SHARING THE SAVINGS: A VOLUNTARY BUYOUT OF PREMIUM FEED-IN TARIFF SCHEMES THAT CAN HELP VULNERABLE HOUSEHOLDS

SUPPLEMENTARY REPORT

Premium Feed-in Tariff Buy-out Survey
Tell us what you think about a feed-in tariff buy-out scheme.

1. Name
    a. First
    b. Last

2. Email

3. Phone number

4. State

5. Number of people in your household

6. Annual household income? (ranges)
    a. Less than $40,000
    b. $40,000-$59,999
    c. $60,000-$69,999
    d. $70,000-$79,999
    e. $80,000-$99,999
    f. $100,000-$119,999
    g. $120,000-$149,999
    h. $150,000+
    i. Prefer not to say

1. When did you install your solar system?
    a. Less than 12 months
    b. 1-2 years
    c. 3-5 years
    d. 6-10 years
    e. More than 10 years
    f. Not sure

2. What year does your FiT scheme end?

3. Has your solar system paid for itself yet?
    a. Yes
    b. No
    c. Don't know

Solar Citizens is investigating a policy of offering solar bonus scheme customers a voluntary buy-out of their premium feed-in tariff in exchange for an upfront lump sum to be spent on a battery storage system. This lump sum would be equal to the amount you would receive until the end of your feed-in tariff scheme, minus a "discount" that would be used to fund low-income energy efficiency and solar and storage projects.

4. Is this buy-out scheme something you'd be interested in participating in?
    a. Yes

    b. No
    c. Maybe
5. Does helping to fund low-income projects make you more or less likely to participate?
    a. More likely
    b. Less Likely
    c. No impact

6. Would you be willing to take a discount of:
    a. 15%
    b. 20%
    c. 30%
    d. No discount

7. Any comments on the idea?

8. Are you interested in sharing your story as a case study in our report on this issue?
    a. Yes
    b. No

Voluntary Buyout of Premium Feed-in Tariffs

Solar Citizens

Final Report

18 October 2017

MARCHMENT HILL CONSULTING

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1 Background

Solar Citizens is working as an independent, community-based organisation to protect and grow solar in Australia. As part of their advocacy work, Solar Citizens is investigating policy options to boost uptake of battery storage technology and improve low-income access to renewable energy. This work has received the support of the Melbourne Lord Mayor's Charitable Trust by means of a grant to support analysis and the production of a report detailing the findings and impacts for governments.

The larger report has a number of objectives, including:

1) Identifying the savings that would be generated from a voluntary buyout of Premium Feed-In Tariff (PFiT) schemes in National Energy Market (NEM) states, namely Queensland, South Australia, Victoria and the ACT under various uptake scenarios.
2) Identifying policies to boost battery storage by subsidising battery purchases for solar owners who voluntarily forfeit their PFiT.
3) Setting out policies that would be funded through savings garnered through the voluntary buy-out scheme, with emphasis on low-income households, such as free or subsidised solar and storage and/or energy efficiency upgrades for sub-standard properties.

The larger report will be produced in collaboration with Marchment Hill Consulting (MHC) and Environment Victoria, with input from the Clean Energy Council, ACOSS, Community Power Agency and Australian Solar Council.

This report by MHC is intended to provide supporting analysis for the larger, final report. It specifically focussed on the findings of modelling undertaken to analyse the impact of the voluntary buyout of remaining PFiT schemes in the NEM.

1.1 Approach

MHC undertook detailed modelling using PFiT and PV information collected from Energex, Ergon, SA Government, Victorian Government, ACT Government and the Australian Photovoltaic Institute. Other data sources utilised for this analysis include

- Battery storage market prices from 34 providers;
- Annual energy consumption data sourced from AEMC
- Indicative financing rates and terms from the CEFC
- Retail tariffs from Origin Energy and ActewAGL
- Industry standard capacity factors and degradation rates

Full details of assumptions used are listed in Appendix A – Model Assumptions.

