



Oakley Greenwood

Microgrids within grids

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Lessons learnt from detail embedded network studies & implementation

An Overview

- Customers typically **better off financially** and have more stable energy cost over time, and
 - Customers are well protected (now), but there are regulatory conflicts that can occur within that protection mechanism
- The key **counter party becomes the network but the pricing is Retail driven** – network “cost reflective” signals may not make it, but
 - The tariffs are **commercial** ones – and pass through of “cost reflective” tariffs is evident in for example demand based charging - but energy only and other options are also available – tariff analysis and modelling is essential, and
 - The **pricing structure significantly effects (even dominates) the investment decisions** around renewable integration and net returns – lot more work needs to be done on “cost reflective” tariffs design – networks price to retailers and embedded networks - and key issues here for **renewable targets by States?**
 - **Uniform Tariff Policy subsidies** in non-urban areas look like they could be **reduced or provided to less, or more targeted, users** under this model – they don't apply to Embedded Networks (e.g. Ergon Energy area) - yet customer still better off?

An Overview

- **Networks may potentially be better off financially** if they could optimise offers to embedded networks and provide the right supporting services, and
- Desperately need to **reform their export analysis/processes, and**
- **Undertake meaningful customer engagement** – this is a key area of reform for networks and is not just about regulatory resets – it is about tariff design, cost reflectivity, demand response and network optimisation – and there are major gains to be made for them and customers (and the economy)
- In an era of no limited merit reviews **demand side solutions could significantly lower risks for networks** and embedded networks provide major opportunities – must engage though
- There is a strategic issues of **when does an embedded network transgress a perceived network “franchise”** – opportunity or threat – and **will they just disconnect – the answer here is cost reflective pricing so the network becomes indifferent to how customers use their network**
- Potential role for **gas generation and battery storage** - this is developing rapidly and will impact further on networks – but again provides major opportunities

Background work - AEMC Embedded Network Project

- Australian Energy Market Commission - Embedded Network Advice
 - Embedded Network Case Studies - May 2017
 - 5 case studies undertaken in some detail, across 3 states - all grid connected - urban and regional locations
 - 2 Owner/Operators, 1 profit motivated, and 1 renewables motivated
 - Houses, low rise units and high rise units
 - New entrants and well established groups - developers and straight out service providers, and a co-operative
 - Looked at competition issues, service models, benefits to customers and operators/owners, renewable integration, regulatory frameworks, interactions with Retailers and Networks
 - Looked at via a taxonomy - motivation, use of the grid, embedded network configuration and degree of bundling
- Impact of “cost-reflective” network pricing rule changes (mainly related to residential use) on Embedded Networks
 - No real effect as already see these type of tariffs as EN’s are charged commercial rates which already either include or are more cost reflective that residential rates

AEMC Project - some of our key observations

- Embedded networks are more regulated than in the past - focused on customer protection, competition access and professional management
 - Both under AER & State Governments in a lot of cases (with inherent conflicts at times)
- The industry is more mature than expected and competitive with specialist providers in the field
 - As sophisticated as Retailers – similar billing and pricing options and very responsive to customers and external competition
- Developers are seeing opportunities to provide more attractive product to their customers and they “gift” (or pay for) most of the assets to utilities anyway
 - Cheaper than external retail, green energy, add on services - and customers have protection from gouging and have recourse, and can seek external offers
 - But sometimes the circumstances limit that option and this must be clear when buying into the schemes – but benefits seem to outweigh in general
- Raises a lot of questions about supply side industry structure, regulation, focus and development – major opportunities here for substantive disruption to networks

Landmark case study - RV Homebase (Maryborough)



- This is a lifestyle village with (274) houses suitable to park very large RVs and Vans
- Tailored for people over 50 who may also have retired and want to travel around Australia in their RV – while they are away (for months at a time) every thing is looked after – when they are back there are a large number of amenities available to them
- Owner/Operator looking to build another at Sunshine Coast a bit larger

RV Homebase (Maryborough)

- This was an extremely detailed set of studies as all ½ hour interval data was available for electricity supply, home owner demand and self generation - across the park
- Started by Gregor Jenkyns in his Master of Energy Studies, Applied Research Project, University of Queensland - and I was his UQ Supervisor
 - Very detailed analysis of the underlying cost pass through to the residents as there was a considerable under recovery through resident electricity bills of the cost of power at the gate - communal load and charging regime in the Park, and
 - How the available retail/network tariffs, EN regulation would impact those costs,
 - How the Uniform Tariff Policy and other consumer protection rules and regulations would impact, and
 - How adding solar PV and potentially battery storage may also impact these costs
- One major finding was that a simple change in tariff - from an energy only to a demand/time of use commercial tariff virtually eliminated the initial problem, and
- That addition of solar PV would be highly beneficial over time to the residents but had core barrier issues related to equity on where to install units

