CHARGING FORWARD: POLICY AND REGULATORY REFORMS TO UNLOCK THE POTENTIAL OF ENERGY STORAGE IN AUSTRALIA

CLEAN ENERGY COUNCIL

CLEAN ENERGY COUNCIL BRIEFING PAPER

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EXECUTIVE SUMMARY

Electricity markets are rapidly changing. The increasing prevalence of renewable energy is redefining the Australian energy market. As the National Electricity Market shifts from coal and gas generation toward more diverse and distributed forms of power such as wind and solar, energy storage has a vital role to play in the development of an affordable, clean and secure energy system.

Energy storage comes in many forms, with technologies as diverse as battery technology, hydrogen fuels and pumped hydro, and can be used at residential, commercial and grid scale. The technology is developing rapidly and the availability, functionality and cost of many forms of energy storage technology is improving dramatically.

This paper outlines thirteen reforms that can be introduced to accelerate the uptake of energy storage and the many benefits this technology can deliver to homes, businesses and the electricity system overall[1].

Rising electricity costs, changing tariff structures and rapidly falling technology costs are creating the ideal conditions for the continued adoption of 'behind the meter' technologies. At the same time, the closure of some large coal power plants and high wholesale gas prices are driving increased interest in large-scale energy storage.

Energy storage is the final piece of the energy puzzle that can enable substantially higher levels of variable sources of generation – such as wind and solar – while also providing services that will deliver a resilient and robust energy system.

Benefits offered by energy storage include:

- meeting peak and fluctuating energy demand, ultimately reducing the need for additional network investment and augmentation;
- empowering residents and businesses by helping them to better manage the production and use of electricity;
- replacing diesel in remote locations and support mini-grids and embedded electricity networks;
- complementing and support greater deployment of renewable energy technologies;
- providing network support services such as rapid frequency response and synthetic inertia (mimicking some of the useful characteristics of large thermal power generators); and
- batteries requiring a much shorter time to deploy compared to other technologies such as open-cycle gas power.

[1] While many of the recommendations in this paper apply across the range of energy storage technologies, there may be individual challenges and solutions that should be considered for some unique technologies and applications.

The national energy market framework currently undervalues many of these benefits. Recognising and rewarding the value of energy storage is critical to ensure the security of Australia's energy system.

While government funding is helping to accelerate early technology adoption and targeted commercial incentives for projects remains important, unlocking the full potential of energy storage demands a coordinated and strategic approach to regulatory and market reform..

The Clean Energy Council has identified thirteen energy market reforms required to drive the most efficient commercial roll-out of energy storage throughout Australia while ensuring a secure and affordable national power system.

These reforms can be summarised under the following categories:

- Level the playing field;
- Remove regulatory barriers to storage behind the meter;
- Recognise and reward the value of storage behind the meter; and
- Establish standards and protect consumers.

SUMMARY OF RECOMMENDATIONS

Level the playing field

1. Reform the current energy market settlement regime to adopt a five-minute market settlement approach that provides a more effective market signal for energy.

2. Reform the frequency control regime to enable fast acting devices to assist with frequency control and system security support by rapidly responding to emergency frequency events with Fast Frequency Response capability.

3. The Australian Energy Market Commission (AEMC) should review options to address electricity market rules that distort investment away from network services and towards poles and wires.

4. Distribution businesses should publish better data on impending network constraints that could be addressed by incremental investments in on-grid energy storage. The AEMC and Australian Energy Regulator (AER) should change the requirements on distribution businesses regarding the Distribution Annual Planning Report to transition from a report-based approach to a geographic information system (GIS)-driven portal, to enable better market access and usability of data.

5. The AEMC should significantly lower the RIT-D threshold from the current $5 million level and encourage approaches such as Ergon Energy's 'Optimal Incremental Pricing', which allow for smaller increments of investment while reducing the administrative burden on distribution businesses.

Remove regulatory barriers to storage behind the meter

6. Distribution businesses should follow Energy Queensland's example, making it easier to obtain approval for grid connection when adding a battery to an existing solar PV system.

Recognise and reward the full value of storage behind the meter

7. State and territory governments should support benefit-reflective feed-in tariffs (as adopted by the Victorian Government) in order to ensure the full value of energy storage is recognised.

