their jobs, and service levels falling as new private owners focus solely on the bottom line. Without the dividend stream from GOCs, Scott Emerson needs to come clean and tell Queenslanders what services will he cut, will he cut education spending, health spending, police or all of them like he did when the LNP were in government*." Clearly, the returns from the Queensland Government electricity assets are viewed as a cash cow or hidden tax used to prop up the Queensland budget.

The Queensland Government is part of COAG, and therefore Queensland along with the other state and territory governments, set the National Electricity Rules and all state and federal governments benefit from the rules they set. The rules have driven us to this current power crisis.

Until recently Australian consumers in general would best be described as disgruntled, disengaged and passive participants in a highly regulated electricity market. This situation is changing daily, not out of choice but out of necessity.

The word 'choice' is the most over used and misunderstood word in energy policy. It gives the impression that under the rules consumers do have a 'choice' in their energy decisions.

The Power of Choice Review was presented to the ministers of the COAG Energy Council for their consideration in November 2012. At that time there was limited engagement by COAG with consumer advocates; those engaged predominately represented low income residential consumers. Small business and regional consumers were largely absent and thus had little input into the Power of Choice Review.

The lack of input into energy policy from small business consumers, regional consumers and non-concessional residential consumers continues to this day, evidenced by their minimal representation on the Australian Energy Regulator's Customer Consultative Group and the federally funded National Energy Consumers Roundtable. This is particularly worrying as it means the voice of the engine room of Australia's economy – small business – and that of middle Australian households and regional consumers is literally unheard.

The 5 member Finkel Review Panel was appointed by COAG and does not include a representative from any type of consumer organisation. The Queensland Electricity Users Network (QEUN) communicated this glaring omission to the members of the COAG Energy Council but to no avail. To date the QEUN has been satisfied with the consultation opportunities provided by the Finkel Review Panel and sincerely hope that this broader engagement continues as the Panel formulates its recommendations for COAG.

The changes made to the National Electricity Rules as a result of the Power of Choice Review paints a picture of rules that allow consumers to sit comfortably in the driver's seat, able to actively negotiate and take advantage of a competitive electricity market with innovative products offered by multiple electricity retailers. Yet hundreds of thousands of consumers are still on non-market retail contracts and are struggling to pay power bills. Clearly perception and reality are streets apart.

In addition, COAG believes their rules allow 'choice' to be exercised by all consumers in relation to the adoption of renewable energy.

The reality is the massive uptake of solar PV has been driven primarily by generous government solar feed-in tariffs and government assistance towards the installation and capital cost of a solar PV system.

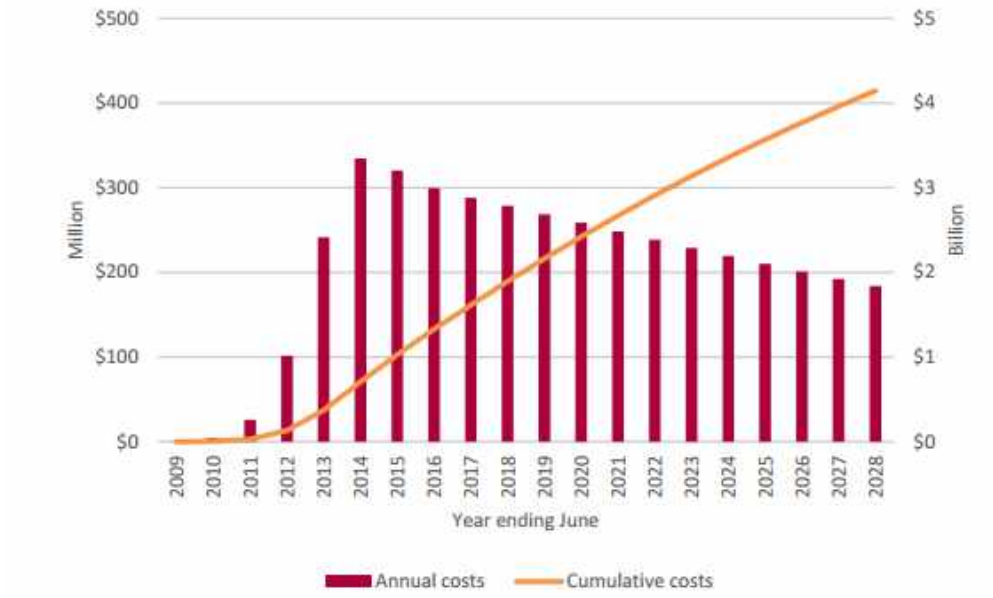
The 'choice' exercised by the minority of consumers with solar will cost non- solar consumers as the solar incentives and subsidies will be recovered through all consumers' power bills.

For example, the Queensland Government's now defunct 44 cents per kWh Solar Bonus Scheme will result in higher retail electricity prices paid by all consumers of grid supplied electricity in Queensland. As non-solar households outnumber solar households, and as average consumption from the grid is less for solar households, the increase in retail electricity

prices is mainly paid for by non-solar households. According to the Queensland Productivity Commission the Solar Bonus Scheme will cost over its life (until 2028) more than $4.1 Billion (see Figure 7).

The Queensland Competition Authority estimated that the recovery of the scheme's cost in 2015-16 would add around $89 to the average Queenslander's annual electricity bill for a residential customer on the main residential Tariff 11.

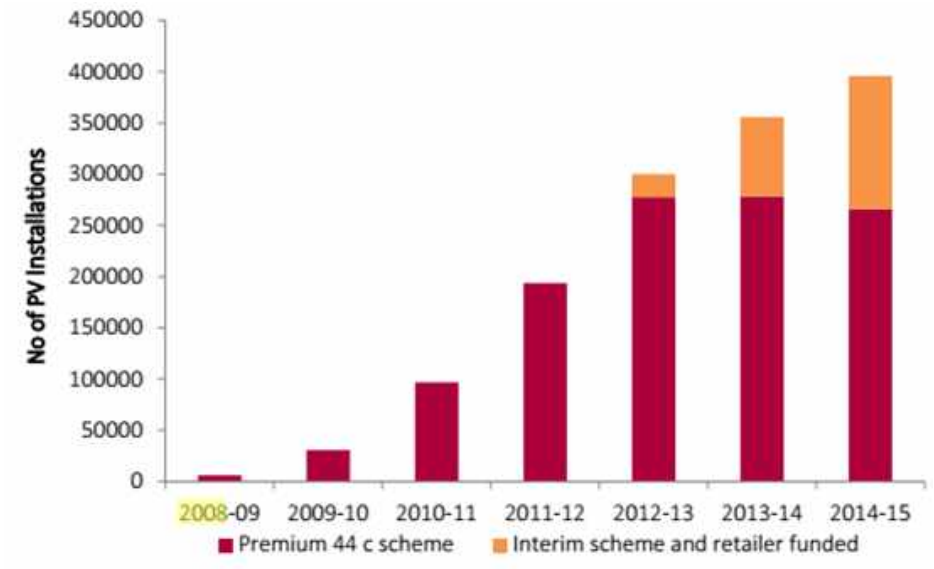
Figure 7: Queensland Government's Solar Bonus Scheme Costs: 2008 to 2028



Source: Solar Feed-In Pricing in Queensland Report, Queensland Productivity Commission, 2016

Around two thirds of the rooftop solar PV installed in Queensland receives the generous Solar Bonus Scheme's 44 cent Feed-In Tariff (see Figure 8).

Figure 8: Solar rooftop PV installation in Queensland 2008-09 to 2014-15



Source: Solar Feed-In Pricing in Queensland Issues Paper, Queensland Productivity Commission, 2016

In addition to the generous solar bonus feed-in tariff the same consumers were also able to receive a subsidy from the national Small-scale Renewable Energy Scheme (SRES). The SRES reduces the up-front cost of purchasing and installing a solar PV system by around 30-40 percent on average. In 2016, the Queensland Productivity Commission in its Solar Feed-In Pricing Inquiry found that *'mandatory solar feed-in tariffs are not an effective or efficient means to achieve the desired environmental, economic and social outcomes. Alternative policies are more likely to achieve objectives at lower cost*."

The Queensland Government's Solar Bonus Scheme is a glaring example of how choice is not available to all electricity consumers. Choice as per the example above, was only available to consumers with the financial resources to contribute to the installation and capital cost of a solar PV system. Worryingly, the choice of the minority has caused the power bills of the majority to increase. This imposition on the majority of electricity consumers in Queensland is allowed under COAG's National Electricity Rules. This is despite the fact that COAG is a champion of cost reflective tariffs ie no cross subsidies. The Queensland Productivity Commission estimated the combined subsidy of the Solar Bonus Scheme, the SRES and the structure of electricity tariffs as $597 million in 2015-16.

Clearly, COAG's rules have failed to prevent this cross subsidy from impacting on the majority of Queensland electricity consumers that are non-solar consumers.

The choice of the minority has also come at considerable risk to the resilience of the existing electricity system in Australia. The current system has been designed and engineered for a one way flow of electricity from large synchronous generators such coal fired generators, via a poles and wires network to residential and business consumers throughout the National Electricity Market. This system supplied reliable electricity to all consumers and also affordable electricity to all consumers by closely following the Consumer Price Index until the COAG rules took effect on 1st July 2005 (see Figure 6).

The fast uncontrolled and unplanned pace at which renewable energy generation has under the rules been integrated into the National Electricity Market has caused the electricity system to be unreliable both in terms of the 'quantity' of electricity produced and the 'quality' of electricity produced.

Australia is trying to win an international sprint race for the highest penetration of renewable energy and is using expensive government subsidies funded by the consumer as a means of winning the race. Instead Australia needs to develop a strategy to win the Melbourne Cup using consumer education, changes to the National Electricity Rules and heavy investment in renewable energy research and pilot projects. A Melbourne Cup strategy will allow Australia and the world to meet its emission targets and grow the Australian and global economies.

There is no doubt Australia has commenced the transition to a renewable energy future. It is the speed of the transition, the type of generation and the type of network deployed for the transition that are the sticking points. Throughout the transition all Australian businesses and homes must be able to access affordable and reliable electricity without the need for continuous government energy concessions to 'vulnerable' consumers. The definition of 'vulnerable' has changed to include almost all consumers but COAG still defines vulnerable as low income households and businesses deemed too big and too important to fail.

Cherry picking the easy solutions for residential consumers is undermining the viability and profitability of businesses and destroying jobs throughout Australia. It is almost impossible to be green when you are in the red. We need a strong economy and jobs growth to implement a

smooth transition to a decarbonised electricity system. The challenge for renewable energy projects is not how many homes the renewable energy project can power but how many businesses it power with affordable *and* reliable electricity?

To solve the second problem the Finkel Review Panel must address, the Panel needs bipartisan agreement by COAG members to:

- Immediately implement numerous changes to the National Electricity Rules to ensure the rules uphold the National Electricity Objective of providing affordable, reliable and secure electricity to all Australian electricity consumers
- Build a resilient electricity system capable of providing affordable and reliable electricity to both business and residential consumers in a future that will include droughts, hail storms, cyclones, extreme wind events, solar flares, bush fires, floods and cyber attacks.

4.2 Implement Numerous Changes to the National Electricity Rules

4.2.1 General

At the heart of the problem is the National Electricity Rules.

The rules ensure consumers can never win.

The rules have been set by the members of the Council of Australian Governments. COAG members are or have in the past, been direct or indirect beneficiaries of the ownership or sale of electricity assets. The vampires are quite literally in charge of the blood bank.

Ironically it's the vampires that must now work collaboratively together to restore the supply.

Restoration requires immediate changes to the rules.

Rule changes can occur quickly and at a much lower cost than the multi-billion dollar infrastructure solutions that will turn up as yet another rise in consumers' power bills.

Changes to the rules will prevent an uncontrollable death spiral. The death spiral is a term used to describe a situation where the more power bills increase, the more consumers lower their consumption from the network/ grid which in turn forces power bills up again for those consumers still remaining on the network/grid.

The negative effects of an uncontrollable death spiral will start in regional Australia where the drivers of the Australian economy, the agricultural and mining industries, are supplied by a network/grid with fewer consumers per km.

A death spiral can be averted if rule changes are implemented that will increase overall utilisation of networks and reduce peak demand. The QEUN recommend that:

RECOMMENDATIONS

- A rule change be implemented to stipulate that all retail offers throughout the National Electricity Market are in a standard format and include a standard glossary
- Remove cost reflective tariffs and instigate a process of tariff reform
- Introduce a food, fibre and manufacturing tariff throughout the National Electricity Market to take advantage of the parts of the network that have surplus electricity, particularly during daylight hours

- Develop and promote the use of energy efficiency apps for all consumers throughout the National Electricity Market
- Promote the adoption of more load controlled appliances through consumer friendly load controlled tariffs
- Promote the adoption of more load controlled appliances through consumer friendly rules on smart meters
- Adopt a 24 month no harm policy for all consumers in relation to Time of Use tariffs
- Develop an education campaign to reduce the air-conditioning demand during peak demand periods.
- Overhaul the collection and reporting of energy statistics by the Australian Energy Regulator
- Consider regional Queensland as another jurisdiction until residential and small business consumers have effective retail competition in regional Queensland
- Stipulate that retail statistics are released 6 weeks after the completion of a Quarter
- Stipulate that the Australian Energy Regulator must have a fair balance of stakeholders on its Customer Consultative Group that includes representation from small business, regional Australia, middle Australia and low income residential consumers
- Implement a review into the impact of Solar Power Purchase Agreements on the ability of the national network and the large scale generators connected to the national network, to provide reliable and affordable electricity to all consumers during the transition to a renewable energy future
- Instigate rule changes that strengthen protections for the consumer against predatory marketing practices by exempt retailers
- Implement a review into whether consumer laws currently offer sufficient protection to consumers entering into a Solar Power Purchase Agreement
- Introduce rules to protect consumers against a failed retailer
- Introduce rules that limit the market power of gentailers
- Implement a review into the insurance implications of Solar Power Purchase Agreements
- Undertake an urgent investigation into the legal gaming of the wholesale electricity market
- Postpone the commencement date for competitive metering pending a study into the costs and benefits to consumers of the introduction of Time of Use meters in the NEM

4.2.2 Standard Format for an Electricity Bill

Rising peak demand increases the cost of all three components of a power bill; generation, network and retail, forcing consumers to pay higher power bills.

To lower peak demand consumers must be active participants in the retail market. Currently hundreds of thousands of consumers across the National Electricity Market are on non-market contracts because they simply cannot read and understand the offers made by retailers.

The 'format' of a retail offer makes it difficult if not impossible to compare offers. Even the most knowledgeable of consumers can spend hours comparing offers. The majority of consumers are not the engaged consumers continually portrayed in reports by regulatory entities. Consumers are quite basic – they simply want to be able to afford to pay their power bill without having to devote hours to finding the "best" deal.

Residential consumers in southeast Queensland have the 'choice' of 17 retailers with many companies offering multiple products. According to the Australian Energy Regulator's Energy Made Easy website a consumer living alone in Brisbane's CBD (postcode 4000) can access 61 offers ranging from $1,147 to $1,726.

COAG believes the National Electricity Rules allow consumers to exercise choice but the complexity of retail offers has removed consumer choice.

In the past consumers only had to compare the variable usage charge (cents per kilowatt hour) and the fixed daily supply charge (cents per day).

Today consumers need to compare all the terms and conditions as the devil is definitely in the detail. For example, a late payment fee or a reconnection fee could cause any benefit of what appeared to be a low offer to vanish instantly. Late payments can also have more profound ramifications. Credit agencies can list the consumer as a bad credit risk which affects the consumer's ability to procure offers from other retailers on electricity and other products and services eg home loans.

Whilst many consumers are familiar with terms such as a 'payment processing fee for a credit card', many consumers would find other terms and conditions quite perplexing.

A comparison of the three cheapest retail offers for a single person living in Brisbane's CBD revealed the following less familiar terms; ongoing contract with benefit period, membership fee for an electricity retailer.

For many consumers a jump in their power bill coincides with the realisation that their electricity price is not fixed but rather the retailer can change the electricity price at any time with notice. This can play havoc to tight business and household budgets.

The complex terms and conditions are a nightmare for consumers with English as their first language, however for many ethnic businesses and households it is an insurmountable hurdle.

The complexity is about to be turbo charged when in December 2017 competitive metering is introduced across the National Electricity Market under COAG's rules. This will herald in the age of 'Time of Use' tariffs. Time of Use tariffs charge consumers according to when the electricity is used. The charges will be highest at peak times ie from 10.00 am to 8.00 pm week days for small businesses and from 3.00 pm to 9.30 pm for households in regional Queensland.

Consumers are already struggling to understand retail offers now. The introduction of competitive metering and the progressive roll out of 'Time of Use' tariffs throughout the National Electricity Market will cause widespread financial hardship to business and residential consumers.

Consumers can play an integral role in reducing peak demand and therefore reducing their own power bills. The QEUN recommend that:

RECOMMENDATION

- A rule change be implemented to stipulate that all retail offers throughout the National Electricity Market are in a standard format and include a standard glossary

4.2.3 Tariff Reform to Increase Network Utilisation

The Australian Energy Regulator has recently made a number of decisions pertaining to the Tariff Structure Statement proposals of a number of networks in the National Electricity Market.

The National Electricity Rules on tariff structure have fully embraced the misguided concept of cost reflective tariffs.

The whole concept of "cost reflective tariffs" indicates a preoccupation with "supply side" issues in approaching the question of electricity markets at the expense of "demand side" considerations.

One of the first lessons in Economics 101 is that in determining volume and price in a market for goods or services, there is a "demand curve" as well as a "supply curve".

The other consideration that is not so obvious, is the fact that much of electricity supply is of a highly capital intensive nature, especially in the form of distribution networks and large power stations.

This situation is not uncommon. Irrigation dams and systems, railway operations, shipping and air services are in a similar situation.

To maximise income in this situation, a degree of flexibility and approach is needed of "what the market will bear".

In this situation, there is no such thing as one customer "subsidising" another. Although costs will be a factor in the supply side, reality of the demand side needs to be recognised.

In airfares, cheap fares are used to fill the marginal seat. Airlines offer $300 return airfare, Cairns to Brisbane. Because such a fare is below the average cost of a seat – is it "subsidised"? Definitely not.

Ships will look for a "base cargo" to provide a large base revenue even if it is below average costs and then profitably fill up the ship with smaller high value cargoes.

Will an irrigation water supplier provide a rice farmer who requires large volumes of water for a relatively low value crop, at a lower price than to an orchard farmer with a high value crop requiring relatively small volumes that are marginal to his production? Certainly they will.

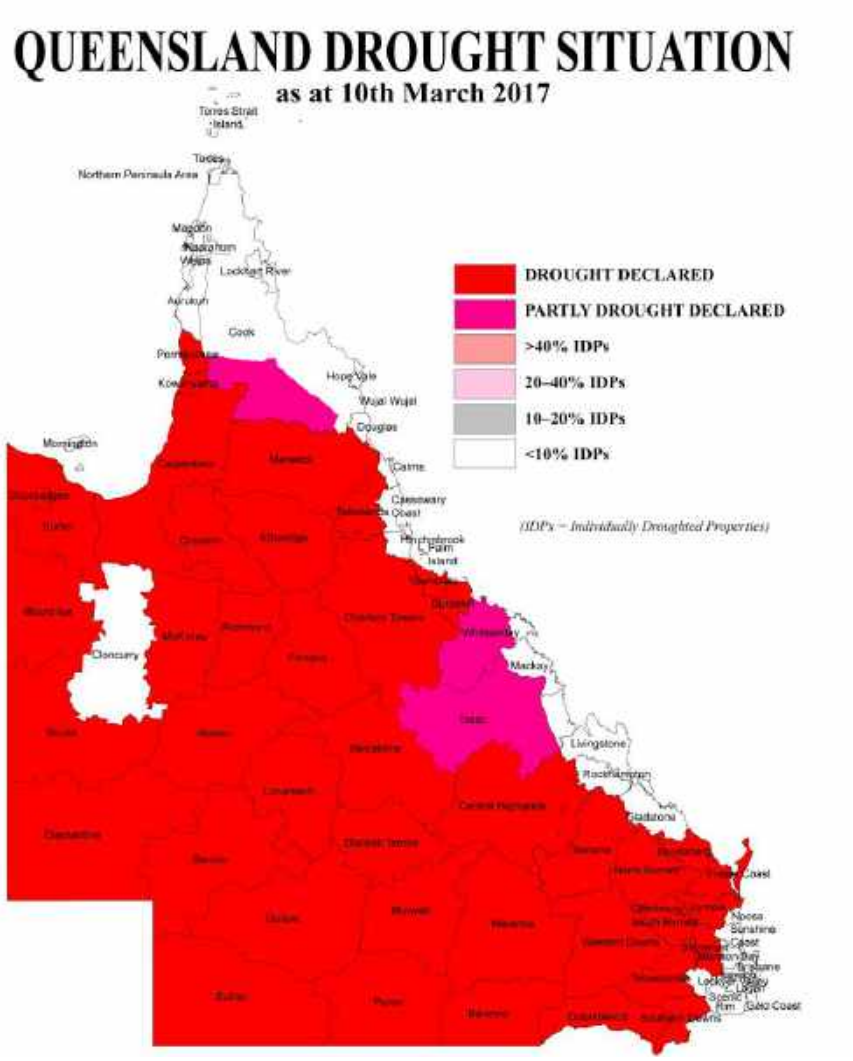
The principle is already there in the electricity industry – in the lower price to major electricity users. However more recently, the flexibility in approach needed to maximise returns appears to have been lost. We are seeing users for whom cheap larger volumes are important being lost to a network system that has a very high fixed cost resulting in network costs for the remaining consumers being increased.

Certainly the whole principle of "cost reflective tariffs" and a concept that consumers should not be "subsidised" is inappropriate for the capital intensive electricity supply industry.

Cost reflective tariffs have lowered the demand for network supplied electricity and have failed to curb peak demand. Tariff reform must be introduced to prevent an accelerated death spiral and the destruction of agricultural, mining/mineral processing and manufacturing industries located primarily in regional Australia.

The inability of farmers to be able to afford to irrigate their crops will affect ordinary Australians through increased cost of living in regional Australia *and* in the cities. Irrigation is particularly critical to Queensland as 87.47% of the total area of Queensland is officially drought declared (see Figure 9).

Figure 9: Queensland Drought Situation – 10 March 2017



Source: Queensland Government, 10 March 2017

Regional manufacturing and processing industries located on less dense networks are critical to the overall health of state and federal budgets. There is a misguided belief that if a manufacturing business closes or reduces their production the consumption and revenue will be replaced by another manufacturing business. This is an erroneous assumption. In many cases the lost production will be replaced by imported product and hence the network revenue is permanently lost.

Similarly, some farmers may choose to grow crops that do not require irrigation or choose to reduce their irrigation. Both choices will result in lost network revenue which can be permanent. Reduced agricultural production can have a devastating effect on regional towns reliant on agricultural processing eg multiple Queensland towns have sugar mills whilst a town such as Malanda is heavily reliant on its dairy factory.

Recouping lost consumption revenue through higher fixed charges is also a backward step as this further reduces overall demand for network supplied electricity. The Ergon Energy network supplies 97% of the geographic area of Queensland and in 2015-16 the network's capacity had an overall utilisation of 38%, two percent lower than the previous year. The Energex network that supplies the remaining 3% of Queensland around Brisbane, had a 25% overall utilisation of its capacity in 2015-16, compared to 23% in the previous year.

