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Valuing Solar for Tasmania's Future

TREA Submission to the Office of the Tasmanian Economic Regulator in response to the Draft Investigation Report on the Regulated Feed-In Tariff Rate

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Summary

This submission provides a response from the Tasmanian Renewable Energy Alliance (TREA) to the Office of the Tasmanian Economic Regulator's *Regulated Feed-in Tariff Rate for Standard Feed-in Tariff Customers: Draft Investigation Report* {OTTER 2016a} but it also argues for a broader approach to support renewable energy development.

The combination of critically low dam levels, low rainfall, and an extended Basslink outage have created a short term crisis for Tasmania, but also highlighted the need for longer term planning to meet our energy security, economic and environmental objectives.

The core problem is that long term sustainable yield from existing hydro assets and the two existing wind farms is less than annual consumption. In normal operation Basslink makes up any difference, but this makes it very difficult to make a big impact on storage levels and explains why over the long term Basslink imports more than it exports.

Even if Basslink is fixed soon and rainfall returns to normal there will be a significant challenge to meet the shortfall and rebuild our storages. The government has already flagged that the "longer term strategy now includes securing more gas turbines to expand the Tamar Valley Power Station".[1]

TREA believes that a coordinated plan[2] to expand renewable energy generation, through wind, solar and small hydro — combined with an increased emphasis on demand management and energy efficiency measures — can meet our energy needs and rebuild our dam levels.

Under this plan, wind power will need to do much of the heavy lifting, but solar PV can contribute significantly to solving the many challenges we face, including reducing the overall cost of delivering electricity, meeting our greenhouse gas (GHG) emission reduction targets and generating employment throughout Tasmania.

Existing regulatory structures are ill-equipped to recognise these benefits:

- Regulatory frameworks in the electricity sector look only at the short term costs and benefits, despite a stated national objective of being in the 'long term interests of consumers'.
- Government support for employment creation tends to focus on large projects that have a visible impact in one location, rather than generating employment throughout the state.
- There is no effective mechanism for valuing infrastructure developments that have long term benefits for human health and the environment.

In this submission we have identified the benefits that solar PV can contribute to our electricity system and the ways these could be included in a FiT calculation. We have also identified additional benefits beyond the electricity system (for example for health and the environment) and identified existing research that attempts to put monetary values on these where possible.

Because the benefits to Tasmania from distributed generation are much greater than just those that can be identified as savings in the current electricity market we believe the ultimate decision of the FiT rate should be made by the Minister and endorsed by parliament. The Economic Regulator can play a valuable role in costing these benefits where possible. A full

[1] http://www.abc.net.au/news/2016-02-23/tasmanian-government-considers-long-term-loss-of-basslink-cable/7192408 24 Feb 2016.
[2] http://reneweconomy.com.au/2016/how-much-new-renewable-energy-does-tasmania-need-67697 22 Feb 2016.

accounting of the benefits is important so that consumers can see that these arrangements benefit all Tasmanians in multiple ways rather than just being seen as a cost impost on electricity consumers who do not have solar panels.

List of recommendations

Calculating a Fair and Reasonable Feed-In Tariff

This section addresses methodological issues in setting a FiT and the questions asked in Chapter 6 of the Draft Investigation.

Chapter 6

In calculating a fair and reasonable FiT the Economic Regulator is seeking comment on:

- the proposed mathematical formula used to calculate the fair and reasonable FiT; and
- the proposed timing of, and process for, updating the FiT.

Alternative approaches in setting a FiT

In this submission we have adopted the approach in the Draft Investigation of looking in turn at a variety of factors and components that might go into making up a FiT. This is a common approach from both regulators and researchers, however it is not the only way a FiT could be determined. As we have argued above and below (p14), distributed renewable energy generation has many economic, social, industry development and environmental benefits. Not all of these can readily be translated to a cents/kWh figure, and even when they can, this involves a large number of assumptions so the final results are not as objective as the plethora of acronyms, the arcane economic language and mathematical formulas might suggest.

Problems have been created in the past through legislated FiTs at figures as high as 60c/kWh which have proved unsustainable and have created perverse incentives. However even in these cases we would argue that the problem was not so much the high rate as the long periods for which they were locked in and the failure to review the arrangements as panel and installation prices dropped and take-up boomed.

Tasmania has never had a FiT at greater than the retail price of electricity.