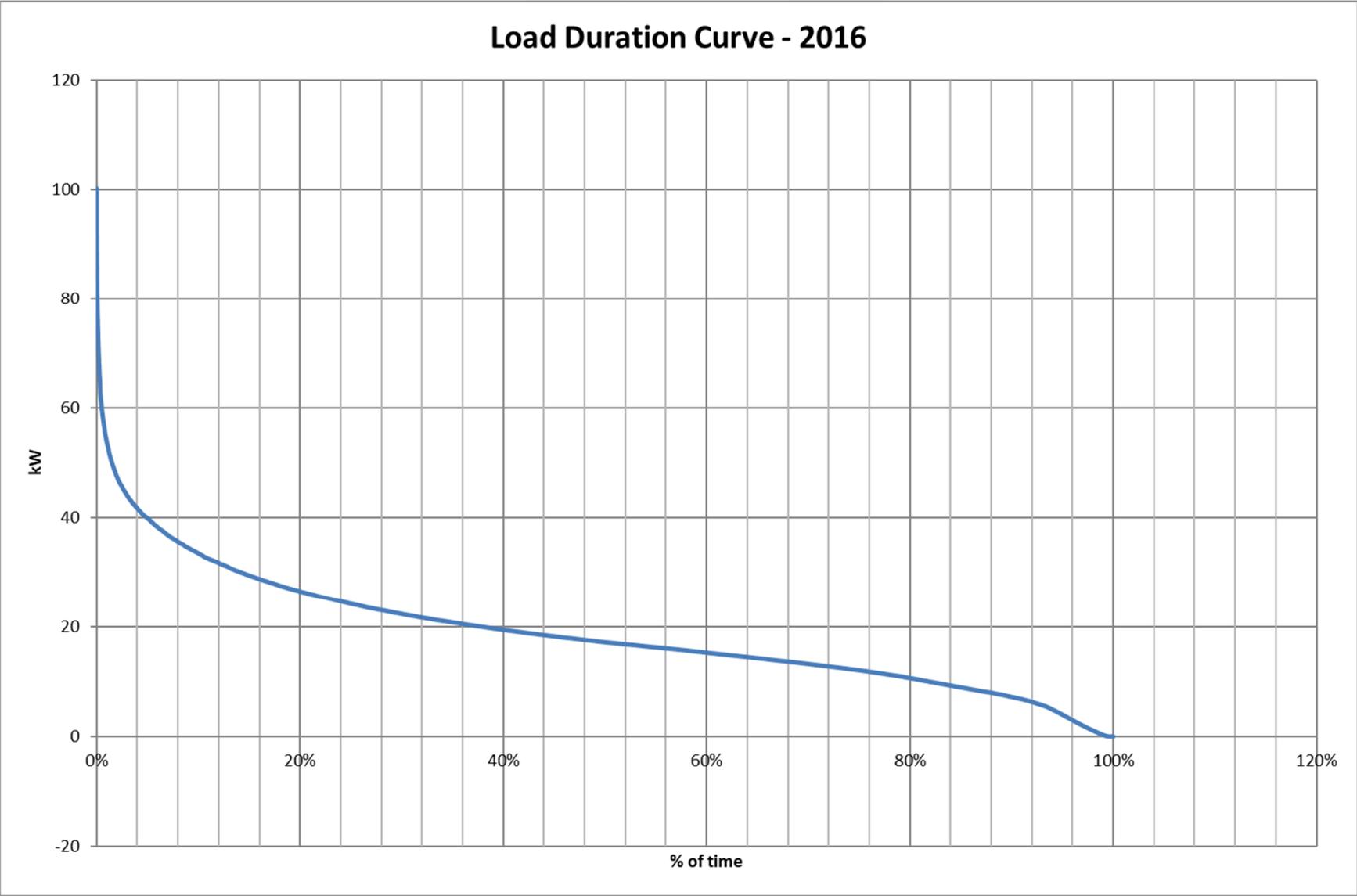
RV Homebase (Maryborough)

- RV Homebase (with Greg) then decided to approach Oakley Greenwood to undertake more commercially based modelling of the options for the park
 - At the time they thought a large solar PV and battery farm may be viable and had it costed up - issues arise here about the value of land annexed - roof tops are cheaper
- The modelling defined more accurately the savings on the shortfall from a change in tariff and from other areas, and
 - Demonstrated the transactional issues associated with trying to determine the levels of export constraints that the network would allow - the network process for determining this is fraught and inconsistent and in desperate need of reform - something that was also found in the AEMC study - this is a legacy issue and needs to be addressed for all concerned
 - That the export constraints largely determine what levels of PV can be installed and this falls out to be best if it has communal internal benefits - equity issues compound for those with and without PV at the household level - direct mimic of network issue
 - Batteries could make sense but only on some tariffs and not for example on the supposed more cost reflective demand tariffs (yet) - energy only tariffs yield higher savings but it is obtuse to use a separate more expensive tariff to try and justify a storage cost for example - but sometimes there are drivers for this to occur