The gross under-utilisation of two Queensland Government owned assets worth around $23 Billion is a tragedy. However, the greatest tragedy is the tariffs proposed by the owner and sanctioned by the Australian Energy Regulator which is destroying Australian businesses particularly in the regions. Queensland and Australia cannot transition from the mining to the dining boom without affordable and reliable electricity in regional Australia.

The Ergon regional network may have a higher overall utilisation of its network capacity but it must maintain a line length of 140,415 km with a customer density of 5.3 customers/km and an energy density of 18.6 MWh/customer. Energex has a line length of 43,798 km with a customer density of 32.5 customers/km and an energy density of 14.87 MWh/customer. Energex consumers in southeast Queensland are dependent on Ergon consumers to provide the outside earnings from mining and agriculture to boost the Queensland Treasury's coffers.

The networks are adept at requesting the Australian Energy Regulator for more capital expenditure to augment areas that are 'constrained' but have not developed tariffs that encourage consumption in areas where there is surplus electricity from solar during daylight hours.

For example, in some areas of Queensland the high penetration of domestic rooftop solar PV has resulted in electricity supply that outstrips demand during the day. The right tariff structure will incentivise consumers such as farmers and councils to utilise the surplus daytime energy to irrigate crops and run council infrastructure such as water and sewerage plants. Instead under the rules the networks are allowed to penalise business consumers by charging peak rates for consumption between the hours of 10.00 am to 8.00pm on weekdays. This incentivises business consumers to reduce consumption therefore reducing economic productivity and jobs, particularly in the regions.

Alternatively, some business consumers feel forced into investing in generation and storage to avoid peak rates and demand charges. At a time when Australia is planning a pathway to a decarbonised electricity system it is quite perverse that following an energy audit a business

can be advised to invest in diesel generation to avoid excessive peak rates and demand charges.

The rules in relation to tariff structure have failed to keep up with the changing generation mix in the NEM and the impact it is having on network consumption and revenue. The Australian Energy Market Operator (AEMO) recognised the change in 2015 and included a minimum demand forecast for South Australia. In 2016 AEMO expanded its minimum demand forecasts to include all regions in the National Electricity Market. At present minimum demand occurs overnight in all NEM regions except South Australia. By mid 2020s AEMO predicts minimum demand will follow the South Australian trend and shift from overnight to midday. The loss of consumption revenue during the day will wreak havoc on total network revenue. Multi-billion dollar networks with high fixed costs will need to recoup the lost consumption revenue in higher fixed charges. This will once again accelerate the death spiral.

The better alternative is to incentivise businesses to use the surplus energy to produce food, fibre and manufactured goods.

The QEUN recommend that:

RECOMMENDATIONS

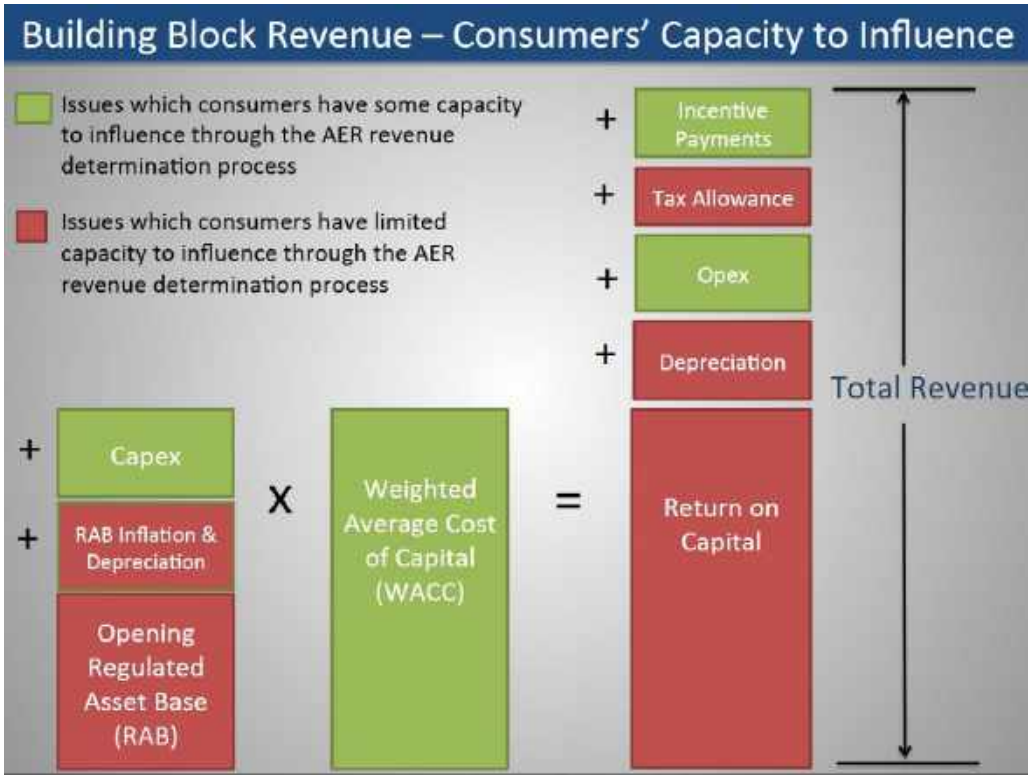
- Remove cost reflective tariffs and instigate a process of tariff reform and
- Introduce a food, fibre and manufacturing tariff throughout the National Electricity Market to take advantage of the parts of the network that have surplus electricity, particularly during daylight hours

4.2.4 A Smarter network to Reduce Peak Demand

Any augmentation (capital expenditure) of a network increases the value of a network's Regulated Asset Base (RAB).

Under the National Electricity Rules the amount of revenue a network can earn is directly related to the value of its Regulated Asset Base. The higher the Regulated Asset Base the higher the revenue, unless the Weighted Average Cost of Capital (WACC)/Rate of Return falls (see Figure 10). The revenue is recouped from consumers via power bills, hence it is extremely important to minimise unnecessary network augmentation (capital expenditure).

Figure 10: The calculation for network revenue



Source:Presentation by Hugh Grant -AER Consumer Challenge Panel Member, AER's Public Forum on Ergon and Energex Revenue Proposals, 9th December 2014

There are two types of augmentation; increasing the network due to new consumer demand (eg new housing estates) or increasing the network to maintain reliability standards.

Under the rules the network must meet set reliability standards. If the reliability standards are in danger of being breached the network can include augmentation/capital expenditure in its regulatory proposal to the Australian Energy Regulator.

There are two ways to reduce augmentation due to reliability standards being breached.

The first is to lower reliability standards. This has already occurred in the Ergon network when the Minimum Service Standards were reduced to 2010-11 levels for the period 2015-20. Whether Queenslanders would accept a lower standard of reliability in return for lower power bills is questionable as electricity is now expected to be available 24/7 (see Table 11 and Table 12).

Table 11: Reliability Performance of Ergon Energy

	MSS	2011-12	2012-13	2013-14	2014-15	TREND	2015-16
System Average Interruption Duration Index (minutes of outage)							
• Urban Distribution	≤149	136	155	119	134	↓	128
• Short Rural Distribution	≤424	393	341	292	359	↓	350
• Long Rural Distribution	≤964	1,042	952	796	1,053	↓	955
System Average Interruption Frequency Index (number of outages)							
• Urban Distribution	≤1.98	1.4	1.5	1.4	1.3	–	1.3
• Short Rural Distribution	≤3.95	3.6	3.0	2.8	3.2	↓	3.0
• Long Rural Distribution	≤7.40	7.0	6.2	6.1	6.8	–	6.8

Reporting based on the Minimum Service Standards (MSS) exclusion criteria outlined in the Electricity Industry Code

Source: Ergon Energy Annual Stakeholder Report 2015-16

Table 12: Reliability Performance of Energex

Normalised Reliability Performance MSS (Total of Planned & Unplanned)		2011/12 Actual	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Actual	2015/16 MSS
SAIDI (mins)	CBD	8.030	1.690	3.560	3.699	4.680	**15.000**
	Urban	64.700	72.700	74.864	90.851	76.680	**106.000**
	Short rural	198.000	160.500	173.392	178.790	180.840	**218.000**
SAIFI (events)	CBD	0.035	0.015	0.058	0.158	0.032	**0.150**
	Urban	0.747	0.820	0.804	0.786	0.726	**1.260**
	Short rural	1.730	1.611	1.556	1.547	1.514	**2.460**

Source: Energex Annual Performance Report 2015-16

The second and most effective way to reduce network augmentation is to reduce the peak demand. It is often said that 10% of the network is only used for a few days of the year but that capacity exists as the networks must meet the specified reliability standards, even during those few peak demand days. To reduce the need for this additional network (and generation capacity) will require consumers to use the network more wisely during periods of peak demand. This can be achieved through the development and promotion of energy efficiency apps, the promotion and adoption of more load controlled appliances and consumer education.

The CitySmart "Reduce Your Juice" energy behaviour change program uses mobile phones to target people under 35 who rent and own a smart phone. Research shows that on average 90% of this target group owns a smart phone and checks their phone on average 56 times per day. Reduce Your Juice uses games, social media, email, SMS communications and prizes to educate this particular target group on ways to reduce their power bills.

Reduce Your Juice ran for three years from July 2013 through to May 2016 and was valued at $6.4 million including $5.5 million from the Australian Government and $1.2 million from consortium partners. The consortium included CitySmart, Queensland University of Technology, Queensland Council of Social Services, Energex and the retailer 'The Good Guys'.

The program was built around three core principles; make it fun, social and competitive. Although prizes were used as an incentive, this innovative app can be tailored to individual target groups with less emphasis on prizes.

Apps are powerful tools for assisting consumers to understand their energy consumption and need to be available to all consumers, not just low income renters. Apps could be developed to assist consumers to understand Time of Use tariffs. Smart meters and Time of Use tariffs are poised to bring severe financial hardship to all consumers throughout the NEM. It is therefore

critical that consumers understand their current energy usage before smart meters and Time of Use tariffs are rolled out.

We strongly advocate that the National Electricity Rules are changed to allow for a 24 month no harm clause in relation to smart meters and Time of Use Tariffs. An innovative app will ensure consumers understand their current consumption pattern and are able where possible to reduce their consumption during periods of peak demand. An app could be developed that could plot the difference between a Time of Use tariff and their current non-Time of Use tariff. In regional Queensland in 2016-17, business Time of Use tariffs rose by 15.8% compared to 11.2% for the main business non-Time of Use tariff. Consumers need to be able to make an "informed choice" on whether to switch to smart meters and Time of Use tariffs.

A smarter network requires consumers to have a better understanding ofload controlled appliances. Load controlled appliances can reduce peak demand and therefore reduce the need for expensive network augmentation and expensive spikes in wholesale generation prices.

A large percentage of households do not have load controlled tariffs ie their hot water system and pool pump are not on a load controlled tariff. Many consumers don't even know what a load controlled or off-peak tariff is and whether their power bill includes a load controlled tariff. This has implications for load shedding as the more load controlled appliances are connected to the network the greater the ability of a network to shed load easily.

The main culprit for rising peak demand is air-conditioning. Yet consumers have little knowledge of how their air-conditioners are causing them long term bill pain through unnecessary network augmentation and exorbitant wholesale generation prices.

In regional Queensland, consumers with a combination of non-load and load controlled tariffs are being hit with higher power bills. For example, in 2016-17 the Queensland Competition Authority estimated the annual power bill for a typical residential consumer on Tariff 11 would rise by2.8%. Consumers on a combination of Tariff 11 and load controlled Tariffs 31 and 33 could expect a rise of 4.8% and 3.1% respectively. Tariff 31 provides a guaranteed supply of electricity to the load controlled appliance for a minimum of 8 hours per day and Tariff 33 for a minimum of 18 hours per day. The price signal above does nothing to promote the uptake of load controlled tariffs.

Energex has developed a PeakSmart program which provides a cash incentive to a consumer installing a load controlled air-conditioner. Similar cash incentives have recently been offered to Ergon's consumers but only in certain geographic locations.

Most consumers do not understand what a load controlled air-conditioner is, what the benefits are and if existing air-conditioners can be retrofitted.Yet air-conditioning demand is causing peak demand to rise, and with it, power bills.

To lower peak demand the QEUN recommend that:

RECOMMENDATIONS

- Develop and promote the use of energy efficiency apps for all consumers throughout the National Electricity Market
- Promote the adoption of more load controlled appliances through consumer friendly load controlled tariffs
- Promote the adoption of more load controlled appliances through consumer friendly rules on smart meters

- Adopt a 24 month no harm policy for all consumers in relation to Time of Use tariffs
- Develop an education campaign to reduce the air-conditioning demand during peak demand periods.

4.2.5 Changes to the Collection and Reporting of Energy Statistics

This power crisis has been caused by the rules which have been supported by false and misleading statistics collated and reported by regulatory entities and the owners of electricity assets.

If COAG and the owners of electricity assets knew their consumers we would not have reached this dangerous point where Australia's electricity is both unaffordable and unreliable.

There are numerous problems with the collation and reporting of energy statistics. However, the most obvious involves a fundamental principle of marketing; know your customer. The customer determines the demand side of the equation. Basic statistics and information such as the number of customers supplied and what pressures are being experienced by the customer base in the short, medium and long term is an absolute must know for a successful business.

However, the fundamentals of a free market do not apply to the owners of regulated electricity assets. The modus operandi of network owners is to maximise the returns from the five-year regulatory resets determined by the Australian Energy Regulator. What business would like to have earned a guaranteed rate of return of 9.72% for the five-year period 2010 to 2015? Ergon Energy did. The rate of return for 2016-17 has decreased to 6.04% but this is still well above normal business returns in today's market.

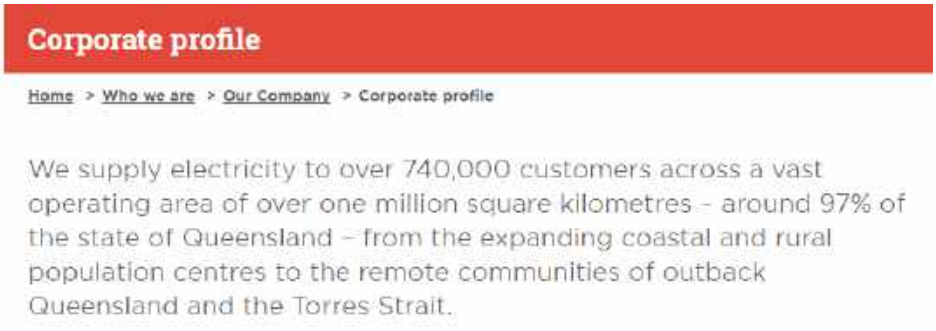
Owners of regulated electricity assets have ignored fundamental marketing principles because the rules protect them and they believe their customers are captive due to the essential service they provide.

A business operating in a free unregulated market and experiencing the same widespread customer financial stress as is currently occurring in the electricity market, would act differently in order to survive and thrive. In the free market there is no safety net of rules to provide a guaranteed rate of return.

One statistic a business in a free market would investigate is how many customers could be lost if the financial stress on their customer base was ongoing. The business would estimate the impact on their viability and profitability if a large customer was lost or conversely a large number of smaller customers were lost.

Ergon Energy states that it serves over 740,000 customers. No it does not. Ergon supplies electricity to over 740,000 points of connection (see Figure 13). This is the most basic of errors and is repeated by electricity asset owners throughout the National Electricity Market.

Figure 13: Corporate profile of Ergon Energy



Source: Ergon Energy website "Our company – Corporate Profile"

For example, Ergon can supply electricity to 4 points on a dairy farm eg the house, dairy, machinery shed and an irrigation pump. Each point of connection has a National Metering Identifier (NMI) and each NMI has a separate electricity account/power bill. Ergon counts each NMI as a customer. If the dairy farmer cannot afford to milk anymore, the dairy farm is likely to become a beef cattle business or a lifestyle property. This would result in the loss of 2 or 3 NMIs which Ergon would translate as the loss of 2 or 3 customers. In reality, Ergon only ever had one customer and the change in the type of farming enterprise (or loss of a farming enterprise) has caused Ergon to lose a high consuming customer.

The problem is exacerbated when numerous dairies in a particular valley cease to dairy farm. Ergon is still legally obligated to supply electricity to the valley yet the revenue from the distribution line is now greatly diminished. Ergon's fixed infrastructure costs remain the same and the lower number of NMIs can look forward to higher fixed charges as Ergon replaces consumption charges with fixed charges.

National Metering Identifiers are a valuable source of demand data that is completely untapped. If networks used NMIs for demand forecasting they would understand which parts of their networks were at risk of losing consumption revenue. To capture the demand data each NMI would be identified as a particular type of consumer, eg.egg farm, caravan park, sugarcane farm, heavy manufacturing, retail shop.

The sugar industry is the lifeblood of many towns in regional Queensland. The industry has endured many challenges in the past 15 years and until recently was buoyed by the prospect of higher global sugar prices. This gain has been more than offset by the drought declarations in major irrigated sugarcane areas throughout regional Queensland. By understanding how many canefarmers are in a particular section of the Ergon's network, instead of losing the network consumption demand due to exorbitant electricity prices, Ergon could work with canegrowers to design a tariff structure to keep the consumption demand from the canegrowers and in doing so support the economy and jobs of regional towns up and down the Queensland coast. Like dairy farmers, canegrowers can opt to grow crops that don't require irrigation which will reduce consumption revenue and increase the fixed charges for the remaining NMIs.

Under the rules the Australian Energy Regulator must report energy statistics. The way the rules are reported hides the true picture of what is happening to consumers, particularly in Queensland.

Queensland has two distinct and separate markets; regional Queensland with over 740,000 points of connection covering 97% of the geographic area of Queensland and southeast Queensland with over 1.4 million points of connection squeezed into 3% of Queensland. Southeast Queensland has 17 retailers operating in the residential market and regional

Queensland has one retailer; Ergon Energy. If regional Queensland is opened up to full retail competition then both areas should be reported as one. Otherwise all statistics should report regional Queensland as a separate jurisdiction. Electricity consumers in regional Queensland have more in common with Tasmania than southeast Queensland.

If the national and state statistics had been reported correctly COAG would have been aware of the growing power crisis years ago, well before the Finkel Review was commissioned. The AER's lack of consultation with small business, regional Australia and middle Australia has further contributed to the problem being masked. According to the AER's reports Australia has a functioning energy market. Yet consumers throughout the National Electricity Market have been screaming for years. This power crisis did not occur overnight.

The AER's Annual Report on the Performance of the Retail Energy Market 2015-16 includes an infographic for Queensland (see Figure 14). The infographic purports to illustrate the change in energy affordability based on an energy bill for a low income household consuming 4,100 kWh per year. From figures compiled from the AER's own Energy Made Easy website the closest consumption to a 4,100 kWh household in Queensland in November 2015 is a one person household in Townsville (see Table 15).

For comparison, in 2015-16 the average annual electricity consumption per household in the Ergon network area was 5,941kWh, down from 6,474 kWh the previous year.

In Table 5 a four person household in Cairns could have an annual consumption 7,897 kWh resulting in an annual power bill of $2,360. If this household was in the lowest quintile of Australian households and its disposable income for 2013-14 was adjusted to 2015-16 values, the proportion spent on electricity would be 7.9% not 4.3% with an energy concession (or 5.6% without an energy concession) as stated in the AER's infographic(ABS Cat 6325 Table 5.1).

The AER's infographic states an annual electricity bill for 2015-16 on the median standing offer without a concession was $1,470 and on a medium market offer without a concession is $1,401. Based on Table 5, this is an annual power bill for a one person household in Townsville.

The AER is not alone in perpetuating misleading statistics. Since 2007 the Queensland Competition Authority (QCA) has received a delegation from the Queensland Government to set the regulated retail electricity price for regional Queensland. In QCA's 2015-16 summary of impact on residential customers it stated "*a **typical** customer on Tariff 11 (consuming 4,053 kWh) will face a decrease in this portion of their annual bill from $1,467 to $1,459*." Tariff 11 is the main residential tariff and is often not used in conjunction with other tariffs.

To say consumers are confused by media statements is to put it mildly. Consumers know their power bills have increased dramatically but the media spin says differently. It is best summarised by this excerpt from the Queensland Energy Minister's media release on 23 February 2017, "*Under the first two years of the Palaszczuk Government the average annual electricity price increase for households was just 1.2 per cent - and 3.8 per cent for small businesses compared to 21.9 per cent under the LNP*."

In reality, electricity prices for regional Queensland consumers increased in 2016-17 by 2.8% to 4.8% for households and 11.2% to 15.8% for small business.

Consumers are tired of the blame game. Which political party is responsible for what part of the current unsustainable electricity price is somewhat irrelevant. The message politicians and bureaucrats are failing to hear is that electricity prices for all business and residential electricity consumers across the NEM must fall significantly. For Queensland, electricity prices for

business consumers have to fall by at least 16% compared to 2016-17 prices. For residential consumers prices have to fall by at least 8% compared to 2016-17 prices.

The Queensland Competition Authority has just announced its Draft regulated retail electricity prices for 2017-18 which proposes another rise of 1.7% for a typical residential consumer on Tariff 11 resulting in an annual power bill of $1,515. Small business tariffs are tipped to rise another 1.5% resulting in a typical small business on the standard small business Tariff 20 paying $2,449 annually. A mechanics business employing 2 people and working out of a tin shed, with no air-conditioning and no computers, has an annual bill of around $2,400 per year. Not sure if this is what most people would regard as a typical small business. With 87% of Queensland in drought, irrigation tariffs are proposed to increase by another 1.9%.

This may not be the end of the bad news. The QCA did not include the exorbitant wholesale electricity price rises paid over summer in its draft prices. Wholesale generation is one quarter of a power bill and this quarter has the real potential to be increased before the final retail electricity price for regional Queensland is set on 31st May 2017.

