North Melbourne
Vic 3051

10 February 2016

Dear Sir

Submission to the enquiry into the fairness and completeness of the Feed In Tariff

I own a 5kW photovoltaic panel (Solar) system at my home in North Melbourne and I have read the terms of reference regarding the fairness and completeness of the Feed In Tariff.

In your paper "Our Proposed Approach", you raise a number of questions for consultation. I am particularly interested in question 2.2.1:

1. 2.2.1 THE ECONOMIC BENEFIT OF DISTRIBUTED GENERATION TO THE ELECTRICITY MARKET

- The electricity produced by a distributed generator, whether used by a customer to meet their own demand or supplied to the grid, is essentially offsetting the need for that electricity to be supplied by more centralised sources. The electricity produced therefore has two potential benefits:
    - A benefit based on the wholesale price of electricity, as the output from a distributed generator reduces the amount of electricity that a retailer must purchase from the wholesale market. The wholesale price of electricity is determined by the National Electricity Market (NEM) and is set on a half-hourly basis. The price at each half-hour period reflects the demand-supply balance at that time. This means that the benefit of a unit of electricity produced by a distributed generator will depend on the time of day that it is produced.
    - A benefit that reflects the avoided line losses of distributed generation. As distributed generation is consumed close to the point of generation, line losses can be avoided.

This is the basis on which the current Victorian Feed-in Tariff rate is calculated.