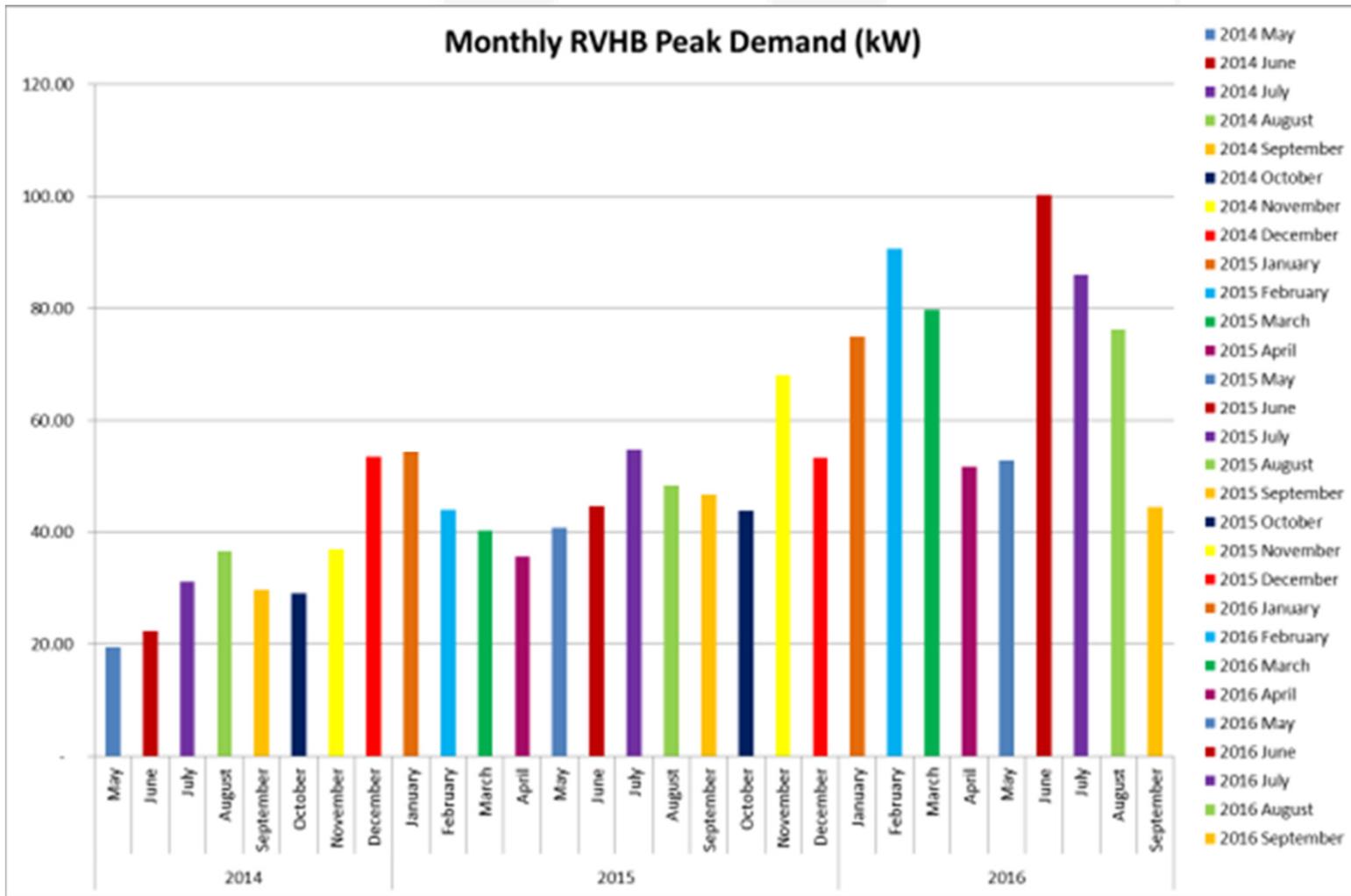
RV Homebase (Maryborough)