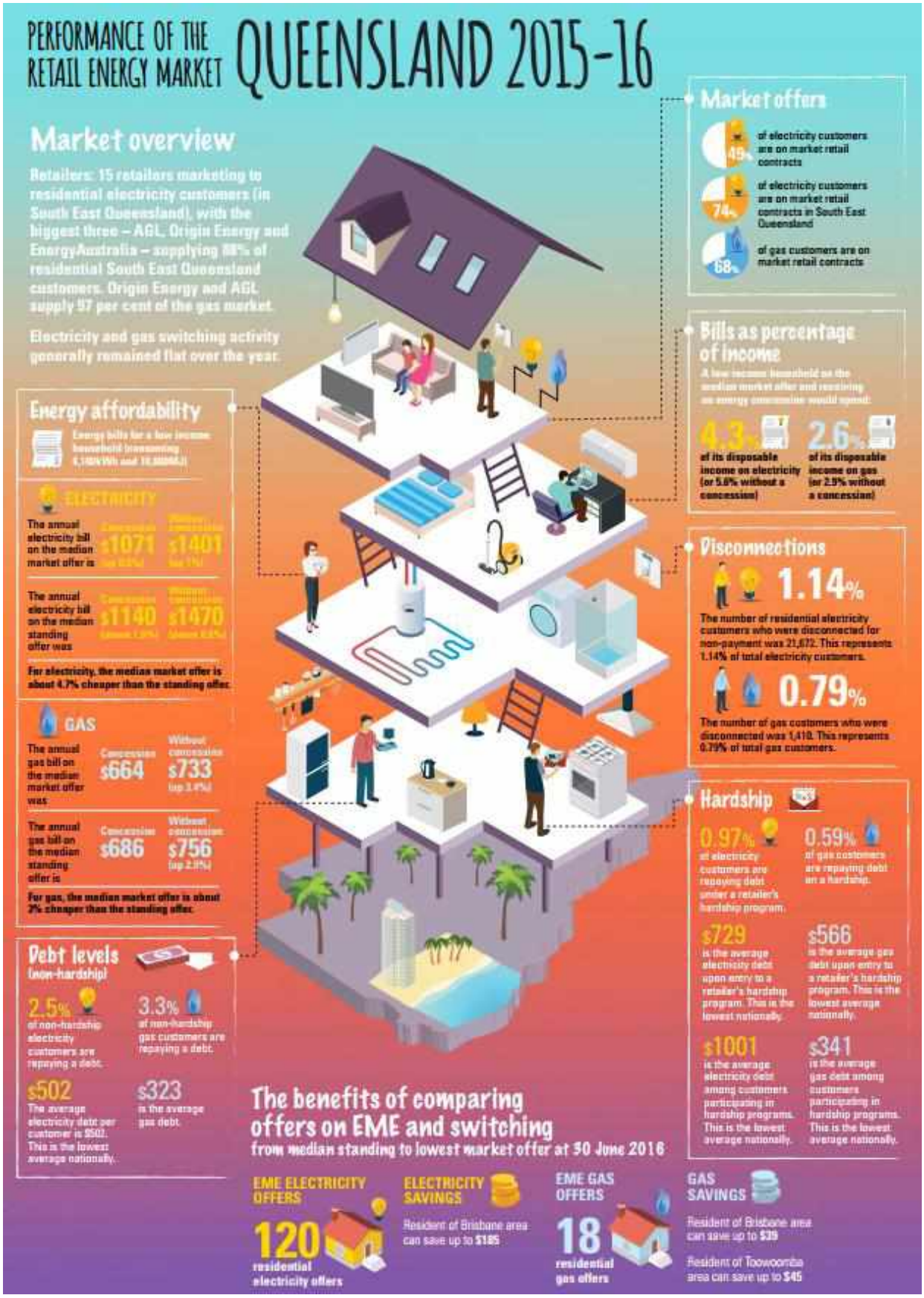
Table 15: Queensland electricity consumption and annual bill by postcode

Location/Postcode	1 person		2 person		3 person		4 person		6 (5)person (a)	
	kWh year	kWh day	kWh year	kWh day	kWh year	kWh day	kWh year	kWh day	kWh year	kWh day
1 **Brisbane (4000)**	3837	10.5	5114	14	6390	17.5	7666	21	10220	28
2	3178	8.7	4909	13.4	5501	15.1	6971	19.1	*7456*	*20.4*
Lowest offer $/yr	$1,170		$1,568		$1,704		$2,042		*$2,154*	
1 **Toowoomba (4350)**	3709	10.2	4943	13.5	6178	16.9	7412	20.3	9880	27.1
2	3114	8.5	4811	13.2	5390	14.7	6831	18.7	*7306*	*20.0*
Lowest offer $/yr	$1,190		$1,605		$1,747		$2,099		*$2,216*	
1 **Bundaberg (4670)**	3376	9.2	4497	12.3	5620	15.4	6742	18.5	8987	24.6
2	3053	8.4	4717	12.9	5285	14.4	6698	18.4	*7163*	*19.6*
Lowest offer $/yr	$1,175		$1,582		$1,721		$2,067		*$2,181*	
1 **Gladstone (4680)**	4093	11.2	5454	14.9	6816	18.7	8177	22.4	10900	29.9
2	3436	9.4	5307	14.5	5947	16.3	7536	20.6	*8060*	*22.1*
Lowest offer $/yr	$1,269		$1,727		$1,883		$2,272		*$2,400*	
1 **Mackay (4740)**	4363	12	5815	15.9	7267	19.9	8719	23.9	11621	31.8
2	3534	9.7	5494	15.1	6270	17.2	8059	22.1	*8148*	*22.3*
Lowest offer $/yr	$1,293		$1,772		$1,962		$2,400		*$2,422*	
1 **Townsville (4810)**	4870	13.3	6490	17.8	8111	22.2	9370	26.7	12970	35.5
2	3945	10.8	6131	16.8	6998	19.2	8995	24.6	*9094*	*24.9*
Lowest offer $/yr	$1,393		$1,928		$2,140		$2,629		*$2,653*	
1 **Cairns (4870)**	4276	11.7	5698	15.6	7121	19.5	8544	23.4	11387	31.2
2	3463	9.5	5383	14.7	6144	16.8	7897	21.6	*7984*	*21.9*
Lowest offer $/yr	**$1,276**		**$1,745**		**$1,931**		**$2,360**		***$2,382***	

Note (a): Data in italics relates to a 5 person household as no data is available for a 6 person household in November 2015.

Source:(1) Energy Made Easy, Australian Energy Regulator accessed January 2015.
(2) Energy Made Easy, Australian Energy Regulator accessed November 2015.

Figure 14: Performance of the Retail Energy Market in Queensland



Source: AER's Annual Report on the Performance of the Retail Energy Market 2015-16

The AER's 2015-16 Annual Report on the Performance of the Retail Energy Market grossly underplays the impact of rising electricity power bills.

One statistic buried in their 97 page retail report that needs to be highlighted is who is being disconnected.

First, the AER displays Queensland disconnection data from previous years on their website but chose not to include Queensland's disconnection history in their annual retail report (see Table 16 and Table 17).

Table 16: Residential electricity disconnections for non-payment, 2009-10 to 2015-16

	Queensland	New South Wales	South Australia	Tasmania	ACT
2009–10	–	15 835	4 748	1 396	880
2010–11	–	18 561	7 383	958	402
2011–12	–	23 207	9 893	178	420
2012–13	–	24 888	10 723	1 057	73
2013–14	–	32 940	10 148	1 555	269
2014–15	–	31 979	10 179	1 046	345
2015–16	21 672	30 065	10 546	1 172	388

Source: AER's Annual Report on the Performance of the Retail Energy Market 2015-16

Table 17: Queensland residential disconnections for non-payment

Queensland - residential customer disconnections

Data | Information

Retailer	ELEC 2012-13	ELEC 2013-14	ELEC 2014-15	ELEC 2015-16	ELEC Q1 2016-17	ELEC Q2 2016-17	GAS 2012-13	GAS 2013-14	GAS 2014-15	GAS 2015-16	GAS Q1 2016-17	GAS Q2 2016-17
AGL	5481	3653	5246	4037	568	1101	1203	935	1501	916	118	182
Australian Power & Gas	527	612	-	-	-	-	85	106	-	-	-	-
Click Energy	242	796	718	350	23	11	-	-	-	-	-	-
Diamond Energy	0	12	18	10	3	8	-	-	-	-	-	-
EnergyAustralia	211	519	504	1820	456	233	-	-	-	-	-	-
Ergon Energy	6645	12454	12994	8381	3050	2332	-	-	-	-	-	-
Locality Planning Energy	-	-	-	6	9	7	-	-	-	-	-	-
Lumo Energy	347	333	538	1088	341	249	-	-	-	-	-	-
M2 Energy	0	6	52	73	9	22	-	-	-	-	-	-
Metered Energy Holdings	-	-	-	184	27	31	-	-	-	-	-	-
Origin Energy	5701	6722	9256	5362	1642	464	448	534	965	486	108	57
Powerdirect	100	143	299	312	135	167	-	-	-	-	-	-
QEnergy	52	49	50	25	2	4	-	-	-	-	-	-
Sanctuary Energy	0	3	9	7	1	0	-	-	-	-	-	-
Simply Energy	0	3	8	12	4	4	-	-	-	-	-	-
Urth	-	-	-	-	1	0	-	-	-	-	-	-
TOTAL	19306	25305	29692	21667	6270	4633	1736	1575	2466	1410	226	239

Source: AER's Annual Report on the Performance of the Retail Energy Market 2015-16

On the surface the falling disconnections due to non-payment is a positive. However, the rules require energy retailers to offer payment plans to consumers experiencing payment difficulties. A payment plan is a plan for a residential consumer experiencing payment difficulties to pay a retailer in periodic instalments any **overdue amount** payable by the consumer. A consumer experiencing moderate payment difficulty will be placed on a payment plan by the retailer whilst those identified with chronic and severe difficulties will enter a hardship program. A consumer on hardship program will not be disconnected while they continue to meet the agreed payment arrangements. Hence, the statistics on disconnection for non-payment must be read in conjunction with the number of consumers on payment plans and hardship programs.

Unfortunately the AER's annual retail report lists consumers on hardship programs as customers per 100. For Queensland it is 0.97 per 100 and Ergon (or regional Queensland) it is 1.06 per 100. This compares with South Australia at 1.8, ACT at 0.37, Tasmania at 0.87 and NSW at 0.79.

The actual "number" of consumers on hardship programs is buried in Appendix 4 but without a cumulative total for each state. It is also on the AER's website (Table 18) and QEUN have previously compiled the statistics from the Queensland Competition Authority's website (Table19).

Table18: Queensland customers on hardship programs

Queensland - customers on hardship programs

Data | Information

Retailer	ELEC June 2013	ELEC June 2014	ELEC June 2015	ELEC June 2016	ELEC Sep 2016	ELEC Dec 2016	GAS June 2013	GAS June 2014	GAS June 2015	GAS June 2016	GAS Sept 2016	GAS Dec 2016
AGL	1332	2617	2519	4966	5397	5146	165	304	284	776	868	817
Australian Power & Gas	174	-	-	-	-	-	8	-	-	-	-	-
Click Energy	169	18	266	434	554	516	-	-	-	-	-	-
Diamond Energy	0	6	6	13	11	15	-	-	-	-	-	-
EnergyAustralia	300	747	1664	1093	899	875	-	-	-	-	-	-
Ergon Energy	3822	3209	5515	6321	6311	6726	-	-	-	-	-	-
Lumo Energy	164	282	302	391	362	360	-	-	-	-	-	-
M2 Energy	27	88	266	264	304	312	-	-	-	-	-	-
Metered Energy Holdings	-	-	-	14	26	25	-	-	-	-	-	-
Origin Energy	3189	2370	4330	4729	5498	5270	115	86	213	282	356	366
Powerdirect	31	37	95	143	172	172	-	-	-	-	-	-
QEnergy	22	28	34	40	59	69	-	-	-	-	-	-
Sanctuary Energy	0	0	4	13	8	0	-	-	-	-	-	-
Simply Energy	0	0	0	2	5	6	-	-	-	-	-	-
TOTAL	9230	9402	15003	18423	19606	19492	288	390	497	1058	1224	1183

Source: AER website

Table 19: Customers in Queensland on a Hardship Program, 2010 to 2015

Period	Participating in a hardship program (#)	% in a hardship program in Ergon area	Av. Debt on entry into a hardship program ($)	Av. Length of time a customer remained in a hardship program (days)
Jun Quarter 2015	15003		n/a	n/a
- Ergon only	5515	36.76%	301	127
Mar Quarter 2015	14438		n/a	n/a
- Ergon only	5087	35.23%	365	154
Dec Quarter 2014	12757		n/a	n/a
- Ergon only	3603	28.24%	390	174
Sept Quarter 2014	11422		n/a	n/a
- Ergon only	3242	28.38%	726	190
June Quarter 2014	9402		n/a	n/a
- Ergon only	3209	34.13%	388	196
Mar Quarter 2014	8633		n/a	n/a
- Ergon only	2938	34.03%	311	230
Dec Quarter 2013	7104		n/a	n/a
- Ergon only	2461	34.64%	389	264
Sept Quarter 2013	8497		n/a	n/a
- Ergon only	2998	35.28%	648	236
Dec Quarter 2012	8950		n/a	n/a
- Ergon only	5184	57.92%	768	292
Sept Quarter 2012	8653		n/a	n/a
- Ergon only	5293	61.17%	731	250
Dec Quarter 2011	7512		n/a	n/a
- Ergon only	4580	60.97%	645	247
Sept Quarter 2011	7309		n/a	n/a
- Ergon only	4454	60.94%	696	181
Dec Quarter 2010	5311		n/a	n/a
- Ergon only	2659	50.07%	633	191
Sept Quarter 2010	4932		n/a	n/a
- Ergon only	2367	47.99%	663	163

Source: Queensland Competition Authority.

The rules require the AER to distinguish between consumers experiencing payment difficulties generally and consumers on hardship programs.

We are not aware of any statistics collected by the Queensland Competition Authority in relation to the number of consumers on payment plans. Therefore the best indication is the September 2015 Quarter statistics collected by the Australian Energy Regulator (see Table 20).

Table 20: Queensland customers on payment plans

Queensland - customers on payment plans

Data | Information

Retailer	ELEC Sep 2015	ELEC Dec 2015	ELEC Mar 2016	ELEC June 2016	ELEC Sep 2016	ELEC Dec 2016	GAS Sep 2015	GAS Dec 2015	GAS Mar 2016	GAS June 2016	GAS Sep 2016	GAS Dec 2016
AGL	1662	1664	3343	3637	3313	3844	109	136	298	275	265	336
Click Energy	752	814	802	744	688	660	-	-	-	-	-	-
Diamond Energy	0	80	91	99	75	71	-	-	-	-	-	-
EnergyAustralia	14051	9582	15418	11189	11570	11398	-	-	-	-	-	-
Ergon Energy	11224	10607	10248	15483	10020	9368	-	-	-	-	-	-
Locality Planning Energy	0	4	5	8	10	10	-	-	-	-	-	-
Lumo Energy	2323	2200	2225	2534	2416	2408	-	-	-	-	-	-
M2 Energy	23	29	21	32	44	36	-	-	-	-	-	-
Metered Energy Holdings	83	64	191	111	72	71	-	-	-	-	-	-
Momentum Energy	1	0	0	0	0	0	-	-	-	-	-	-
Origin Energy	5350	4498	4528	4532	4615	3549	463	451	402	396	484	630
Powerdirect	164	205	250	334	396	364	-	-	-	-	-	-
QEnergy	99	92	106	110	118	101	-	-	-	-	-	-
Red Energy	-	-	-	-	-	5	-	-	-	-	-	-
Sanctuary Energy	13	17	32	35	23	15	-	-	-	-	-	-
Simply Energy	5	3	6	10	7	6	-	-	-	-	-	-
TOTAL	35750	29859	37266	38858	33369	31906	572	587	700	671	749	966

Source: AER website

After much searching through statistics collected by the AER, it is now possible to interpret the true extent of the numbers of consumers under financial stress due to power bills.

The Queensland residential disconnections due to non-payment fell by 8,025 to 21,667 households in June Quarter 2016. However, payment plans increased by 3,108 to 38,858 (moderate payment difficulty) and hardship programs increased by 3,420 to18,423 (chronic and severe difficulty). Hiding statistics by quoting the statistic as x number per 100 customers is painting the wrong picture. Nearly 40,000 homes in Queensland have moderate or severe difficulty paying their power bills. This has far reaching social as well as financial impacts on Queenslanders. The Queensland Government's solution is to extend the existing electricity rebate to an estimated 157,000 households holding a Commonwealth Heath Care Card saving those low income households $330 a year from 1st January 2017.

This is a flawed strategy as it ignores who is being disconnected for non-payment and who is entering into payment plans and hardship programs. It is no longer appropriate to measure energy affordability in relation to low income households, the problem has spread into the homes of middle Australia.

In 2015-16, 76% of Australian households disconnected for non payment did not receive an energy concession, ie these households are working families, couples and individuals of middle Australia (see Table 21).

Table 21: Residential customer disconnections 2015-16

Type of customer disconnected	Electricity (% of disconnections)	Gas (% of disconnections)
Customer had been on a payment plan in previous 12 months	33% ▲8	24% ▲5
Customer had been disconnected on more than one occasion in the previous 24 months	18% ▲8	13% ▲7
Customer was receiving an energy concession	24% ▼2	N/A
Customer was on a hardship program	<1% •	<1% •

Source: AER's Annual Report on the Performance of the Retail Energy Market 2015-16

In 2015-16, nearly half of the Queensland consumers on hardship programs (severe or chronic difficulty) came from middle Australia (see Table 22).

Table 22: Concession customers on hardship programs (change since 2014)

Jurisdiction	Electricity (% of customers on hardship programs)		Gas (% of customers on hardship programs)	
Queensland	52%	N/A	53%	
South Australia	41%	0%	12%	▼4%
ACT	60%	▲2%	26%	▼31%
New South Wales	73%	▲13%	66%	▲66%
Tasmania	79%	▼2%	–	–

Source: AER's Annual Report on the Performance of the Retail Energy Market 2015-16

It would be interesting to ascertain how many payment plans (moderate payment difficulty) are emanating from middle Australia.

The AER does make a small acknowledgement in their annual retail report that the affordability problem is spreading by including the following quote from St Vincent de Paul:

"*As with energy concessions, lower proportions of customers on hardship programs using Centrepay to repay energy debt (as in South Australia and New South Wales) may suggest that not only customers with low incomes are accessing hardship programs. This observation supports findings of consumer welfare organisations that the demographic of people needing assistance is changing, that more middle income families are seeking assistance to pay their energy bills, and that energy stress is not limited to traditionally socio-economically disadvantaged areas."*

The failure of the AER to highlight the spread to middle Australia has severely skewed policy to bandaid solutions for low income households rather than tackling the root cause of the pain; the National Electricity Rules.

The shortcomings for small business statistics is more worrying than for residential consumers. Small business is the engine room of the Australian economy and electricity is a major input cost.

In 2015-16, the number of small businesses in Queensland being disconnected for non-payment fell by 656 to 1,403 businesses (see Table 23).

Table 23: Queensland small business customers disconnected for non-payment

Queensland - small business customer disconnections

Data | Information

Retailer	ELEC 2012-13	ELEC 2013-14	ELEC 2014-15	ELEC 2015-16	ELEC Q1 2016-17	ELEC Q2 2016-17	GAS 2012-13	GAS 2013-14	GAS 2014-15	Gas 2015-16	GAS Q1 2016-17	GAS Q2 2016-17
AGL	469	393	437	326	37	33	107	116	119	56	5	3
Click Energy	13	35	39	24	4	0	-	-	-	-	-	-
Diamond Energy	-	-	-	1	1	0	-	-	-	-	-	-
EnergyAustralia	48	148	44	103	10	12	-	-	-	-	-	-
Ergon Energy	368	433	662	384	256	138	-	-	-	-	-	-
Lumo Energy	18	17	21	32	13	10	-	-	-	-	-	-
Momentum Energy	2	1	1	3	0	0	-	-	-	-	-	-
Origin Energy	812	841	690	388	148	32	36	72	97	45	11	7
Powerdirect	138	171	100	81	10	9	-	-	-	-	-	-
QEnergy	117	128	65	61	16	7	-	-	-	-	-	-
Simply Energy	-	-	-	-	2	0	-	-	-	-	-	-
TOTAL	1985	2167	2059	1403	497	241	143	188	216	101	16	10

Source: AER's Annual Report on the Performance of the Retail Energy Market 2015-16

On the surface a fall in small business disconnections may seem like a good result. However, the loss of a single business does not provide a picture of the economic effect on a region or town of a disconnected business. There are very few businesses that can operate without electricity hence jobs are at risk each time a business is disconnected.

Other states with upward trends in small businesses disconnected due to non-payment are NSW from 2,806 to 3,107, ACT from 50 to 75, Tasmania 68 to 84.

It needs to be strongly noted that small business does not have access to hardship programs. However, a large business can receive assistance if the business is deemed too big and too important to fail eg the Portland aluminium smelter in Victoria received $230 million in state and federal government subsidies.

The timely release of statistics is vital to understand what is happening to consumers. Despite the need for a timely release, the AER is allowed under the rules to publish the June quarter data in its annual retail performance report on or before November each year. Statistics for the other three quarters do not have to comply with set dates for release and need to be available within 6 weeks.

There is no doubt we are in a power crisis. To build a resilient electricity system capable of providing reliable and affordable electricity in the short, medium and long term, it is imperative that the electricity system meets the needs of the consumer. This requires timely collection of statistics that are interpreted and reported in a meaningful way.

The QEUN recommend that:

RECOMMENDATIONS

- Overhaul the collection and reporting of energy statistics by the Australian Energy Regulator
- Consider regional Queensland as another jurisdiction until residential and small business consumers have effective retail competition in regional Queensland
- Stipulate that retail statistics are released 6 weeks after the completion of a Quarter
- Stipulate that the Australian Energy Regulator must have a fair balance of stakeholders on its Customer Consultative Group that includes representation from small business, regional Australia, middle Australia and low income residential consumers

4.2.6 The Market Power of Gentailers and Solar Power Purchase Agreements

The Australian market is dominated by three gentailers; Origin Energy, AGL and Energy Australia. Collectively they provide the majority of generation and retail services to consumers throughout the National Electricity Market. This effectively allows the three companies to control 50% of a consumer's power bill.

The Australian Energy Regulator promotes the notion that there is retail competition but in reality there are 3 'first tier' retailers; the 3 dominant gentailers. In 2015-16, the 3 first tier retailers/ gentailers supplied 88% of the electricity consumed by southeast Queensland residential households.

The remaining 12% of the southeast Queensland retail market was supplied by 12 retailers.

In regional Queensland a similar situation occurs as the Queensland Government owns 65% of the generation, 100% of the network and is literally the sole retailer to small business and residential consumers.

This extraordinary market power can cause major shifts in favour of gentailers, especially in a rising wholesale electricity market. Second tier retailers have higher risks and the introduction of one new retailer in the southeast Queensland market in 2017 shows that second tier retailers are prepared to aggressively chase market share.

If a retailer goes broke in a market serviced by multiple retailers the impact on consumers is far reaching.

The National Electricity Rules allow for consumers to be supplied by a retailer of last resort. This ensures a consumer will be supplied with electricity even though their contracted retailer cannot supply.

The issue is not so much the immediate continuation of a consumer's electricity supply but the price of the electricity supply going forward.

If a business has based its budget on its contracted electricity price it has no recourse to recoup the price differential in a rising retail market. This could threaten the future viability of a business and numerous jobs. The whole economy of a regional town could be adversely affected if the retailer had a sizable consumer base in a particular geographic region.

Similarly, households with tight budgets may find that the inability to secure another contract at similar prices could have social, physical as well as financial implications.

Both of these scenarios are now possible as two second tier retailers; Urth Energy and Go Energy have already failed in the past year. Their demise affected around 3,000 consumers across Queensland, South Australia, ACT and NSW. Under the retailer of last resort provision the consumers were transferred to Origin Energy, AGL and Energy Australia; the 3 dominant gentailers.

The current rules are allowing gentailers to comfortably transition their business model from operating traditional coal and gas generation on their land to operating their power station on a consumer's roof. The rules allow the AER to grant a retail exemption which enables a retailer to negotiate a Solar Power Purchase Agreement with a consumer. The consumer does not own the solar PV system and therefore avoids the installation, capital and maintenance costs. The exempt retailer will match the output of the solar PV system to the consumer's demand.

The consumer is contracted to purchase all the electricity produced by the solar PV system fixed to the consumer's roof. A Solar Power Purchase Agreement (SPPA) can lock a consumer into a particular retailer for more than 15 years.

The SPPA does not have to be offered by one of the 3 dominant gentailers, it can be a small family trust. Consumers need to seriously consider if the retailer offering the SPPA will be around to fulfil their contractual obligations over the entire contract period. Consumers also need to check the insurance implications of a solar PV system not owned by them but attached to their home or business premise. In the case of a natural disaster such a severe wind event or hail storm who is responsible for the damage? Is the exempt retailer capable of restoring electricity supply in a timely manner? If the roof is damaged there could be major damage to large sections of the house or business premises impacting on contents insurance.