Setting a FiT involves the difficult task of assessing the value of the multiple benefits of distributed generation and working how to pass this on to solar owners as an incentive to install solar to realise these benefits. This needs to be done in a way that does not place undue burden on customers of the electricity system. An additional requirement is the need for some stability in the FiT so that prospective solar purchasers can estimate the financial payback from their investment. These decisions need to be made in a context where both the cost and the nature of available technology is changing rapidly. Governments have traditionally not handled these decisions skilfully with the result that the industry is constantly going through boom and bust cycles. In Tasmania, the change from a 1:1 FiT to the current arrangement resulted in halving the size of the industry, with an estimate loss of over 200 jobs[3].

The reductionist approach of setting the FiT based only on identified component benefits that can be quantified results in a figure that does not recognise the full range of benefits from distributed renewable energy generation.

R.1 ***The Economic Regulator should identify and quantify the benefits of distributed generation. However the FiT should ultimately be set by the Minister to reflect the wider non-monetary benefits as well.***

R.2 ***The FiT rate and review and grandfathering arrangements should be set to provide some level of certainty to prospective purchasers, while not placing an undue burden on customers of the electricity system.***

[3] http://tasrenew.org.au/boombust/ accessed 1 Mar 2016.

Sharing the benefits

The economic theory behind cost reflectivity assumes that if customers are charged for the actual cost of services provided to them, this will reduce cross subsidy, and lead to efficient allocation of resources and hence lower costs for all customers. This fails to taken into account the difficulty of changing behaviour, both for customers and service providers. In addition, if a proposed change is cost neutral for a service provider, they will have no motivation to facilitate change.

For example a purely cost reflective approach to transmission charges in related to distributed generation would lead to a retailers being given an avoided TUoS benefit and passing this on to customers. In theory this would lead to lower costs to customers for distributed generation and hence encouragement for customers to invest in solar which reduces the need for transmission infrastructure. The problem is that neither the transmission provider or the retailer has any financial incentive to facilitate this change.

We there believe that mechanisms need to be found to share the benefits of distributed generation between all participants in the electricity supply chain.

Limited terms of reference

TREA has consistently argued that the terms of reference for setting the FiT are too narrow and that where they do allow some discretion, the Economic Regulator has not exercised this discretion.

We argued for wider terms of reference in:

- A letter to the Minister on 19 May 2015
- A further letter to the Minister on 5 November 2015
- In a meeting with the Minister on 7 December 2015, at which we presented a petition signed by 464 people calling for "a fair feed-in tariff that recognises the many benefits to Tasmania of a growing solar industry including the savings for all consumers from generating electricity close to the point of use."
- At the Minister's request we provided more detailed suggestions in a letter on 10 December 2015.
- A written submission to the Economic Regulator on 18 December 2015 {TREA 2015b}

The "Principles to be taken into account in making feed-in tariff rate determinations" as set out in section 44H of the Electricity Supply Industry Act 1995 focus mainly on the benefits to retailers.

However section 44H (c) does *require* the Regulator to take into account "the other costs, or other benefits, that … the Regulator considers relevant, including, but not limited to including, those related to the distribution networks or transmission networks …"

By recommending that only benefits that flow to retailers from distributed generation be included in the calculation of the FiT the Regulator has short changed Tasmanians.

This narrow interpretation also fails to meet the National Electricity Objective to "promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers …".

The issue of "cross subsidy"

The Regulator is required to take into account "the principle that the feed-in tariff rate specified in the determination should not have the effect that any customer would effectively be cross-subsidising any other customer".

The electricity network is a public good which provides benefits to all users in excess of the cost of using it. We support the general principle of cost reflectivity to the extent that it leads to behaviour which supports the National Electricity Objective that the electricity market should operate for the long term interests of consumers of electricity with respect to price, quality, safety, reliability, and security of supply of electricity. We also support the COAG 2012 principle that FiTs "should not impose a disproportionate burden on other energy consumers".

Total avoidance of 'cross subsidy' between individual customers is an unobtainable goal, and is not applied in any other area of electricity pricing. For example there has never been any serious suggestion that customers in remote or hard to service locations should pay the full cost of having access to the grid. Yet the cost difference between servicing these customers and customers in urban locations is far greater than any difference between the network costs retrieved from solar and non-solar customers.

The argument that solar customers as a class cost networks more than non-solar customers was tested when SA Power Networks (SAPN) proposed a $100/year additional charge for solar customers. The AER found that:

> *"We are not satisfied that SA Power Networks has demonstrated that PV and non-PV retail customers have sufficiently dissimilar load profiles. A PV specific tariff of the type proposed by SA Power Networks would therefore constitute less favourable treatment of retail customers with micro-generation facilities in contravention of clause 6.18.4(a)(3)."* Quoted in {Orme 2015}

Eligibility for the regulated FiT

Which systems are eligible for a regulated FiT is set at the state level. Eligible system sizes vary enormously, from 5kW in regional Queensland[4] to 100 kW in Victoria.