8. In states where customers continue to receive premium feed-in tariffs (PFiTs), governments should consider the feasibility of programs to allow the value of the PFiTs to be traded in exchange for a subsidy for a battery.

9. The Australian Energy Regulator (AER) should support the transition to demand-based tariffs and empower consumers by updating its online tariff comparison tool to include demand charges.

Establish standards and protect consumers

10. State government safety regulators should require that all battery installations must be performed by a qualified installer with the demonstrated competency in battery

installation, such as those accredited for battery installation under the Clean Energy Council's accreditation scheme.

11. There should be a legally enforceable Australian Standard for the product safety of lithium ion batteries. Until then, State government safety regulators should mandate that batteries installed in their jurisdiction be required to demonstrate compliance with best practice international product standards for battery safety, such as IEC 62619:2017.

12. Governments that provide rebates or conduct reverse auctions for 'behind the meter' battery storage systems should specify tender conditions that either: require use of retailers that are signatories to the Solar Retailer Code of Conduct; or that can demonstrate compliance with standards at least as stringent as those of the Solar Retailer Code of Conduct.

13. Industry and all levels of government should work together to develop an agreed approach toward the reuse, recycling or disposal of batteries at the end of their useful life.

THE ROLE OF ENERGY STORAGE

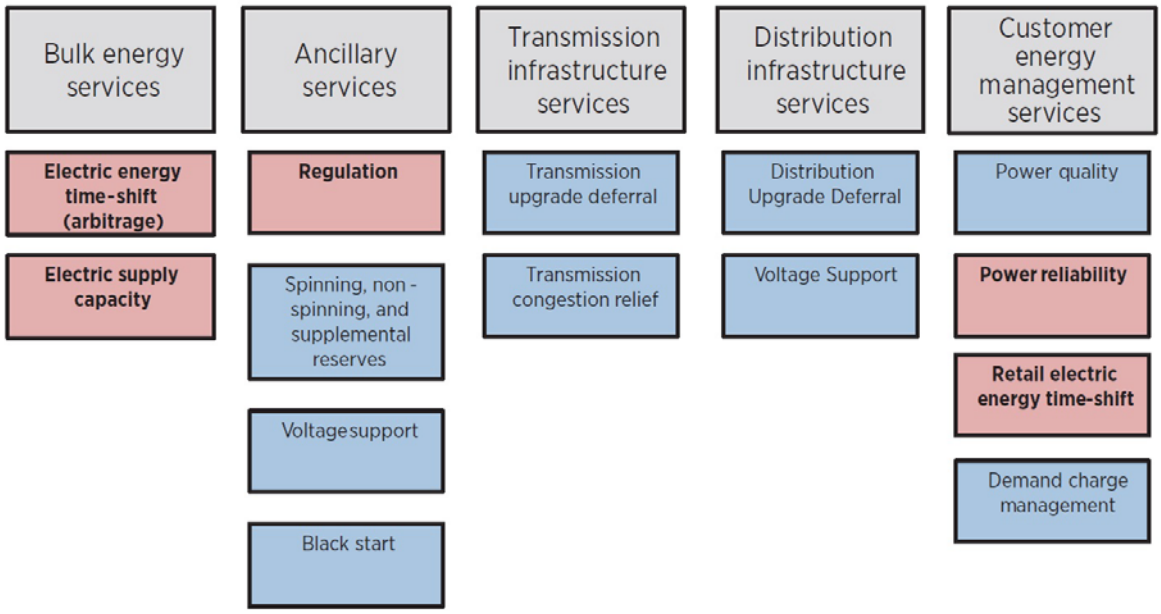
Energy storage can provide a range of functions and services to deliver immense value to Australia's evolving energy system.

Batteries empower households and businesses with a sense of independence. They can be used to meet peak demand and mitigate wholesale price volatility, thereby reducing electricity costs for everyone on the network.

They can reduce system losses by enabling closer energy flows between distributed generation and load. Batteries operated in a coordinated manner can also provide important system services such as network upgrade or augmentation support, local voltage management and control, frequency keeping and control (regulation), and very fast-acting frequency response to maintain system security.

A summary of the system services provided by energy storage is outlined in Figure 1.