- Which raises issues about network customer engagement - which is a lot more than just related to a network regulatory reset
- Cost reflective tariffs are generally not - how can a network have a range of cost reflective tariffs for a single voltage level off-take for example?
- These tended to be designed specifically to try and allocate costs reasonably fairly and recover network revenue with least risks - this was understandable - but they are not cost reflective - and why are they offered by “customer class”, rather than asset utilisation?
- But, it is very clear from this project that the tariff structures and “cost reflectivity” significantly influence the investment decisions being made by the demand side now - customers have choice and control and will respond to the tariffs provided (as in this case)
- A cost reflective tariff should be one where the network is truly indifferent to the way customers use their network financially - if demand and energy are reduced their costs are reduced, and
 - They need to get into the game - engage with customers more on what they are doing and why and how this can be optimised

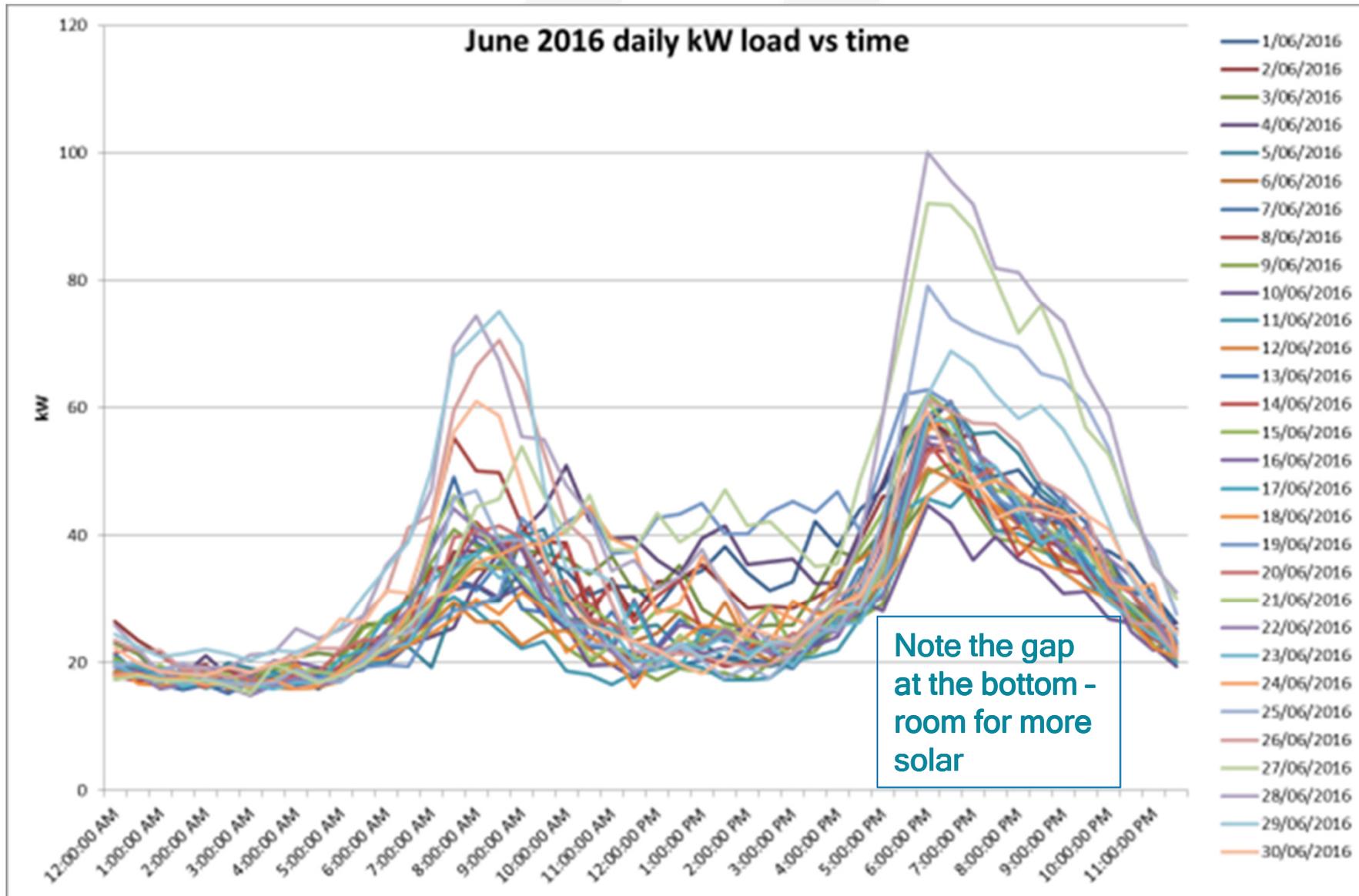
Winter & Summer peaks - classic curve, very short duration