The Draft Investigation says that "*A qualifying system is defined in section 44B of the ESI Act as a system that: … has a maximum generating capacity of 10 kW*". In fact the eligibility is for 10 kW for a single phase system and 30 kW for a three phase system[5].

In the days of premium FiTs there was a case for limiting the size of eligible systems. Once the FiT is calculated to reflect the benefit of the energy exported there is no logical reason to set a low limit on the size. Some cut-off point between eligibility for a FiT and generators that fall within the NEM rules is necessary. Given that eligibility for STCs for solar projects is capped at 100 kW it would be logical to use the same level for FiT eligibility.

Larger embedded generators can cause problems for network operation in some locations but the logical mechanism for this is at the connection agreement stage with the distribution company, not by a blanket limit on the size of eligible systems.

If the FiT methodology includes consideration of health and environmental benefits, it would be logical that only renewable energy sources (wind, solar, hydro) should be eligible rather than other embedded generators (eg gas co-generation).

Eligibility should be for any embedded generator connected to the distribution network (rather than the transmission network).

[4] https://www.dews.qld.gov.au/electricity/solar/installing/benefits/regional accessed 24 Feb 2016
[5] http://www.austlii.edu.au/au/legis/tas/consol_act/esia1995364/s44g.html accessed 1 Mar 2016

R.3 The regulated feed-in tariffs should be available for all renewable energy generation up to 100 kW connected to the distribution network.

Impact of technology developments

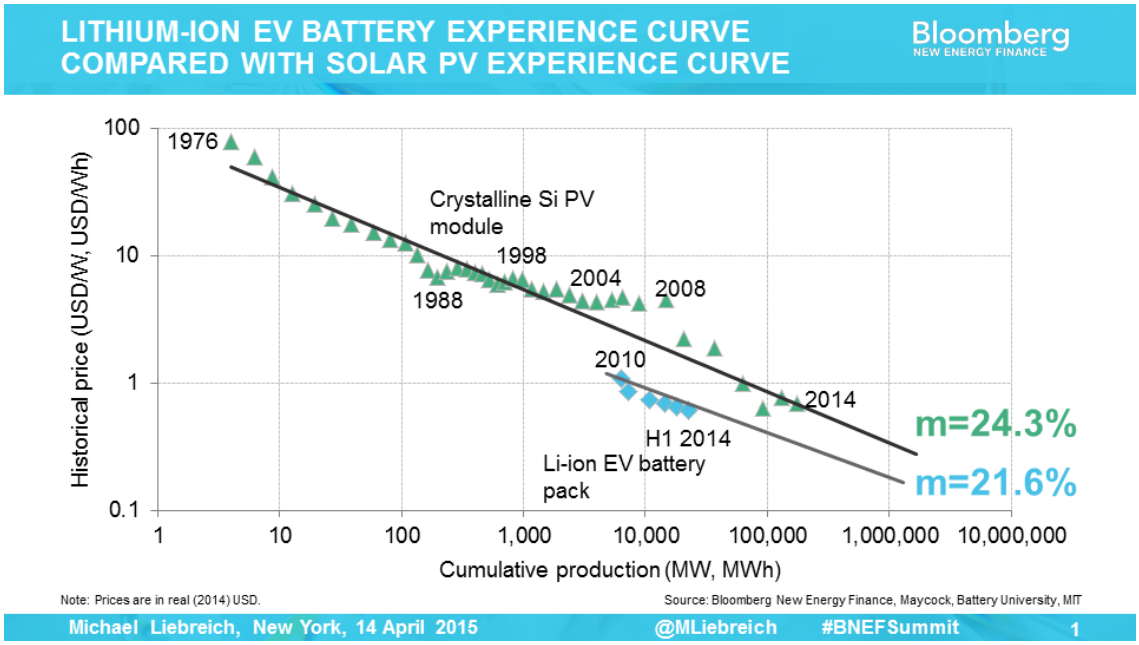
The current FiT determination process is intended to set a methodology for the next three years. Many new technologies are likely to impact on the electricity industry over this period, in particular local grid-connected battery systems and the integration of electric vehicle charging into home energy management systems.

These technologies provide the potential for distributed generation to be fed into the grid when it is of most benefit, rather than just when the sun is shining.