Figure 1: Energy storage services[2]



When the value of these different services is accumulated, energy storage becomes a more compelling commercial proposition in many scenarios around Australia, especially considering the ongoing cost reductions in energy storage that are already occurring.

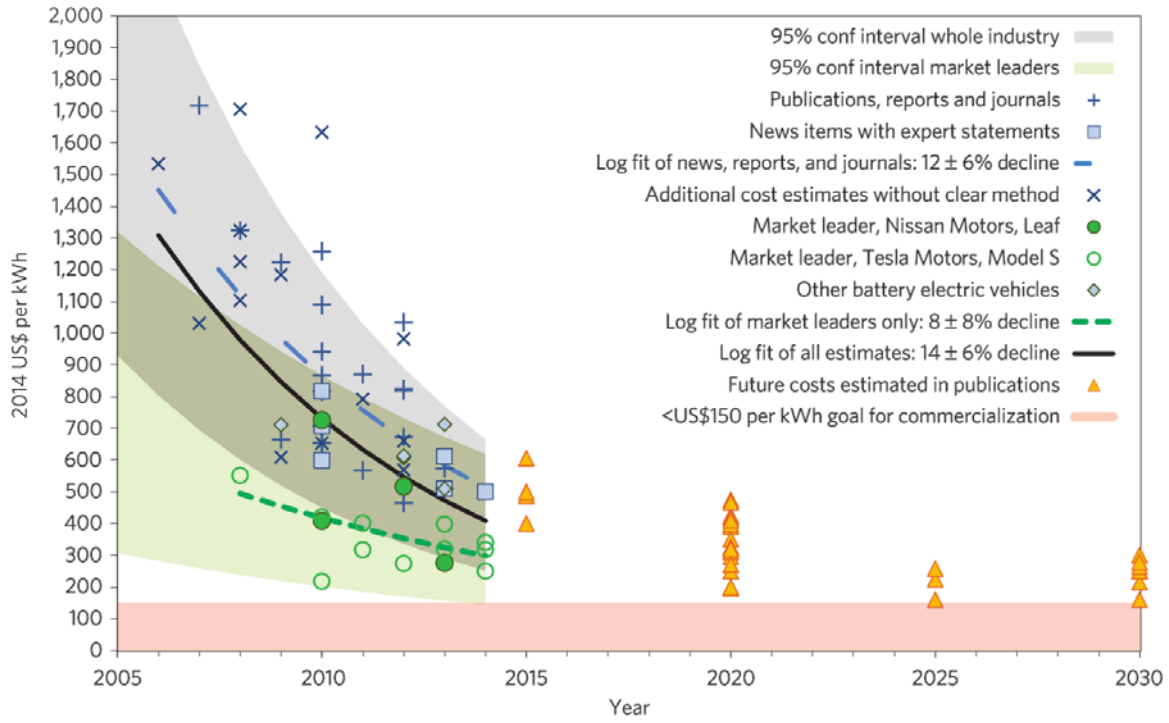
[2] R. Kempener and E. Borden, International Renewable Energy Agency, *Battery Storage for Renewables: Market Status and Technology Outlook*, January 2015, p.11

CURRENT STATUS OF BATTERY STORAGE

Energy storage technology is evolving and developing rapidly throughout the world. Battery storage technology in particular is undergoing rapid technology development, resulting in improvements in efficiency and cost reductions.

The recent cost reduction of lithium ion batteries is outlined in Figure 2 below.

Figure 2: Levelised cost of electricity (LCOE) reduction of lithium ion batteries over recent decade[3]