The objective of the analysis was to achieve the following outcomes:

1. **Identify overall savings that would be generated from a voluntary buy-out of future PFiT earnings including:**
    a. State and territory breakdown of savings for governments supporting PFiT's in the National Electricity Market (NEM): South Australia, Victoria, Queensland and the ACT

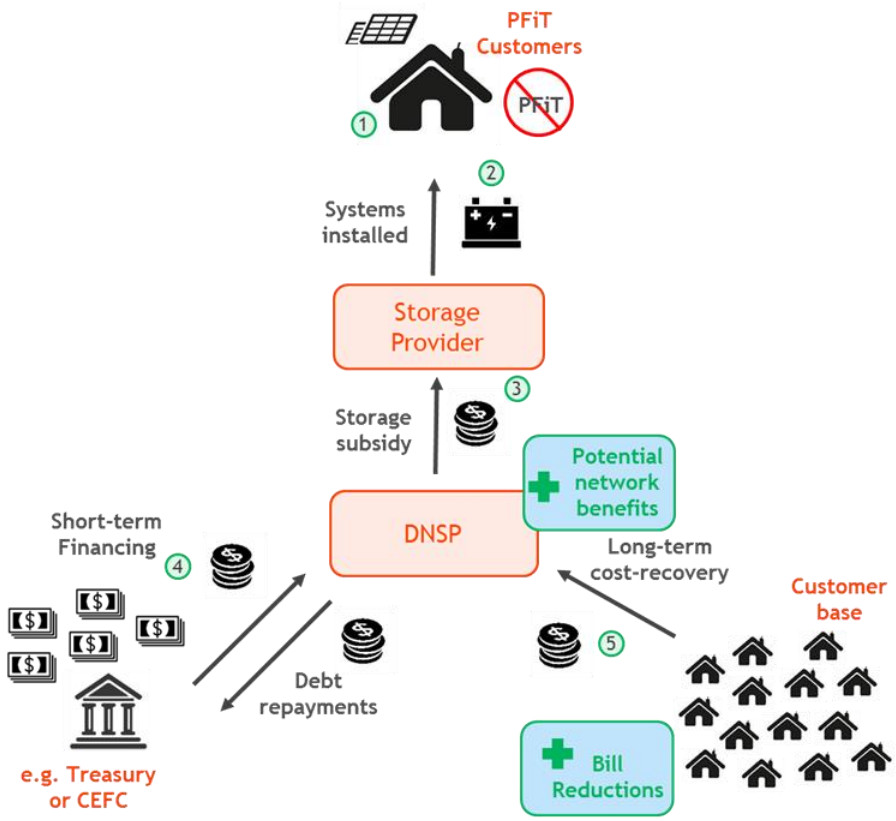
   b. Analysis considering three (3) different uptake scenarios - low, medium and high
   c. Three (3) different discount rates – low, medium and high
   d. Avoiding any price spike[1] in subsidy levels
2. **Suggest how government savings could be spent**:
   a. Identify level of battery storage investment and capacity for the previous PFiT customers under each of the assumed discount rates
   b. Identify the amount of remaining government savings that could be spent on low-income policies
3. **Provide case studies of three (3) 'typical' PFiT customers and how the voluntary buy-out scheme would work for them, including**:
   a. The impacts it would have on their annual electricity related cash flows
   b. The size of battery they could receive under the two (2) discount rates
   c. The overall Net Present Value for each customer when 'opting-in' to the scheme under the two (2) discount rates, over a 10-year period

[1] A price spike is where the subsidy pass through costs are higher under the proposed scenario than under a business as usual scenario.

2 Analysis Overview

MHC undertook detailed analysis of the PFiT schemes within South Australia (SA), Victoria (VIC), Queensland (QLD) and the ACT to assess the level of government savings that could result from a voluntary PFiT buyout scheme.

A voluntary PFiT buyout scheme is a government mandated scheme to customers who are currently receiving a PFiT. The below provides a high-level overview of how such a buyout scheme could work:



1. PFiT customers are given the option to convert the residual value of their PFiT subsidy, at a discount (the "*discount rate*"), into another subsidy which could be put towards a battery storage system subsidy ("cash-out"). The cash-out may cover the full cost of the battery and installation, or the customer can choose to co-invest in a system.
2. All customers who take up the offer ("*uptake rate*") have an eligible storage system, installed by an accredited installer.
3. The storage provider receives the lump sum subsidy from the distribution network service provider (DNSP) and passes the saving onto the customer in the form of a discount off the listed price.
4. The DNSP covers the upfront cost of the battery storage subsidy via a financing agreement (which includes the *"Financing Term"*) at a low interest rate (*"Financing Charge")* possibly via State Treasuries or the Clean Energy Financing Corporation (CEFC), alternately via other national or international sources of low-cost clean energy dedicated finance.

