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By web form: http://www.qpc.qld.gov.au/inquiries/solar-feed-in-pricing/submission-form/

Australian Solar Energy Society Limited (ABN: 32006824148)
trading as

Australian Solar Council & Energy Storage Council

Submission to the Queensland Productivity Commission: ***Inquiry into Solar Feed-in Pricing.***

Dear Sir/Ms

Thank you for the opportunity to make a submission to the Queensland Productivity Commission (QPC) *Inquiry into Solar Feed-in Pricing*.

Australian Solar Council and Energy Storage Council Position

A fair export price (FEP) should be paid to Queensland consumers who are generating electricity that is fed back into the National Electricity Market (NEM). All values and benefits must be identified and recognised in any price determination, not simply cost impacts.

Background

The Australian Solar Council (ASC) and the Energy Storage Council (ESC) are the peak bodies for the Australian solar industry and the energy storage industry respectively.

The ASC promotes scientific, social and economic development through the environmentally sound use of solar energy. The principle objectives of the ASC are to:

- promote research, development and adoption of solar energy and other complementary low emissions technologies;
- promote research into and use of solar energy in building design;
- compile and disseminate information on solar and complementary low-emissions technologies and their utilisation;
- promote public understanding and adoption of practices, technologies and systems for the use of solar energy and energy efficiency; and

- advocate for the adoption by all levels of government of appropriate policies and programs to promote the use of solar energy.

The ASC is a not-for-profit organisation and is governed by a volunteer board elected by its members. The ASC has been a catalyst for the development of solar applications for more than 54 years, bringing together the interests of industry, academics and the broader community.

The Australian Energy Storage Council seeks to advance the uptake and development of energy storage solutions in Australia. The ESC is an independent forum comprising representatives of the energy storage industry for advocacy, networking and information sharing. We connect local and global industry partners in this growing industry.

Members benefit from our policy and advocacy activities, news updates, industry events and training opportunities. Members have the opportunity to directly engage with other industry participants and have a voice in deciding the future of this emerging industry.

The ESC takes a critical role in creating industry standards and encouraging industry best practice for the energy storage sector.

Principle Criteria for a Fair Export Price for Solar

There are core criteria, which should be considered in any assessment of a Fair Export Price for Solar PV output into the NEM. These include the:

- general reduction of wholesale prices for all consumers through the merit-order effect[1];
- beneficial impact of household PV in reducing network losses and by effectively augmenting capacity by pushing electricity back into the grid[2];
- avoidance of the need to build additional power plant capacity to meet peak energy needs;
- provision of energy for decades at a fixed price;
- reduction of wear and tear on the electric grid, including power lines, substations, and power plants;
- further comparator for a market assessment of a fair export should be equivalent new renewable generation output on the NEM; and
- a value should be placed on the externalities of health and other social benefits when determining a fair export price.

What is a Fair Export Price – the Value of Rooftop Solar PV

The ASC and the ESC congratulate the Queensland Government for establishing a wide-ranging inquiry by the Queensland Productivity Commission into a fair price for solar. This

[1] McConnell, D., Hears, P., Eales, D., Sandiford, M., Dunn, R., Wright, M. & Bateman, L. 2013. Retrospective modelling of the merit-order effect on wholesale electricity prices from distributed photovoltaic generation in the Australian National Electricity Market. *Energy Policy,* 58**,** 17-27

[2] Australian Energy Market Operator 2012. Rooftop PV Information Paper

is the first time in Australia that such an inquiry has incorporated the benefits of solar PV, as well as network costs, in determining an appropriate price.

We believe this work is nationally significant, providing a template for similar inquiries by other State and Territory Governments.

As a result, in this submission we draw attention to the various benefits and costs that should be evaluated by the Productivity Commission. Our submission also outlines some core principles for this work.

We put on the public record our very strong view that the current system of determining which tariffs should apply and at what level, where a home or small business owner has to negotiate with the utility on the rate of their feed-in tariff, is demonstrably unfair and unjust, given the market failures which comprise disproportionate power relationships based on massive information asymmetry. That this approach must end as soon as possible is evidenced by the recent COAG changes requiring a greater consumer focus by the regulatory bodies, AER, AEMO & AEMC[3].

We draw the Queensland Productivity Commission's attention to a number of relevant reports all of which cover methodologies and factors to be considered when establishing a fair value for solar PV generation. We note that although some of these references are from the USA the issues involved around assessment and recognition of value are entirely analogous to the Australian market. See the following:

- September 2014 report from the US National Renewable Energy Laboratory (NREL) *Methods for Analyzing the Benefits and Costs of Distributed Photovoltaic Generation to the U.S. Electric Utility System*.

- April 2014 report on *Minnesota's Value of Solar*, produced by the Institute for Local Self-Reliance.