The Draft Investigation acknowledges the future impact of these technologies but argues:

> *"However, the Economic Regulator considers that the development of embedded battery storage technology is in its early stages and there is insufficient information at this time to assess the benefits of Time-of-Use FiT rates, although this issue may be a matter for further consideration in the future."*

Battery systems are being installed in Tasmania now and many commentators are predicting that both cost reductions and technology take-up are likely to match the rapid take-up of grid connected PV over the last few years.



Reproduced from {Naam 2015}

Residential and business battery systems and EV charging present both opportunities and threats for the electricity system. With proper planning and price signals these technologies can contribute to reducing peak demand and hence network costs. Without planning and incentives these technologies can increase peak demand (for example early evening vehicle charging) and increase overall costs, by for example encouraging people to go off-grid in locations where this does not have network benefits.

Optimum integration of these technologies is likely to require a mixture of regulation, appropriate tariffs and possibly time and location based FiTs. Once these frameworks are in place the industry can design and promote suitable hardware options. All of these have significant lead times. It is therefore important that planning for this commences as soon as possible.

Waiting three years before considering the best way to maximise the benefit of these new technologies would be a massive wasted opportunity.

R.4 New and broader terms of reference, incorporating active consideration of new technologies, should be drafted and a new FiT methodology investigation should be carried out before the start of the 2017-2018 regulatory period.

R.5 The revised terms of reference should require the Regulator to investigate the role that new distributed generation options (including domestic battery systems) can play in reducing network costs and make recommendations on mechanisms to allocate this benefit, including the possibility of time and location based FiTs.

Direct impacts considered by OTTER

This section addresses the factors in Chapter 4 of the Draft Investigation and the following questions:

Chapter 4

In relation to the direct financial benefits retailers receive from the FiT, the Economic Regulator is seeking comment on:

- the proposed inclusion of wholesale electricity costs, network losses and National Electricity Market (NEM) fees in calculating a 'fair and reasonable' FiT;
- estimating wholesale electricity costs using the regulated wholesale electricity price adopted as part of the determination and approval of standing offer retail prices rather than the market price method;

and the proposed exclusion of all other direct impacts.

Wholesale price of electricity

We do not believe that the Economic Regulator proposed approach of adopting the regulated wholesale price is appropriate for several reasons:

- As the Draft Investigation acknowledges (p17), a market based price is more consistent with the COAG National Principles.
- Wholesale prices are likely to increase in Tasmania as a result of low rainfall and an extended Basslink failure. It will take some time for these costs to flow through to regulated wholesale prices. Solar owners will be given a lower price signal than the actual wholesale value of the energy they are exporting.
- It is explicit government and Hydro policy that not all the costs of meeting the current higher costs of generating electricity in Tasmania will flow through to wholesale energy prices.

Cost of future generation

Future real costs of generating electricity in Tasmania are likely to rise substantially due to several factors:

- Loss of Basslink will cause a substantial increase in the use of expensive gas-fired energy from the Tamar Valley Power station (estimated costs around 7-10c/kWh)

- There will be a period of diesel fired generation. The running cost of this alone is estimate at in excess of 17c/kWh without acquisition and siting costs. Estimates of the real cost of diesel generation start at 25c and go upwards.
- Once Basslink is restored there will be a need to import significant quantities of energy from Victoria in order to retire gas and diesel generation and build up dam storages.

Hydro Tasmania and the state government have made it clear that the full cost of emergency measures to meet energy demand will not be reflected in regulated wholesale prices. Hydro have stated that only a third of the cost of running diesel generators will be recouped in electricity sales {Hydro 2016a p2}. All of the acquisition and siting costs and two thirds of the running costs will be absorbed into the Hydro budget and likely result in an operating loss {Hydro 2016a p2}. So a substantial part of these costs will ultimately be met by the Tasmanian taxpayer through loss of dividends from Hydro rather than being passed on to energy consumers.

The Energy Minister has consistently stated that the costs of alternative generation will not be passed on to consumers[6].

As a result of these policy decisions, the regulated wholesale price of electricity will not reflect the real cost of meeting electricity demand. Failure to reflect this fact in the FiT paid to distributed generators will distort the market and discourage additional installation of solar PV resulting in a sub-optimal result for tax payers and energy consumers.