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5. The DNSP recovers the cost of the battery storage subsidy from the customer base via their network charges over the life of the scheme.
6. The storage financing charges are less than the discount off the original PFiT scheme, so the overall subsidy cost pass through to the customer base is reduced, as well as wider storage benefits being realised

A voluntary PFiT buyout scheme allows customers to access future revenue streams as a lump sum, which can be used to access additional energy value streams (via gaining access to battery storage). It also allows governments to reduce their future liabilities through paying out PFiT subsidies at a discount, whilst also redirecting subsidy payments to increase storage within the network – which could help to reduce network costs and increase network stability.

The analysis of government savings was undertaken by modelling the yearly PFiT related cashflow requirements for each government under a business-as-usual case and under a future PFiT buyout scenario. One of the key assumptions impacting the cost of the buyout of PFiT's is the financing rate, which has been estimated following discussions with the Clean Energy Finance Corporation, who have expressed an interest in support such a scheme.

The analysis also assumes the PFiT environmental charges included in network charges but not required for customers who choose to cash-out can be used to offset the debt requirements.

2.1 Scenarios

MHC's analysis ran three scenarios utilising the core assumptions above:

- **Low Uptake** – This reflects a scenario where the discount rate is highest and as a result there is minimal uptake of the scheme.
- **Medium Uptake** – The discount rate is lowered and as such there is an increased uptake of the buyout scheme
- **High Uptake** – This scenario assumes 60% of customers take-up the buyout scheme due to a low discount rate

The following scenario assumptions were used for each state and territory:

	Low Uptake	Medium Uptake	High Uptake
Uptake Rate	**10%**	**30%**	**60%**
Discount Rate	**30%**	**20%**	**15%**

3 Benefits from a voluntary buyout of PFiTs

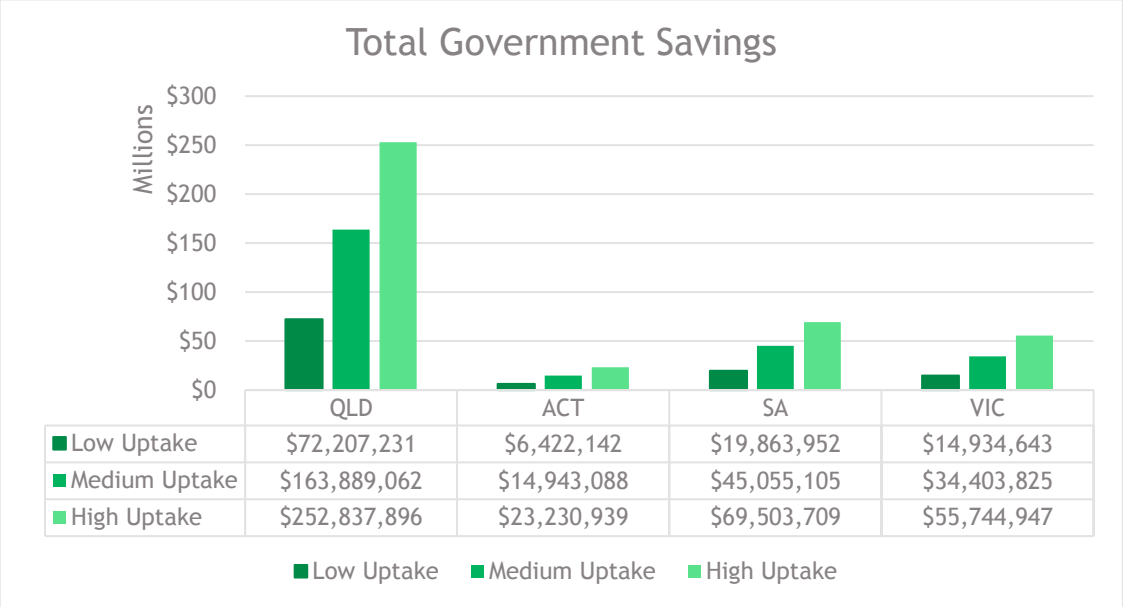
There are significant benefits for all stakeholders involved through the implementation of a voluntary buyout of PFiTs. This report will focus on the benefits to governments and PFiT customers

3.1 Government Benefits

Governments implementing these schemes would see a range of benefits including:

- Reduced overall subsidy burden;
- Improved power system security;
- Building significant export markets (e.g. DER market and optimisation software); and
- Significant jobs growth in storage system sales, marketing and installations.