The current power crisis is leaving consumers vulnerable to being preyed upon by exempt retailers offering SPPAs. Some predatory practices have already been prosecuted but further protection needs to be considered in relation to aspects of consumer law.

If SPPAs are widely adopted the unplanned drop in consumption from the national network will further accelerate the death spiral, causing financial pain to business and households captive to the network. This will enable gentailers to promote Stage 2 of the transition plan; the benefit of going off network/grid completely with the installation of batteries. The gentailers have now successfully transitioned their business model from owning a power station on their land and having to compete for retail consumers to charging a captive consumer for its power station/solar PV system attached to a consumer's home or business. Choice is no longer able to be exercised and questions arise as to whether the choices of some have inadvertently caused the demise of the national network and with it Australia's food, economic and defence security.

As mentioned earlier there is no doubt we are transitioning to a renewable energy future. It is the speed of the transition, the type of generation and the type of network deployed for the transition that are the sticking points. Throughout the transition all Australian businesses and homes must be able to access affordable and reliable electricity.

The AER seems oblivious to the implications of SPPAs and have been issuing retail exemptions in reckless abandon under the National Electricity Rules. The current power crisis, together with climate change concerns, has provided the ideal environment for SPPAs to flourish. An accelerated uptake of SPPAs could be to the detriment of a smooth transition to a renewable energy future but conversely shareholders in retail companies stand to benefit significantly.

The QEUN recommend that:

RECOMMENDATIONS

- Implement a review into the impact of Solar Power Purchase Agreements on the ability of the national network and the large scale generators connected to the national network, to provide reliable and affordable electricity to all consumers during the transition to a renewable energy future
- Instigate rule changes that strengthen protections for the consumer against predatory marketing practices by exempt retailers
- Implement a review into whether consumer laws currently offer sufficient protection to consumers entering into a Solar Power Purchase Agreement
- Introduce rules to protect consumers against a failed retailer
- Introduce rules that limit the market power of gentailers

- Implement a review into the insurance implications of Solar Power Purchase Agreements

4.2.7 Stop the Legal Gaming of the Wholesale Electricity Market

The wholesale electricity price represents about a quarter of a power bill in Queensland.

In Queensland the average wholesale electricity price jumped from $52.52/MWh in 2015 and $59.99/MWh in 2016, to average $95.22/MWh so far in 2017 (see Table 24).

The 2016-17 Queensland Budget, estimated dividends from the Queensland Government owned generation at $216 million, up from the estimated $160 million in 2015-16 (see Table 15). This is despite AEMO stating in its Electricity Statement of Opportunities in August 2015 that Queensland was not at risk of reaching the low reserve condition until 2024-25 (medium scenario) or 2021-22 (high scenario) (see Table 25). The Queensland Government owns 65% of the generation in Queensland.

Wholesale electricity prices rose even before the 1,600 MW Hazelwood Power Station closes in March 2017. If the wholesale electricity market can be legally gamed under the National Electricity Rules before supply is tightened in the NEM, it is highly likely that the legal gaming of the wholesale market will be a larger problem in the latter half of 2017.

Table 24: Average wholesale electricity price by state

YEAR	NSW	QLD	SA	SNOWY	TAS	VIC
1999	23.35	53.17	47.69	23.67	N/A	24.51
2000	28.27	44.11	59.27	27.96	N/A	26.35
2001	37.69	41.33	56.39	37.06	N/A	44.57
2002	34.76	35.34	31.61	31.59	N/A	30.97
2003	32.91	37.79	30.11	29.83	N/A	27.56
2004	32.37	28.18	34.86	30.80	N/A	25.38
2005	39.33	26.96	36.07	34.04	77.27	27.62
2006	37.25	28.12	37.76	31.08	56.76	32.47
2007	58.72	52.14	51.61	55.19	49.66	54.80
2008	41.66	52.34	73.50	45.49	54.68	46.79
2009	38.85	34	50.98	N/A	58.48	41.82
2010	44.19	33.30	55.31	N/A	29.37	35.28
2011	36.74	30.97	32.58	N/A	29.44	27.09
2012	29.67	29.07	30.28	N/A	32.58	27.28
2013	55.10	67.02	69.75	N/A	46.30	57.44
2014	52.26	58.42	61.71	N/A	41.98	51.49
2015	35.17	52.52	39.29	N/A	37.16	30.35
2016	51.60	59.99	61.67	N/A	102.70	46.14
2017	76.53	95.22	106.05	N/A	61.45	52.55

Source: Data dashboard, Australian Energy Market Operator, accessed 27 March 2017

Table 25: Regional low reserve condition timing and unserved energy by state

Region	Low Scenario		Medium Scenario		High Scenario	
	LRC Timing	USE	LRC Timing	USE	LRC Timing	USE
Queensland	Beyond 2024–25	N/A	Beyond 2024–25	N/A	2021–22	3,393 MWh 0.0050%
New South Wales	Beyond 2024–25	N/A	2022–23	4,003 MWh 0.0056%	2021–22	1,648 MWh 0.0022%
Victoria	Beyond 2024–25	N/A	2024–25	1,502 MWh 0.0033%	2019–20	1,360 MWh 0.0029%
South Australia	Beyond 2024–25	N/A	2019–20	275 MWh 0.0022%	2019–20	587 MWh 0.0043%
Tasmania	Beyond 2024–25	N/A	Beyond 2024–25	N/A	Beyond 2024–25	N/A

Source: AEMO Electricity Statement of Opportunities for the NEM, August 2015

To stop the legal gaming of the wholesale electricity price and remove the threat in poses to the reliability and affordability of electricity in the near term, the QEUN recommend that:

RECOMMENDATION

- Undertake an urgent investigation into the legal gaming of the wholesale electricity market.

4.2.8 Delay the Introduction of Competitive Metering

Under the National Electricity Rules competitive metering will commence in December 2017.

It is our understanding that networks and retailers are not ready to implement the rule on 1st December 2017 which would cause widespread chaos for consumers.

As detailed earlier, smart meters will herald in the age of Time of Use tariffs.

We find it frustrating that competitive metering is being forced upon consumers throughout the NEM when the Auditor General's report tabled in the Victorian Parliament in September 2015 found that:

- Victorians have paid more than $2 billion for the roll out of smart meters and received few benefits
- A Victorian Government review of the program in 2011 said there would be no overall benefit to consumers but instead a likely cost of $319 million. It said the cost was likely to climb further and there was a risk consumers would not see any benefits
- Victorian consumers have been paying for the roll out of smart meters since 2009 when they were introduced to try to help consumers save money on their electricity bills
- The Auditor-General's report found just 0.27 percent of consumers had subscribed to flexible pricing offers associated with smart meters, well below the target of 4 percent by 2014 and 15 percent by 2017
- Two thirds of Victorians did not understand the benefits of smart meters

A Consumer Sentiment Survey by Energy Consumers Australia (ECA) in March/April 2016 found that almost two thirds of Victorians said they did not have Time of Use meters, but almost all do because of the compulsory roll-out legislated by the Victorian Government.

In ECA's March/April survey, a total of 23% of Victorian consumers stated they wanted a Time of Use meter in the future and in the August/September 2016 follow up survey 24% of Victorians are still considering purchasing a Time of Use meter.

This clearly shows the Victorian Government has failed to educate Victorian consumers on what the Victorian Government sees as the benefits to consumers of Time of Use meters.

Instead of learning from the Victorian experience, COAG has dogmatically followed the mantra of competitive metering to the detriment of the consumer.

Before chaos is unleashed on consumers throughout the NEM on 1st December 2017, the QEUN recommend that:

RECOMMENDATION

- Postpone the commencement date for competitive metering pending the completion of a business case detailing the costs and benefits to consumers of the introduction of Time of Use meters in the NEM

4.3 Key Considerations for Planning a Future National Electricity System

4.3.1 General

The challenge presented by COAG to the Finkel Review panel is to provide a blueprint for a future electricity system that is reliable and secure having regard to affordability.

COAG's brief failed at the first hurdle.

The challenge is to design a future electricity system that is reliable, secure **AND** affordable and meets consumer needs.

If COAG had appointed a consumer representative to the 5 member panel of the Finkel Review, consumers may have had some confidence that COAG understood that the future electricity system being designed has to be affordable to meet consumer needs.

Affordable to consumers is an electricity system that costs much less to run than the current electricity system.

It is essential the starting point for the Finkel Review should be a cheaper electricity system.

Electricity prices across the NEM are unsustainable and must fall. For Queensland, the retail electricity prices must fall by at least 16% for business consumers and 8% for residential consumers, compared to the 2015-16 regulated retail prices set by the Queensland Competition Authority.

The 16% and 8% reductions are derived by removing the 5% headroom charge from the 2015-16 regulated retail prices and adding in the increases in regulated retail prices that occurred in 2016-17. For example, for business consumers 16% = removal of the 5% headroom charge plus the increase of 11.2% to 15.8% for regulated retail prices for businesses in 2016-17. For residential consumers 8% = the removal of the 5% headroom charge plus the increases of 2.8% to 4.8% for regulated retail prices for residential consumers in 2016-17. The headroom charge is a nonsensical charge imposed by the Queensland Competition Authority to "promote" retail

competition when there is no retail competition in regional Queensland for small business and residential consumers.

In addition to designing a lower cost electricity system, the Finkel Review must also ensure that the future electricity system:

- Can adapt to the changing needs of Australian consumers
- Is resilient to a range of weather events such as droughts, hail storms, cyclones, extreme wind events, lightning, solar flares, bush fires, floods, dust storms and cyber attacks. Some of which may occur more frequently and with greater intensity
- Allows for all **business** consumers to have access to affordable, reliable and secure electricity during the transition to a renewable energy future
- Allows for all **regional** consumers to have access to affordable, reliable and secure electricity during the transition to a renewable energy future
- Allows for all **residential** consumers to have access to affordable, reliable and secure electricity during the transition to a renewable energy future
- Enables Australia to meet its current carbon emission reduction targets

But the first decision needs to be whether the design is for a "national" electricity system.

If COAG members cannot agree to work collaboratively on a national system then it is pointless to plan a national system. Already the energy policies of individual members of COAG are severely impacting on the ability of the national electricity system to function.

The time for petty finger pointing has well and truly passed. It is time to work collaboratively on a design for a resilient national electricity system that is reliable, secure and affordable for all the people who use it – Australians that consume network supplied electricity.

To design a national electricity system the QEUN recommend that:

RECOMMENDATION

- The removal of State borders when developing a national electricity system

4.3.2 Mapping Consumer Demand

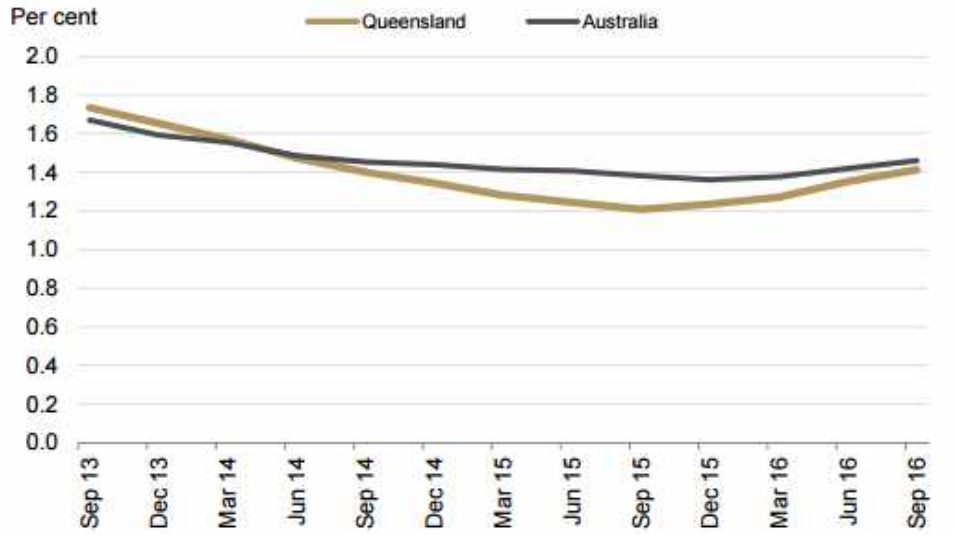
There are two sides to the supply/demand equation but to date the efforts to solve the national power crisis have been firmly focused on the supply side.

The purpose of the national electricity system is to supply the demand of consumers. Hence, it is necessary to understand consumer demand. This requires a range of statistics eg number and location of consumers but also a detailed analysis of factors that will influence the future demand of consumers eg economic conditions, population growth and commodity prices.

For example, a map overlay of the number of consumers connected to the Energex network in southeast Queensland would show around 1.4 million points of connection to residential, commercial and industrial premises. The $12 billion Energex network covers approximately 3% of Queensland's geographic area and has a capacity utilisation of only 25%.

Demand for the Energex network is predicted to fall but Energex hopes the slide will be arrested through population growth, something Energex has little direct influence on. Ergon supplies the remaining 97% of Queensland and it too will be hoping demand for its network will be bolstered by new connections from population growth. Queensland's population growth is now below the Australian average (see Table 26).

Table 26: Annual population growth rate, Queensland and Australia



Source: Queensland Government Statistician's office

There are around 310,000 solar PV systems connected to the Energex network and around 122,000 solar PV systems connected to the Ergon network.

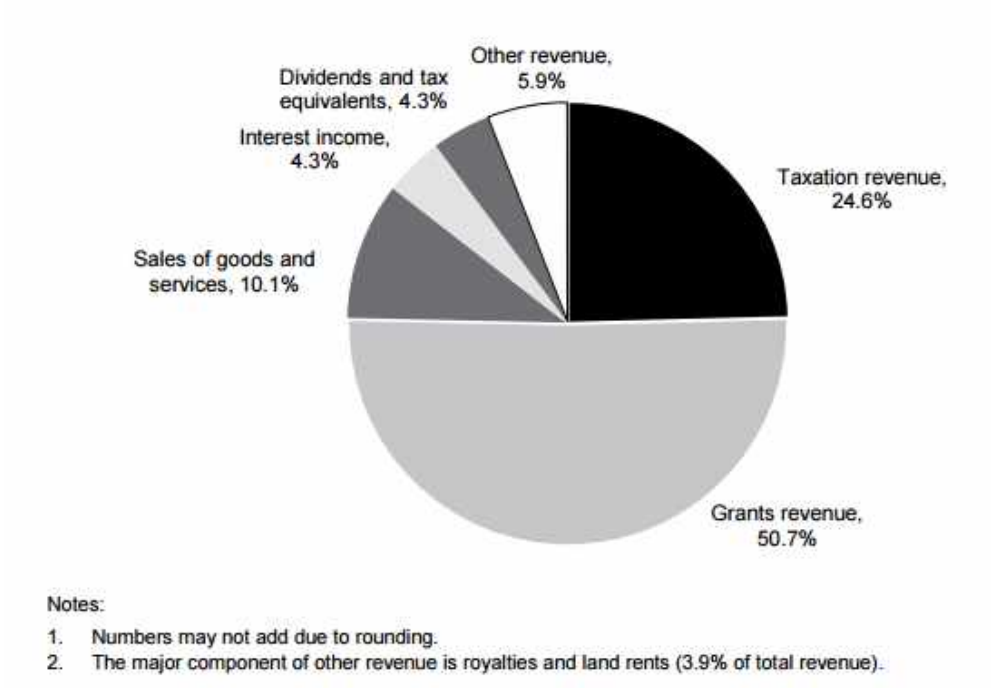
The Queensland Government has a policy of one million rooftop solar PVs or 3,000 megawatts of installed solar generation capacity by 2020.

If the Queensland Government achieves its one million rooftop solar PV target the demand for Energex's and Ergon's networks, worth a combined $23 Billion, will continue to plummet except during the night or overcast days. The networks will become an electricity supplier of last resort. The greater the demand reduction (from more rooftop solar PV) or the permanent loss of demand (from battery installations), the greater the fixed charge component of all power bills.

To date electricity networks have been an incredible source of income for the Queensland Government. In 2014/15, the Queensland Government declared a 100 percent dividend from Ergon Energy and Energex resulting in a dividend payment to the Queensland Government of $3.22 Billion; $1.925 Billion from Ergon Energy and $1.295 Billion from Energex.

To put the importance of electricity dividends to the Queensland Government into perspective, in 2016-17 the total general government sector revenue in the Queensland Budget was estimated at $53.449 Billion. Around half of Queensland's revenue is grants from the Federal Government (50.7%), hence the Queensland Government is highly reliant on the dividends provided by the Ergon and Energex networks (see Figure 27).

Figure 27: Queensland Government revenue by operating statement category, 2016-17



Notes:
1. Numbers may not add due to rounding.
2. The major component of other revenue is royalties and land rents (3.9% of total revenue).

Source: Queensland Budget 2015-16, Budget Strategy and Outlook - Revenue

The Queensland Government has counted on the revenue earned from its electricity networks to fund future state government spending e.g. schools, roads and hospitals. The Queensland Government derives its electricity network revenue from dividends, tax equivalent payments and competitive neutrality fee payments. In 2016-17, the Queensland Budget estimated the combined revenue of the networks to be $1.557 Billion falling to $1.159 Billion in 2019-20 (see Table 28, 29 and 30).

Despite a Queensland Government policy to increase solar generation from the installation on consumers' roofs of one million rooftop solar PVs, the Queensland Government estimates the revenue earned from its electricity generation assets will rise from $328 million in 2016-17 to $385 million in 2019-20 (see Table 28, 29 and 30).

Table 28: Dividends from Queensland public non-financial corporations

	2014–15 Actual $ million	2015–16 Budget $ million	2015–16 Est. Act. $ million	2016–17 Budget $ million	2017–18 Projection $ million	2018–19 Projection $ million	2019–20 Projection $ million
Electricity Networks	1,364	1,198	1,137	1,000	768	683	626
Electricity Generation	90	125	160	216	258	223	257
Transport	252	216	269	278	262	343	365
Water	25	50	31	41	23	23	18
Other	..	..	10	..	..	..	..
Total PNFC Sector Dividends	**1,731**	**1,590**	**1,607**	**1,535**	**1,312**	**1,273**	**1,266**

Notes:
1. Numbers may not add due to rounding and bracketed numbers represent negative amounts.
2. The above dividends do not include amounts from the Public Financial Corporations Sector.
3. Dividends are declared as part of end–of–year accounting arrangements and usually paid in the following November, although Energex and Ergon Energy will pay 2015–16 dividends in June this year.

Source: Queensland Budget 2016-17, Budget Strategy and Outlook, Public Non-Financial Corporations Sector

Table 29: Tax equivalent payments from Queensland public non-financial corporations

	2014–15 Actual $ million	2015–16 Budget $ million	2015–16 Est. Act. $ million	2016–17 Budget $ million	2017–18 Projection $ million	2018–19 Projection $ million	2019–20 Projection $ million
Electricity Networks	497	514	491	463	366	333	310
Electricity Generation	29	84	66	91	92	105	112
Transport	124	113	126	116	98	114	116
Water	19	20	21	9	14	11	11
Other	4	1	5	9	9	9	10
Total PNFC Sector tax equivalents	**672**	**733**	**710**	**687**	**579**	**573**	**558**

Notes:

1. Numbers may not add due to rounding.

Source: Queensland Budget 2016-17, Budget Strategy and Outlook, Public Non-Financial Corporations Sector

Table 30: Competitive neutrality fee payments from Queensland public non-financial corporations

	2014–15 Actual $ million	2015–16 Budget $ million	2015–16 Est. Act. $ million	2016–17 Budget $ million	2017–18 Projection $ million	2018–19 Projection $ million	2019–20 Projection $ million
Electricity Networks	150	155	134	94	138	199	223
Electricity Generation	28	30	26	21	18	17	16
Transport	47	42	38	37	45	47	50
Water	7	4	4	5	5	5	5
Other	..	..	..	..	..	..	..
Total PNFC Sector CNF payments	**232**	**232**	**202**	**156**	**206**	**268**	**294**

Note:

1. Numbers may not add due to rounding.

Source: Queensland Budget 2016-17, Budget Strategy and Outlook, Public Non-Financial Corporations Sector

The overall consumption demand from Queensland consumers is falling eg for Ergon the electricity distributed fell by 143 GWh to 14,997 GWh in 2015-16 (see Table 31). However, the maximum coincident peak demand increased by 99 GWh to 2,481 GWh in 2015-16.

Table 31: Distributed electricity and maximum coincident peak demand for Ergon Energy

	2011-12	2012-13	2013-14	2014-15	TREND	2015-16
Maximum Coincident Peak Demand	2,417MW	2,380MW	2,441MW	2,382MW	⇧	2,481MW
Electricity Distributed	15,212GWh	15,097GWh	15,247GWh	15,140GWh	⇩	14,997GWh

Source: Ergon Energy Annual Stakeholder Report 2015-16

Queensland consumers, along with consumers throughout the NEM, are placing great pressure on networks and the connected generators to supply electricity during periods of high summer temperatures. To address the national power crisis, Queensland networks and all networks

throughout Australia, need to increase their capacity utilisation and reduce their peak demand. As per earlier sections of the submission, this requires a range of measures to be implemented including consumer education and changes to the National Electricity Rules, particularly in relation to cost reflective tariffs and the tariff structure.

The Queensland Government appears to be oblivious to the real possibility that falling consumer demand for their Ergon and Energex networks, under a combination of Queensland Government policies and COAG policies (National Electricity Rules), is placing in jeopardy the future viability of Queensland's networks and their lucrative dividends.

With the closure in March 2017 of the 1600 MW Hazelwood Power Station in Victoria, it is not only Queensland that is reliant on Queensland generators, but other states in the National Electricity Market. To service consumer demand, either intrastate or interstate, requires viable transmission and distribution networks.

It is imperative that consumer demand is mapped ahead of supply. Electricity is no longer a service that can operate on a "build it and they will come basis".

As discussed earlier National Metering Identifiers are an untapped resource that can be utilised to better predict future consumer demand throughout the NEM.

The other relatively untapped resource is consumer advocates from small business, regional Australia and middle Australia. The energy policy table has ample representation from advocates for low income households and big business – it's time to rebalance the representation from consumers.

The QEUN recommend that:

RECOMMENDATION

- Create map overlays estimating the short, medium and long term demand of consumers using National Metering Identifiers, public data, network data and market research using random sampling techniques and longitudinal research
- Consumer representation at the energy policy table is a balance of consumers representing small business, regional, middle Australia, low income residential and big business consumers

4.3.3 Strategic Plan for a Diversified and Resilient Mix of Generation Close to Demand

The map to design the future national electricity system has now ticked two boxes:

- The removal of state borders and
- Created map overlays estimating the short, medium and long term demand from consumers using National Metering Identifiers and a range of data sources such as the Australian Bureau of Statistics' census data (household residents, number of bedrooms, household income), network data (location, size and date of solar PV system installations), commodity market prices (cotton, sugar, copper, coal) and data from market research using random sampling techniques and longitudinal research.

The task now is to locate generation as close to consumer demand as possible taking into account that the Australian Energy Market Operator (AEMO) must have access to sufficient

generation capacity to meet consumer demand across the National Electricity Market for all but 11 minutes of each year.

Sufficient generation also requires AEMO to provide safe and secure electricity which encompasses considerations around the standard of electricity output supplied to consumers. The present issues on supply have been brought about by the integration of intermittent renewable energy into the national electricity network.

Under the National Electricity Rules, AEMO is responsible for ensuring that all generation connected to the national electricity network meets the relevant technical standards. AEMO is currently **not** responsible for planning 'how much' generation is located at any point in the national network, nor what 'type of generation' is located at any point in the national network.

