AN OBJECTIVE FOR THE SOLAR EXPORTS PRICING POLICY.

From Peter T. Hale

An objective for the solar exports pricing policy should be to remove disincentives for domestic PV electricity producers with battery storage to remain connected to the grid. This is because a large proportion of electricity produced by a normal domestic PV unit is not used by the household.

This submission addresses ways to achieve this. The data presented below illustrates that over a 12 month period an average household with a 5 kW PV unit, solar hot water and battery storage will be producing about 30% more power than it is consuming, with minimal power taken from the grid. With high fixed grid connection costs, what then is the incentive to remain connected?

THE DATA. The attached graph shows monthly data for electricity generated, used and exported to grid over 17 months, for an all-electric house in Brisbane (having 5 occupants) with a 5 kW PV unit, oriented E (2.5 kW) and W (2.5 kW) at 23^{o}, with electricity boosted solar hot water and assuming 20 kWh of battery storage. Electricity generated is actual data while flow to and from grid is estimated from total monthly electricity generated minus total monthly electricity used by the household. Over 12 consecutive months about 6300 kWh is generated, of which nearly 4300 kWh is used (with battery storage) and about 2000 kWh exported. Only 50 kWh would be taken from the grid. Fixed charges from the utility are a little over $300 / year for this household.

If fixed charges are high, such that they are not covered by a feed-in tariff, then it becomes a costly decision to remain connected to the grid for the sake of a small (50 kWh / year!) backup.

One aim of perhaps all domestic producers is to contribute by providing clean energy to the grid. If not grid-connected, once the batteries are charged and the water is heated, the PV must be turned off if what's generated is not being used. In an urban situation there is unlikely to be opportunity to use the excess power somewhere else, like pumping water to a large header reservoir. What's the point of this generating capacity being idle?

If the feed-in tariff is about the same as the wholesale electricity price, say 5c / kWh, then this average household I've illustrated would only recoup 1/3 ($100) of the fixed costs.

One option is to increase generating capacity on this low feed-in tariff:

- If an extra 2.5 kW capacity is added (total of 7.5 kW), almost all the extra power generated will be surplus (say 3150 kWh) and exported to the grid; a total of 5150 kWh exported, which at 5c / kWh is $258, which still does not cover the fixed costs of being connected to the grid.
- If an extra 5 kW capacity is added (total of 10 kW), 12,600 kWh is exported (while 4300 kWh is used), and a feed-in tariff of 5c / kWh recoups $ 630, which recovers the fixed costs of grid connection.

Therefore for an average household at least 10 kW of capacity would be needed if feed-in tariffs are low, considering that wholesale electricity prices will fall (as more renewable energy comes online) and fixed costs will likely increase over time.

Therefore, in light of the realistic illustration above, the following should be considered:

- Reduce fixed costs for domestic producers to help offset the need to install more capacity to offset those costs,
- Not penalise domestic producers for installing larger PV units,
- Vary feed-in tariff for domestic producers based on demand, where utilities draw on power stored in domestic batteries.

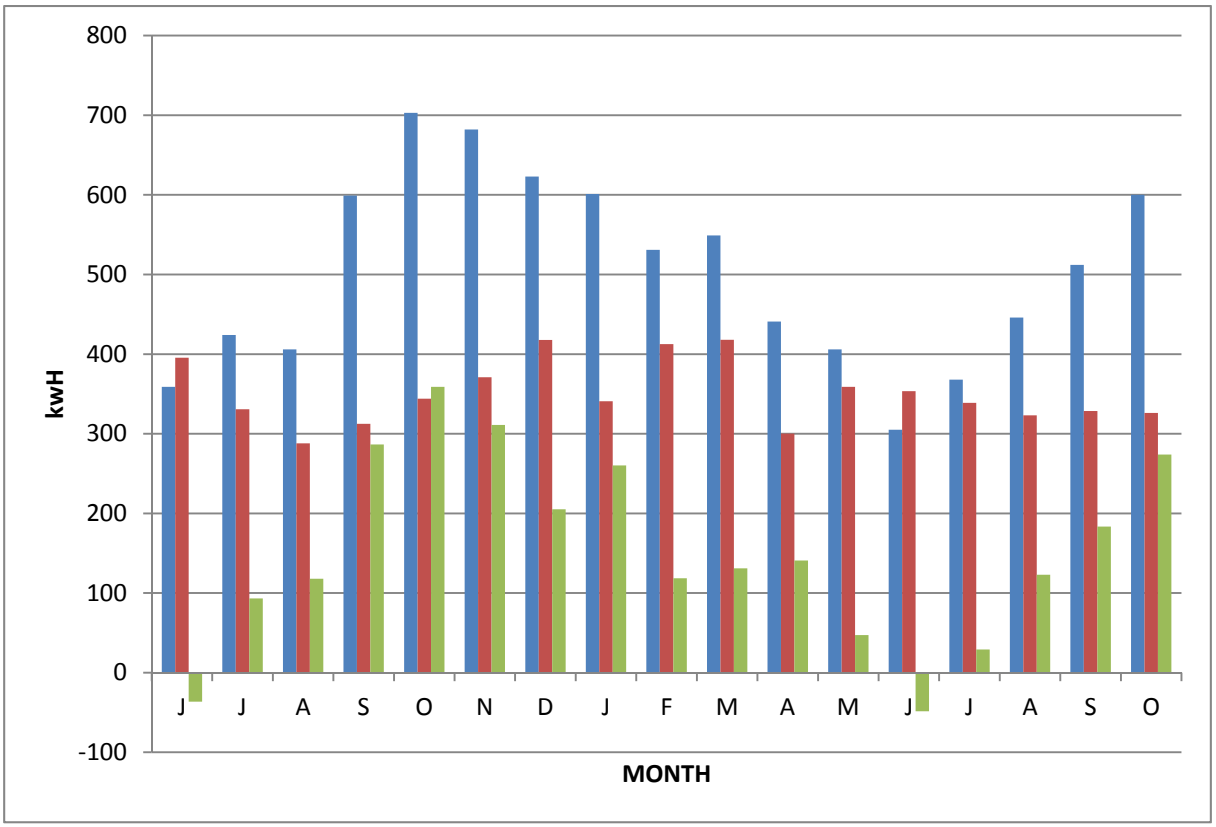

Chart showing monthly data for electricity generated (blue bars), consumed (brown bars) and exported to (or imported from) grid (green bars), over 17 months, for an all-electric house in Brisbane with 5 kWh PV unit oriented E (2.5 kWh) and W (2.5 kWh) at 23^{o}, and assuming 20 kWh of battery storage. Electricity generated is actual data while flow to and from grid is obtained from total monthly generated minus total monthly consumed