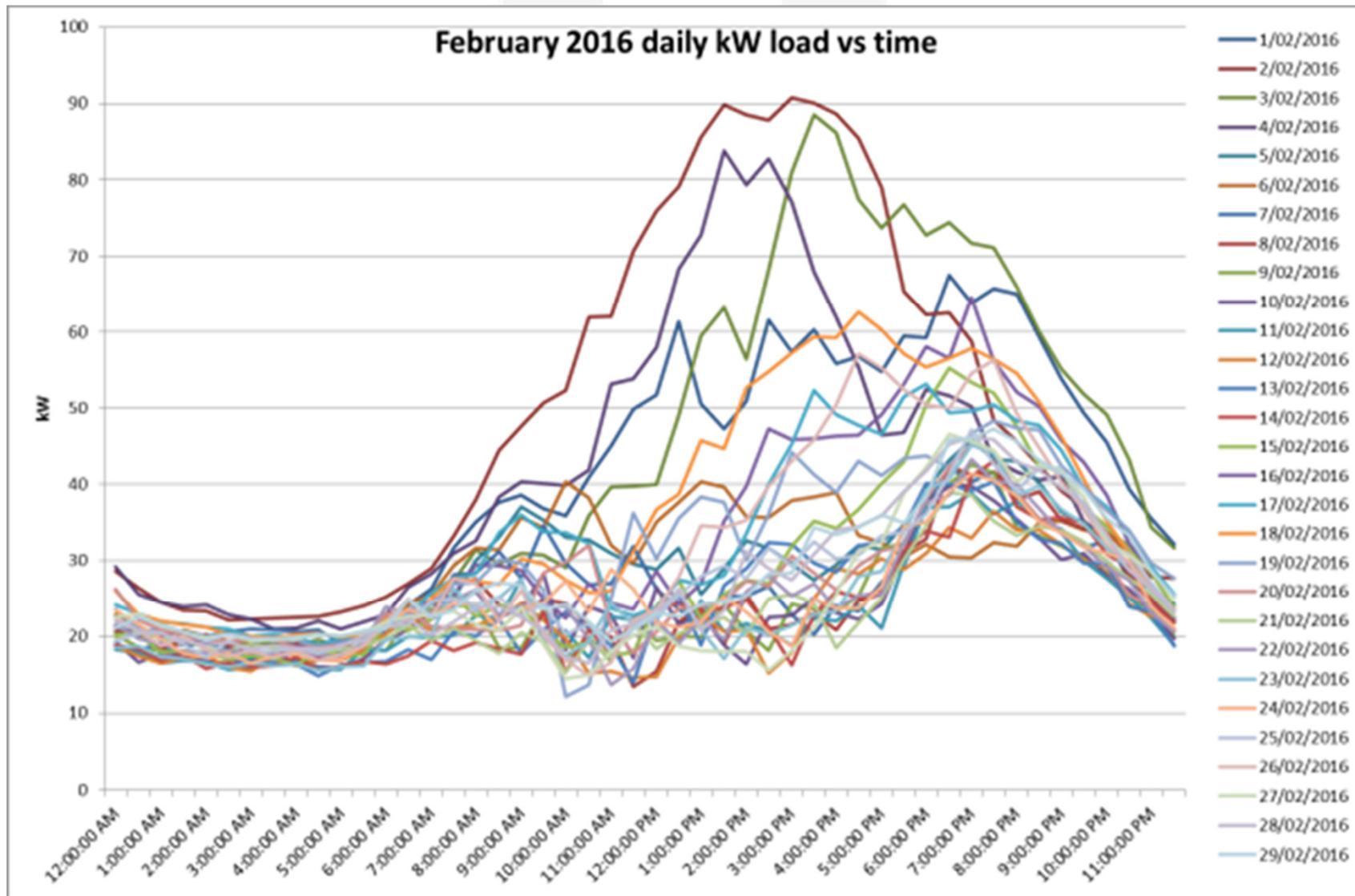
Shows housing build out and leap frogging peak demand (winter/summer)