The problems caused by the unplanned 'location' of renewable energy generation in the national network are compounded by the Renewable Energy Target (RET). The RET is an Australian Government scheme designed to reduce emissions of greenhouse gases by the electricity sector and encourage additional generation of electricity from sustainable and renewable sources. Proponents of a renewable energy project do not have to receive prior permission from AEMO to locate their project in a particular section of the national network. Proponents only need to satisfy the design and technical standards to connect to the national network.

Under the RET, electricity retailers are liable entities and must purchase and surrender an amount of large-scale generation certificates (LGCs) and small-scale technology certificates (STCs) based on the volume of electricity they acquire each year. To maintain their competitive advantage in the retail market, retailers need to source their certificates from the cheapest source. The cheapest source for the retailer has resulted in problems for AEMO in managing both the quantity and the standards (eg frequency and voltage) of electricity in sections of the national network.

The amount of certificates an electricity retailer is required to surrender is determined by the renewable power percentage for LGCs and the small-scale technology percentage for STCs.

The 2016 renewable power percentage is 12.75%. The amount of large-scale generation certificates an electricity retailer is required to surrender each year is in proportion to the amount of electricity acquired during the year. The required surrender amount is determined by multiplying the renewable power percentage by an electricity retailer's liable electricity purchases minus any exemption certificates each year. LGCs can be purchased from the open LGC market or from accredited renewable energy power stations or certificate brokers. Prices for LGCs can vary depending on a number of factors including the fuel source and supply and demand in the market for LGCs. The renewable power percentage is published by the Clean Energy Regulator by 31 March each year.

The 2016 small-scale technology percentage is 9.68%. The small-scale technology percentage is used to regulate demand for small-scale technology certificates (STCs) each year. The small-scale technology percentage is published by the Clean Energy Regulator (CER) by 31 March each year. The CER may also publish a non-binding estimate forecasting the small-scale technology percentage for the next two years. This allows electricity retailers to budget and plan for their small-scale technology certificate purchases for each year. The non-binding estimate for 2017 is 9.02% and 8.31% for 2018.

Surrendering certificates is a legal requirement for electricity retailers. If an electricity retailer does not meet its obligations, it may be subject to a shortfall charge.

The Clean Energy Regulator announced in February that the 2016 compliance rate for certificate surrender under the Large-scale Renewable Energy Target and Small-scale Renewable Energy Scheme combined was 94 percent. This is a decline in the over 99% compliance rate of previous years. The drop in the compliance rate is attributed to two electricity retailers that incurred significant shortfalls under the Large-scale Renewable Energy Target. The electricity retailers paid a combined $131 million in shortfall charges. There is no shortfall of Large-scale Generation Certificates in the LGC market ie the electricity retailers could have purchased the required amount of LGCs.

The Clean Energy Regulator expects electricity retailers to comply with their obligations by fully acquitting their RET liability through the surrender of certificates not the payment of a shortfall charge.

Under the Large-scale Renewable Energy Target there is provision for an electricity retailer with a shortfall of *less than* 10% of their total LGC liability to carry forward their shortfall to the next assessment year eg the shortfall for 2016 and the 2017 LGC liability would both need to surrendered by 14 February 2018. The carry forward provision is designed to give electricity retailers flexibility to manage their obligations between assessment years (see Table 32).

Table 32: Large-scale generation certificate shortfall of *less than* 10% for 2016 by electricity retailers

Liable entity	LGC liability (No of certificates)	LGCs surrendered	LGC shortfall (No of certificates)	LGC shortfall (percentage of total LGC liability)	Value of LGC shortfall charge ($)
Perth Energy Pty Ltd	228,567	200,400	22,852	9.99%	-
Blue NRG Pty. Ltd.	47,307	42,800	4,507	9.52%	-
IPOWER 2 PTY LIMITED and IPOWER PTY LIMITED TA Simply Energy	476,431	432,123	44,308	9.29%	-
Amanda Energy Pty Ltd	10,693	10,000	693	6.48%	-
GridX Power Pty Ltd	3,103	2,951	152	4.89%	-
Progressive Green Pty Ltd	36,658	36,240	394	1.07%	-
Kanara Energy Pty Ltd	185	17,123	185	0.45%	-

Source: Clean Energy Regulator website, 2nd March 2017

Table 33 below shows the LGC shortfall of *more than* 10% for the 2016 assessment year following the annual reporting and certificate surrender deadline on 14 February 2017.

Table 33: Large-scale generation certificate shortfall of *more than* 10% for 2016 by electricity retailers

Liable entity	LGC liability (No of certificates)	LGCs surrendered	LGC shortfall (No of certificates)	LGC shortfall (percentage of total LGC liability)	Value of LGC shortfall charge ($)
ERM Power Retail Pty Ltd	2,255,827	354,588	1,900,000	84.22%	123,500,000
Alinta Energy Retail Sales Pty. Ltd.	344,982	221,930	123,052	35.66%	7,998,380
Alinta Sales Pty Ltd	217,871	140,331	77,539	35.58%	5,040,035
Qenergy Limited	62,671	-	62,671	100%	4,073,615
CovaU Pty Limited	26,658	77	26,581	99.71%	1,727,765
Next Business Energy Pty Ltd	17,962	-	17,962	100%	1,167,530
Online Power & Gas Pty Ltd	17,015	241	16,728	98.31%	1,087,320
COzero Energy Retail Pty Ltd	15,887	-	15,887	100%	1,032,655
GoEnergy Pty Ltd	14,485	-	14,485	100%	941,525
SparG Pty Ltd	7,836	-	7,836	100%	509,340
People Energy Pty Ltd	6,349	-	6,129	96.53%	398,385
1st Energy	5,483	508	4,975	90.69%	323,245
Globird Energy Pty Ltd	3,675	-	3,675	100%	238,875
Sanctuary Energy Pty Ltd	3,328	-	3,328	100%	216,320
OzGen Retail Pty Ltd	3,181	-	3,181	100%	206,765

Source: Clean Energy Regulator website, 2nd March 2017

The Clean Energy Regulator assessed two electricity retailers to have a small-scale technology certificate shortfall in the 2016 assessment year (see Table 34). There is no option to carry forward a STC shortfall or to provide STCs at a later date to receive a refund on the shortfall charge paid. The STC shortfall charge is $65 per STC and STCs can be purchased through the STC clearing house for a fixed price which according to the Clean Energy Regulator is currently $40 per STC.

Table 34: Small-scale technology certificate shortfall for 2016 by electricity retailer

Liable entity	STC shortfall (No of certificates)	Value of STC shortfall charge ($)
GoEnergy Pty Ltd	10,997	714,805
COzero Energy Retail Pty Ltd	2,273	147,745

Source: Clean Energy Regulator website, 2nd March 2017

The Federal Government's Renewable Energy Target has no role in determining the location of renewable energy generation in the national electricity system, yet it is the unplanned integration of renewable energy that is largely responsible for the current power crisis.

Renewable energy generation that is not located near existing network infrastructure, or exceeds the current network capability, is likely to cause further capital investment in networks. For example, AEMO is conducting a Regulatory Investment Test - Transmission in relation to the western Victorian network due to a high level of interest in renewable energy generation and a Victorian Renewable Energy Target that could result in up to 5,400 MW of new renewable energy capacity in Victoria. An increase in the network component of a power bill will increase power bills.

The increased investment in intrastate transmission networks to support more renewable generation is not confined to Victoria. One option to solve the current power crisis is to increase the number and capacity of 'interstate' inter-connectors (transmission networks).

The unplanned nature of where additional renewable energy generation is located is only part of the problem.

The other major consideration is; can the future electricity system provide reliable, secure and affordable electricity after weather events such as hail storms, droughts, cyclones, extreme wind events, lightning, solar flares, bush fires, floods, dust storms and cyber attacks? Some of which may occur more frequently and with greater intensity.

Hail storms

The worst insurance disaster in Australia's history was a hailstorm that swept across Sydney's eastern and city suburbs on 14 April 1999 causing extensive damage to homes, businesses and vehicles and costing $1.7 Billion (see Table 35).

One report suggested the amount of hail which fell on Sydney during the storm was in the order of 500,000 tonnes. Hail stones up to 9cm in diameter were measured. More than 35,000 buildings had serious roof damage or were completely destroyed, 40,000 vehicles and 25 commercial aircraft were also damaged. It is estimated that it took almost two weeks to temporarily cover all the buildings with tarpaulins.

Large hail stones are not a recent phenomena in NSW. In 1824 a 9.5 cm hail stone was measured in Sydney with a 110 reports of hail stones greater than 2 cm (see Table 36).

Table 35: Ten largest catastrophe events in Australia, 2011 adjusted dollar amounts

10 Largest Catastrophe Events in Australia (2011 adjusted dollar amounts)						
Rank	Event	Year	Location	State	Loss (AUD$)	Normalised Loss* (2011) (AUD$)
1	Hailstorms	1999	Sydney	NSW	1,700,000,000	4,296,000,000
2	Tropical Cyclone Tracy	1974	Darwin	NT	200,000,000	4,090,000,000
3	Earthquake	1989	Newcastle	NSW	862,000,000	3,240,000,000
4	Flood	1974	Brisbane	QLD	68,000,000	2,645,000,000
5	Flood	2010/11	Multiple	QLD	2,380,000,000	2,380,000,000
6	Hailstorm	1985	Brisbane	QLD	180,000,000	2,063,000,000
7	Ash Wednesday Bushfires	1983	Multiple	VIC/SA	176,000,000	1,796,000,000
8	Severe Storm	2007	Multiple	NSW	1,480,000,000	1,742,000,000
9	Tropical Cyclone Madge	1973	Multiple	QLD/NT/WA	30,000,000	1,492,000,000
10	Tropical Cyclone Yasi	2011	Multiple	QLD	1,300,000,000	1,352,000,000

Source: Insurance Council of Australia website

Table 36: Largest confirmed hailstones in each New South Wales weather district to 2003

District	Largest confirmed hailstone (cm)	Year	No. of reports of hail >= 2cm (1990 to 2003)
Northern Rivers	14	1991	90
Mid-North coast	7.5	1908	7
Hunter	7.5	1907	99
Metropolitan	9.5	1824	110
Illawarra	9	1847	41
South Coast	5	2000, 1999, 1997, 1958	15
Northern Tablelands	8.5	1993	70
Central Tablelands	7	1995, 1986	70
Southern Tablelands	5.5	1994, 1972	29
Northwest Slopes	7.5	1912	49
Northwest Plains	6.3	1969	17
Central West Slopes	7	1958	27
Central West Plains	5.5	1906,1908	6
Southwest Slopes	6.3	2002	20
Riverina	7	1967	9
Upper Western	8	1889	5
Lower Western	5	1899	2

Source: Australian Bureau of Meteorology website

According to the Insurance Council of Australia the worst affected states for hailstorms are NSW, Victoria and Queensland and the worst months for damaging hail are from October to April, although hail can occur at anytime. AEMO does not collate statistics on hail.

Distributed generation refers to electricity that is produced at or near the point where it is used. Distributed solar energy can be located on roof tops or ground mounted. If Australia transitions to a national electricity system based on distributed solar energy, the networks will only be an electricity supplier of last resort to those premises with solar PV. What happens if thousands of homes and businesses across the NEM require network electricity as their solar PV system has been damaged by hail or an extreme wind event?

A report by SGS Economics and Planning estimated that three Sydney districts (including Sydney's CBD area), together contributed nearly one quarter of all the growth in Australia's economy in 2015-16. The three districts contain high value, knowledge intensive industries such as finance, IT, professional services, engineering, research, healthcare, marketing and media. The National Broadband Network (NBN) requires electricity to work. What would happen to Australia's economy if the national electricity system could not supply electricity to the NBN in these three Sydney districts? What would happen to small business in general if the NBN was down due to no electricity?

The problems a national electricity system would encounter if it was highly reliant on distributed solar generation is poorly understood. A glimpse of the complexity of issues that need to be addressed can be found in an electricity survey conducted in 2016 of the Daintree/Cape Tribulation community in Far North Queensland. The 600 strong community has never been supplied with electricity from the network and the issue of network supplied electricity has been topical for decades. Some of the issues not discussed by policy makers that needs to be considered is the Daintree/Cape Tribulation residents cleaned their solar panels every 4 months.

When was the last time you were on your roof? In Cairns it can cost $6 per panel to clean solar panels. Around a third of respondents said their roof would need to be replaced or repainted before the lifespan of the solar system. Around 75% of respondents had the trifecta of solar PV, generator and batteries. The median cost of their system was $40,000 and the average cost was $53,000. The median maintenance cost was $2,000 per year. Respondents plan to spend $12,000 (median) or $6,500 (average) on their system over the next 5 years. Over half located their batteries in their home. This can be a safety issue. A total of 61% said they would connect to the network if it was available.

The findings of the Daintree/Cape Tribulation Electricity Survey have implications for distributed solar generation throughout the NEM and needs to be considered before COAG actively promotes distributed solar generation. For example, COAG needs to consider policies on battery standards particularly in relation to their storage and disposal, the structural integrity of roofs that support solar PV and the level of output from a solar system that is not regularly cleaned. See Appendix 1 for the Daintree/Cape Tribulation Electricity Survey.

Droughts

There has been a growing interest in pumped hydro storage culminating in the Federal Government's announcement of a feasibility study into a $2 Billion expansion of the Snowy Mountains Scheme from 4,000 MW to 6,000 MW. The current and an expanded Snowy Mountains Scheme is reliant on cheap off-peak power to pump the water from the lower dam. It is also reliant on water.

The following is an excerpt from a Snowy Hydro media release on 20th December 2006:

"*Some facts on the current drought and its impact on Snowy Scheme storages are:*

- *The current drought sequence is now longer than the previous worst dry sequence which occurred from 1936 to 1946;*
- *Snowy Scheme water storage levels are currently at their lowest December level since the Snowy Scheme was completed in 1973;*
- *Water inflows from rain and snow melt have only been around 25% of long term average;*
- *Water inflows during the months of October and November were significantly below the previous lowest ever minimums – minimums recorded over 101 years - and were worse than could have been anticipated;*
- *December is anticipated to also provide well below average inflows and may prove to be the worst on record;*
- *At mid December, Snowy Scheme water storage levels are only around 17% of active storage capacity.*

Snowy Hydro Limited Managing Director, Mr Terry Charlton, said: "Because of the extremely low water inflow pattern over the last 10 years, water levels in the Snowy Scheme storages have steadily decreased since 1997. With no improvement to water inflows forecast in the foreseeable future, water storage levels in Snowy Scheme storages will continue to drop unless there is a marked improvement in rainfall over summer."

The extended period of drought prompted Snowy Hydro to investigate and confirm the effectiveness of cloud seeding for enhancing snowfall. After cloud seeding trials from 2004 to

2012, the absence of adverse environmental impacts were sufficient for the government to pass legislation for an ongoing operational cloud seeding program to commence from the winter of 2013.

Diversity of generation will provide a resilient national electricity system

In November 2015, Dubai announced its Clean Energy Strategy.

Under the strategy, Dubai aims to produce 25% of its energy requirements from clean sources by 2030 and 75% by 2050. The fifth pillar of the strategy is focused on creating an environment friendly energy mix comprising solar energy (25%), nuclear power (7%), clean coal (7%) and gas (61%) by 2030.

The strategy includes a solar park that will be the largest renewable energy project on a single plot in the world. The solar park aims to generate 5,000 MW by 2030.

The solar park is being developed in phases:

- First phase: 13 MW photovoltaic in October 2013 (152,880 panels covering 280,000m^2)
- Second phase: 200 MW photovoltaic in April 2017
- Third phase: 800 MW in total being 200 MW photovoltaic by April 2018, 300 MW by April 2019, 300 MW by April 2020
- Fourth Phase: 200 MW of concentrated solar power

The staged development allows the solar park to take advantage of new solar technology.

The third phase was awarded in June 2016 to a consortium that bid US$2.99 cents per kWh (approx. AU$4 cents per kWh) - the world's lowest recorded Levelised Cost of Electricity (LCOE) for a utility scale Solar Photovoltaic Independent Power Project.

In comparison, in September 2016 the Federal Government's Australian Renewable Energy Agency (ARENA) awarded $92 million to companies to install 12 new large scale solar projects using existing solar technology. One of the terms for the ARENA's funding is a LCOE of below $135/MWh (AU$13.5 cents per kWh).

The fourth phase of the 200 MW of concentrated solar power is part of a larger project which plans to generate 1,000 MW of concentrated solar power by 2030. The tender for consultancy services for the fourth phase was announced in June 2016.

The surprise inclusion in the Dubai Clean Energy Strategy was 7% for clean coal. A US$3.4 billion 2,400 MW ultra supercritical coal-fired power station will be built in 4 stages. The Engineering Procurement Contract was awarded in June 2016 for 600 MW to be operational by March 2020. Stages 2, 3 and 4 are planned to be operational by March 2021, March 2022 and March 2023. The back-up fuel is gas. The cost of the electricity generated by this ultra supercritical coal fired power station is USD4.5 cents per kWh (approx AUD6 cents per kWh).

The question arises; why would Dubai, a country with ample sunshine invest in clean coal and nuclear? The answer may lie in why Dubai needs to always have reliable electricity regardless of what weather events may impact on its electricity system. Dubai uses large quantities of electricity to desalinate water. No electricity would mean less water and that would be catastrophic for Dubai. Australia is not currently reliant on desalination for its water supply although commercial scale desalination plants do exist in Australia.

Can Australia's food, economic and defence security be maintained with a future national electricity system based on a generation mix that is not diversified?

The QEUN recommend that:

RECOMMENDATIONS

- Develop a strategic plan for a diversified generation mix located close to demand and able to provide affordable and reliable electricity to all consumers and resilient to droughts, hail storms, cyclones, extreme wind events, solar flares, bush fires, floods and cyber attacks
- Consider the findings of the Daintree/Cape Tribulation Electricity Survey together with the modelling of Cyclone Debbie statistics before planning a national electricity system reliant on distributed solar generation
- A review of battery standards particularly in relation to the safety aspects of their storage and disposal
- A review on whether AEMO is better placed than ARENA to coordinate the funding and therefore integration of renewable energy projects into the national electricity system to enable the National Electricity Market to function in a reliable and secure state

4.3.4 Investment in Technology to Reduce Emissions from Fossil Fuelled Power Stations

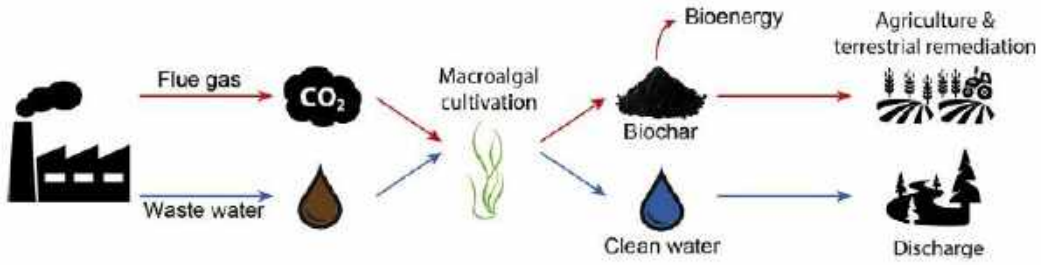
Hydro is not the only type of generation affected by droughts.

The 95 kilometre Boondooma Dam-Tarong Pipeline supplies cooling water to the coal-fired Tarong Power Station in Queensland. Recently Boondooma Dam dropped to below 70,000 ML which meant all the water remaining in the dam was reserved for the Tarong Power Station.

A carbon capture trial at Tarong Power Station is an example of emissions reduction research in action.

The concept of the bioremediation trial is best described in Figure 37.

Figure 37: Conceptual algal bioremediation model for coal-fired power stations



Source: Bioremediation for coal-fired power stations using macroalgae, Journal of Environmental Management, January 2015

The research was part of the MBD Energy's Research and Development program for Biological Carbon Capture and Storage, supported by the Advanced Manufacturing Cooperative Research Centre through the Australian Government's CRC Scheme and ARENA.

While the trial did not solve the quandary of carbon capture and storage, overall the research demonstrated that bioremediation of ash dam water with algae could reduce the concentration of heavy metal contaminants, allowing the power station to have zero discharge of contaminants from ash water within a decade. The long period of time required to reach zero

discharge is due to the stockpiled waste in the ash dam accumulated over the 30 year life of the power station. Importantly, the bioremediation rates of all contaminants exceeded the predicted rate of new metal inputs each year. Therefore, bioremediation can remediate the new inputs of contaminants released by a power station each year. This is important to a water limited industry such as coal-fired power production. It is also potentially good news for irrigators who share the same water supply as a coal-fired power station.

The Tarong pilot project shows that more research needs to be invested into reducing the emissions from coal fired power stations. Particularly, since coal continues to be the largest single fuel used for electricity generation worldwide. China and India are reported to be slowing down their construction of new coal-fired power stations but they will continue to operate their existing coal-fired power stations for decades to come. Hence, investing in carbon capture and storage research will benefit the entire world and meaningfully contribute to the reduction of global carbon emissions.

The QEUN recommend that:

RECOMMENDATION

- ARENA to actively invest in technology to reduce carbon emissions from fossil fuelled power stations.

4.3.5 Actively Invest in Renewable Energy Research and Pilot Projects

The mobile phone is an example of technology that has seen huge advances in recent times, from large expensive devices with limited capabilities to a 5G wrist watch that can perform a myriad of functions.

It is extremely important that the Finkel Review does not lock Australian consumers into a national electricity system based on expensive existing technology. This will make Australian industries uncompetitive in the global market due to high electricity costs.

Already there is evidence ARENA is subsidising the installation of existing technology.

In a pool of limited research funds, it is important that Australian researchers can access funding that will advance energy research and enable pilot projects to advance to a point of commercialisation across a range of renewable energy sources.

The QEUN recommend that:

RECOMMENDATION

- ARENA to actively invest in renewable energy and pilot projects to assist embryonic technology to progress to commercialisation across a range of renewable energy sources

5.0 Governance

Consumer organisations are struggling to compete with the financial and human resources available to COAG, state governments, regulatory entities, generators, networks and retailers. All the above are supposed to provide a national electricity system that is reliable, secure and affordable AND meets the needs of all consumers. This is all embodied in the National Electricity Objective. Clearly, the current power crisis is evidence that the limited input from consumers has resulted in rules and policies that fail to achieve the National Electricity Objective.

Consumer organisations across the NEM have minimal ability to hold to account the entities responsible for this broken national electricity system.

Consumer organisations have for the first time challenged the Australian Energy Regulator's network decisions at the Australian Competition Tribunal. The whole process cost consumers millions of dollars as ultimately the costs of the legal action is passed on to the consumers through power bills. The decisions of the Australian Competition Tribunal largely favoured the networks.

Consumer organisations across the NEM are disillusioned with their ability to challenge decisions made by the Australian Energy Regulator (AER). The AER recently determined the Tariff Structure Statements (TSS) for a number of networks across the NEM. We have been advised by Energy Consumers Australia that a challenge to the AER's TSS decisions would need to be made at the Federal Court, not the Australian Competition Tribunal.

Whereas on paper it appears consumers have the legal right to challenge, the reality is consumer organisations cannot singularly, or collectively, afford to engage legal opinion of the standard required to mount a challenge to the AER's TSS decisions at the Federal Court.

The relationship the AER has with consumers can be adversarial in nature as evidenced by Figure 38.

Strong experienced consumer advocates such as Hugh Grant should be encouraged not silenced.