- June 2014 Michigan Public Service Commission Solar Working Group report and the Commissioner's presentation.

- June 2015 report *Calculating the Value of Small-scale Generation to Networks*, prepared by EY for the Clean Energy Council.

The NREL report outlines seven categories of benefits and costs for distributed generation:
- Energy
- Environmental
- Transmission and distribution losses
- Generation capacity
- Transmission and distribution capacity
- Ancillary services

[3] http://www.scer.gov.au/council-meetings/

- Other factors

In addition to these categories, we draw attention to additional economic and social benefits, including economic development, job creation and tax revenue all of which have been discussed in the report.

The Minnesota's Value of Solar report notes in simple, but profound terms, that *"the basic concept behind the value of solar is that utilities should pay a transparent and market-based price for solar energy."* The Australian Solar Council agrees.
For the Institute for Local Self-Reliance, the value of solar energy is based on:

- Avoiding the purchase of energy from other, polluting sources
- Avoiding the need to build additional power plant capacity to meet peak energy needs
- Providing energy for decades at a fixed price
- Reducing wear and tear on the electric grid, including power lines, substations, and power plants.

There is no question significant value from rooftop systems comes about because of the close proximity to loads. Australian grids typically see average network losses of around 8%, although some segments within the NEM, the South West Integrated System (SWIS) and other grids can be much higher than this – more than 20% in some cases.

Net exports provide value in terms of the costs avoided if that electricity were supplied from distant generation sources.

The value provided to a retailer or other part of the supply chain comprises:

- Energy value, comprising the value that the net exports would earn if it was traded on the wholesale market or if the equivalent amount of electricity had to be purchased from the wholesale market. This value comprises not only the spot value on the wholesale market but, at low levels of installation within a region, the avoided losses from central supply sources and any costs incurred by retailers in contracting for wholesale energy.
- Network savings mainly in the form of deferred investment in fixed cost assets. The magnitude of this value depends on the correlation between PV generation and peak demand at the regional level.
- Ancillary savings, such as avoided market fees.
- Other benefits are also possible such as a reduction in the wholesale price to other customers during peak periods, reduced network losses faced by customers in regions with a high level of uptake, and environmental benefits through reduced emissions and reduced water use.

These benefits have generally not been considered in the calculation of the value of net exports because they might not be able to be realised under current market arrangements or because there is a lack of data, modeling tools and systems to make robust estimates of the value of the benefits. There is also no incentive for retailers or

others beyond the prosumer customer to identify benefits that might have to be shared when they are currently opaque – although real enough.

The Queensland Productivity Commission has a unique opportunity to quantify these benefits.

There are a range of network benefits that can accrue relating to the support of the distribution network, but again these are not generally being accounted for because the networks themselves do not have the information and communications intelligence and capabilities to identify and monetize their value.

Net exports from PV systems depend on the size of the system relative to load, with estimates of typical net exports of around 26% for a 1.5 kW system to 33% for a 2 kW system and larger systems even more. The data suggests that most of the exports occur in mid morning to mid afternoon, when wholesale market prices are typically higher than average. The evidence also suggests that rooftop solar PV has moved the peak period (although not decreased its level) and considerably flattened the demand curve.

Current energy market arrangements make it difficult to capture this value. Various studies have looked at spot prices weighted to the level of net exports and indicate that the value can vary from 50% to 100% higher than the time-weighted average price. The level of add-on to the time-weighted price depends on the level of exports occurring in the high price periods.

Estimates of the typical export values show volume-weighted base price sits around 7.9 c/kWh and the long run marginal cost of QLD generation is around 5 c/kWh1. As mentioned network losses on avoided electricity purchases are about 8%. Studies also show avoided market fees and market costs of around 0.1 c/kWh.

There would be no easy way to value for network deferral, but there is some contribution of PV generation during the early (daylight) part of the evening peak at distribution nodes largely connecting residential nodes. Although we have not attempted to put a value on that, it is certain that there is some deferral of transmission asset upgrades given the uptake of small-scale PV systems in QLD networks.

The value is likely to increase over time due to higher electricity prices as a result of higher fuel prices and the future re-imposition of carbon pricing.

We noted above the variability of losses across regions in the value of net exports. As mentioned above losses can be as high as 20% in some nodes considerably increasing the value of net exports at those nodes, resulting in a value as high as 70% of the time-weighted average. Marginal network losses are averaged over the whole year under current market arrangements, and may not reflect the real loss value at times when PV generation is occurring when network elements are heavily loaded.

The high level of penetration of PV systems in any particular region could result in <u>all</u> customers in that region from benefiting from lower network loss factors. This is beyond

the capability for the ASC to examine in detail, but as these considerations could favour a higher value for the net PV export they should be examined further.