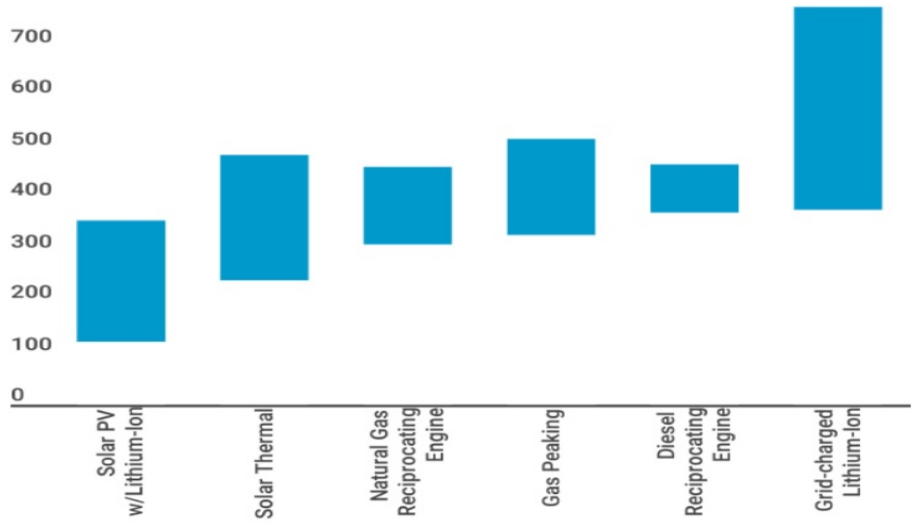
[3] B. Nykvist and M. Nilsson, Nature Climate Change, *Rapidly fallings costs of battery packs for electric vehicles*, April 2015, p.329

As the global battery storage sector gains momentum, substantial cost reductions can be expected. These will be driven by:

- scale of manufacturing facilities and output;
- evolution of balance of system and software platforms; and
- learning and development of in-country installation practices.

In Australia, the cost of battery technology is falling rapidly. Recent analysis by Reputex suggests the cost of deploying battery storage combined with solar to provide dispatchable power is now cheaper than alternative solutions, as illustrated below.

Figure 3. LCOE of peak electricity generation adjusted to consider storage ($/MWh)[4]



The other substantial development in battery storage is the rate at which it can be deployed, particularly at commercial and utility scale. Recent international experience has demonstrated the ability to deploy large-scale battery projects in a matter of months. This compares very favourably with alternatives such as gas peaking generators, which are usually deployed over years rather than months.

[4] Reputex, *The Energy Trilemma – A cost curve for abatement & energy storage in Australia,* 8 March 2017

UNLOCKING THE FULL POTENTIAL OF ENERGY STORAGE

Unlocking the vast potential of energy storage requires a coordinated and strategic approach, which includes collaboration between industry, regulatory and market operators and policymakers.

Australian governments of all persuasions have recognised they have an important role to play in supporting the development of large-scale energy storage infrastructure to assist with the integration of variable forms of generation, such as wind and solar.

While the business case for energy storage is compelling over the long term, doing anything for the first time is difficult, time-consuming and often expensive. Government support for energy storage projects is critical in identifying barriers, growing confidence and familiarity with battery storage solutions, finding innovative business and financing models, and building capability and capacity within the industry.

Federal and state governments are proposing direct government investment in large-scale energy storage, which will help to establish supply chains, a skilled workforce and familiarity with the new technologies. In the longer term, the market reforms outlined in this paper should make continuing direct investment by governments unnecessary.

In March 2017, the Turnbull Government announced its aspiration to build Snowy 2.0, a potential investment of up to $2 billion to increase the Snowy Hydro Scheme's 4100 MW capacity by as much as 50 per cent. In the same week, two state governments announced investments in large-scale energy storage on the grid. The Andrews Government announced it would invest $25 million in battery storage on the Victorian grid in the 2017 financial year, with plans to boost that investment to deliver 100 MW of battery storage by the end of 2018. The Weatherill Government also announced it would invest $75 million in grants and $75 million in loans to provide South Australia with 100 MW of grid-connected battery storage.

More recently, the Tasmanian and Commonwealth Governments have announced further commitments to feasibility studies across the Hydro Tasmania system to explore additional pumped hydro development.

The Clean Energy Council welcomes the bipartisan recognition and support for more large-scale energy storage assets on the grid. While governments can invest directly in energy storage to accelerate the roll-out of the technology, the industry believes a mix of market reform and regulation will deliver the most cost-effective way to make the most of the many benefits storage can offer the energy system.

The elements of energy market reform required can be organised into the following categories:

- Level the playing field;
- Remove regulatory barriers to storage behind the meter;
- Recognise and reward the value of storage behind the meter; and
- Establish standards and protect consumers.