The QEUN recommend that:

- COAG and all regulatory entities ensure a balanced representation of consumer organisations at the energy policy table which includes small business consumers and regional consumers together with low income residential consumers and big business consumers
- Consumers are appropriately resourced to challenge the decisions of regulators

Figure 38: Sunday Mail article, 22nd January 2017

Electricity monopoly Powerlink lobbies to have strong consumer advocate dumped from government advisory panel

Kelmeny Fraser, The Sunday Mail (Qld)
January 22, 2017 12:00am

STATE-OWNED electricity monopoly Powerlink lobbied to have an industry expert fighting to slash consumers' skyrocketing bills dumped from a government advisory panel.

Emails obtained by *The Sunday Mail* under Right to Information reveal Powerlink boss Merryn York personally lobbied the Australian Energy Regulator to axe expert Hugh Grant from an independent consumer panel assessing its latest revenue bid, sparking a two-week review despite no written complaint from Powerlink.

Mr Grant had gained a reputation as a tough consumer advocate while assessing Powerlink's spending plans up to 2022.

The electrical engineering graduate was chosen to serve on the regulator's consumer challenge panel when it was launched in 2013 to give consumers a voice in decisions on how much revenue the networks are allowed to recoup via householders' power bills.

Mr Grant was put on a sub-panel reviewing Powerlink's revenue bid because of his experience in the state's transmission network.

Ms York complained about his appointment during a "meet and greet" with AER chairwoman Paula Conboy in March 2015.

Ms Conboy wrote of the meeting in an email raising concerns about a "conflict of interest and perception of bias" because he had worked for Powerlink up until 2009.

"Powerlink is not comfortable ... and I have to admit, neither am I," she says in the email. "Hugh Grant (as you may know) is a former employee of Powerlink and is quite scathing of the company. I would rather not have him assigned to that subgroup."

AER chief executive Michelle Groves later emailed that Powerlink was "unhappy" and "want a different panel".

"Paula [Conboy] seems sympathetic to their position. Can we discuss how we can manage Hugh off and someone else on?"

Mr Grant responded to concerns by reminding the AER its own lawyer had cleared him of a conflict of interest 19 months earlier.

"Powerlink's reason for requesting my removal from the panel has nothing to do with conflict of interest," he wrote.

"They want me removed because they know that I will subject their revenue proposal to some robust challenges — challenges that they want to avoid at all costs." He warned it would signal the networks can dictate who is allowed to assess their proposals.

The AER later wrote to Ms York to reject "an actual conflict of interest" existed.

"Hugh worked for Powerlink seven years ago and left on amicable terms," it wrote.

An AER spokesman yesterday said it always took conflict of interest concerns seriously.

Ms York said the AER's guidelines state potential conflicts of interest should be reported. Mr Grant declined to comment.

Source: Sunday Mail newspaper, 22nd January 2017

6.0 Summary of Recommendations

Australia's food, economic and defence security, together with Australia's comfortable living standards, are all utterly dependent on finding a solution to this current power crisis.

The following QEUN recommendations will assist the Finkel Review to plan a future national electricity system that is reliable, secure, affordable, meets the needs of all consumers and is resilient to future weather events.

Recommendations to address the immediate problems of the national electricity system:

- Implement a Traffic Light System of notification to the consumer of potential load shedding
- A rule change to ensure that networks carry adequate insurance cover for natural disasters in the form of either an insurance policy or if self-insured, a locked reserve for natural disasters
- Collect statistics on the number of solar PV systems damaged by Cyclone Debbie
- Collect statistics on the length of time to reconnect business consumers with damaged solar PV as a result of Cyclone Debbie
- Collect statistics on the length of time to reconnect residential consumers with damaged solar PV as a result of Cyclone Debbie
- Collect statistics on the number of reported incidences of illegal repairs to damaged solar PV as a result of Cyclone Debbie

Recommendations to address the short, medium and long term problems of the national electricity system:

- Change the National Electricity Rules to stipulate that all retail offers throughout the National Electricity Market are in a standard format and include a standard glossary
- Remove cost reflective tariffs and instigate a process of tariff reform
- Introduce a food, fibre and manufacturing tariff throughout the National Electricity Market to take advantage of the parts of the network that have surplus electricity, particularly during daylight hours
- Develop and promote the use of energy efficiency apps for all consumers throughout the National Electricity Market
- Promote the adoption of more load controlled appliances through consumer friendly rules on smart meters
- Adopt a 24 month no harm policy for all consumers in relation to Time of Use tariffs
- Develop an education campaign to reduce air-conditioning demand during peak demand periods
- Overhaul the collection and reporting of energy statistics by the Australian Energy Regulator
- Consider regional Queensland as another jurisdiction until residential and small business consumers have effective retail competition in regional Queensland
- Stipulate that retail statistics are released 6 weeks after the completion of a Quarter
- Implement a review into the impact of Solar Power Purchase Agreements on the ability of the national electricity network and the large scale generators connected to the national network, to provide reliable and affordable electricity to all consumers during the transition to a renewable energy future
- Instigate rule changes that strengthen protections for the consumer against predatory marketing practices by exempt retailers on Solar Power Purchase Agreements

- Implement a review into whether consumer laws currently offer sufficient protection to consumers entering into a Solar Power Purchase Agreement
- Introduce rules to protect consumers against a failed retailer
- Introduce rules that limit the market power of gentailers
- Implement a review into the insurance implications of Solar Power Purchase Agreements
- Undertake an urgent investigation into the wholesale electricity market to understand why the National Electricity Rules are allowing the legal gaming of the wholesale electricity market
- Postpone the commencement date for competitive metering pending a study into the costs and benefits to consumers of the introduction of Time of Use meters in the NEM
- Remove state borders to develop a national electricity system
- Create map overlays estimating the short, medium and long term demand of consumers using National Metering Identifiers, public data, network data and market research using random sampling techniques and longitudinal research
- Consider the findings of the Daintree/Cape Tribulation Electricity Survey, together with the modelling of Cyclone Debbie statistics, before planning a national electricity system reliant on distributed solar generation
- COAG to implement policies on battery standards particularly in relation to their storage and disposal
- Develop a strategic plan for a diversified generation mix located close to demand and able to provide affordable and reliable electricity to all consumers and resilient to droughts, hail storms, cyclones, extreme wind events, solar flares, bush fires, floods and cyber attacks
- A review on whether AEMO is better placed than ARENA to coordinate the funding and therefore integration of renewable energy projects into the national electricity system to enable the National Electricity Market to function in a reliable and secure manner
- ARENA to actively invest in technology to reduce carbon emissions from fossil fuelled power stations.
- ARENA to actively invest in renewable energy and pilot projects to assist embryonic technology to progress to commercialisation across a range of renewable energy sources
- Ensure COAG and all regulatory entities have balanced consumer representation at the energy policy table which includes small business consumers and regional consumers together with low income residential consumers and big business consumers
- Consumers are appropriately resourced to challenge the decisions of regulators

7.0 Appendix 1:
Cape Tribulation / Daintree Electricity Survey

DAINTREE / CAPE TRIBULATION ELECTRICITY SURVEY

FAR NORTH QUEENSLAND ELECTRICITY USERS NETWORK

W S (Bill) Cummings
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38 Grafton St
CAIRNS QLD 4870

CUMMINGS ECONOMICS/
COMPASS RESEARCH
ABN: 99 734 489 175

January 2016

DAINTREE / CAPE TRIBULATION ELECTRICITY SURVEY

FAR NORTH QUEENSLAND
ELECTRICITY USERS NETWORK

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1. INTRODUCTION

1.1 General

At the request of the Far North Queensland Electricity Users Network, Compass Research, the market research arm of Cummings Economics, was asked, with funding support from Energy Consumers Australia Ltd, to carry out a survey of residents and businesses who were located in the Daintree Cape Tribulation area, north of Cairns, not connected to the ERGON/national electricity grid.

The aim of the survey was to identify how households and businesses actually reacted in a situation of not having grid power available, the technology adopted, the resulting costs and reliability issues.

Details of the Far North Queensland Electricity Users Network and its participants are included in Appendix 1.

1.2 The Daintree Cape Tribulation[1] Area - Background

The Daintree Cape Tribulation area north of Cairns has a special history in relation to electricity supply.

The coastline north of the Daintree River is backed by high mountains and covered, except for some cleared areas, in dense rainforest.

Although there are some areas of relatively flat land, they are limited and the barrier of the Daintree River and the need to cross the Alexander Range (see Map, Appendix 3) historically led to it being uneconomic to extend light rail lines into the area to support sugar cane farms to supply Mossman Mill. Historically, there was some clearing of land for farming, especially in the Cape Tribulation area, with various crops tried over the years with, otherwise cattle run on the cleared areas.

To this day, access to the area from the south is still via a ferry over the Daintree River.

The situation started to change in the 1960s, 70s and 80s as major expansion of tourism into the Cairns region commenced and the Daintree Cape Tribulation area (Daintree rainforests), developed as a tourism experience. The special qualities of the area with its dense rainforests and the Great Barrier Reef close offshore led to a major surge in visitor interest. This was heightened in the 1980s by a proposal to extend the then unsealed road to Cape Tribulation north to Bloomfield to connect with the unsealed road south from Cooktown to Bloomfield.

Environmental interests set up a blockade to try to stop the road being built attracting national and international media attention on a scale similar to the Franklin Dam issue in Tasmania. In the end, Douglas Shire built the road but the blockade site became something of a “shrine” for a backpacker trade.

About 1990, large parts of the area were included into the World Heritage Wet Tropics Management area.

[1] Note: The name Cape Tribulation was given by Lt James Cook in 1770 after his ship the “Endeavour” struck a coral reef in the area. After being re-floated with difficulty jetissing cargo and guns, it limped north to the current site of Cooktown for repairs.

Growing visitor numbers into the area along with development of accommodation and services and new residents moving in to develop lifestyle blocks led to requests to extend the electricity grid into the area.

Costs of extending the electricity grid into the area combined with pressure from environmentalists and tourism considerations resulted in the grid not being extended and the area being excluded from Ergon's service requirements.

However the road was subsequently sealed as far as Cape Tribulation to facilitate tourism access.

There has been, over the years, continuing requests by local residents to have the grid extended. As a result, it was important to explain in the introduction to this survey that the aim of the survey was not specifically to address that issue (although no doubt, the survey findings will have relevance to consideration of this question), but provide information to help national decision making on electricity supply issues.

1.3 Demographics of the Area

Census data for the Statistical Areas Level 1 3116417 and 3116409 covers the area in question (see Maps, Appendix 4).

The area not connected to the grid covers all of SA1 3116409 (Cow Bay and Diwan area). It also covers the coast section of SA1 3116417 from north of Diwan to Cape Tribulation. This leaves a substantial part of SA1 3116417 in the Daintree area that is connected to the grid. As part of the questionnaire/interview process, households and businesses in this area were excluded from the survey.

Census 2011 indicates that total households in the two relevant SA1s (including those connected to the grid) were as follows:

	No.	**%**	**(cf Australia)**
Family households	159	*58%*	(72%)
Single and lone households	99	*36%*	(24%)
Group households	15	*5%*	(4%)
Total	**273**	***100%***	**(100%)**

The area has a high proportion of single and one person households and lower family households.

The following gives age profile.

Years	**Cape Trib/Daintree**	**(cf Australia)**
0 - 14	13.3%	(19.3%)
15 - 29	10.4%	(20.3%)
30 - 49	40.1%	(28.1)
50 - 64	26.7%	(18.3)
65 plus	9.4%	(14.0%)

The indications are that the population is dominantly in the 30 – 49 and 50 – 64 age range 66.7% (cf Australia 46.4%) and low in children and young up to 29 and low in over 65.

The following compares median weekly incomes.

	SA1 3116409	SA1 3116417	(cf Australia)
Personal	$460	$531	($77)
Family	$739	$1,052	($1,481)
Household	$700	$955	($1,234)

Median incomes are thus substantially below national averages, especially in the SA1 3116409 covering Cow Bay/Diwan.

1.4 Methodology

The survey was conducted by telephone using experienced interviewers and a set questionnaire.

A telephone book setting out numbers in the Douglas Shire area was used to help identify residents and businesses in the area. Numbers were called up to three times in the process of the survey. Responses were recorded direct into a data base using a CATI type system. Some 192 were identified excluding those ascertained to be on the grid or disconnected.

Some 100 interviews were carried out. Of the remaining 92, 41 were on answering machines and 13 no answer despite call-backs, 2 were on fax, 3 were call-backs not finalised by time of wind-up and 1 not in the required category. There were 32 refusals.

1.5 Questionnaire

The questionnaire used is given as Appendix 2. It was developed in consultation with key members of the Far North Queensland Electricity Users Network with some advice received from some electricity users in the Daintree Cape Tribulation area.

1.6 Timing

Interviewing was carried out over the period 15th December to 22nd December 2015 and 13th January to 15th January 2016.

1.7 Accuracy

Total sample achieved was 100 residences and businesses.

However a sample of 100 in this situation represented more than 1 in every 2 households in the survey area not on the grid. Most businesses were run from or attached to residences in the area and only 4 identified were separate.

A random sample of 100 in a population of 200 has a 6.95% level of variance at a 95% degree of confidence when results are about 50% one way and 50% the other way.

2. SAMPLE CHARACTERISTICS

2.1 Sample Level

A total sample of 100 was achieved out of an estimated population of households/businesses not connected to the grid of the order of about 190 in locations as follows.

Table #1: Q1 – Location

Cape Tribulation	26
Cow Bay	37
Diwan	22
Forest Creek	11
Kimberley	2
Thornton Beach	2
Total	**100**

2.2 Residents/Businesses

Table #2: Q2 – Residents/Businesses

	No.	%
Residents only	71	*71%*
Residents/Businesses	25	*25%*
Businesses only	4	*4%*
Total	**100**	***100%***

While 29 businesses were identified, only 4 operated separately to residences with 25 mixed residential and business. Some businesses were, at times, mixed with a number of different activities. The following table groups by main activity.

Table #3: Q3a – Type of Business

Tourism	
B&Bs	8
Resorts/hotel	4
Holiday lets/cabins	2
Restaurants/cafes/food	4
Attractions	3
Farms (including farm stay)	4
Construction	
Construction	1

2.3 Businesses Employment

The following gives peak number of people employed in businesses including owners/family members/casuals.

Table #4: Q3b – Numbers Employed at Peak by Businesses

Peak employment No.		No.	%
1	7	13	46%
2	7		
6	3	6	21%
7	1		
8	2		
10	1	5	18%
11	2		
12	2		
16	1	4	14%
20	1		
22	1		
25	1		
Total		28	100%

Almost half had only 1 or 2 employed. However 14% employed over 15 and average per business was 7.1.

The following gives details of combination for businesses by whether business only or business/residential by size as per numbers employed.

Table #5: Q2 x 3b – Business Only & Business/Residence by Employment Size

	Employees	No.
Business Only	15 plus	2
	10 - 14	1
	5 - 9	0
	Less than 5	1
Business/Residence	15 plus	2
	10 - 14	4
	5 - 9	6
	Less than 5	13

Two of the 4 respondents in the larger employment category (15 plus) were “Business only” and two “Business/Residence”.

2.4 Household Numbers – Adults and Children

Households were asked how many adults in the household and how many children.

Table #6: Q3c – Household Numbers, Adults

No. of adults in household	No. of households	
	No.	%
1	24	25%
2	61	64%
3	3	3%
4	3	3%
5+	4	4%
Total	**95**	**100%**

Some 25% were single adult households (cf Census 2011 36% of the population), indicating a tendency for the survey to have had a lower response from single/lone person households.

Mean and average number was 2 per household.

Table #7: Q3c – Household Numbers, Children

No. of children in household	No. of households	
	No.	%
1	5	25%
2	8	64%
3	3	3%
Total	**16**	**100%**

Some 16 households indicated they had children with none recorded with more than 3 children and average number 1.9 per household with children.

Average number of total persons per household was 2.3.

2.5 Age and Gender of Respondents

The questionnaire asked to speak to the person in the household (if available) most familiar with the electrical system. Some 65% of respondents were male.

Age groups were as follows.

Table #8: Q36 – Age Groups

Years	No.
30 - 34	3
35 - 44	12
45 - 54	23
55 - 64	41
65 plus	20
Not recorded	1

The sample had an older profile than the general community (see Table Page 6)

2.6 Employment Where

The following gives place of work.

Table #9: Q35 – Main Place of Employment

Home	6%
In Daintree	51%
Out of Daintree	22%
Retired	19%
Don't work/unspecified	2%
Total	**100%**

About 20% were retired or didn't work. Of those working, 28% worked outside of the Daintree area. Note: Most would probably work in Mossman or Port Douglas.

2.7 Length of Residence

The following summarises length of residence in the Cape Tribulation/Daintree area.

Table #10: Q34 - Length of Residence in Area

2 – 4 years	10
5 – 9 years	15
10 – 14 years	19
15 – 19 years	14
20 – 24 years	16
25 – 29 years	10
30 – 34 years	10
35 plus years	5
Not specified	1

Only 10% were less than 5 years.

Modal group was 10 – 14 years. Median group was 15 – 19 years. Average was 17.4 years.

3. Power Systems

3.1 Power Generation Systems Used

The following gives responses.

Table #11: Q4 – Detailed List of Responses

	No.	%
Diesel generator	3	*3%*
Diesel generator/Gas	8	*8%*
Diesel generator/Petrol generator/Gas	1	*1%*
Petrol generator	3	*3%*
Petrol generator/Gas	3	*3%*
Solar	2	*2%*
Solar/Diesel generator	9	*9%*
Solar/Diesel generator/Gas	19	*19%*
Solar/Diesel generator/Hydro	1	*1%*
Solar/Diesel generator/Hydro/Gas	2	*2%*
Solar/Diesel generator/Petrol generator	6	*6%*
Solar/Diesel generator/Petrol generator/Gas	6	*6%*
Solar/Hydro/Gas	1	*1%*
Solar/Petrol generator	15	*15%*
Solar/Petrol generator/Gas	19	*19%*
Solar/Petrol generator/Hydro/Gas	1	*1%*
Solar/Petrol generator/LPG gas generator	1	*1%*
Total	**100**	***100%***

Ignoring gas, the above simplifies into:

Table #12: Q4 – Power Systems Used

Power Systems	No. of respondents
Solar/generator	79
Generator only	18
Other	3
Total	**100**

Thus apart from the 3 “Other”, all had generators.

“Other” were solar only 2, and 1 solar hydro gas.

Within the generator only group of 18, there were 12 (67%) that supplemented with “gas”. With the solar/generator group of 79, there were 49 (62%) who also had gas. Within that group, there were 3 with hydro, making 4 in total with hydro.

Of the generators, a number had more than one type, with total:

Diesel	57
Petrol	55
LPG	1
Total	**113**

The following analyses by business/residence.

Table #13: Q4 by Q2 – Power Systems by Business/Residence

		No.	%
Generator	Business	2	*2%*
	Resident	8	*8%*
	Resident/Business	8	*8%*
Other	Resident	2	*2%*
	Resident/Business	1	*1%*
Solar/Generator	Business	2	*2%*
	Resident	61	*62%*
	Resident/Business	16	*15%*
Total		**100**	***100%***

Analysis of this table indicates that 32% of the businesses had generator only while only 11% of the residents had generators only.

The following analyses those businesses with generators only by size of business.

Table #14: Q4 by Q3b – Business Respondents, Generators Only, by Size (Employees)

		No.
Generator	Very small	3
	Small	3
	Medium	4
	Large	1
Other		Nil
Solar/generator	Very small	11
	Small	2
	Medium	1
	Large	**3**

The table indicates that among the businesses with generator only, some 6 were in the small and very small category.

Of the medium businesses, 4 were generator only out of 5. However 3 out of 4 of the larger businesses had solar as well as generators.

3.5 Power Voltage

Table #15: Q5 – Power Voltage Used

Voltage	No. of respondents
12	4
24	23
48	3
240	66
415	3
Not specified	1
Total	**100**

Although 240 volt dominates at 66%, there is a substantial number 23% on 24 volt and a few 12, 48 and 415.

Table #16: Q5 x Q2 – Power Voltage by Business/Residence

	Voltage						
	12	24	48	240	415	n/a	Total
Business	0	0	0	3	1	-	**4**
Business/Resident	1	11	1	9	-	-	**22**
Resident	3	12	2	54	-	1	**72**
Total	**4**	**23**	**3**	**66**	**1**	**1**	**98**

As might be expected, the four business only were on 240 (3) and 415 (1). Surprisingly, a substantial proportion of the business/resident respondents were on 12, 24, or 48 volts – more than the number of those on 240 volts.

3.6 Gas Use

As indicated by Section 3.1, almost all respondents use gas, mainly for cooking but heavily for "hot water".

Table #17: Q5 – What Use Gas For

	No.	%
Cooking	99	*99%*
Hot water	75	*75%*
Refrigeration	6	*6%*

3.7 Solar

3.7.1 General

Some 77% use solar with 19% saying no and 4% no response, ie. of those responding to the question, 20% do not use solar at all.

3.7.2 How old solar panels

Table #18: Q6 – How Old Solar Panels

Years	No.	%
0.3	3	*3%*
0.6	3	*3%*
1	3	*3%*
2	3	*3%*
3	2	*2%*
4	1	*1%*
5	2	*2%*
6	2	*2%*
7	3	*3%*
8	7	*7%*
9	1	*1%*
10	10	*10%*
12	8	*8%*
15	13	*13%*
16	2	*2%*
17	2	*2%*
19	2	*2%*
20	8	*8%*
21	1	*1%*
22	1	*1%*
28	1	*1%*
No solar	22	*22%*
Total	**100**	***100%***

Modal group was 15 years. Median was 10 years and average was 11.2 years.

3.7.3 How often clean solar panels

Table #19: Q6 – How Often Clean Solar Panels

Times a year	No.	%
na	23	*23%*
0	8	*8%*
1	17	*17%*
2	10	*10%*
2.4	1	*1%*
3	3	*3%*
4	2	*2%*
12	9	*9%*
24	9	*9%*
36	11	*11%*
52	1	*1%*
72	4	*4%*
144	1	*1%*
156	1	*1%*
Total	**100**	***100%***

Median was 3 times a year, ie. every 4 months. However because of a few washing every 2 to 3 days, the average is 18 times a year.

Interviewer feedback indicates that those washing frequently probably have their panels at ground level and not on a roof.

3.7.4 Will roof need replacing or repainting before the life span of solar system

Table #20: Q8 – Roof Needs Replacing or Repainting Before Current Life Span

	No.	%
No	50	*68%*
Yes	24	*32%*
Total	**74**	***100%***

About a third said, "Yes".

3.8 Batteries

Table #21: Q9 – Use Batteries for Storage

	%
Yes	86%
No	13%
No response	1%
Total	**100%**

Some 86% use batteries.

Table #22: Q10 – Type of Batteries Mentioned

	No.	*% of respondents*
Lead	69	*80%*
Gel	17	*20%*
Calcium	1	*1%*

There was one response that said both "lead" and "gel". While 80% said "lead", a significant 20% said "gel".

Table #23: Q10 x Q4 – Use of Batteries by Type of Power System

	No.	%
Generator (no batteries)	12	*12%*
Generator/Gel	1	*1%*
Generator/Lead	5	*5%*
Other/Gel	1	*1%*
Other/Lead	2	*2%*
Solar/Generator (no batteries)	2	*2%*
Solar/Generator/Calcium	1	*1%*
Solar/Generator/Gel	14	*14%*
Solar/Generator/Lead	61	*61%*
Solar/Generator/Lead/Gel	1	*1%*
Total	**100**	***100%***

Most of those who use generators only (12 of 18, ie. 67%) do not use batteries. This compares with those with solar/generator and other, where only 2 out of 82, ie. 2% do not use batteries.