As a minimum, the value of the tariff on exported electricity should be represented by the wholesale value, network losses, network ancillary services contribution, avoided greenhouse gas emissions (as expressed in higher electricity prices)[4], avoided market fees and avoided regulatory fees.

Externalities

There are also social benefits that should be accounted for, the most significant being the health co-benefits of coal-fired generation being replaced by clean renewable generators.[5] The Australian Academy of Technological Sciences and Engineering (ATSE) estimated in 2009 that that the cost of the adverse health impacts from coal-fired electricity generation (including associated respiratory, cardiovascular, and nervous system diseases) was $2.6 billion annually.[6] In comparison, the process of renewable generation does not have deleterious health impacts.[7] These are long-term lifetime benefits.

The environmental benefits of renewable energy generation include fewer greenhouse gas emissions, less water, air, noise and land pollution and reduced impacts on biodiversity (compared with fossil fuel powered electricity generation).[8]

It is important to note that the 'externalities' of health, social and environmental costs not accounted for in the market price of electricity or fuel are nonetheless borne by the community. A particular concern, often unrecognised, is that these costs are disproportionally borne by low-income and other vulnerable members of the Australian community.[9]

It follows that replacing fossil fuel generation by renewable generation is of most value to low income and vulnerable Queenslanders and pricing regimes for those producing clean energy should incorporate some notional value for these benefits – in the knowledge that the initial assessment of that value will be difficult.

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[4] It could be argued that the RET covers avoided GHG emissions, but the RET is a) a fixed in time amount and is un-indexed so a depreciating value, and b) relates only to the first 15 years of production on a 25 to 30 year generation life.

[5] Physicians for Social Responsibility (2012) *Coal's Assault on Human Health* Physicians for Social Responsibility.

[6] Biegler T, Zhang Dong-Ke & Australian Academy of Technological Sciences and Engineering. (2009) *The hidden costs of electricity: externalities of power generation in Australia*, Australian Academy of Technological Sciences and Engineering.

[7] National Health and Medical Research Council (NHMRC) (2014) *Systematic review of the human health effects of wind farms*, NHMRC.

[8] For example, see the Sustainable Energy for All initiative: http://www.se4all.org/our-vision/our-objectives/renewable-energy/.

[9] Armstrong F, Haworth E, Tait P & Barker H. *Health and Energy Policy*, Climate and Health Alliance; Colagiuri R, Cochrane J, Girgis S (2012) *Health and Social Harms of Coal Mining in Local Communities: Spotlight on the Hunter Region*, Beyond Zero Emissions.

It is important to note that a FEP is not intended to replace the 'wholesale price' for exported energy paid currently by retailers (from 5c-8c/kWh although some consumers are getting no export price). That would be a windfall to retailers and transfer costs from the retailers to all consumers as a pass-through cost. The intention of a FEP inter alia is to allow a) maximum own use of energy behind the meter, which saves the consumer the retail price otherwise paid (although increased use of separate fixed charges, even for services not used, counter this), and b) to get a fair price for exported energy so as to stimulate private investment in the transformation of the energy sector to renewables.

The mechanism to address this problem would be to require the retailer to seek a pass through amount from the QPC of the FEP less their standard export price offer. That means the FEP recipients get the fair export price, while only the difference between the regular amount already being paid and the FEP gets passed through to all consumers – this prevents any windfall gain by retailers. So the retailers do not try to set their offer at zero or below they would need to have that price approved through the QPC. This can be done though existing arrangements as the QPC already deals with pass-though events and makes determinations accordingly.

Retrospective modelling of the merit-order effect on wholesale prices from PV in the Australian energy market found for 5 GW of capacity the reduction in wholesale prices would have been worth in excess of A$1.8 billion over two years. The higher penetration of PV in Queensland means a higher proportional benefit.

Network service providers have been increasing the fixed element of their tariffs much more quickly than the variable elements to address what they call cross-subsidies to households with rooftop PV. ASC argues that fixed charges are already high by international standards, that recovering stranded sunk costs through fixed charges is inefficient and unfair.

Consumer needs have changed and the network businesses – which have been extremely profitable – should be exposed to stranding risk. Any use of demand or capacity charges need to relate directly to real and actual peaks on the network – if the consumer demand is assessed on an averaged basis (eg: highest load in any month or averaged over any period) that is likely to result in higher charges, while not gaining any beneficial impact on the network which demand and capacity charges should be aiming to do.

Conclusion

The real value of electricity exports should be paid by retailers to system owners. We note here that applying a fair and reasonable rate to net exports based on the above factors should not of itself lead to higher costs to other customers since they are simply the result of properly accounting for efficiencies and values in the electricity supply chain currently invisible to consumers and the market.

The ASC and ESC would welcome the opportunity to meet again with the Queensland Productivity Commission to discuss these matters further.

Yours sincerely

John Grimes
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