1. Level the playing field

Unlocking the full value of battery storage requires substantial reform of Australia's energy market and regulatory framework so that system owners can realise the economic benefits of an investment in the technology.

There are multiple streams of value and therefore commercial incentive that could and should be realised from energy storage. Many of these values are currently attributed or realised by different stakeholder groups, making it complex and challenging for a project proponent to commercialise energy storage solutions.

The rules of the National Electricity Market favor investment in poles and wires over storage. Reform is needed to level the investment playing field and thereby remove distortions and barriers that are holding back cost-effective investment in large-scale storage on the grid.

a. Five-minute settlement rule changes

In the wholesale electricity market, dispatch prices are determined every five minutes, whereas settlement prices are calculated on a 30-minute basis. This approach was established when the electricity market was designed, based on the technology available at the time.

The Australian Energy Market Commission (AEMC) has recognised that five-minute settlement would provide "an improved price signal that would be technology neutral"[5]. The more granular price signal would lead to more efficient investment in generation, storage and demand response by encouraging efficient bidding that could reduce wholesale electricity prices.

A move to five-minute settlement would significantly increase the opportunities for fast-acting charging and discharging of battery storage, creating a more flexible and responsive electricity market and system that will enable higher renewable energy uptake. The Clean Energy Council supports this change, noting the complex transitional issues associated with it and need for careful planning and implementation.

Recommendation for action:

Reform the current energy market settlement regime to adopt a five-minute market settlement approach that provides a more effective market signal for energy.

b. Reform the ancillary services markets

The market and rules for ancillary services, such as frequency control, was designed in a time when large synchronous plants were the dominant technology in Australia's energy system.

The control systems in inverters enable very fast response to disturbances on the grid. Inverter energy systems are fully capable of helping to support a secure power system. What is needed to take advantage of these opportunities is reform of the frequency control regime to enable fast-acting devices to assist with frequency control and system security support by rapidly responding to emergency frequency events with Fast Frequency Response capability.

[5] AEMC, *Five Minute Settlement, directions paper*, 11 April 2017

Recommendation for action:

Reform the frequency control regime to enable fast acting devices to assist with frequency control and system security support by rapidly responding to emergency frequency events with Fast Frequency Response capability.

c. Remove distortions that favour poles and wires investments

There is a need to remove distortions to investment decisions by distribution businesses. The current framework gives network businesses an incentive to build assets and place them in their regulatory asset base. It does not give network businesses an incentive to use operational expenditure (opex), such as contracting services from energy storage owners, instead of capital expenditure (capex). This distorts the investment incentives towards poles and wires and away from the network services that can be provided by energy storage.

The AEMC has acknowledged that it will be important for network businesses to seek opportunities to contract with the owners of those resources where that is the most efficient solution. This will be particularly important if more of the energy market – including network services – is supplied by distributed energy resources in the future.

Recommendation for action:

The AEMC should review options to address electricity market rules that distort investment away from network services and towards poles and wires.

d. Make network information available and useable

Distribution businesses are required to publish information on network constraints. The format and usefulness of the information varies from report-based approaches to geographic information system (GIS) platforms.

Making information more accessible and available in GIS format would enable more economic and efficient deployment of demand-side alternatives such as energy storage to network expenditure. An example of this is illustrated in Figure 4 below.

Localised or distributed energy markets have the potential to support optimal, location-specific investments in energy storage to address impending network constraints. Ergon Energy is trialling this approach in Queensland with its 'Optimal Incremental Pricing' strategy, which enables storage suppliers to bid to address identified network issues. This allows for small incremental costs to be incurred as network issues generally increase incrementally. It helps to insulate all customers against large-scale fixed network costs associated with network augmentation, particularly in the face of uncertain energy forecasts.

Recommendation for action:

Distribution businesses should publish better data on impending network constraints that could be addressed by incremental investments in on-grid energy storage. The AEMC and AER should change the requirements on distribution businesses regarding the Distribution Annual Planning Report to transition from a report-based approach to a GIS-driven portal to enable better market access and usability of data.