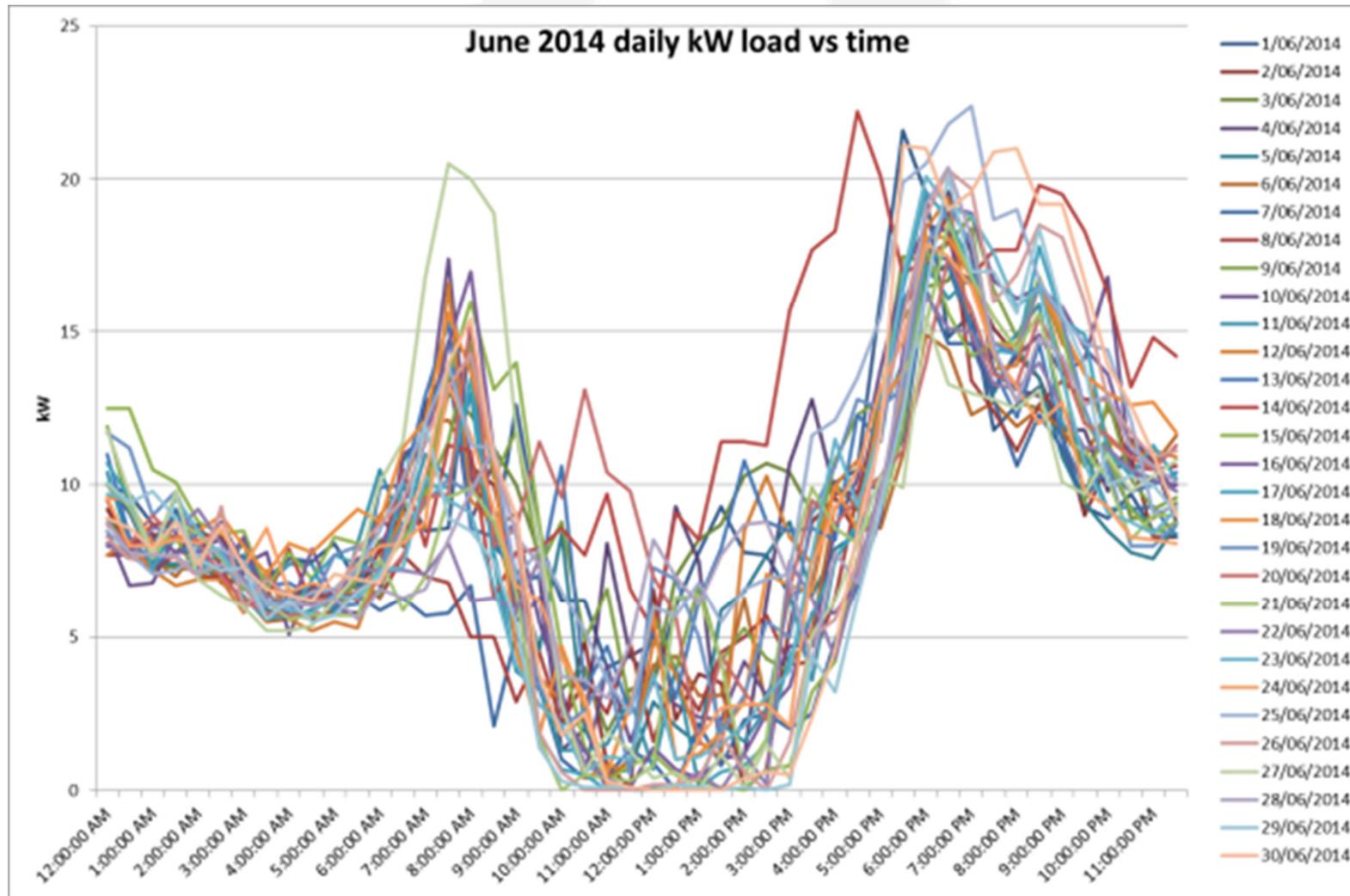
June 2016 peak day - very peaky - role for more solar...



February - lot more bulk use on certain days in summer - set and forget air conditioning