Table #24: Q10 – How Often Replacing Batteries

Years	No.	%
0	1	*1%*
1	4	*4%*
2	2	*2%*
3	1	*1%*
4	2	*2%*
5	5	*5%*
6	1	*1%*
7	6	*6%*
7.5	1	*1%*
8	4	*4%*
9	3	*3%*
10	20	*20%*
11	4	*4%*
12	11	*11%*
13	1	*1%*
20	1	*1%*
15	1	*1%*
No response	32	*32%*
Total	**100**	***100%***

Modal was 10, median was 10, but average was 8.7 years.

Table #25: Q11 – Considering Purchasing Lithium Batteries

	%
Yes	34%
No	36%
Don't know	15%
Not applicable (don't use batteries)	15%
Total	**100%**

A significant proportion said, Didn't know, but over a third were considering.

Respondents were asked, "Why?" their response.

The following table summarises responses by whether they said "Yes" or "No" and the current type of batteries they have.

Table #26: Q11 – Considering Purchasing Lithium Batteries in the Future - Why

Yes		**No.**	*%*
Gel	Cost	3	*4%*
	Performance	2	*3%*
Lead	Cost	8	*10%*
	Performance	11	*14%*
	Lifespan	3	*4%*
	Maintenance	5	*6%*
No			
Gel	Cost	3	*4%*
	Maintenance	1	*1%*
Lead	Cost	14	*18%*
	Limited Lithium resources	1	*1%*
	Limited knowledge	4	*5%*
	Better technology future	1	*1%*
	Heating issues	1	*1%*
	Efficiency / reliability	3	*4%*
	Prefer Gel	4	*5%*
	Maintenance	1	*1%*
DK			
Gel	Price	1	*1%*
	Limited knowledge	1	*1%*
Lead	Limited knowledge	6	*8%*
	Better technology future	3	*4%*
	Efficiency / reliability	1	*1%*
	Cost	1	*1%*
Total		**78**	***100%***

The table indicates that those who said "Yes" mostly said "Better performance" followed by "Cost". Those who said "No" mentioned "Cost". Those who "Didn't know" recorded "Limited knowledge" and "Better technology in the future".

Table #27: Q12 – How Charge Batteries

	%
Solar	74%
Generator	75%
Hydro	5%

Responses indicate that many use both solar and generator to recharge batteries.

Table #28: Q13 – Where Batteries Located

	No.	**%**
Home	48	*55%*
Away from home		
In shed	21	*24%*
In separate structure	19	*22%*
Total	**88**	***100%***

Over a half had batteries in their home.

4. COST OF POWER SYSTEM

4.1 Amount Spent on System or Replacement Value

Table #29: Q14 – The Amount Spent on Power System to Date or What is Replacement Value

	No.
$0 - $5,000	6
$5,000 - $9,000	5
$10,000 - $19,000	11
$20,000 - $29,000	15
$30,000 - $39,000	9
$40,000 - $49,000	7
$50,000 - $59,000	13
$60,000 - $69,000	5
$70,000 - $79,000	7
$80,000 - $89,000	3
$90,000 - $99,000	0
$100,000 - $190,000	10
$200,000 - $300,000	5
Not applicable/no response	4
Total	**100**

Amounts ranged from $100 to $300,000. Median was $40,000. Average was $53,000. Total amount is $5.1 million.

Thus, indications are that given that the sample does not cover all households and businesses, it can be expected that investment in households and businesses supplying their own system is probably of the order of $8 - $10 million.

4.2 Government Subsidies

Table #30: Q15 – Received Subsidies

	Federal	Queensland State
Yes	30	22
No	48	47
Don't know	22	31
Total	**100**	**100**

Some 30% said they received Federal Government subsidies, 48% said they didn't and 22% didn't know.

Some 22% said they had received State subsidies, 47% said they didn't and 31% didn't know.

Table #31: Q15.1 – Summary of Subsidies Received

Amount	No.
$1,000 - $9,000	9
$10,000 - $19,000	22
$20,000 - $29,000	6
$30,000 - $39,000	2
$40,000	1
$50,000	1
Total	**41**

The 41 who said they received subsidies recorded a total of $670,500. Median was $15,000 and average was $16,400.

4.3 Expect to Spend on System over Next 5 Years

Table #32: Q16 – Summary – Amount Expect to Spend on System Over Next 5 Years

Amount	No.
$0 - $1,000	12
$1,500 - $3,000	8
$4,000 - $6,000	11
$6,500 - $10,000	12
$12,000 - $20,000	25
$25,000 - $50,000	17
$80,000 - $100,000	3
Total	**88**

Of the 88 who responded, median was $12,000, total spending $575,000 and average $6,500.

4.4 Maintenance Cost of System

Table #33: Q17 – Approximate Maintenance Cost of System

$ per annum	No.
Nil	4
100	3
200	2
250	1
300	3
500	2
600	1
780	1
1000	9
1200	5
1800	3
2000	10
2400	1
2500	3
2600	2
3000	3
3600	4
4000	2
4800	1
5000	5
6000	2
7000	1
7800	1
8000	1
9600	1
14400	1
15000	1
15600	1
18000	1
24000	1
60000	1
120000	1
NA/No response	21
Total	**100**

Median was $2,000. Total for 79 responding was $438,000. Average due to a few very large responses was much higher at $5,540.

5. GOOD AND BAD THINGS ABOUT SYSTEM

Respondents were asked about the good and bad things of the systems. Appendix 5 lists detailed responses. The following tables summarise.

Table #34: Q18 – Summary of What is Good About Your System

Generator	No. of Mentions		
Consistent / reliable	10	9%	77%
No power bill	2	2%	15%
Cheaper	1	1%	8%
Total	**13**	**12%**	**100%**
Generator/Battery			
Consistent / reliable	2	2%	50%
Eco / clean energy	2	2%	50%
Total	**4**	**4%**	**100%**
Solar/Generator/Battery			
Self reliant	26	24%	28%
Consistent / reliable	25	23%	27%
Eco / clean energy	14	13%	15%
Efficiency	11	10%	12%
Nothing	5	5%	5%
Economical	5	5%	5%
Minimal weather concerns	3	3%	3%
Total automated	2	2%	2%
Energy consumption awareness	1	1%	1%
Air-conditioning	1	1%	1%
Total	**93**	**85%**	**100%**
Overall Total	**110**	**100%**	

The indications are that almost all those on generator without solar say the good thing is that it is consistent and reliable.

For those with solar in the system, there was a high proportion who said self-reliance 28%, ecoclean friendly 15%. However 27% said consistent/reliable and 12% efficiency.

Table #35: Q18 – Summary of What is Bad About Your System

Generator	**No. of Mentions**		
Constant maintenance	5	4%	20%
Fuel Costs	5	4%	20%
Maintenance cost	3	2%	12%
Reliant on fossil fuels	2	1%	8%
Appliance limitations	2	1%	8%
Generator issues noise / emissions / costs	2	1%	8%
Setup / replacement costs	2	1%	8%
Brownouts	1	1%	4%
Nothing	1	1%	4%
Operating knowledge issues	1	1%	4%
No Air-conditioning	1	1%	4%
Total	**25**	**18%**	**100%**
Generator/Battery			
Generator issues noise / emissions / costs	4	3%	40%
Fuel cost & transportation	2	1%	20%
Nothing	2	1%	20%
No government assistance	1	1%	10%
Constant maintenance	1	1%	10%
Total	**10**	**7%**	**100%**
Solar/Generator/Battery			
Appliance limitations	26	19%	25%
Constant maintenance	19	14%	18%
Setup / replacement costs	18	13%	17%
Maintenance cost	12	9%	11%
Generator issues noise / emissions / costs	8	6%	8%
Service provider problems	5	4%	5%
Operating knowledge issues	4	3%	4%
Nothing	4	3%	4%
Reliant on fossil fuels	4	3%	4%
Fuel cost & transportation	2	1%	2%
No government assistance	1	1%	1%
Everything	1	1%	1%
Lightning strikes	1	1%	1%
Total	**105**	**75%**	**100%**
Overall Total	**140**	**100%**	

Responses were much more dispersed than the “Good” things. Among those with generators without batteries, constant maintenance and maintenance costs were high and fuel costs. For those with generator and batteries, “Noise, emissions and fuel costs” led. For those with solar, “Appliance limitations” was highest and with constant maintenance, setup and replacement costs also high.

6. GENERATORS

6.1 Use of Generators

Respondents were asked how many hours they ran their generators in "Winter", "Early summer" and "Wet season". Some 78% said they used generators. The following table for the winter months illustrates the wide spread of responses.

Table #36: Q20 – Hours Run Generator per Week – Winter Months

Hours per week	No.
0.50	1
0.75	1
1.00	1
1.25	2
1.50	1
2.00	1
2.50	1
3.00	7
4.00	3
5.00	8
6.00	2
6.25	1
7.00	5
8.00	2
10.00	2
11.00	2
12.00	1
14.00	4
20.00	1
21.00	2
25.00	3
28.00	2
35.00	2
56.00	2
66.50	1
70.00	3
90.00	2
112.00	5
154.00	7
168.00	1
NA/No response	22
Total	**100**

Early summer and wet season ranges were similar.

For winter, median group was 11 hours a week (ie.1.6 hours a day). However because of some running at or towards 24 hours a day, average was 40 hours (ie. 5.7 hours a day).

The following table sets out average hours run per day by whether business or residential and at different times of the year.

Table #37: Q20 – Average Hours Run Generator per Day

	Winter months	Early summer	Wet season
Business only	17.1	17.1	17.1
Business/Resident	9.9	9.4	10.0
Resident only	3.7	3.3	4.4
Overall Average	**5.7**	**5.3**	**6.1**

It can be seen that there are substantial differences between businesses and residents with businesses only running an average of 17.1 hours a day, ie. 120 hours a week whereas residents only average about 3 – 4 hours a day.

There is a variation between seasons with lowest being early summer when sun intensity is high and cloud cover low. Wet season is the highest with cloud cover high along with hot humid conditions.

7. ESTIMATED COST OF POWER

Respondents were asked how much they believed their power was costing them.

Only 40 of the sample were able to respond with the following results.

Table #38: Q21 – How Much Power Costing Per Annum

Cost pa	No.
$72	1
$200	1
$350	1
$400	1
$1,000	2
$1,200	2
$1,300	1
$1,560	3
$1,606	1
$1,800	1
$2,000	1
$2,080	1
$2,400	1
$2,500	1
$3,000	2
$3,500	1
$3,640	1
$3,900	1
$4,000	1
$4,160	1
$4,927.5	1
$5,000	1
$6,000	1
$7,280	1
$8,840	1
$10,000	1
$24,000	1
$31,200	1
$42,000	1
$43,800	1
$73,000	1
$80,300	1
$90,000	1
No response	62
Total	**100**

Average amount spent was $12,509.

Table #39: Q21 – How Much Power Costing Per Annum

	$
Average Residence	$2,365
Average Business	$29,899
Average Total	**$12,l509**

Only a very few could give an estimate of how much power was costing them per kwhr as follows.

Table #40: Q22 – Cost of Power per Hour

Hours per week	No.
80 cents	1
60 cents	2
55 cents	1
20 cents	1
15 cents	1
Total	**6**
No response	92
Overall Total	**100**

8. ATTITUDE TO GRID POWER DELIVERY SYSTEMS

8.1 Micro Grid

Respondents were asked, *"If an off-grid local area power network (micro grid) was set up in your area based on renewable sources that you could join, what would be needed to convince you to connect to it?"*

Few could respond re price. Other factors mentioned are set out in Appendix 6. The following summarises.

Table #41: Q23 – Summary of Factors to Convince to Connect to Local Area Micro Grid

	No.	%
Affordability / cost effective / economical / cheaper	46	*46%*
Reliability	29	*29%*
Would connect / relief / nothing / love it	19	*19%*
Don't want / wouldn't connect / more bills	8	*8%*
Environment factors / trees / bio diesel / technology	7	*7%*
Subsidies / government	5	*5%*
Tariff rates	4	*4%*
Cost without it / maintenance / emissions	4	*4%*
Could feed back / paid / rebate	4	*4%*
Convenience	4	*4%*
Don't know	4	*4%*
Would connect / keep existing system	3	*3%*
Accessibility / availability	3	*3%*
Nothing / wouldn't work / too remote	3	*3%*
Community support	1	*1%*
No limitations	1	*1%*
Total	**100**	***100%***

Comments about "Affordability cost" led followed by "Reliability" and then positive comments about "Would connect" and the like. Only 8% said that they "Didn't want it/wouldn't connect".

8.2 Grid Power

Table #42: Q24 – Attitude to Connecting to Grid, if a satisfactory off-grid local network was not available

	Sample	Of those responding
Yes	61%	69%
No	28%	31
No response	11%	-
Total	**100%**	**100%**

Some 69% of those with an opinion were in favour and 31% against.

Table #43: Q24 – Grid Connection by Residents/Businesses

	Yes	No	Don't know	Yes of those Yes or No
Residents only	56%	28%	15%	67%
Businesses	72%	28%	Nil	72%

The "Don't know" were all residents only. Of those with an opinion, businesses recorded 72% "Yes" and residents only 68%.

9. LIMITATIONS OF SYSTEMS

9.1 Air-conditioning

Table #44: Q25 – Have Air-conditioning

	No.	%
Yes	14	*14%*
No	84	*84%*
No response	2	*2%*
Total	**100**	***100%***

Only 14% have air-conditioning. Of the 14 who had air-conditioning, 8 said that the capacity of their system limited its use.

9.2 Other Appliances

Table #45: Q27 – Because of Capacity of System – Do not have appliances or limit use of appliances (other than air-conditioning)

	%
Yes	73%
No	23%
No response	4%
Total	**100%**

Some 73% said yes.

Table #46: Q28 – Have to Buy Appliances Specifically Designed to Suit Power Generation System

	%
Yes	71%
No	27%
No response	2%
Total	**100%**

Some 71% have to buy specifically designed appliances.

Table #47: Q28 – Have to Buy Appliances Specifically Designed to Suit Power System by Voltage

	% Yes
12 volt	75%
24 volt	96%
48 volt	67%
240 & 415 volt	64%

Those on 24 volt especially had very high “Yes” responses.

9.3 Need to Check System

Table #48: Q29 – Need to Have Neighbours/Other Regular Check System When Go Away

	%
Yes	56%
No	40%
No response	4%
Total	**100%**

The majority of systems need to be regularly checked while owners away.

9.4 Household Numbers Able to Operate System

Table #49: Q30 – Are All Members of Household /Business Capable of Operating System

	%
Yes	70%
No	26%
No response	4%
Total	**100%**

About a quarter had members of household/business who couldn't operate the system.

9.5 Safety

Table #50: Q31 – Have You Had Any Safety/Accident Incidents with Current System

	%
Yes	11%
No	87%
No response	2%
Total	**100%**

Some 11% had safety/accident incidents.

9.6 Maintenance of System

Table #51: Q32 – Who does Maintenance of Your System

	%
Self	76%
Other	18%
Friend	3%
Professionals	65%

Some have a combination with 35% not using professionals.

10. DESIGN AN IDEAL SYSTEM

Table #52: Q33 – If Could Design Ideal system, What Would It Be – Mention of Elements

	%
Solar	60%
Back-up generator	44%
Main grid	37%
Hydro	27%
LAPN/Micro grid	20%
240°	9%
Wind	8%
Lithium	6%
Generator	5%
Other	3%
Lead acid	2%
Computer controlled	
Gel batteries	2%
Storage battery system	2%
Inverter	1%
Gravity fed	1%
Grid connection	1%
Renewable	1%

Most commonly mentioned were solar, back-up generators, main grid, hydro, LAPN/micro grid.

DAINTREE / CAPE TRIBULATION ELECTRICITY SURVEY

APPENDICES

DETAILS FAR NORTH QUEENSLAND

ELECTRICITY USERS NETWORK (FNQEUN)

The following is a list of organisations involved in the FNQ Electricity Users Network:

1. Cairns Regional Council
2. Tablelands Regional Council
3. Cook Shire Council
4. Far North Queensland Regional Organisation of Councils
5. Advance Cairns
6. Tourism Tropical North Queensland
7. Regional Development Australia FNQ & Torres Strait
8. Cairns Chamber of Commerce
9. Mareeba Chamber of Commerce
10. Atherton Tablelands Chamber of Commerce
11. Innisfail District Chamber of Commerce, Industry and Tourism
12. Urban Development Institute of Australia (Cairns branch)
13. Consolidated Tin Mines Ltd
14. Tableland Canegrowers
15. North Queensland Miners Association
16. Australians in Retirement (Cairns branch)
17. Queensland Dairyfarmers Organisation (Northern Division)
18. Canegrowers – Tablelands
19. Mareeba District Fruit and Vegetable Growers Association

APPENDIX 2

QUESTIONNAIRE

compassresearch.net.au

Hello my name is [▾] *of Compass Research Cairns. We are carrying out research into electricity and power systems on behalf of Energy Consumers Australia.*

Could I speak to the person in the household or business who is most knowledgeable about your electricity power systems?

This research survey is not aimed at the question of whether the electricity power grid should be extended into the Daintree area or not. It is about how households & businesses operate separately from the national power grid, and it is to help develop government policies on how electricity can be supplied to households and businesses throughout Australia in the future.

Individual responses are confidential and inputs only into an overarching report providing the findings. It should only take about 10 minutes of your time.

Could I just confirm that you are not connected to the grid? ***(If connected, terminate survey)***

Reset

Q1. First, could I just check the area you live in?

- ○ Cape Tribulation
- ○ Cow Bay
- ○ Diwan
- ○ Forest Creek
- ○ Kimberley
- ○ Thornton Beach
- ○ Other [ ]

MAP

Q2. What type of user are you?
(Note if business or residential on separate systems, complete two different responses.)

- ○ Resident only
- ○ Business only
- ○ Residence & Business combined

Q2.1. Is your network shared? all or part shared?

- ○ Not shared
- ○ All shared
- ○ Part shared

Q3a. What is the nature of your business? [ ]

Q3b. Total employed at peak (including owners/family members/casuals)? [ ]

Q3c. How many people reside at your household?

- Adults [▾]
- Children [▾]

Q4. Which of the following power generation systems do you use?

1.Diesel generators, Petrol generators, Solar panels, Gas, Wind, Hydro, Anything else? ***(include multiples)***

2.Is it fixed or portable?

3.What size or power output does it generate? Watts, Kilowatts or Kilovolt Amps/kVA
(if solar and in doubt, what is on the inverter (kW) or how many panels)(rated)

4.***For solar only*** How many solar panels do you have installed?

5.***For part shared only*** Is that power source/generater/solar part shared?

Do you have any other sources for power generation?

Power generator	Fixed or Portable	Output No (rated)	Output type	Panels No/Gas yearly	Other specify:	Part shared

Q5. What voltage is your house running on? ***(Appliances)***
DC = Direct current, AC = Alternating current
3 Phase = 3 wires of alternating current (240) to deliver more power, industrial usage

○	12 volt DC
○	24 volt DC
○	48 volt DC
○	240 volt AC
○	415 volt (3 phase)
○	Other
○	Not sure / don't know

IF gas used What do you use your gas for?

The regular household cooking	☐
Hot water system	☐
Refrigeration	☐

Does the household / business use solar panels?

Yes	○
No	○

Q6. How old are your solar panels? ____ *years.months*

Q6.1.*Only if solar panels are older than 15 years old*
Can we contact you again regarding your solar panels for further research?

Yes ☐

Q7. How often do you carry out maintenance / cleaning of your solar panels? ____ ▾

Q8. Will your roof need replacing or painting before the current life span of your solar system?

Yes ○
No ○

Q9. Do you use batteries for storage?

Yes ○
No ○

Q10. What type of batteries do you use & how many & how old & lifespan*(Lead acid, Lithium, Other) (age years.months)*

Type	Qty	Age	Lifespan
▾			
▾			
▾			
▾			

Other: ____

Q10.1.How often do you find yourself replaceing your led acid batteries? ____ *years.months*

Q11.Are you considering purchasing lithium batteries in the future?

○ Yes
○ No
○ Don't know

Why?

Q12. How do you charge your batteries?

☐ Via solar
☐ Via generator
☐ Via wind
☐ Via hydro

Q13. Where are your batteries located?

☐	Inside or adjoined to house or business
☐	Away from house business in general shed
☐	Away from house business in special structure

Q14. About how much do you think you have spent on your power system to date or what is the replacement value?

$ ____

Q15. Did you receive any Govt subsidies to purchase your power system?

Government	Yes	No	Don't know
Australian Federal	○	○	○
Queensland State	○	○	○

Q15.1. Approximatly what is the total amount of subsidies you recieved?

$ ____

Q16. Excluding operating costs about how much do you expect to spend on your power system in the next 5 years?

$ ____

Q17. Approximatly what is the overall maintenance cost of your system?

Cost	Per
$ ____	▾

Q18. What are the good things and bad things about your current system?

Good?

Bad?

Does the household / business use generators?

Yes	○
No	○

Q19. For Generators, how much fuel do you typically use on average?

Type	Litres	Per	Average Cost per Ltr
Diesel			$
Petrol			$
Bio fuel			$
LPG			$

Q20. Can you estimate how many hours you run your generators for the following seasons?

Season	Hours	Per
Winter months		
Early summer		
Wet season		

Q21. Can you estimate how much you believe your power is costing you?

Cost	Per
$	

Q22. Do you know how much your power costs on a cents per Kilowatt hour basis?

$ per kWh

Q23. If an off grid local area power network (micro grid) was set up in your area based on renewable sources that you could join, what would be needed to convince you to connect to it?

What price? $ or cents per KWh (Kilowatt hour)

What other factors? ***Tariff, reliability, subsidies, Other?***

Q24. If a satisfactory off grid local area power network was not available, what is your attitude to connecting to grid power. Are you for or against grid power being extended into your area?

- Yes
- No

Why do you say that?

Q25. Do you have air-conditioning?

- Yes
- No

Q26. Does the capacity of your system limit the use of your air-conditioner?

- Yes ○
- No ○

Why do you say that?

Q27. Excluding airconditioning are there any appliances you do not have, or appliances you limit the use of, because of the capacity of your system?

- Yes ○
- No ○

What appliances?

Q28. Do you have to buy appliances specifically designed to suit your power generation system?

- Yes ○
- No ○

What appliances?

Q29. When you go away, do you need to have neighbours/others regularly check your electricity system?

- Yes ○
- No ○

Q30. Are all members of your household / business capable of safely operating your system?

- Yes ○
- No ○

Which members are unable?

	Male	Female
Adults	▾	▾
Children	▾	
Business	▾	

Q31. In relation to safety, have you had any safety/accident incidents with your current system?
(Ok to refuse to answer)

- Yes ○
- No ○
- Refused ○

Q31. In relation to safety, have you had any safety/accident incidents with your current system?
(Ok to refuse to answer)

Yes	○
No	○
Refused	○

Describe?

Q32. Who does the maintenance on your system?

Yourself	☐
Other person in household/business	☐
Friend	☐
Paid professional	☐

Q33. If you could design an ideal system, what would it be?