Our modelling shows that there is the potential for governments across QLD, ACT, SA and VIC to save a combined value of more than $400M over 14 years under the high uptake scenario (60%). These savings could be spent on policies supporting access to renewables for low-income households.



	QLD	ACT	SA	VIC
Low Uptake	$72,207,231	$6,422,142	$19,863,952	$14,934,643
Medium Uptake	$163,889,062	$14,943,088	$45,055,105	$34,403,825
High Uptake	$252,837,896	$23,230,939	$69,503,709	$55,744,947

3.2 PFiT Customer Benefits

The following benefits have been identified for PFiT customers:

- The ability to choose to be more active in new technologies (battery storage);
- Increase asset value of property; and
- Easier/trusted access to higher quality storage and related technology products and services.

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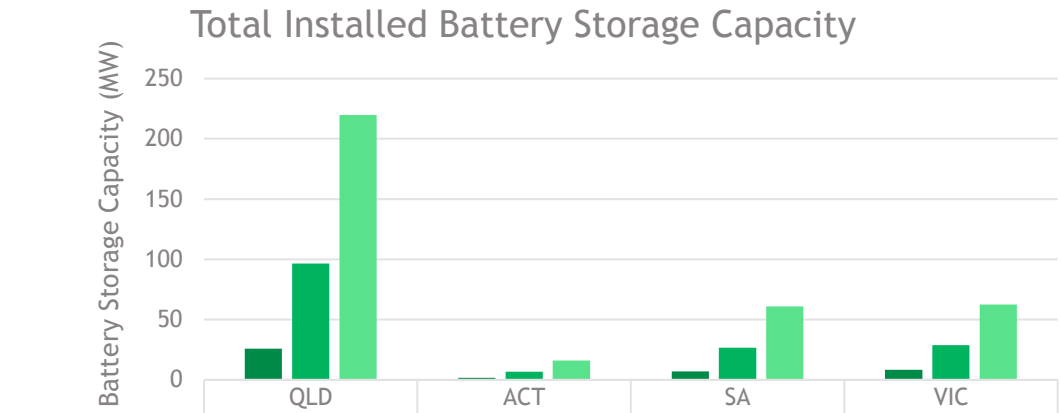
3.2.1 Battery storage potential

If the cash-out payments were provided as a subsidy to be used to install battery storage this would result in a significant amount of installed capacity. MHC has modelled this approach, which indicates that a total of 359 MW of installed capacity could come as a result of voluntary buyout under a high uptake (60%)[2].



	QLD	ACT	SA	VIC
Low Uptake	25.8 MW	1.8 MW	7.2 MW	8.3 MW
Medium Uptake	96.4 MW	6.9 MW	26.7 MW	28.8 MW
High Uptake	219.8 MW	16.2 MW	60.9 MW	62.5 MW

Key considerations for linking this policy to the uptake of energy storage systems:

- The introduction of a battery storage subsidy would also enable the state government to define the minimum standards for eligibility – ensuring high quality systems and installation. Eligibility should also be contingent upon the battery storage system being integrated into a virtual power plant (or at least have the capability to do so). This would provide additional benefit for the system owner, as they could access value streams from external markets and additional benefits for the remaining customer base from aggregated demand response at critical peak periods, improved local power quality and reduced network augmentation costs. This could have a significant impact on both network charges (due to reduced network capital costs) and wholesale energy costs (due to reduced market volatility).

