Australian Solar Round Table

Submission to

Independent Pricing And Regulatory Tribunal

Solar feed-in tariffs

Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW

Executive Summary

Achieving a "fair and reasonable" value is about recognizing the value provided to the grid by owners of small-scale PV systems and the role played by retailers and distributors in enabling that value to be realized. When tariffs are set at a fair and reasonable value, small-scale PV owners will receive an adequate return on their investment and the broader market stakeholders will also share in the benefits provided by the systems.

Historically, tariffs have been based on the cost of generation of power at large-scale centralized fossil fuel based generators or on providing incentives for an emerging PV market and have either under or over valued the electricity exported by small-scale PV systems.

There are several key components in the value that small-scale PV systems provide to the electricity market, including:

1. The electricity they generate
2. They increase the efficiency of the grid by reducing transmission losses
3. They reduce the peak demand on the grid, adding to network stability particularly
4. They reduce the average wholesale price in the market by shaving the "ultra peaks" in summer when wholesale prices reach their maximum
5. The value of emissions abatement achieved

Valuing the individual components above can be complex, however:

1. The electricity generated and exported is easily measured and recorded
2. Grid losses avoided can be measured and calculated, though there is a limit to the level of granularity that is practical
3. AEMO has estimated that network enhancements have been deferred as a result of the installation of PV systems but the value of these deferrals is more complex to achieve
4. Historical AEMO data, say from 2010, can be used to model wholesale electricity market volumes and prices with and without a specific amount of PV generation. The difference between the total paid for wholesale electricity without the PV and the Total paid with PV is the wholesale value (or cost) of the PV generated electricity. This modeling has been used a number of times before to calculate the effect that wind and renewable energy in general has by depressing wholesale electricity prices
5. The Australian Government's Renewable Energy Target provides for the value of emissions abatement via Small-scale Technology Certificates.

The real value to the electricity market of a kWh generated by small-scale solar is a pro-rata sum of the sum of 1-4 above - approximately 39 cents per kWh.

A fair and reasonable proportion of 39 cents per kWh can be paid to the producer of the power, leaving the balance of the value to be shared by other stakeholders in the market – including other consumers.

IPART's proposed methodology

IPART proposes to determine the "fair and reasonable" value of electricity exported by solar PV units through:

- Method 1 - Estimating the financial gain to the retailer;
- Method 2 - Wholesale market value.

These methods essentially attempt to fulfill IPART's scope by providing the "fair and reasonable" value for:

- The retailer to pay (Method 1);
- Wholesale electricity trader to pay (Method 2).

However, for a "fair and reasonable value" to be achieved, a some of the value must also be provided to those that actually generate and export the power.

Solar PV generates significant value beyond the direct value of the kWh export of the systems. For example, solar PV reduces wholesale electricity market costs through the merit order effect and reduces network losses. These savings benefit all electricity users and retailers.

A "fair and reasonable" feed-in-tariff should reflect the broader economic value of solar PV, and over come a market failure, which inhibits the majority of the value generated by solar PV from funding its deployment.

By limiting their methodology to only considering the "fair and reasonable" value to retailers and traders, IPART may significantly under represent the value to the community and the "fair and reasonable" value to solar PV investors.