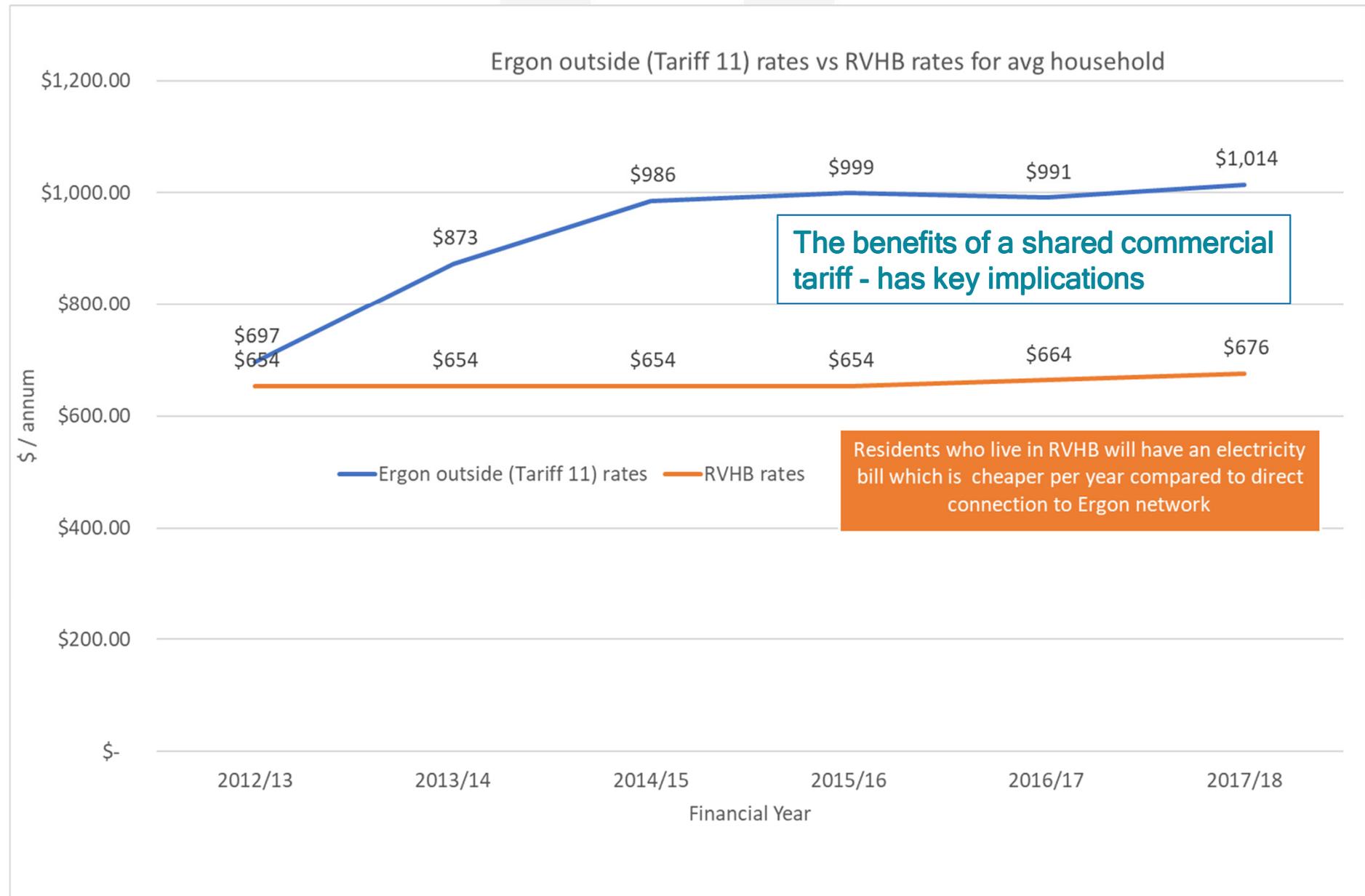
June 2014 - less houses - allowable solar maxed out very fast and installs had to be halted (network constraints)



RV Homebase (Maryborough)....continued

- There is little direct profit driver on the owner/operator to invest in PV and/or storage as they can not excessively “profit” from customers - and they are often expected to simply pass on the energy costs (which has its own problems outlined later)
- The real incentive is to limit communal electricity costs, or any under recovery, as this impacts monthly fees to customers, and
- To be able to market to their customers that they are in fact getting a very good deal over what is on offer in the external market - this later point was actually critical across all the EN’s we studied
- So RVH are investing in solar for communal electricity use - individual homeowners can put solar on their roof if they can get permission to export higher levels to the network - if not that can install with zero export controls (self use only) - clearly an issue for State renewable penetration aspirations?
- Capital savings over the original concept - which was a large solar battery farm on the park were massive - reduced to about 5% of initial budget - and because it is a less than 100 kW scheme STC’s are paid upfront (larger farms create LGC’s)
- Savings overall were very high - tariff changes, alignment of customer billing with now established regulatory requirements, and the communal solar system - north of \$450k per year - investment less than half that all up
- So lets look at what customers see in terms of electricity costs

Customers >30% better off than the subsidised tariff



Regulation - protecting customers - confusing customers?

- **Qld Manufactured Homes (Residential Parks) Act 2003**
 - Amendments - Housing Legislation (Building Better Futures) Bill 2017
 - Ability to recover utility costs is limited by external charge by supplier
 - Aim for better transparency and eliminate profiteering by park owner
- **National Energy Consumer Framework (NECF)**
 - Exemptions from the requirements to register as a retailer
 - Subject to specific conditions in relation to quality of supply and access
 - Limits the amount that can be recovered within embedded networks (such as RVH)
 - Will activate competition to on-sellers (park owners) in Queensland
 - Park tenants can go to external retailers for electricity contract and products
- **Qld Uniform Tariff Policy** - major subsidy outside of urban areas - \$600m/year (grows \$30m/year)
 - Limits retail pricing in Ergon patch to the regulated UTP price
 - Qld Government pays Ergon a subsidy to recover shortfall (not available to EN's)
 - Provides one cap to site electricity charges in embedded network

Manufactured Homes (Residential Parks) Act 2003 Act s99A

- s99A - limits energy charging to sharing out supply authority/retailers costs e.g. Ergon charges
 - Does not technically limit recovery method just the maximum amount
 - However, methods have been tested at QCAT and in courts
 - The expected (and defensible) is the “equal share” approach
 - **Divide total park costs by total park load to get ¢/kWh, then**
 - **Charge each site/customer for their usage based on this rate - communal costs are a shortfall**
 - Silent on Feed in Tariffs => to be dealt with later in this presentation
- Park common facilities pay the balance of the energy charge - the energy deficient if you like
 - Effectively the same ¢/kWh as the sites
 - Park common facilities are typically recovered as part of site fees
- Well documented on DEWS and DHPW website on utility and electricity charging in parks
 - Information Bulletin on methodology provided by Residential Services Unit who regulates the Act
- But, severely limits incentives to invest in larger scale solar - States take note!