[2] The following scenario assumptions were used for each state and territory in assessing the battery storage capacity:

- Average installed battery storage costs (including inverter) are ~$1,600/kWh
- Conversion from kWh to kW is 0.51
- Only the cash-out amount was used in calculating total storage potential. If customers also contributed towards the battery costs to improve the size of their battery, this would increase the total installed storage capacity across each state.

- The installation of the battery storage system should not limit the customer's ability to switch retailer or service provider
- CSIRO forecast significant price reductions in battery storage units over the next 3-4 years so this could impact the timeframes for the scheme and uptake preferences

3.3 Other Benefits

Non-PFiT Customers	• Downward pressure on prices based on network cost saving and reduced wholesale market volatility • Reduced cross-subsidy to solar PV customers • Secondary benefits from an accelerated energy services markets (improved and lower cost energy products and services) • Benefits could be recycled into low income energy subsidy/support rather than returned to the whole customer base
Networks	• Greater access to the value of battery storage for network services and support • Improved integration of solar PV fleet • Improved power quality • Reduced network augmentation costs • Accelerated transition to new, innovative network business and operating models • Greater visibility of characteristics and location of installed storage devices • Accelerated transition to cost reflective network tariffs
Storage Industry	• Accelerated business development opportunity • Incentive to develop high quality hardware and software • Incentive for high quality installation training
Energy Services/ Retailers	• Significant catalyst in the development of VPP products and services • Opportunity for product innovation • Greater visibility of characteristics and location of installed storage devices

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4 Customer Case Studies

MHC have analysed a typical customer for across each of the regions. This analysis focussed on the cash flow impacts of a typical customer under a business as usual scenario versus a scenario where the customer accepts the voluntary buyout payment provided by the government and installs a battery storage unit utilising the entire cash-out payment.

Key assumptions:

- Customers are all on a flat-rate tariff prior to cashing out, and change to a time-of-Use tariff (ToU) after cashing out (except for SA, as there are no ToU tariffs currently available);
- Customers will need to install a new inverter (which is included in the battery storage pricing);
- After receiving the cash-out subsidy and purchasing a battery, the customer can self-consume 100% of the solar electricity; and
- 80% of demand is shifted to the off-peak ToU tariff whilst the remaining 20% of demand is on a peak rate.

Other assumptions related to each customer can be found in Appendix B - Customer Case Study Assumptions.

4.1 Findings

The following key findings were found from this analysis:

State	Discount Rate	Cash-out value	Battery Size	NPV[3]
QLD	15%	$4,273	2.65 kWh	-$300
	30%	$3,058	1.90 kWh	-$300
ACT	15%	$4,101	2.55 kWh	$1,450
	30%	$2,760	1.71 kWh	$1,450
SA	15%	$3,752	2.33 kWh	$1,100
	30%	$2,685	1.67 kWh	$1,100

[3] NPV is calculated over 10 years and is a comparative NPV (i.e. the NPV of a BAU case vs the NPV of the buyout scheme). The NPV is the same for both 15% and 30% discount rates as a) the cash-out amounts (which are calculated using these discount rates) are perfectly offset with the cost of purchasing of battery storage, and b) all other assumptions impacting cash flows (e.g. energy usage, self-consumption rate, peak/off-peak usage, tariffs etc.) remain the same.