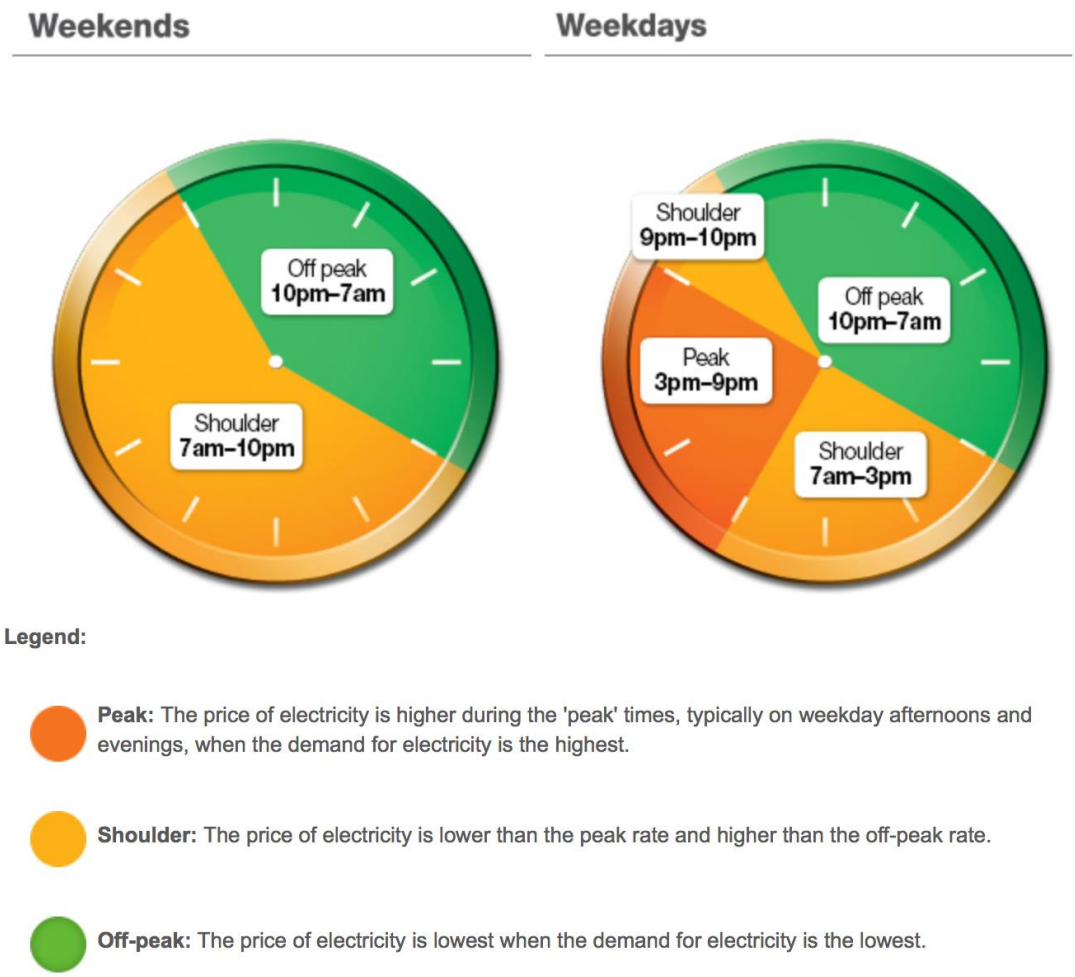
QUESTION FOR CONSULTATION

Q9. Are there any environmental or other public benefits that a distributed generator provides to the distribution network? How can these identified benefits be quantified?

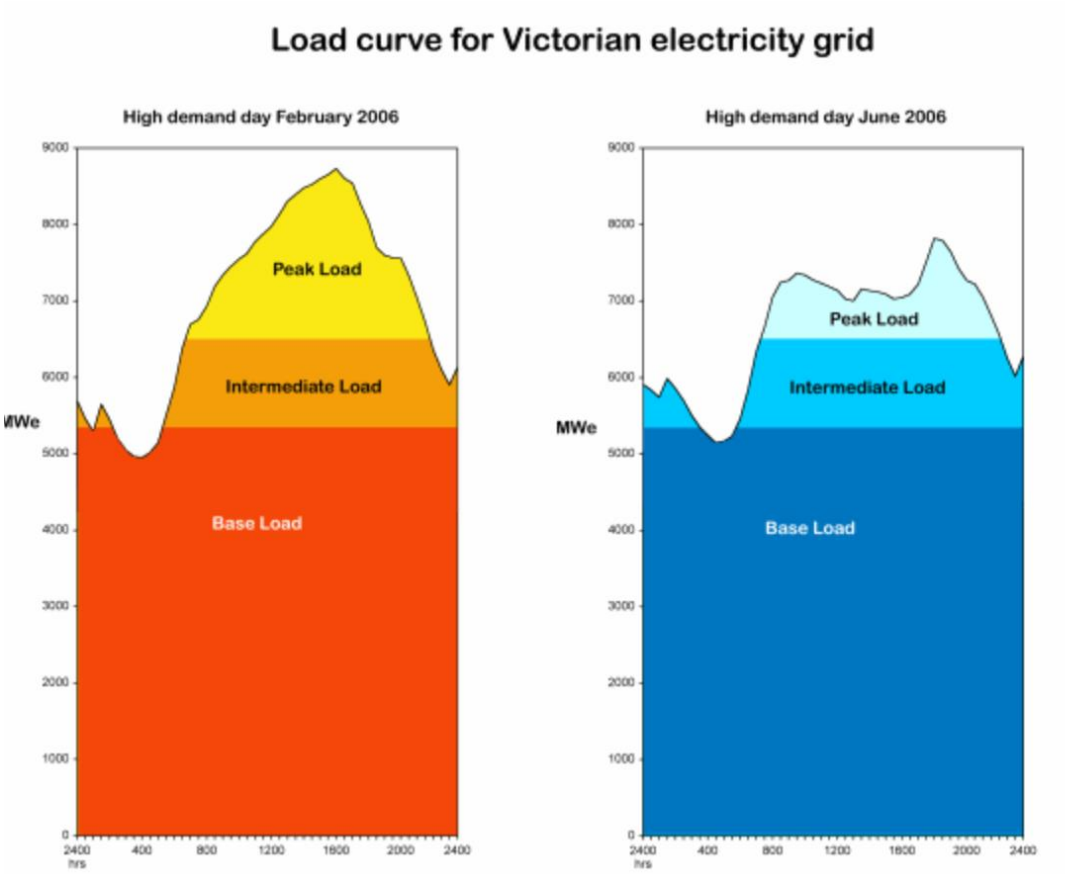
I believe that the current FIT does not take into consideration either the effects of modifying the peak electricity generation (lowering and delaying the peak), and the clear costs of the environmental benefits.