National Energy Consumer Framework

- RV Homebase is an on-seller or “embedded network owner”.
- National Energy Retail Law and Rules commenced in Qld 1 July 2015
 - Rules set out exemptions for anyone on-selling energy to tenants.
 - AEMO exemption from network service provider registration required
- AER governs competition at the retail level and in embedded networks
 - Exemption for retailer requirements - (Retail) Exempt Selling Guideline
 - Embedded network power to the Australian Energy Regulator (AER)
 - Embedded network competition via Rules
 - From December 2017 the full embedded network Rules came into play
 - Competition in on-selling - residents can access retail offers from authorized energy retailer instead of the on-seller.
 - New accredited role - “embedded network manager” - link customers to the NEM via embedded network.
 - AER (Retail) Exempt Selling Guideline Stipulations
 - Limit maximum on-selling prices to local regulated tariffs - price protection of small customers
 - Clause 3.3 charging limits apply to all components of tariff - supply and usage charge
 - Silent on Feed-in Tariffs

Discussions with Regulators - conflicting outcomes

- The methodologies for determining charges present some conflicting outcomes and also influenced by the assumed tariff - following example from RVH study
 - The RSU methodology is a full variable charge and may exceed the limits identified in the (Retail) Exempt Selling Guideline.
 - Issues about how this is applied and relevant tariff structures to customers e.g. can't pass through a standing charge?
- Discussions with Regulators
 - RSU
 - Advised 23/11/17 is the methodology identified by RSU was their only recognized procedure and that if any complaints were lodged by residents they would check that the charge does not exceed by the proportion determined by the methodology
 - They don't recognize the application of any fixed or supply charges to customers in the EN as identified by the AER's methodology.
 - Advice from the AER
 - The AER position (17/11/17) is that "a person selling energy to residential customers within a manufactured home park under a retail electricity exemption must comply with condition 7, as set out in the AER Retail exempt selling guideline" and that any proportion can't exceed the supply or consumption charges in the standing tariff
 - AER advised they were aware of Residential Parks charging a supply charge in Qld.

Feed in Tariffs

- Queensland FiT for regional customers is set annually by QCA
 - Ergon has a regulated FIT (10.102¢/kWh)
 - Only eligible if solar inverter capacity < 30kW (changed from 5kW to 30kW)
 - **Queensland legislation is silent on Feed in Tariffs (FIT) within Embedded Networks.**
 - Advice provided by Qld Govt website on utilities in Residential Parks states tenants “may not be able to utilise the benefits of solar power”.
- QCAT (determination 14-127) has determined that no FIT is payable within Embedded Networks
 - Under current legislation - without an agreement between site tenants and the Park
- Payment of a FiT for RV Homebase tenants is a **communal “cost”** and can't be passed on through electricity bills to tenants based on S99A - recovered through park fees
 - Feed-in kWh does reduce the communal electricity load to a point and potentially a benefit to the park owner - but this is very limited due to export restrictions
 - Ultimately a commercial decision within the park - possible options when battery prices drop to trade internally, etc.

Clean Energy Regulator (CER)

- The type of renewable certificates that can be earned is dependent on the size of the system installed - and how this is defined....communal, household?
 - Small-scale Technology Certificates (STCs) are earned by small generation units for:
 - <100kWDC system with a maximum generation of 250MWh pa
 - Certificates for the life of the system are earned at the time of installation and rebated off the cost of the installation
 - If system is greater than 100kW - classed as a power station and would generate large-scale generation certificates (LGCs)
 - Certificates are earned as generated - 1 LGC/MWh over until 2030
 - Exposed to full capital cost at install
 - Exposed to the market/spot price risk over the life of the solar plant (oversubscribed?)
- RV Homebase is one site/owner with 2 NMI's or network connections
 - CER approached to get view on allowable capacity that RV Homebase could install and remain a small generation unit.
 - As two separate NMI's possible to install 100kW DC on each and be valid as a small generation units and get the upfront rebate
- Any solar that is not owned by RV Homebase is not included in the STC limitations

Revisit what has been learnt and issues to address

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