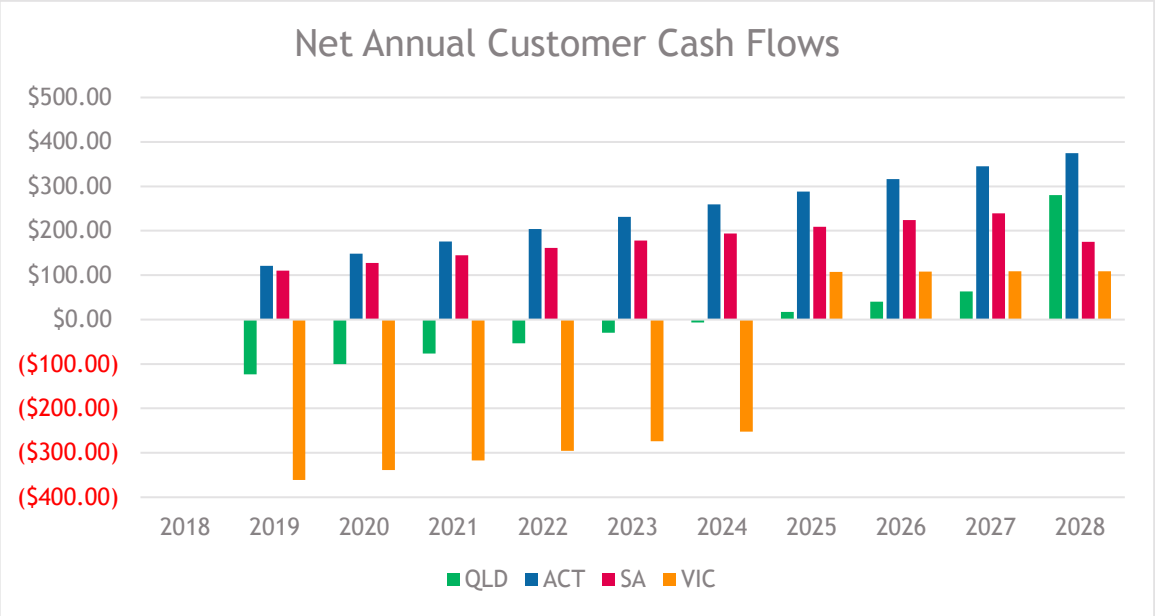
VIC	15%	$4,073	2.53 kWh	-$1,347
	30%	$3,255	2.02 kWh	-$1,347

Other insights from this analysis are:

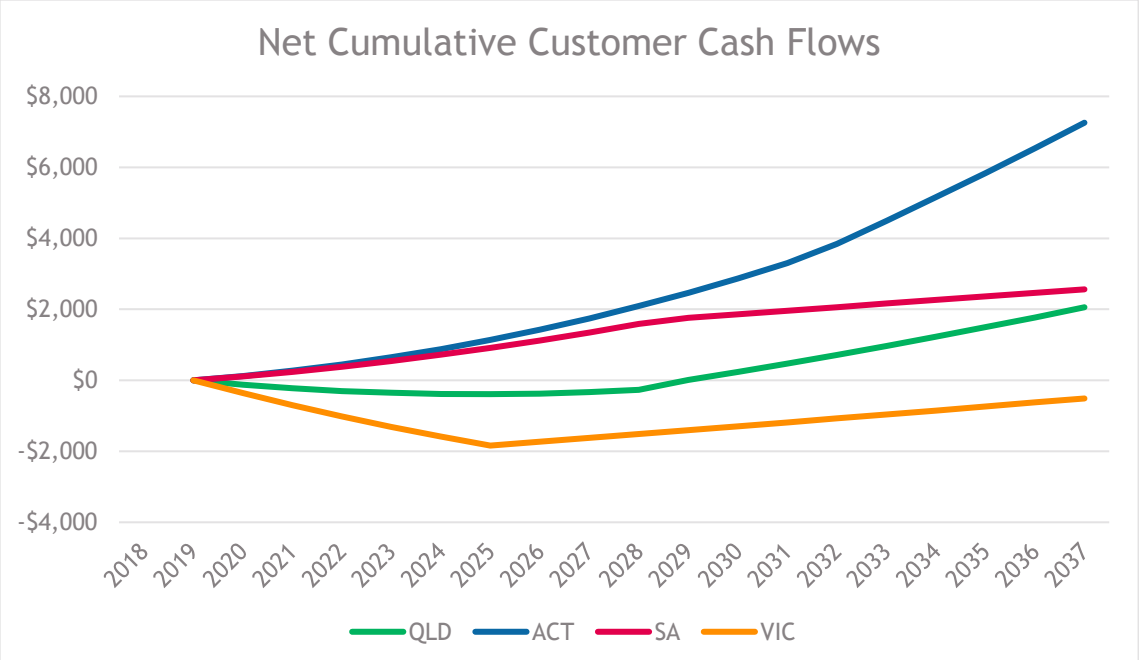
- The SA customer has significant benefit from the buyout scheme as they can shift the solar exports into self-consumption, offsetting a high flat-rate tariff
- The QLD customer has a relatively larger solar system and therefore generates significant PFiT income under a BAU case. Following the buyout, they shift demand to utilise to a ToU tariff, however the ToU tariff does differ substantially from the flat rate that they were on prior to the PFiT buyout. The combination of these factors leads to less net benefit.
- The VIC customer has a relatively high PFiT rate of 60c/kWh with a relatively low flat rate tariff. Following the buyout, they utilise the ToU tariff, however much like QLD, this is not substantially different to the BAU flat rate tariff and as a result they are worse off under the scheme.
- The ACT customer has a relatively smaller PV system to the other states with much higher energy consumption. As a result, they have a worse net cash flow than other states. After the buyout, the customer can take advantage of a significantly lower ToU off-peak rate. As a result, they have a positive net cash flow in each year when compared to BAU.
- The NPV for each customer reflects the comparative outcome if the customer were to make a 5 per cent return on the cash-out amount using traditional investments means (bank interest, stocks etc) against utilising the cash out payment on battery storage. ACT and SA customers would have had an improved outcome over the 10-year period of $1,450 and $1,100 respectively. QLD and VIC however had a comparatively worse outcome over the 10-year period of -$300 and -$1,347 respectively. None of the NPV's are large enough to have a significant impact on the customer whether it be for better or worse, as they are estimated over a 10-year period.
- Under all scenarios the customer has an improving net cash-flow after the buyout, however as shown in the below graphs, this rate of improvement differs significantly depending on the customer's energy characteristics.