Figure 4. GIS format information provided to industry by Ergon Energy

e. Lower regulated thresholds for poles and wires so storage can compete

The Regulatory Investment Test – Distribution (RIT-D) requires electricity distribution businesses to consider alternatives to building new poles and wires. Batteries on the grid and other forms of distributed generation and demand management can be a cost-effective alternative to building new network assets. However, the threshold for the RIT-D process is $5 million, which is sometimes too high for batteries to be considered as an alternative. This limits the opportunities for providers of demand response and network support services to identify where they can provide such value.

The Clean Energy Council has called on the AEMC to lower the RIT-D threshold from the current level of $5 million. In addition, the administrative burden imposed on distribution businesses and proponents should be reduced to make the RIT-D simpler, timelier and more useful for lower cost projects. Ergon Energy's 'Optimal Incremental Pricing' approach is superior to the RIT-D approach in that it allows more timely investment in smaller increments without excessive administrative burden. The AEMC should encourage other distribution businesses to consider the approach pioneered by Ergon Energy.

Recommendation for action:

The AEMC should significantly lower the RIT-D threshold from the current $5 million level and encourage approaches such as Ergon Energy's 'Optimal Incremental Pricing', which allow for smaller increments of investment while reducing the administrative burden on distribution businesses.

2. Remove regulatory barriers for storage behind the meter

Outdated regulations are creating barriers to investment and market participation

The grid connection rules of most distribution businesses in Australia fail to recognise the fundamental technical difference between solar PV and battery storage and their respective positive impacts upon the grid. For example, many distribution businesses that have a 5kW limit on inverter size do not allow the addition of a 5 kVA AC-coupled battery to an existing 5 kW solar system. The distribution businesses are treating the battery as though its impact on the grid is the same as the addition of another 5 kW solar array.

Energy Queensland is a notable exception, with its latest connection rules allowing a 5 kVA AC-coupled battery to be added to a 5 kVA solar system[6].

Unnecessary restrictions on the addition of batteries to existing solar systems will prevent households and businesses from playing an active role in energy supply. Regulations should be encouraging solar households to add batteries, not making it more difficult.

Energy Queensland's approach will strengthen the grid, make it easier to add batteries and in the long run that will reduce electricity prices and make our system more secure and reliable.

Recommendation for action:

Distribution businesses should follow Energy Queensland's example, making it easier to obtain approval for grid connection when adding a battery to an existing solar PV system.

[6] Joint Ergon Energy / Energex Connection Standard for Micro Embedded Generating Units up to 30kVA - A copy of the latest version of this Ergon Energy Standard may be obtained by searching for 'solar connection' from the following website: https://www.ergon.com.au/

3. Recognise and reward the value of storage behind the meter

Consumers are becoming increasingly active participants in our electricity markets. Both household and business customers are making their own investments in technologies such as solar and storage, as well as a range of software and technology platforms that allow them to maximise the value of these assets. Allowing customers to be rewarded for the broader benefits they are providing will ensure these investments will play an increasingly important role. For example, tariffs that can allow consumers to use their storage system in a way that supports the local electricity grid (i.e. at peak times) could reduce the scale of future grid upgrades, providing long-term savings for other customers.

a. Feed-in tariff reform

Battery storage can reduce demand for electricity at peak times. If leveraged effectively, the widespread use of the technology can help to reduce the costs spread across the entire electricity system associated with generating and distributing electricity at peak periods. However, the current electricity tariff structures make it difficult for households to be properly rewarded for the benefits they can bring during peak times. Feed-in tariffs should be designed in a way that rewards customers for the value that storage brings to the energy system.

The Victorian Government is leading in this area of tariff reform and recently legislated a 'critical peak' time-of-use feed-in tariff payment that from 1 July 2017 will reward solar households and businesses for the additional value of the electricity they feed into the grid when demand and the system is under strain and wholesale prices are high (above 30 cents per kWh).

A 'critical peak' feed-in tariff will help to reduce wholesale electricity price spikes and avoid the need for additional expenditure on poles and wires. It is the feed-in tariff design that is most likely to affect behaviour and motivate change. Early adopters and battery owners are likely to be motivated by the higher prices that could be offered for limited duration at times of critical peak demand.

In one of the most detailed and comprehensive studies of its kind, the Essential Services Commission (ESC) found that solar generation creates network value by reducing congestion[7].