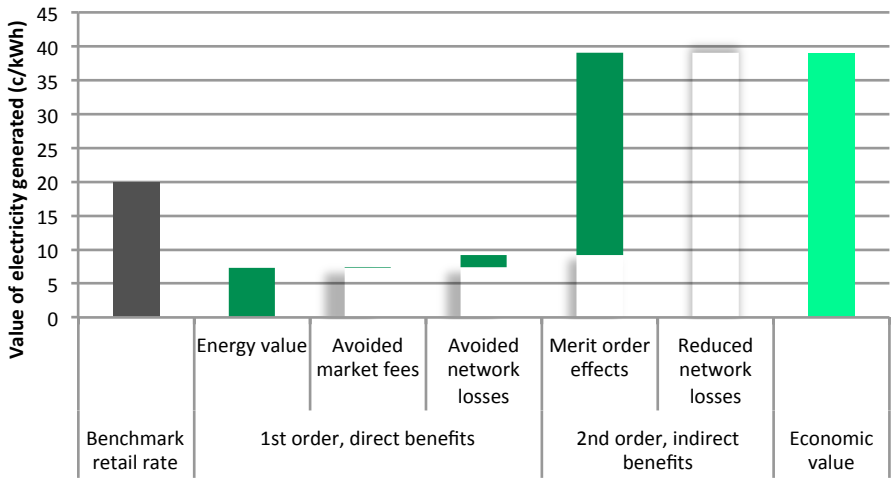
This suggests that any "fair and reasonable" feed-in-tariff may involve two components:

- Retailer component (estimated through Method 1); and
- Community component (which reflects broader economic benefits such as the benefits derived from the merit order effect).

The community component would not come at a cost to the community or Government but would overcome a market failure, which is preventing value generated by solar PV to be returned to investors. The Community component may be implemented through network charges, which are appropriately spread across energy users to fairly offset benefits from solar PV that they would otherwise accrue. This creates an opportunity for a sustainable funding approach that does not require Government subsidy, nor requires electricity users to pay more than they otherwise would have paid.

The following chart considers the additional economic value of electricity generated by embedded, Solar PV and to inform sizing of a potential feed-in-tariff assigns this value to electricity exported to the grid.

Figure 1 – Economic value of solar exports



Solar PV delivers significant value for all electricity users

Source: 'Economic Value of Solar PV Generation', August 2011, University of Melbourne. Assumes 35% of electricity generated is exported.

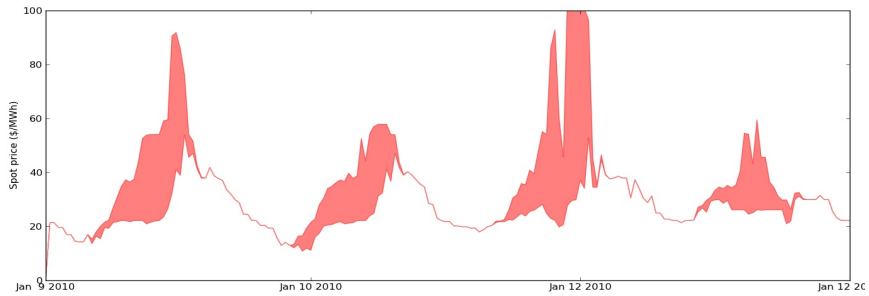
Figure 1 shows:

1. First order, direct benefits, reflect the value in current market
   a. Energy value, if it were traded on the wholesale National Electricity Market at 7c/kWh, which reflects the wholesale electricity price weighted by solar PV's generation profile across the day.
   b. Avoided market and regulator based fees and charges valued at 0.1c/kWh.
   c. Avoided network loss through embedded generation delivers savings worth on average around 2c/kWh, which reflects the daytime network loss factors in the order of 20%. Network losses are higher when loads are higher, and hence, the more congested daytime loss factor is higher than the regularly quoted annual average loss factor of 8%.[1]
2. Second order, indirect benefits, reflect how Solar PV may effect the dynamic electricity market:
   a. Merit order effects, which reflects Solar PV reduces wholesale electricity prices and volatility. This value driver is over and above the value of the energy (1a) described above. Australia's wholesale electricity market is particularly volatile: **only 1% of the time accounts for over 30% of cash flows through the National Electricity Market in a year**.[2] This volatility cost is borne by all electricity users and is a significant challenge for retailers. **Solar PV generation reduces wholesale prices**. Analysis of Germany's electricity market concluded: "the value of the merit order effect due to renewable energy was calculated to be in the order of €3-5 billion. Once the actual market value of electricity produced by the renewable energy installations was added to that, the net benefits to consumers outweighed the costs of the German renewable energy support payments (Feed-in-Tariffs)".[3] Modeling by the University of Melbourne of the impact of greater levels of Solar PV on the National Electricity Market has also demonstrated this effect (Figure 5).
   b. Reduced network loss factors. Solar PV leads to higher levels of generation embedded in the local network and to **lower network losses, which benefits all electricity users** within the local network. So while (1b) above represents the avoided losses by electricity not being lost on route to the site, (2c) recognizes that the loss factors will be reduced for all users due to the solar PV project. This benefit has yet to be quantified.