Peak Time and Value

Currently the peak time for generation is the most expensive electricity for any consumer on the flexible pricing regime. This is defined as follows:



The Peak Charges are defined as that power consumed between 3pm to 9pm on weekdays. However, the actual peak is not a consistent value between these times, but is in fact a real peak as shown below:

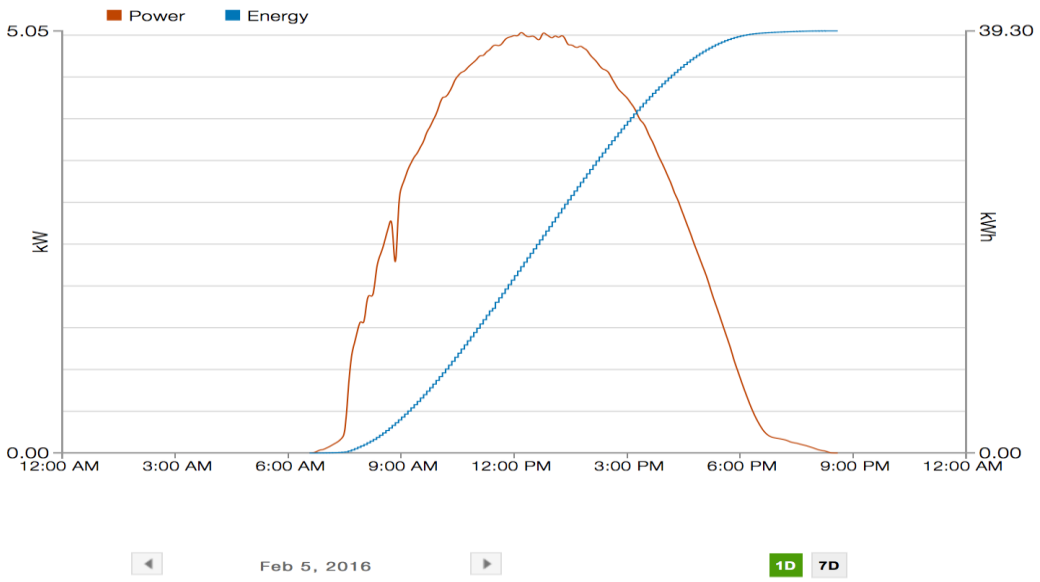


The actual peak appears to be just prior to 6:00pm.

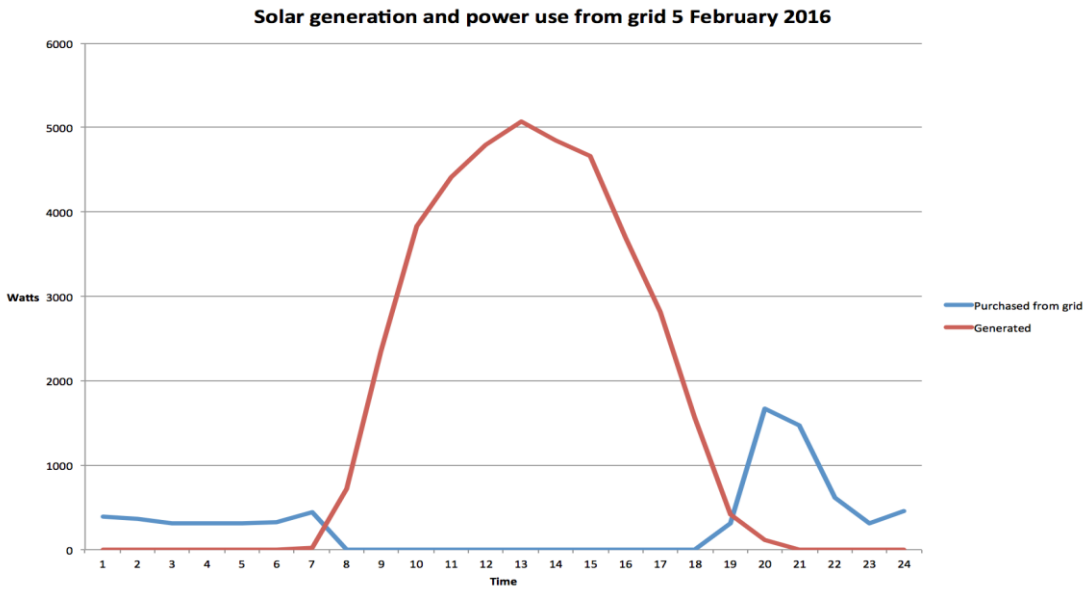
It has long been stated by both the large electricity generators and the supply authorities that the costs of adding additional generation and the poles and wires is as required by this peak. It is also stated that the biggest recent increases in this peak load is due to the installation and use of air conditioners, which are in use at the end of the day, and particularly on hot summer days when electrical loads peak. This increase to the peak load is the prime reason that more generation and upgrades to poles and wires are undertaken, which in turn has been, and continues, to increase electricity charges to consumers. As the entire electrical supply industry claims this as factual, and is supported by the controlling authorities responsible for accepting additional charges, it stands to reason that any proven technologies that reduce this peak must save money.