Encouraging additional solar PV installation through a higher FiT has significant benefits for the Tasmanian electricity system in reducing costs for all consumers because:

- The capital costs of solar PV is met by the owner, thus avoiding capital costs for new generation infrastructure.
- A FiT is paid only on the energy exported, but the whole generation of the PV system reduces the need for new generation capacity and the purchase of additional wholesale energy at a high marginal cost.
- In the short to medium term, increased solar PV will displace more expensive gas and diesel generation.
- Solar PV is fed into the grid close to the point of consumption, avoiding the need for transmission network and reducing the need for distribution networks.

R.6 The price of energy used to calculate the FiT should be based on a forward estimate of the wholesale market cost of electricity in Tasmania plus allowance for additional future generation costs not reflected in the regulated wholesale price.

Transmission costs

The Draft Investigation acknowledges that solar PV does not make use of the transmission system:

> *"Conceptually, transmission costs can be avoided through the purchase of excess electricity generated by solar PV systems as less electricity is purchased from large-scale generators and consequently less electricity is transmitted through the transmission system to customers." p17*

[6] For example the Minister is quoted in the Mercury on 29 Feb 2016 as saying "the direct costs of the response to the Basslink outage are being paid for by Hydro, not power consumers"

Despite this acknowledgement, the Draft Investigation rejects making allowance for this in the FiT on the grounds that transmission costs are not avoidable by retailers and also that other jurisdictions have taken the same approach.

Retailers pay network charges for all the electricity they sell, irrespective of whether the energy is sourced via the transmission networks or locally from solar PV. These network costs are passed on to customers. As a result, the benefits of local generation are not recompensed, costs to consumers are not reduced and network operators receive payment for services they did not provide.

The Economic Regulator has previously noted:

> *Section 9.1.3 of Aurora Distribution's [now TasNetworks] approved pricing proposal outlines the case in which Aurora Distribution may need to pay embedded generator's avoided TUoS charges. Specifically, Aurora notes that "the National Electricity Rules require Aurora to pay avoided TUoS usage charges to embedded generators who have generated electricity and transmitted this energy into Aurora's distribution network". {OTTER 2013a p16}*

There are also examples from SP AusNet and AusGrid of existing methodology used to calculate avoided Transmission Use of System charges as a result of distributed generation. {ATA 2014 p2}.

So there is no doubt that an existing methodology exists to reward distributed generators for avoided transmission charges. The question is whether solar PV should be recompensed for these savings and if so how much.

Given the strong move towards cost reflective tariffs we believe that the FiT should include an allowance for avoided transmission charges. The rationale for cost reflective tariffs is that users should pay for the actual costs of the components of the electricity network that their consumption necessitates. Charging retailers, and ultimately customers, is doubly unfair:

- Customers pay for a service that is not provided (use of the transmission network for the proportion of their energy that comes from distributed generation), and
- A lower cost method of supplying electricity is not rewarded which ultimately increases costs for all customers.

The most transparent way for these savings to be acknowledged would be for TasNetworks to provide an avoided TUoS credit to retailers in proportion to the percentage of the energy they sell which comes from distributed generation by their customers.

However in the current Tasmanian situation where both the network company and the only retailer to residential customers are both state owned enterprises, the lack of this mechanism should not be used as an excuse to delay acknowledging transmission savings in the FiT calculation.

R.7 FiT calculations should include an allowance for avoided use of the transmission system.

Based on a TasNetworks estimate that transmission costs contribute 15% to a typical residential bill[7] and the current Aurora tariff 31 charge of 25c/kWh this benefit would be of the order of 3.7c/kWh.

[7] Tariff Strategy Information Brochure "Improving the way we price our services", TasNetworks, p1 http://www.tasnetworks.com.au/TasNetworks/media/pdf/customer-engagement/TAS0107_Tariff-Pricing-Information-Brochure.pdf

Distribution costs

The Draft Investigation rejects including any allowance for avoided distribution costs in the calculation of the FiT, solely on the basis that these cannot be avoided by retailers.

We believe that solar PV does require less use of the distribution network than centrally generated and distributed energy. However the case is not as clear cut as it is for transmission costs. There are at least two ways in which distributed generation makes less use of the distribution network and reduces its costs. Exported energy from solar PV is typically used close to the point of export and therefore makes significantly less use of the 'poles and wires'. Also a significant proportion of the cost of the distribution network is the transformers which convert form 11 or 22 kV to 230/415V. Solar inverters have this capability built in and export power at 230V single phase or 415V three phase.

There are a variety of proposed mechanisms for recognising the reduced use of network when energy is generated and consumed in a local area. Most notably at the moment, the proposed Rule change for Local Generation Network Credits {AEMC 2015a}. Any proposed mechanism involves transfers between consumers, retailers, and networks with the intention of reflecting the actual cost of different ways of meeting electricity demand to encourage the least cost and most effective developments.