The following chart graphs the value of the power that would have been exported to the grid in 2010 if a total of 5GW was deployed in or around the 4 eastern seaboard capital cities.

[1] Ausgrid 'Distribution Loss Factor Paper' February 2011
[2] Melbourne Energy Institute researchers analysis of AEMO data showed 1% of time accounts for 30% in 2010 and 37% 2009
[3] Stensuss, F. et al (2008), "The merit-order effect: A detailed analysis of the price effect of renewable electricity generation on spot market prices in Germany", Energy Policy, 36, pp3086-3094

Figure 2 Impact of solar on wholesale spot electricity prices



Solar PV reduces wholesale prices

The shaded area represents the modeled reduction of wholesale prices due to an additional 5GW of Solar PV.

Source: 'Retrospective modeling of the merit-order effect on wholesale electricity prices from distributed photovoltaic generation in the Australian National Electricity Market', August 2011, University of Melbourne

The remainder of this document steps through the issues on which IPART seek comment.

Estimating the financial gain to the retailer

Issue	Comment
1 What are the direct financial gains to retailers as a result of their solar PV customers exporting electricity to the grid?	We agree with IPART's approach to assessing the direct financial gains to retailers.
2 Do retailers pay for the cost of complying with the RET on electricity exported by solar PV customers?	This is outside of the scope of the Round Table's submission.
3 Are there other indirect financial gains to retailers as a result of their solar PV customers exporting electricity to the grid? If so, how can these be estimated? Should these indirect financial gains be fully reflected in the feed-in tariff or shared with all electricity customers?	We support IPART's consideration of the indirect financial gains to retailers to inform the retailer component of a fair FIT. IPART should also consider benefits to the community, which exist beyond what retailers in a competitive market may be able to financially capture on a kWh generated for kWh sold basis, particularly regarding the merit order effect. The Melbourne Energy Institute's analysis of the merit order effect demonstrates how solar PV can generate significant cost savings. Their paper (attached) and on-going research may support IPART in their investigation. Any "fair and reasonable" feed-in-tariff must reflect what would otherwise be indirect financial gains to retailers and the community.
4 Are there additional costs to retailers associated with serving PV customers?	Solar PV typically coincides with customers switching to smart meters, which may provide retailers and network distributors operating cost savings rather than costs.
5 Are there alternative approaches to estimating the financial gain to retailers as a result of their solar PV customers exporting electricity to the grid?	IPART's methodology appears consistent with SKM MMA's study of a fair value for retailers to pay in any NSW, residential feed-in-tariff.

Estimating the wholesale market value of solar PV electricity

Issue	Comment
6 What is the most appropriate approach to estimating the market value of the electricity exported by solar PV customers to the grid? What are the key issues that need to be considered?	Firstly, any approach must determine what is to be valued – that is: the timing and volume of solar generated electricity. Recent public debate on solar PV in NSW was undermined by basic errors in the calculation of solar PV generation within NSW. To our knowledge, the Melbourne Energy Institute houses the best model for predicting solar PV generation across Australia. The model analyses sun irradiation and temperature data from meteorology sites across Australia, and measured PV panel performance results, to estimate generation output. The value of solar PV generation profile can then be weighted by the wholesale market price.