My own system generation, like most if not all solar panels based systems, generate their most output on sunny days, which can be seen to coincide with the same hot days requiring the most power.

Also, even in Melbourne, which is one of the more southerly cities, I am generating electrical power during the hot summer months as late as 8:30pm. A typical example of my generation (taken from my ABB inverter data for production on 5 February 2016) is shown below:

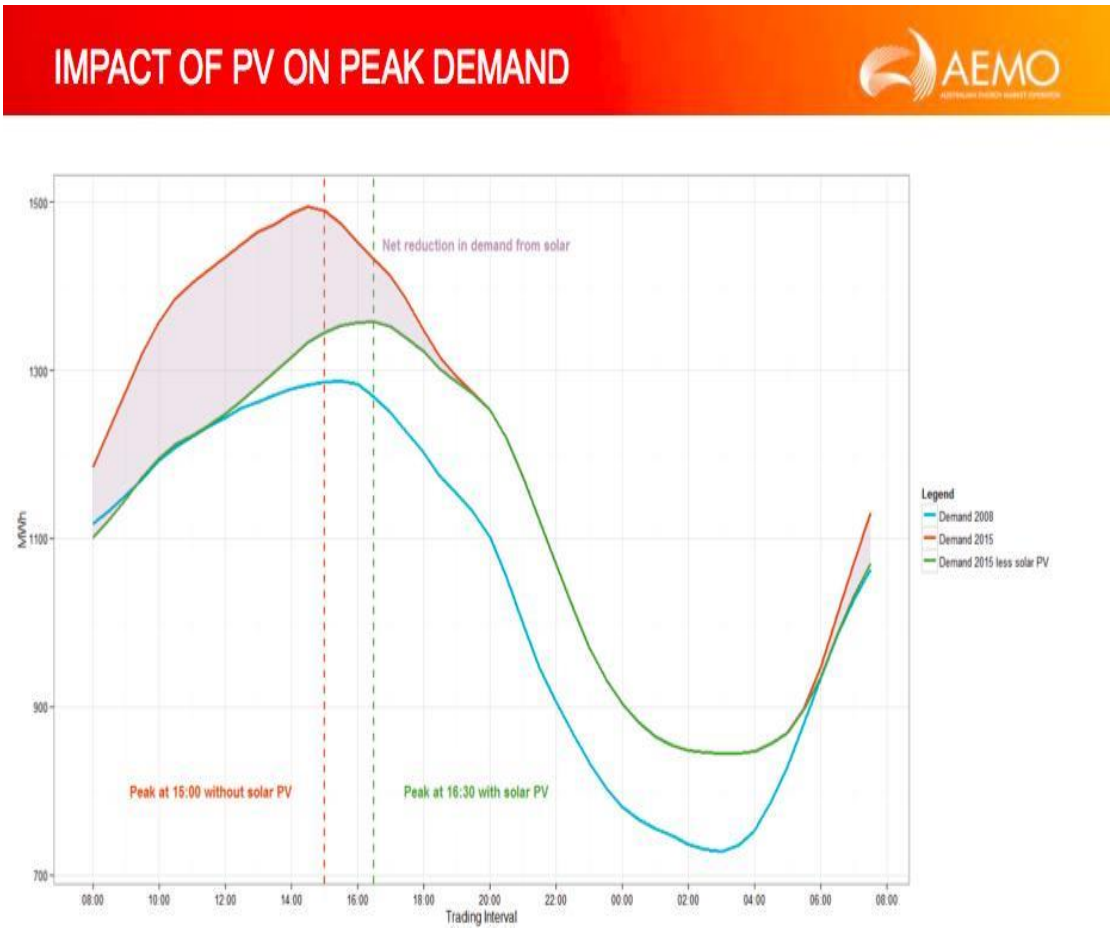


What is absolutely clear from the above output, is that I am producing worthwhile power during the actual peak demand for Victoria, and for some hours after the actual peak shown on the load curve. Using data from my smart meter I can add the actual demand I make on the grid, as below:



The effect of my solar system becomes clear from this data – my system has both changed my actual peak time, and has lowered my demand during the actual peak generation time of about 6:00pm. My peak demand at this time is reduced by whatever I am producing at that time, and my demand peak is now after 8pm.

I have found numbers of published papers on websites providing data on the effects of increasing solar take up by households. They all show declining peak use, and the delaying of this lesser peak demand. One such publication by the Australian Energy Market Operator for their use in Western Australia is as follows, and clearly shows the reduction in peak demand:



South Australia Power Networks have also published a similar graph and finding, that household solar energy systems have lowered and delayed their peak demand.

Yet another published paper from On Power for Victoria and South Australia is as follows, and shows exactly the same trend:

Table 3: SA and VIC Peak Demand (time and MW)

Year	State	Peak demand	Local time	Date
2008-09	VIC	10,576	5:00 PM	29/01/2009
	SA	3,383	5:00 PM	29/01/2009
2009-10	VIC	10,105	5:00 PM	11/01/2010
	SA	3,308	1:30 PM	11/01/2010
2010-11	VIC	9,914	1:30 PM	1/02/2011
	SA	3,399	5:00 PM	31/01/2011