Note: the impact on customers is highly dependent on their specific tariff, energy usage, future tariff, demand shifting and self-consumption rate. A customer who can take advantage of the buyout to move to a much lower ToU rate, or maximum demand based tariff, will be generally better off.

The below shows the yearly net cash flow impacts on each typical customer within each state when comparing BAU to buyout scheme. This graph shows VIC and QLD commencing with a comparatively (to BAU) negative cash-flow, which turns positive in year 7.



The below shows the net cumulative cash-flow impacts when comparing BAU to the buyout scheme. This graph shows the point in which cumulative cash-flows return to zero. ACT and SA have net positive cumulative cash-flows throughout the 10-year period, whilst QLD and VIC do not return to positive within the 10-year timeframe, with QLD being $268 negative (returns positive in year 11), and VIC $1,514 negative (returns positive in year 22). The primary reason why the VIC customer remains negative throughout the period is due to the tariff rates assumed, under more favourable peak and off-peak tariffs, the customer would return to positive cash-flows by year 11.



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Appendix A - Model Assumptions

Assumptions	Description	Values				Source
		QLD	ACT	SA	VIC	
Solar PV Assumptions						
Capacity Factor	The ratio of actual power output over a period of time, compared to potential output (at nameplate capacity) over the same period of time	15%	15%	15%	15%	Industry Standard
Degradation Rate	The annual rate at which the PV system will degrade over time, decreasing productive capacity	0.5%	0.5%	0.5%	0.5%	National Renewable Energy Laboratory (US), Photovoltaic Degradation Rates, 2012
Assumed Exports	The amount of electricity that is exported to the grid and that would receive the PFiT rate	50%	100%	50%	50%	MHC Assumption, ACT is 100% due to Gross PFiT scheme
Average installation Date	The average time when each customers' PFiT scheme starts	1/06/2012	10/06/2011	1/06/2011	1/06/2011	APVI data
Average Solar System Size	The average size of solar systems installed under the PFiT scheme	3.21 kW	2.56 kW	2.89 kW	2.89 kW	ACT: ACT Government, QLD: Energex and Ergon, VIC & SA: Average of ACT and QLD.

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Assumptions	Description	Values				Source
		QLD	ACT	SA	VIC	
PFiT Assumptions						
Total PFiT Capacity	The total generating capacity of all the solar systems installed under the PFiT schemes	773,572 kW	26,319 kW	204,889 kW	199,795 kW	ACT: ACT Government, QLD: Energex and Ergon, VIC & SA: APVI data
PFiT Rate	The rate the customer receives per kWh of exported solar electricity	44c/kWh	40.5c/kWh	44c/kWh	60c/kWh	Government mandated rates. ACT is based on an average of all rates provided, as they have multiple PFiT rates.
PFiT End Date	The time when the PFiT scheme ends	1/7/2028	10/6/2031	30/6/2028	1/11/2024	Government mandated times. ACT is based on an average of all PFiT customers, as customers receive the PFiT for 20 years from commencing the scheme.
Scheme Assumptions						
Assessment Start Date	The date when the analysis period commences	1/1/2018	1/1/2018	1/1/2018	1/1/2018	MHC Assumption
Cash-out Start Date	The date when the customers begin to accept the cash-out	1/1/2018	1/1/2018	1/1/2018	1/1/2018	MHC Assumption