Other possible benefits from solar PV generation

Issue	Comment
7 What impact does solar PV generation have on network costs? How can this impact be most accurately measured?	Solar PV as distributed generation impacts network costs by: 1. Avoiding network losses for electricity generated by embedded solar PV, which may be estimated by the existing daytime loss factors (noting that losses are higher during the day when solar power is generated as compared with average annual loss factors). 2. Reduced network losses for all electricity users, which may be estimated by the expected change in daytime losses. This is a separate item to 1 as losses are not linearly related to demand and hence, the avoided losses for embedded generation also reduce losses for imported electricity. 3. Differed network capital works, where the local load aligns with the solar PV generation profile across the day, which may be more prominent for solar PV on commercial and industrial sites. 4. Solar system invertors may also support grid stability and performance at lower cost that traditional network solutions.
8 How can any network benefits resulting from solar PV generation be shared with solar PV customers?	Through fair contributions from all electricity users, which are designed to offset the network (and other) benefits generated by solar PV that would otherwise fully accrue to the electricity user.
9 How should any value from reduced energy losses as a result of solar PV generation be estimated?	We support the undertaking of network modeling to enhance our understanding of Solar PV's impact on network losses and performance. This modeling should also consider the benefit of west facing solar systems, very smart meter and inverter technology, or other methods, which may enhance the economic benefit of solar PV.
10 If the value of reduced energy losses is material, should it be shared with solar PV customers? If so, how could this be achieved?	Yes, this may be achieved through a simple network charge to all electricity users which then funds part (the community component) of the feed-in-tariff.

Implications of setting the feed-in-tariff too high or too low

Issue	Comment
11 What are the implications of setting the feed-in tariff too high or too low? What is the most appropriate way of managing this risk?	This needs to be considered in terms of all key parties: the solar PV owner, the retailer/trader and the community. A net feed-in-tariff which is too high may lead investment being focused on an unreasonably high financial return rather than maximizing the financial, energy and environmental benefits achieved. A net feed-in-tariff which is too low will reduce the deployment of small-scale PV systems and energy efficiency initiatives which will in turn lead to increased and earlier demand for new large-scale generation and new network infrastructure, which will force up retail rates and stretch the market's ability to fund large energy infrastructure ($94 billion over next decade, according to the Energy Supply Association of Australia's 'Capital Markets Survey 2010'). An accurately set and managed feed-in-tariff will: • Encourage wide spread energy efficiency initiatives at a micro level • Encourage "right sized" small-scale PV systems that generate power very close to demand • Significantly reduce the cost of peak power to the community and defer

	the need for investment in some new infrastructure We agree mandated payments for retailers which are higher than the financial value of the electricity may discourage retailers from servicing solar customers. A preferred position may be to allow retail competition on the component the retailer currently pays as occurs now.

Assessing retail market competition

Issue	Comment
12 Is our proposed approach for analysing the effectiveness of retail market competition appropriate for this review? Are there any other factors we should consider?	Yes we support IPART's review of retail competitiveness. We note SKM MMA's analysis concluded a fair rate for retailers to contribute between 50% and 70% of the retail price. We would support retailer contributions remaining unregulated if it were demonstrated that the unregulated pricing currently offered by retailers is near the fair level.
13 Are there any barriers (or emerging barriers) to entry that may limit the potential for competition in the NSW retail electricity markets, particularly in relation to solar PV customers?	While the Small Renewable Energy Scheme (SRES) is an Australian Government scheme, it is worth noting and considering it impact on the NSW market. SRES provides a potential market advantage for large retailers by enabling their solar PV divisions to price Small Technology Certificates (STCs) at their maximum of $40 while independent solar PV providers are more highly exposed to the STC market, which has traded at $18 this year.
14 Are there any other developments that may affect the competitiveness of the retail electricity market in NSW?	Not to our knowledge.
15 Has there been any change in the types of customers being offered competitive contracts? Is there any evidence to suggest that there are particular groups of customers (particularly solar PV customers) that have been more or less active in the competitive market, such as pensioners?	The closure of the NSW feed-in-tariff has led to the collapse of what had become an over heated market. There is limited understanding of PV customers on voluntary feed-in-tariffs because there are simply too few such arrangements in place.
16 What evidence is available on the number of solar PV customers receiving voluntary feed-in tariffs? Does the level of these voluntary feed-in tariffs represent a fair and reasonable value of the electricity exported by solar PV customers?	There is limited understanding of PV customers on voluntary feed-in-tariffs because there are simply too few such arrangements in place. Voluntary feed-in-tariffs may represent a fair and reasonable value to be paid be retailers but do not represent the total fair and reasonable value which solar PV owners should receive.