2011-12	VIC	9,174	5:00 PM	24/01/2012
	SA	2,978	5:30 PM	23/01/2012
2012-13	VIC	9,774	5:30 PM	12/03/2013
	SA	3,095	6:00 PM	17/01/2013
2013-14	VIC	10,313	5:30 PM	28/01/2014
	SA	3,281	7:00 PM	16/01/2014

South Australia boasts the highest penetration rate of solar panels in Australia; a quarter of SA homes have solar. The recent increase in solar panel installations continues to decrease demand during daylight hours. This has the effect of pushing the peak demand time deeper into the evening (as the sun sets, solar systems reduce output). As as shown in table 2, for the last two years, peak demand in South Australia has been pushed back to 6:00 PM and 7 PM respectively.

Given that Solar Energy does not increase the peak load, but decreases it, and has the effect of making it later in the day, this is of assistance to the electrical supply industry. The suppliers are on record stating that their power generation and distribution costs need to be geared to the peak load.

What is absolutely clear is that air conditioning plants are still being installed into new and existing houses, increasing the peak load for the generators and supply authorities. The increased take up of solar is of real benefit to the electrical supply industry as it assists to keep this increasing peak at a lower value, and spreads it to a later time, smoothing out demand.

Conclusion 1: The FIT ought to include some recompense for Solar System owners effectively becoming part of the peak generation supply. Unbiased engineers familiar with the electrical supply industry, can (and have) calculated the worth of this saving. The calculation needs to include the costs of supplying peak generators (that lie unused for most of the time), as well as the connection fees and infrastructure to enable these peaking plants to supply to the grid. Solar Systems connect via the already provided grid connection, not requiring any additional work, yet the supply authorities just take this benefit as a financial gift with no recompense to the small solar generators.