In the Tasmanian context where central generation, networks and residential retailing are all state owned businesses it should be easier to implement arrangements that meet the long term interests of Tasmanian consumers, even if it involves transfers between the various GBEs.

R.8 The Regulator should make some estimate of the proportion of distribution network costs which can be avoided by distributed generation.

R.9 In the absence of a mechanism in the NEM for reflecting the benefits of lower network usage by distributed generation, the Regulator should reflect this benefit in the feed-in tariff.

The approximate value of this benefit can be estimated using TasNetworks statement that transmission costs contribute 41% to a typical residential bill and the current Aurora tariff 31 charge is 25c/kWh. If it was estimated that solar PV avoided half the costs of the distribution network the benefit would be around 5c/kWh.

Network loss factors

We agree with the Economic Regulator (p20) that Distribution Loss Factors should be included in the calculation of the FiT rate.

R.10 We agree that Distribution Loss Factors should be included in the calculation of the FiT rate.

If our argument is accepted that the FiT should include a credit for all the avoided TUoS charges then it would not make sense to include transmission loss factors (MLF) in the FiT calculation.

R.11 If FiT rates include a credit for all avoided TUoS charges, then transmission loss factors (MLF) should not be included in the FiT calculation.

NEM fees

R.12 We agree with the inclusion of NEM fees in the FiT calculation.

Renewable Energy Target costs

As with other cost components we do not accept that whether a cost is avoidable by retailers is the main criterion for whether it is included in FiT calculations.

A case could be made that RET costs should be charged for use of fossil fuel generated electricity only since it is illogical that those using renewable energy already should pay for the development of the renewable energy industry.

Given that RET charges are a relatively small part of electricity costs and that it would be extremely difficult to change the way this scheme operates, we accept the pragmatic reality that RET charges not be included in FiT calculations.

R.13 We do not oppose the exclusion of RET charges in the FiT calculation.

Indirect impacts considered by OTTER

This section addresses the factors in Chapter 5 of the Draft Investigation and the following question:

Chapter 5
In relation to the indirect impacts of micro distributed generation systems, the Economic Regulator is seeking comment on the proposed exclusion of these impacts in calculating a 'fair and reasonable' FiT.

Average network loss factors

The Economic Regulator acknowledges {OTTER 2016a p25} that distributed PV can reduce overall network loss factors and that this should lead to lower costs for all small retail customers. The fact that this benefit is shared by all customers does not mean that solar owners should not be credited for this contribution to a less costly electricity system.

R.14 Further analysis should be carried out on the financial benefit of distributed generation in reducing network loss factors. This would inform a decision on whether credit for this benefit should be included in the FiT calculation.

Impact on wholesale electricity prices

In a competitive wholesale market, research by Dylan McConnell et al. {McConnell 2013 p26} shows that distributed generation can have a substantial impact in lowering wholesale electricity prices via the 'merit order effect'. In fact they show that feed-in tariffs up to 20c/kWh or higher can still result in net benefit to consumers as a result of this effect.

We accept that Tasmania currently does not have a competitive market for wholesale electricity and that much higher levels of on-island electricity generation from owners other than Hydro Tasmania would be needed to create such a market.

Potential deferral of network augmentation costs

The Draft Investigation argues that:

> *"… networks are built to supply customers at peak demand times, which are typically during the early morning in Tasmania during the winter period. However, as solar energy is generated only during daylight hours and peaks during the*

> *summer months, it does not make any significant contribution to meeting peak demand."* (p27)

We accept this argument in the short term but believe that methodology should be developed to evaluate the benefits that distributed energy storage could contribute to reducing peak demand and hence network costs.

Potential need for network reinforcement costs

The Draft Investigation raises several areas in which it claims that "*increased installation of roof top solar PV systems has the potential to add additional costs and risks to the operation of electricity networks*" in particular in relation to interaction with the management of frequency control in the Tasmanian network. Since the report does not make any recommendations in relation to this, we will not respond in detail but a few observations are in order.

TREA has been working with TasNetworks to identify if there might be a problem in relation to significant numbers or inverters disconnecting at once during an under-frequency event. (In an over-frequency event loss of any generation would assist in restoring the network to normal operating parameters.) No evidence has been seen of this ever happening and even if all of solar PV in Tasmania disconnected at once (< 100 MW), this would be less than the maximum size of a credible generator contingency (144 MW) which is already planned for in the Tasmanian Frequency Operating Standards. TREA will continue to work with TasNetworks on this issue and any future requirements are likely to be dealt with through changes to inverter settings rather than requiring additional expenditure within the network.