The network value grows significantly with the introduction of energy storage, smart inverters and smart energy control systems. Analysis undertaken for the ESC shows that the network value of a solar PV system can increase by a factor of about 20 (and sometimes more than 60) when battery storage is added to the system, with the potential to make the distributed generation more 'firm'.

Recommendation for action:

State and territory governments should support benefit-reflective feed-in tariffs (as adopted by the Victorian Government), in order to ensure the full value of energy storage is recognised.

[7] Essential Services Commission, *The Network Value of Distributed Generation: Distributed Generation Inquiry Stage 2 Final Report*, February 2017

b. Re-purpose the existing premium feed-in tariffs

More than 1.65 million Australian homes have installed rooftop solar, and hundreds of thousands of households continue to benefit from a state-level premium feed-in tariff (PFiT). There is a significant opportunity to re-purpose the existing PFiTs to support storage. If all the customers with a PFiT were able to leverage its residual value to purchase a battery storage system, Australia could have a 960 MW virtual power plant, at no additional cost to energy users, and to the benefit of all electricity customers[8].

All customers would benefit if the residual value of a PFiT could be traded (at a discount) in exchange for a subsidy for a battery.

Recommendation for action:

In states where customers continue to receive premium feed-in tariffs, governments should consider the feasibility of programs to allow the value of the PFiTs to be traded in exchange for a subsidy for a battery.

c. Support the transition to demand-based network tariffs

The Clean Energy Council supports the principle of moving toward demand-based network tariffs. Reducing peak demand and spreading the electricity load more evenly will improve network utilisation, reduce network spending and lower wholesale electricity costs. Electricity pricing is crucial to influencing demand. However behavioural economics research (such as that undertaken by the CSIRO) shows that price signals alone are not enough. CSIRO[9] has concluded that:

> *"In all policy making around cost-reflective pricing it will be absolutely critical to distinguish what might promote uptake as opposed to effective usage of cost-reflective pricing.*
>
> *Anything that induces the former without also facilitating the latter will carry with it considerable political, economic and social risks."*

The key issue for tariff reform is to build public understanding and support. Consumers don't want electricity tariffs that make life more complicated. Cost-reflective pricing will be more successful the more it relies on automation technology and the less it relies on consumers, themselves, responding to changing price signals.

It would be a mistake to move too quickly to the mandatory introduction of demand-based tariffs, and that is especially so at the residential and small business level. Customers should be offered demand-based tariffs on an opt-out basis long before any moves are made towards mandatory tariff reassignment.

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[8] R. Wavish, Marchment Hill Consulting, *Marchment Hill Consulting submission to the Independent Review into the Future Security of the National Electricity Market's Preliminary Report*, 3 March 2017

[9] K. Stenner, E. Frederiks, E.V. Hobman and S. Meikle, CSIRO, *Australian Consumers' Likely Response to Cost-Reflective Electricity Pricing*, 2015

Customers should be allowed enough time to gather 12 months of smart meter before being required to decide whether they will 'opt out' of a demand-based tariff.

Customers should have access to on-line tools to enable them to compare their consumption profile against tariff offers. The Victorian government's on-line tariff comparison tool ('My Power Planner') is being updated to include demand-based tariffs. The Australian Energy Regulator (AER) should follow suit and update its on-line tariff comparison tool to enable comparison of smart meter data and tariffs to enable customers to understand the potential benefits and risks of switching to a demand-based tariff.

In late 2017 the ACT will be the first jurisdiction in Australia to introduce demand-based tariffs at the residential level, on an opt-out basis.

Recommendation for action:

The Australian Energy Regulator (AER) should support the transition to demand-based tariffs and empower consumers by updating its on-line tariff comparison tool to include demand charges.

4. Set standards and protect consumers

Consumer confidence in the performance, quality and safety of battery systems is paramount.

The four key considerations when it comes to quality and safety of battery systems are:

- regulation of installation and training, quality and oversight of designers and installers;
- product standards and quality assurance;
- retailing and after-sales service; and
- full life cycle care.

a. Quality and regulation of installation behind the meter

Batteries must be installed to a high level of safety and integrity to ensure continued consumer confidence. Currently no requirement exists for a consumer to use an accredited installer and designer for the installation of a battery storage device. In some cases systems do not even need to be installed by a qualified electrician.