Conclusion 2: The actual peak consumption is not only lowered, but is being smoothed by Solar Systems. Peak demand will be further lowered and smoothed by the addition of storage (batteries) now becoming available. This is recognised by energy experts, and is understood by Adelaide City who are proposing to subsidise storage for its citizens. I doubt that the industry would be willing to calculate what this is worth, but a more uniform load with even more reduced peaks is obviously more stable and will again cut down on the requirements for new large generation plants and additional infrastructure. Perhaps the solar FIT should be even more generous to households who install storage devices, especially in conjunction with solar systems.

Environmental benefits

It has long been understood that the current fossil fuel generators pollute and are subsidised to one degree or another. For the record, and for this submission, I am not claiming that fossil fuel generators are a major source of greenhouse gases that may be affecting climate, as there are many people who have politicised the science and are unable to accept this science as now accepted by world bodies. I am also not claiming that subsidies are as massive as has been recently claimed by some.

What is not controversial is that burning fossil fuels results in large amounts of unwanted by-products found in their flue gas and waste. Flue gas contains carbon dioxide and water vapor, as well as other substances such as nitrogen oxides (NO_x), sulfur oxides (SO_x), mercury, traces of other metals, and, for coal-fired plants, fly ash. "Clean Coal" technology is being worked on and promoted by the fossil fuel industry, as this industry knows of this issue. Such remedial technologies are not yet proven and developed for large power station use and is not likely to be the case for many years. Gas peaking plants, whist not as filthy, also pollute.

What is also not controversial is that with the government abandoning any form of taxing carbon waste, the lowest cost generation is now the Australian (Victorian) brown coal generators and that they are being increasingly used. These low cost generators so happen to be some of the filthiest brown coal generators in use anywhere on earth, generating some of the worst pollution from any generator.

That some of these pollutants cost Australia is also non controversial. The Business Spectator estimated just some of these costs relating to health as below:

Annual costs of air pollution created by Victoria's coal generators

Power station	Annual health costs ($)	Annual carbon costs ($)	Total health and carbon cost ($)
Anglesea	170,800,000	60,600,000	231,400,000
Hazelwood	100,200,000	816,800,000	917,000,000
Loy Yang A	304,700,000	885,700,000	1,190,400,000
Loy Yang B	125,000,000	415,400,000	540,400,000
Yallourn	130,800,000	703,500,000	834,300,000
TOTAL	831,500,000	2,882,000,000	3,713,500,000

Environment Victoria's Safe Climate Campaign Manager, Dr Nicholas Aberle, stated in relation to the findings, "Victoria's old and polluting power stations are continuing to operate well past their use-by date. They've got every incentive to hold on because they're cheap to run, but they're not paying for any of the pollution or damage they create."

I have no doubt these figures will be contested by some. What is not in doubt is that these dirty power stations pollute, and that there is a cost borne by society to remedy the effects of this pollution. Many scientists and planners would be able to conclude just what costs we have to continue to pay for this pollution, if the above table from the Business Spectator is rejected. There are many estimates available via the internet as to what this pollution really costs. It is undeniably NOT zero.

So without a carbon tax, it transpires that every solar system installed and used now prevents an equivalent use of these old polluting power plants. Had the carbon tax been retained, it might have been that gas plants would be more economical and the environment would have been in better shape. However, with Australia backing coal as the best form of generation ("coal is our future" and "coal is good for humanity"), the only way this pollution can now be countered is the further encouragement of domestic solar systems, which has the effect of saving some of the pollution remedial costs that is now borne by us all.

Conclusion 3: The FIT should include a payment recognising that every kWh generated (whether exported or not) prevents this energy from being generated by the world's filthiest brown coal generators. This is a direct saving to Australia, as the costs and effects of this pollution from these fossil generating plants will ultimately have to be paid for by Australians.

Thank you for this opportunity.

Regards

Keith Wein B.Sc (Eng)(Hons)

Relevant experience
20 years designing/construction power stations
20 years managing large system implementations