There are also problems with the interaction between network voltage and solar inverters. Much of the distribution network in Tasmania is run close to the top of the allowed voltage range of 216.2 to 253 V rather than at the nominal 230 V. As a result in some cases solar owners are not allowed to connect to the network if their export of energy causes the network voltage at the connection point to go over 253 V. New TasNetworks connection rules operating from 1 January 2016 require inverters to operate at a lower power factor and to have overvoltage protection settings that will disconnect in case of overvoltage situations.

In summary, interactions between distributed solar PV and the safe operation of the network are being well managed and there is no evidence that network operating costs have increased as a result of solar PV. Where changes have been required, the cost of these have been put back on solar owners.

Security of supply

> *"The Economic Regulator recognises that the availability of additional generation from roof top solar PV systems reduces reliance on hydro generation. This, in turn, improves security of supply particularly when Tasmania is experiencing drought conditions or there is a prolonged Basslink outage." (OTTER 2016a p29}*

The Draft Investigation gives two reasons for not including this in the FiT calculation; because solar is currently only 1% of total electricity demand it is not significant and there is not currently a mechanism for this benefit to be recovered by the retailer.

Solar and other distributed generation could make a significant contribution both to Tasmania's energy security and to reducing the cost of electricity. Current low dam levels exacerbated by the extended Basslink outage are leading to very expensive alternative electricity sources from gas and diesel generators.

A longer term strategy is necessary to support the development of additional renewable energy generation capacity that can assist the rebuilding of dam levels and guarantee security of supply in the face of changing weather patterns and Basslink outages.

Although the current contribution of solar to our total electricity demand is small, acknowledging that there is a benefit will assist to grow distributed generation and increase energy security.

Additional benefits of distributed renewable energy

In this section we address some of the benefits of solar PV and other forms of distributed generation that are not mentioned in the Draft Investigation.

We recognise that a feed-in tariff may not necessarily be the best way to reflect these benefits, but in response to section (c)(ii) of the Notice we believe the Regulator's final report should acknowledge the existence of these benefits and quantify them where practical.

An understanding of these benefits can inform broader policy decisions on the role of distributed generation, as well as acknowledging that setting a higher FiT can benefit all Tasmanians and is not simply a cross subsidy from non-solar to solar customers.

One of the most comprehensive attempt to evaluate the broader social and economic value of distributed generation is the Maine Distributed Solar Valuation Study {Maine PUC 2015}. The study concluded (p6) that the 25 year levelised benefits of $0.33 per kWh from solar PV consist of 13c of benefits to the electricity system and 20c of environmental and other social benefits.

Figure ES- 2. CMP Distributed Value – 25 Year Levelized ($ per kWh)

25 Year Levelized		Gross Value A ($/kWh)	× Load Match Factor B (%)	× Loss Savings Factor (1+C) (%)	= Distr. PV Value D ($/kWh)	
Energy Supply	Avoided Energy Cost	$0.076		6.2%	$0.081	
	Avoided Gen. Capacity Cost	$0.068	54.4%	9.3%	$0.040	
	Avoided Res. Gen. Capacity Cost	$0.009	54.4%	9.3%	$0.005	
	Avoided NG Pipeline Cost					
	Solar Integration Cost	($0.005)		6.2%	($0.005)	Avoided Market Costs
Transmission Delivery Service	Avoided Trans. Capacity Cost	$0.063	23.9%	9.3%	$0.016	$0.138
Distribution Delivery Service	Avoided Dist. Capacity Cost					
	Voltage Regulation					
Environmental	Net Social Cost of Carbon	$0.020		6.2%	$0.021	
	Net Social Cost of SO_2	$0.058		6.2%	$0.062	Societal Benefits
	Net Social Cost of NO_x	$0.012		6.2%	$0.013	$0.199
Other	Market Price Response	$0.062		6.2%	$0.066	
	Avoided Fuel Price Uncertainty	$0.035		6.2%	$0.037	
					$0.337	

Capital investment

Tasmania currently generates less electricity than it uses. Additional investment in renewable energy generation is required to rebuild depleted dam levels and displace expensive gas fired electricity from the Tamar Valley Power Station and reduce imports from Victoria.

The state Energy Strategy[8] makes it clear that future investment in generation is expected to be private rather than state investment "*Put simply, the role of Government was once 'builder', but today it is a 'facilitator' or 'enabler'.*" (p23)

[8] http://www.stategrowth.tas.gov.au/energy/strategy

As discussed on p9, solar PV provides a cost effective way of supporting private investment in both reducing the need for centrally generated energy and feeding surplus energy into the grid.