Form of regulation

Issue	Comment
17 What degree of regulatory intervention is required to ensure solar PV customers receive a fair and reasonable value for the electricity they export to the grid? Are there options (other than those listed in section 4.2) that are more appropriate?	Regulatory intervention is required to overcome a market failure which prevents solar PV owners receiving fair value for their exports. This market failure is: • not due to retailers, who may be shown to be paying a reasonable price based on the value of exports to them • due to there being no mechanism for solar PV owners to appropriately benefit from the value solar PV generates over and above the then current market price of power generated and available to retailers.
18 Should IPART recommend a single year feed-in tariff? If so, how should the feed-in tariff be updated over time?	No, the community and the solar PV industry would benefit from greater regulatory certainty rather than less. We believe IPART should focus on delivering a process that provides a sustainable, certain, long-term solution. Achieving a fair and reasonable tariff requires regular updating so as to consider changes in the market, particularly given the speed of solar PV cost reductions. A realistic review process requires a compromise between the optimum (high frequency) and the practical so as to ensure changes in elements of the value (such as PV system prices, energy market prices) would be a 12 monthly review

	of the tariff with the new tariff announced 60 to 90 days prior to the change. The review itself needs not be cumbersome or costly, it can be a simple reloading of key assumptions and base data into the model used to set the original tariff.
19 Should there be a limit on the size of the customer or solar PV unit that is eligible for this fair and reasonable value? If so, what should this limit be?	It makes sense for there to be a some for of limit, so as to avoid skewing the financial returns towards those individual community members that can afford the biggest investment – the maximum benefit is achieved by increasing the distribution. However, an arbitrary limit on the capacity of the system doesn't reflect the widely varied nature of consumers in the community. The ideal solution may be to cap the amount of exports that can receive the tariff over a period. This approach incentivises the installation of systems that provide maximum value to the grid. A cap of, say, 8000kWh exported per year would equate to a cap on the system size of approximately 5kW over an above that required to meet the needs of the system owner.
20 Should there be a single feed-in tariff across NSW or should it vary by distribution network supply area?	Solar PV may provide greater benefits where network costs and losses are greatest. However, greater complexity may confuse consumers and be costly to administer. An alternative may be for the feed-in-tariff to be presented as a multiple of the retail rate. This may enable network costs and losses to be reflected in the rate in a simple manner when combined with a small number of "zones" that reflect approximate transmission losses due to distance from centralized generation.
21 Should there be different feed-in tariffs for different customer types (eg business and residential?)	The electricity demand of businesses tends to more closely align to the profile of solar PV generation than residential customers. This load matching, combined with the scale of commercial demand, provides greater scope for savings in network capital works (which are driven by the busiest hour of the year). However, we would only support the consideration of a different feed-in-tariff for businesses if it were demonstrated that their existed a materially different market failure for this customer type. Savings in network capital works may already be fairly shared with businesses investing in solar PV through a reduction in their network capacity fee charged on their grid electricity bill.
22 Should the feed-in tariffs vary by tariff component? For example, should there be a peak rate, a shoulder rate and an off-peak rate for customers with time-of-use metering and a standard (or block rate) for customers with accumulation meters?	By structuring the feed-in-tariff as a multiple of the retail rate, the tariff rate will change through the day with the retail rate. Customers are then empowered to choose between all-day, peak/off-peak or time of use systems. This approach may also encourage solar PV owners to align their system more westerly so as to capture the higher evening peak rate. A multiple of the retail rate is also simple to explain to consumers and simple to administer for retailers.
23 Should the feed-in tariff apply to both net and gross metering, or net metering only?	The ideal solution incentivizes both the production of power and energy efficiency. A system that provides a gross tariff does not incentivise energy efficiency. A net only feed-in-tariff does not provide fair and reasonable reward to a system owner that meets their own demand but does not export (or does not export much). The latter also introduces social equity issues – only rewarding those that can award systems large enough to export. Given IPART's scope to consider a fair and reasonable, net metered, feed-in-tariff, we believe the scheme should only apply to net meters and there should be a cap on kWh exported per annum rather than name-plate capacity. Any electricity exported over and above the cap may receive the retailer contribution only.