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Assumptions	Description	Values				Source
		QLD	ACT	SA	VIC	
Cash-out End Date	The date when the customers can no longer cash-out (all customers within the "uptake rate" have cashed-out)	1/1/2020	1/1/2020	1/1/2020	1/1/2020	Discussion with Shani Tager from Solar Citizens - 18/9/2017
Financing Charge	Cost of obtaining finance to fund the cash-out payments	6%	6%	6%	6%	Based on rates obtained from the CEFC
Financing Term	The amount of years in which the financing must be paid off	8	8	8	6	Based on CEFC financing terms. Victoria is 6 years as the PFiT scheme ends in 2024 and any financing after this time results in a spike in pass-through costs.
Government Discount Rate	The rate used to discount the total scheme project payments against BAU (excludes inflation)	6.5%	6.5%	6.5%	6.5%	Typical cost of capital for distribution networks
Financing Modelling Details	The financing charges are applied on the total PFiT cash-out payments that are required in each month. A principle and interest formula is applied which pays down the interest component at a faster rate than the principle component, however the total payments are the same in each year to ensure the principle is completely paid down by the end of the "Financing Term".					

Appendix B - Customer Case Study Assumptions

Attributes	QLD	ACT	SA	VIC
PV System Size	3.21 kW	1.55 kW	2.89 kW	2.89 kW
PFiT Rate	44c/kWh	40.7c/kWh	44c/kWh	60c/kWh
PFiT Type	Net	Gross	Net	Net
System install date	1/06/2012	10/06/2011	1/06/2011	1/06/2011
PFiT expiry	1/07/2028	10/06/2031	30/06/2028	1/11/2024
Capacity Factor	15%	15%	15%	15%
Degradation Rate	0.5%	0.5%	0.5%	0.50%
Average quarterly energy consumption	1,293	1,828	1,250	1,007
Storage costs (with inverter and installation)	$1,610/kWh	$1,610/kWh	$1,610/kWh	$1,610/kWh
Pre-buyout tariff	26.961c/kWh	19.78c/kWh	43.153c/kWh	29.634 c/kWh
Pre-buyout tariff structure	Flat Rate	Flat Rate	Flat Rate	Flat Rate
Post-buyout tariff (off-peak)	20.834 c/kWh (80% of demand)	11.90 c/kWh (80% of demand)	43.153c/kWh	27.280 c/kWh
Post-buyout tariff (peak rate)	30.646 c/kWh (20% of demand)	19.78 c/kWh (20% of demand)	43.153c/kWh	36.630 c/kWh
Post buyout Tariff structure	Time of Use	Time of Use	Flat Rate	Time of Use
Self-consumption	100%	100%	100%	100%
Market feed-in-tariff	7c/kWh	11c/kWh	11c/kWh	11.3c/kWh
Maintenance costs - pre-buyout	$50 / quarter	$50 / quarter	$50 / quarter	$50 / quarter
Maintenance costs - post buyout	$25 / quarter	$25 / quarter	$25 / quarter	$25 / quarter
Storage purchased?	Yes	Yes	Yes	Yes
Assumed solar exports (pre cash-out)	50%	100%	50%	50%

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About MHC

MHC is a management consulting firm **determined to make a difference** by serving the needs of the energy and water sectors in Australia.

Our quarterly journal, QSI Online, shares our insights with the industries we serve and empowers businesses with high quality, content-rich and contemporary information relevant to their industry.

Read it at www.marchmenthill.com/qsi-online

Our Philosophy

The MHC philosophy, validated and reinforced by our work for clients around the world, holds that the value (V) of a consulting intervention rests on three cornerstones:

$$V = Q \times S \times I$$

Value of Engagement — *Quality of Insight* — *Support for Change* — *Implementation with Integrity*

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