Increased export and trading opportunities

Increased generation from distributed renewable energy reduces the use of hydro storage to generate electricity for day to day consumption in Tasmania.

The value of this to Tasmania is greater than the average wholesale price of electricity because lower consumption at any time of the year increases water in storage and maximises the potential income to Hydro Tasmania from arbitrage trading with Victoria at time of maximum advantage.

Reducing CO_2 emissions

The recent COAG Energy Council meeting has recognised the need to better integrate energy and environment policies:

> *"The successful integration of carbon and energy policies will be critical to meeting Australia's emissions reduction target of 26 to 28 per cent below 2005 levels by 2030. Ministers will develop a national approach to connect environmental outcomes and energy policy in the interests of consumers." {COAGEC 2015a p2}*

Tasmania's draft climate change action {DPAC 2015} includes in its actions:

> *10. Maximise the potential for a market-led growth in renewable energy generation in Tasmania*
>
> *14. Facilitate the further promotion of Tasmania's clean energy brand to prospective investors from energy and energy-intensive industries*

Tasmania's Greenhouse Gas Inventory {TCCO 2015 p6} shows that CO_2e emissions from the energy sector increased by 28% between 1989-90 and 2013-14, and this does not include emissions from electricity imported over Basslink.

Increasing Tasmania's renewable energy generation can meet multiple policy objectives, promoting Tasmania's branding, as well as economic and environmental objectives.

In the absence of a carbon pricing mechanism it is worth assessing the contribution that increased use of solar PV can contribute to reducing Tasmania's GHG emissions.

One reference points is the fixed price period under the previous Australian Government's CPRS of \$24.15/tonne of CO_2. Another reference point is the figure of €19/t CO_2 used in the European ExternE methodology. The ATSE study {ATSE 2009 p34} converts this to \$A31/tonne CO_2.

Assuming that in terms of marginal impact, solar PV displaces imported energy from Victoria at a GHG intensity of at least 1 tonne CO_2/MWh this equates to values of 2.4c/kWh or 3.1c/kWh for exported solar. Note that only a proportion of the energy generated by a residential solar PV system is exported but the total amount generated reduces consumption so arguably the benefit should be increased when translating the GHG abatement into a c/kWh FiT.

We have not been able to identify a source for a suggested carbon price that would meet the internationally agreed goal of limiting global warming to 1.5C but it is likely to much higher that these figures.

Health and environmental benefits

Burning of fossil fuels to generate electricity has significant negative health impacts. The Australian Academy of Technological Sciences and Engineering attempted to estimate the cost of a range of 'external' impacts from electricity generation using the European ExternE methodology adapted to Australian conditions.

> *"Combining greenhouse and health damage costs for Australia gives representative total external costs of $A19/MWh for natural gas, $A42/MWh for black coal and $A52/MWh for brown coal." {ATSE 2009 pii}*

Looking just at the health costs (since the environmental costs are arguably covered by the GHG emission estimates above), the study concluded that:

> *"For the main emissions PM10, SO2 and NOX, the mid-range estimates of health damage costs of Australian coal-fired power stations are $1.40/MWh, $7.60/MWh and $4.20/MWh respectively. The mid-range total is $13.20/MWh. The large, cumulative uncertainties in the underlying calculations need to be kept in mind." {ATSE 2009 p46}*

This would equate to a health benefit of 1.3c/kWh for generation from renewable energy in Tasmania that displaces coal fired electricity imported over Basslink.

The health impacts of coal fired electricity are felt mainly on the mainland but this should not absolve Tasmania from the moral obligation to reduce these impacts when they arise from generating electricity imported into Tasmania.

Energy literacy

Installation of solar PV gives homeowner a strong interest and motivation to better understand and manage their energy consumption. This increased energy literacy will be an important driver of the uptake of new technologies such as local storage, demand management and integration of electric vehicle charging which ultimately can lead to a more flexible and economical electricity system.

Industry development and employment

At its peak we estimate that the Tasmanian solar industry created the equivalent of around 450 full time jobs. These highly skilled jobs were located throughout the state. Since the reduction in the FiT we estimate that around half these jobs have been lost. A growing solar industry has the potential to be a significant generator of industry development and employment in Tasmania.

Measures including a FiT which increased the rate of installation of solar in Tasmania back to what it was before the FiT was reduced would generate approximately 200 additional full time jobs in Tasmania.

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