Retailer contribution to the solar bonus scheme

Issue	**Comment**
24 How should we estimate an appropriate contribution of retailers to the Solar Bonus Scheme?	Using IPART's proposed financial value of exports to retailer methodology (Method 1)
25 What are the key issues that need to be considered in recommending a contribution by retailers to the Solar Bonus Scheme?	It is clear that while systems installed under the solar bonus scheme generated value to the broader market, the tariffs set by the then Government provided a more than fair and reasonable value to owners of the systems. It is also clear that a straight pass through of the apparent cost of the tariff, without recognizing the value accrued to market participants (retailers and traders) provides market participants with a windfall benefit. A fair and reasonable cost to the retailers would be similar to their share of the value pie – the value of the benefits that accrue to them from the scheme.

About the Australian Solar Round Table

The Australian Solar Round Table (the Round Table) is a group of CEOs of Australia's largest and most professional Solar Energy Companies that has been formed to provide industry leadership, stakeholder education and to earn market confidence for the Residential and Commercial Solar market in Australia. The Round Table was formed in August 2011 and currently represents about 25% of the Australian solar marketplace. Its membership will expand as likeminded CEOs are invited to join.

Currently, the round table membership is:

- Energy Matters
- Nu Energy
- Solar Shop Australia
- Ingenero
- Zen Home Energy Systems

The Round Table uses objective, fact-based data to develop and communicate industry strategies and policies that are empathic to the needs of the stakeholders in the industry, Governments and the broader community. Members contribute their resources and experience to establish critical mass and a strong voice.

Dave Holland of Right Angle business Services facilitates the Round Table on behalf of the member CEOs.

Contacts

Dave Holland

The Australian Solar Round Table

8 Dover Street

Richmond VIC 3121

Phone: 03 6297 6104

Mobile: 0408 055 171

Email: dholland@rangle.com.au

Attachments

Retrospective modeling of the merit-order effect on wholesale electricity prices from distributed photovoltaic generation in the Australian National Electricity Market: University of Melbourne

Please note: The Round Table has provided the paper to IPART prior to publication by the Authors. This paper is confidential until such a time as it has been published by the Institute. Should IPART wish, the Institute can provide a summary for publication by IPART.

References

1. AEMO – Infrastructure deferment
2. SKM MMA, *Value of Generation from Small Scale Residential PV Systems*, July 2011
3. ESAA, Capital Markets Survey 2010, which may be found at: http://www.esaa.com.au/Library/PageContentFiles/211ca42c-281a-4343-b644-ae9c7875141b/20100719capitalmarketsurvey.pdf

Confidentiality

While the Australian Solar Round Table's submission is not confidential, the attached paper from the University of Melbourne is confidential as it has yet to be published by the authors. Should IPART wish, the Institute can provide a summary of the paper for publication by IPART.