Generator	☐
Back up generator	☐
Solar	☐
Wind	☐
Hydro	☐
Main grid	☐
Local area power network (Micro grid)	☐
Lead Acid Batteries	☐
Lithium Batteries	☐
240v	☐
415 (3 phase)	☐
Other:	☐

Now for some question on usage and costs

Demographics to help us analyse the results:

Q34. How long have you lived in the Daintree/Cape Tribulation area? ____ *years.months*

Q35 Where is your main place of employment?

- ○ Home
- ○ In the Daintree/Cape Tribulation area
- ○ Outside the Daintree/Cape Tribulation area
- ○ House duties
- ○ Retired
- ○ Student
- ○ Don't work

Q36. Finally, which age group do you fall into?

- ○ 18-24 years
- ○ 25-29 years
- ○ 30-34 years
- ○ 35-44 years
- ○ 45-54 years
- ○ 55-64 years
- ○ 65+ years

Q37. Record Gender:

- ○ Male
- ○ Female

Do you have any other comments you think might be helpful?

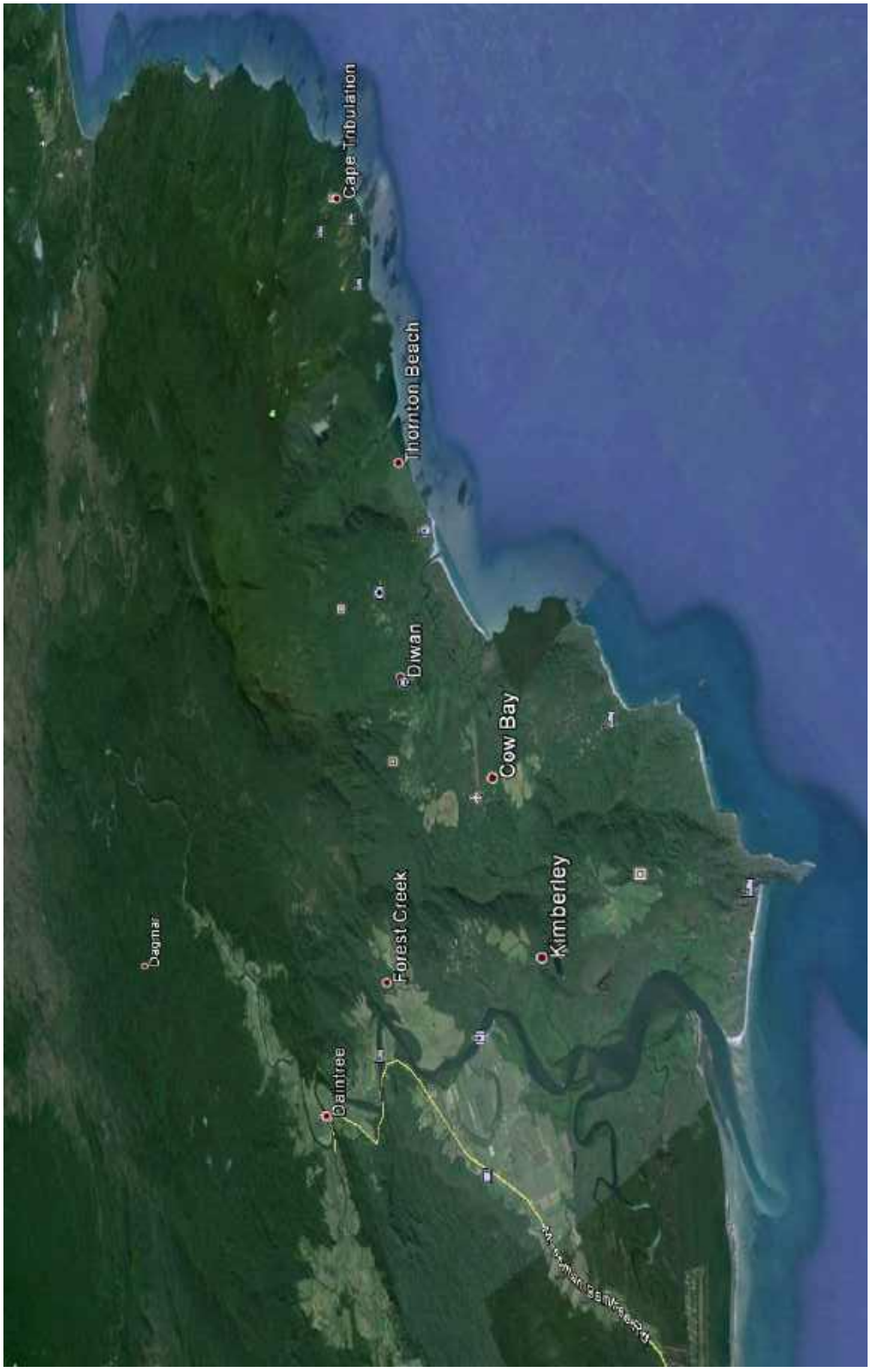
Your individual comments are confidential. My name is _____ from Compass Research our office number is 40312888. Thank you very much for your time & have a great day.

Phone Number:

Submit

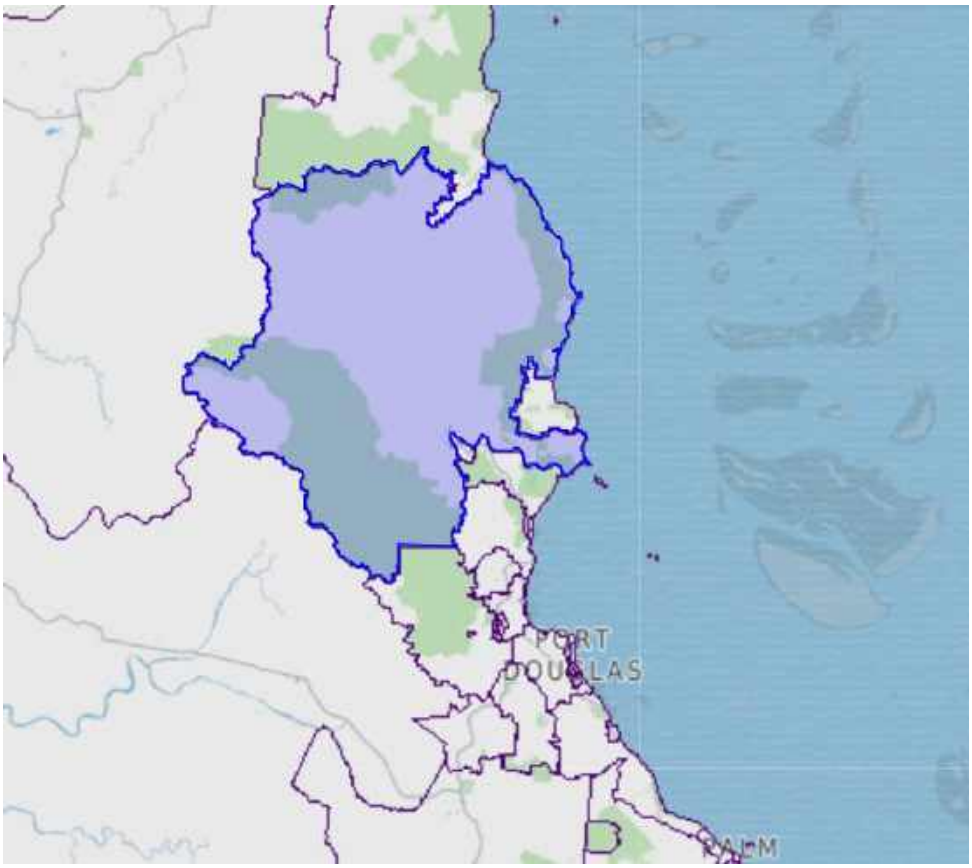
APPENDIX 3

MAP – DAINTREE CAPE TRIBULATION AREA

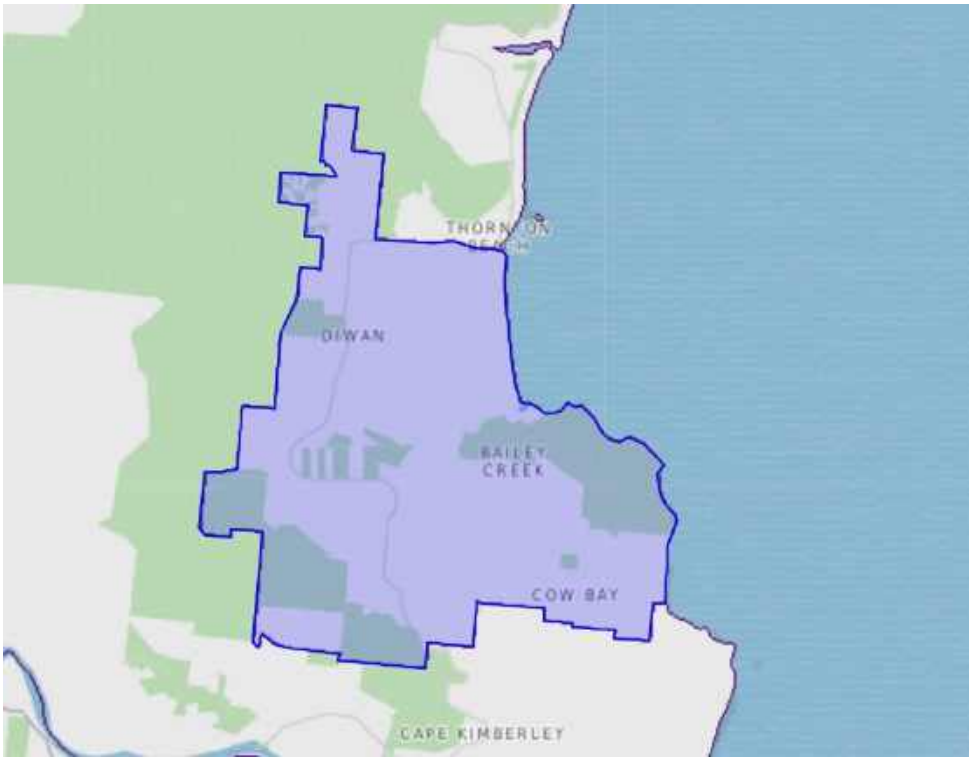


APPENDIX 4

MAP – SA1 – 3116417



MAP – SA1 - 3116409



APPENDIX 5

Q18 – DETAILED RESPONSES WHAT GOOD AND BAD ABOUT SYSTEM

Q18a. What are the good things and bad things about your current system? Good?	No.
▪ 100% clean, efficient, no noise, no break downs, no wastage	1
▪ 24 hr continual power, reliable, economical compared to grid in that area, awareness regarding energy usage	1
▪ As long as I look after it, it goes well	1
▪ Automated, reliable,	1
▪ Clean energy, minimal usage of fossil fuels	1
▪ Consistent & reliable	1
▪ Echo friendly	1
▪ Eco friendly, convenient, no breakdowns, reliable, clean energy	1
▪ Efficient, balanced, continuous power with no breakdowns	1
▪ Efficient, basically maintenance free and almost cost free	1
▪ Efficient, low cost	1
▪ Fully automatic	1
▪ Gone to solar and no generator noise, air not polluting, no bills	1
▪ Greener System	1
▪ Have not got a current system	1
▪ Have power all the time	1
▪ Having two generators we can switch if one goes down.	1
▪ Hydro is fantastic we can operate all the year round.	1
▪ I am a Green person, we do not use the generators unless we have to	1
▪ I am independent from the grid, I can generate my own power and I have no power bill.	1
▪ I am off the main grid	1
▪ I can run anything I want, I have the power I need when I need it	1
▪ I do not always have to use the generator	1
▪ I do not have to worry about anything apart from the weather	1
▪ I do not have to worry about blackouts	1
▪ I do not know	1
▪ I have a light and fan	1
▪ I have gone for a very good system, so I am hoping it will last me ten years.	1
▪ I have lived with little power for 20 years and now with the new system I have plenty of power.	1
▪ I have only had the system for 3 months. I have no bills for power, only time it will cost me is in the wet season.	1
▪ I know I have paid in advance.	1
▪ I like being independent about my power	2
▪ I love having now power. I only need the power on for about 6 hours per day	1
▪ I would be lost if I had a switch to turn off.	1
▪ If you do the maintenance on it, it works well. We can run our air-conditioner.	1
▪ Independence, environmentally sound, not dependant on fossil fuel, reliable	1
▪ Independent	1
▪ Is reliable and is maintained regularly	1
▪ It is all good for us	1
▪ It is easy to budget yourself	1
▪ It is new, as they get older they do not charge up as well	1
▪ It is reliable, when it is working it costs very little, I still think I am ahead against the grid.	1
▪ Much cheaper and convince	1
▪ Never goes out in a Cyclone, no power bill	1
▪ No answer	3
▪ No bill for electricity.	1
▪ No blackouts, and it is a pre-paid bill.	1
▪ No breakdowns, clean energy	1

▪ No cost really only batteries	1
▪ No monthly accounts, no loss of power,	1
▪ No power account	1
▪ No power bill and I can control it all	1
▪ No power bills	3
▪ No power bills, no blackouts, it is green energy.	1
▪ No power bills. Being independent of the grid.	1
▪ No regular power bills, paid for all power usage up front, never have a power cut	1
▪ Not much	1
▪ Not reliant on Grid	1
▪ Nothing	5
▪ Nothing good about it.	1
▪ Nothing, I can turn a light on.	1
▪ On a sunny day the cost is nothing.	1
▪ Reliability, greener energy	1
▪ Reliable	3
▪ Reliable in all seasons, clean, efficient, independent	1
▪ Reliable power, self sufficient	1
▪ Reliable, good for conditions	1
▪ Reliable, self sufficient	1
▪ Self-sufficient, developed for optimum use, quiet, fuel & maintenance efficient, low emission, as eco-friendly as possible to run all services	1
▪ Self-sufficient, independent, as far as bush living goes have some comforts	1
▪ Self-sufficient, reliable power	1
▪ Small carbon footprint, reliability. relatively efficient	1
▪ Still going	1
▪ Still runs	1
▪ That I have 24 hour power	1
▪ The cost is minimal, my only cost this year has been replacing the batteries and they last about 10 years.	1
▪ The environmental side of things. No power bill	1
▪ There is none	1
▪ We are in control of what we use, we only pay for what we've used or what we are going to use.	1
▪ We are self-sufficient and in I cyclone we have power	1
▪ We do not get a power bill. You do not have to run your generator for 6 months if you have good weather	1
▪ We do not have to worry about blackouts.	1
▪ We don't get blackouts and we don't get bills from anyone	2
▪ We don't get bills	1
▪ We have our own power, so if we have a storm, we do not lose power.	1
▪ We have power all year round	1
▪ We have power all the time	1
▪ When the sum is out it is great.	1
Total	**100**

Q18b. What are the good things and bad things about your current system? Bad?	No.
$15-20 thousand dollars it will cost to replace the system in 5 or so years.	1
Breakdown expense, the maintenance.	1
Brown outs	1
Cannot run freezer or air conditioning	1
Cannot use air conditioner or large element appliances, restricted usage	1
Cannot use anything with an element.	1
Careful with energy usage, special appliances	1
Checking usage, battery maintenance	1
Constant cost of batteries, constant maintenance	1
Constant maintenance - especially batteries, cleaning of panels	1
Constant maintenance,	2
Constant maintenance, cost of replacement, reliable contractors to do servicing	1
Constant maintenance, limited in use of appliances	1
Constant maintenance, reliant on fossil fuels, fuel costs	1
Constant maintenance, replacement costs, service providers not always reliable or efficient	1
Constant maintenance, responsibility of running system,	1
Cost involved in the maintenance of it.	1
Cost of constant maintenance, replacement, set up of system	1
Cost of maintaining it, with limited income.	1
Cost of running the system,	1
Cost of servicing and maintenance, the cost of fuel, having someone come in and monitor the system while I am away. Climb upon the shed roof to clean the panels, having to regularly top of the batteries with water, having to run the generator every day because of the wet season, having to cart 100ltrs of fuel. Having to lift fuel up to fill generator, very hard for the elderly. If there is a breakdown with the electrical system it is hard to get someone out to repair it.	1
Cost of setup, no subsidies at present, cannot run many appliances, limited appliances - no elements	1
Cost of the fuel	1
Cost, constant maintenance, limited supply, limited appliance usage	1
Cost, cost, cost	1
Educating people when stay during the wet season on reasons to limit usage	1
Everything.	1
Expensive, lots of maintenance, must be knowledgeable, generator noisy	1
Expensive, unreliable, break downs, noisy , dependant on fossil fuels,	1
Fuel costs, noise, maintenance, limited usage of appliances	1
Getting fuel I am an hours drive from town.	1
Government not coming to the party.	1
Having to run the generator in the winter time, and the heavy batteries.	2
High cost of system, constant maintenance, limited usage of appliances	1
I am working so I saved for it, a lot of people here would not be able to afford it.	1
I have nothing else	1
I have to run the generator every day	1
I need more power	1
If I want to weld I have to use the generator	1
If we want to run the air-conditioner we have to run a generator, you have to charge the batteries all the time.	1
If you run out of power and have no fuel. you have no power until you get it fix, top it up	1
It costs a lot of money to maintain the system	1
It is expensive	1
Lightning strikes.	1
Low lights, noise pollution, no availability use anything over750w	1
Maintenance and up keep of it.	1
Maintenance, generator noisy	1
Maintenance, keeping an eye on usage, unable to use whatever you want	1

▪ Needs boosting up, needs more power	1
▪ No air conditioner	1
▪ No air conditioning	1
▪ No air-conditioning, in the office	1
▪ No comment	3
▪ Noisy, emissions, cost of fuel, maintenance, needs daily constant attention	1
▪ Non	1
▪ Not enough sun light	1
▪ Not really, it keeps everything cold.	1
▪ Nothing	1
▪ Nothing	3
▪ Nothing at all	1
▪ Nothing I can think of.	1
▪ Ongoing maintenance and up keep of the system.	1
▪ Other people not knowing what they are doing	1
▪ Regular maintenance, limited, living within energy footprint	1
▪ Reliance on fossil fuels. Requires regular maintenance. Some noise, cost of setup and replacement	1
▪ Replacement costs, running costs, limited usage of appliances, need caretaker for maintenance if away	1
▪ The amount of power you use	1
▪ The breakdowns and the lack of service where we live	1
▪ The cost	4
▪ The cost of maintaining it	1
▪ The cost of running the system is high	1
▪ The cost of the system	2
▪ The noise	1
▪ The noise of the generator.	1
▪ The weather	1
▪ Very expensive to set up & run. Constant maintenance, high cost of maintenance	1
▪ Very expensive, continual maintenance, ability to maintain, limited in appliance usage, noisy,	1
▪ Very expensive, noisy, constant maintenance, shed maintenance, running costs	1
▪ Very limited in usage, very basic items	1
▪ Very, very expensive, impacts on lifestyle, not everyone can operate system	1
▪ We are going to have to replace the system	1
▪ We cannot have air conditioning.	1
▪ We could go with a few more panels.	1
▪ We do not have any.	1
▪ We have a composting toilet if we have a black out the fan stops and it is bad.	1
▪ When it shuts down and you have a fridge full of food.	1
▪ When there is no sun our weekly fuel bill is approximately $100 and that would be for approximately 70% of the year	1
▪ Where I am in a very wet area and have to use a generator	1
▪ Where I live it is hard to get someone out too fix things	1
▪ You need to spend a lot of money to run air-conditioning	1
Total	**100**

APPENDIX 6

Q23 – FACTORS TO CONVINCE TO CONNECT TO LOCAL MICRO GRID

Q23.What other factors? Tariff, reliability, subsidies, Other?	No.
A three pin plug	1
Affordability, reliable, subsidies	1
An invitation, either way I would connect to it.	1
As long as I could keep my own system, keep the batteries there and use the power system to charge the batteries	1
As long as it did not cost me any more than it is now, if it was a community thing. I may think about it.	1
As long as it is cost effective	1
As long as it is safe	1
Buy Back And Price	1
Connection costs, must be underground, supply voltage, reliability, cost of distribution	1
Connection costs, paid to put back in	1
Connection fees to be reasonable, tariff, reliability	1
Connection fees, tariff, having funds to connect, reliability, restrictions, breakdowns	1
Convenience, cost effective,	1
Cost efficiency	1
Cost factor	1
Cost free	1
Cost of connections, reliability	1
Cost of it, if I could feed back extra power. I don't want to get an extra bill	1
Cost, reliability, be able to feed back into system	1
Costing to set up, very important	1
Costing, availability	1
Don't know	1
Guaranteed feed to the house.	1
Happy with current system	1
How much it would cost	1
How much it would cost me.	1
I am not sure	1
I do not know, have never thought about it.	1
I do not think it could happen	1
I do not want them to cut down trees or alter the landscape	1
I have no need to connect am very happy with my system,	1
I will never want mains power from across the river.	1
I would connect to a network like that because of cost.	1
I would join up to it as I would not have the maintenance.	1
I would not connect to it.	2
I would not need it I am on mains power	1
I would not, that means I would be paying bills	1
If it was cheaper	1
If the cost would be cheaper	1
If they hooked on to bio diesel	1
If we could still use our own system and feed off it	1
It would all depend on how it would work, What would the cost be. We need a good Government subsidies.	1
It would be the price and cost, as I am only a pensioner.	1
It would depend on cost, I would connect to it.	1
It would have to be worth my while	1
It would have to economical , and it should be cheaper	1
It would need to be the same as what we are paying now or cheaper	1
It would not work	1

▪ Less maintenance, cost emission offsets etc	1
▪ Less maintenance, less fuel costs, happy with partial source. Tired system - value for value	1
▪ Need to own the land	1
▪ No answer	1
▪ No impact on the local area and reasonably priced	1
▪ Not in favour of this	1
▪ Not interested	2
▪ Not relevant - too remote. Cost of power, damage of connecting power	1
▪ Nothing at all, I would be jumping for joy, I would have the trenches dug before they could build the power station	1
▪ Nothing I would be straight into it, if we could link all of the systems into it it would be great	1
▪ Nothing I would be straight onto it.	1
▪ Nothing would convince me.	1
▪ Nothing, I would love it.	1
▪ Nothing, if it was at my front gate I would connect to it.	1
▪ Only If Affordable And Reliable	1
▪ Permission or invitation to do so, when	1
▪ Price Structure, Reliability	1
▪ price, reliability, subsidies	1
▪ Put it in and I will connect	1
▪ Reasonable price of connection and Kilowatt	1
▪ Reliability of the power and the system to be maintained.	1
▪ Reliability,	1
▪ Reliability, connection fees, environmental impact	1
▪ Reliability, cost	1
▪ Reliability, cost, accessibility, power availability, restrictions	1
▪ Same price as mainstream, reliability, not limited in usage	1
▪ Some certainty, what is the rate going to be. Would that mean that we would be on Ergon rates	2
▪ Tariff & Reliability, cost	1
▪ Technology, environmental effects, rebate on excess	1
▪ That it was cheap and good for the environmentally safe	1
▪ The cost	1
▪ The cost of getting the power to you	1
▪ The cost of installing it.	1
▪ The cost to connect to it.	1
▪ The load on that power system would be the bigger one	1
▪ The price of the power,	1
▪ Very very little	1
▪ We are too far out . We are in the forest.	1
▪ We would connect immediately. Labour government said there would be no main grid power while they are in government	1
▪ What the cost would be compared to what it costs at the moment,	2
▪ Willingly join; reliability	1
▪ Would join for convenience and use of equipment not able to use now	1
▪ Would join immediately	1
▪ Would not consider	1
▪ Would not join	1
▪ Wouldn't connect to it, cost too much to get the power connected	1
▪ Yes, provided it is reliable and cost effective	1
▪ Zero cost to connect.	1
Total	**100**