There is a role for governments to assist with the establishment of a regulatory regime to ensure the safety of all consumers. However, excessive red tape would unnecessarily increase costs for consumers. The Clean Energy Council believes energy storage units should meet legally enforceable product standards and be installed by an accredited installer to clear guidelines.

A robust accreditation regime, such as that under the framework of the Renewable Energy (Electricity) Act can ensure that high standards of safety and quality are upheld and the industry can quickly address issues as they arise and put in place additional requirements and procedures.

The accreditation scheme under the Renewable Energy (Electricity) Act does not apply to batteries or other energy storage systems. The Clean Energy Council has developed an endorsement to the existing accreditation scheme for installers and designers of PV systems. Currently approximately 200 competent installers hold a battery endorsement under this program. More than 600 installers are also accredited in both Grid-connect and Stand-alone and have the expertise necessary to work on battery systems. In addition, the Clean Energy Council has released highly detailed battery installation guidelines for use by accredited solar installers with an accompanying Battery Endorsement.

Recommendation for action:

State government safety regulators should require that all battery installations must be performed by a qualified installer with the demonstrated competency in battery installation, such as those accredited for battery installation under the Clean Energy Council's accreditation scheme.

b. Product standards and quality assurance

The Clean Energy Council works with the clean energy industry, the Clean Energy Regulator and electrical safety regulators to improve consumer and safety standards for inverters, PV modules and energy storage systems in Australia.

In February 2017, a new international standard for the safe operation of secondary lithium cells and batteries (IEC 62619:2017) was published. It specifies product safety standards for batteries subject to extreme conditions, such as being dropped from a height, crushed, overcharged, overheated or pierced by a large nail. The CEC supports the proposal for this international standard to be adopted as a legally enforceable Australian standard. Until that happens, the CEC will continue to promote the benefits of voluntary adherence to international product standards and installation guidelines.

Recommendation for action:

There should be a legally enforceable Australian Standard for the product safety of lithium ion batteries. Until then, State government safety regulators should mandate that batteries installed in their jurisdiction be required to demonstrate compliance with best practice international product standards for battery safety, such as IEC 62619:2017.

c. Retailing and after-sales service

The Solar Retailer Code of Conduct is a voluntary scheme administered by the Clean Energy Council. It aims to improve standards among solar and storage retailers and is the only solar industry code of conduct authorised by the Australian Competition and Consumer Commission.

The code makes the process of buying systems with solar and storage simpler and safer for consumers by enabling them to choose from a list of retailers who have been through a rigorous screening process. Approved retailers:

- provide a five-year, whole-of-system warranty on all solar PV and energy storage systems;
- use Clean Energy Council-accredited designers and installers;
- provide honest and accurate information about the best system for the customer, based on a site-specific system design and performance estimate;
- properly advise their customers on grid connection procedures;
- ensure customers receive essential information when buying a solar power or energy storage system under a finance agreement;
- use sale and installation contracts that have been verified as meeting the stringent requirements of the code; and
- have been vetted to ensure that their directors have not been directors of previously failed companies.

An independent Code Review Panel oversees the administration and provides direction for the code, as well as hearing appeals of decisions made by the Code Administrator.

Recommendation for action:

Governments that provide rebates or conduct reverse auctions for 'behind the meter' battery storage systems should specify tender conditions that either require use of retailers that are signatories to the Solar Retailer Code of Conduct, or can demonstrate compliance with standards at least as stringent as those of the Solar Retailer Code of Conduct

d. Full Life Cycle Care

Careful consideration must be given to the maintenance, operation and disposal of battery systems. This should include processes for transportation, warehousing, operation and maintenance, along with the management of system faults or issues and procedures for the disposal of units at the end of their operating life.

Batteries and other PV system accessories were listed by the Federal Government for consideration under the Product Stewardship Act in the June 2016–17 Product List.

An Australian recycler (PF Metals) has established ***Envirostream*** to safely handle and process the problematic lithium ion batteries here in Australia. Processing for lithium ion batteries is a rapidly developing area and initiatives to support recycling are under active consideration by governments and industry.

Recommendation for action:

Industry and all levels of government should work together to develop an agreed approach toward the reuse, recycling or disposal of batteries at the end of their useful life.