Centre for Energy and Environmental Markets

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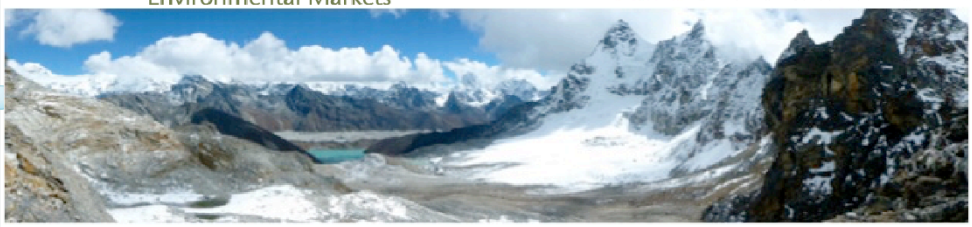

History of the tariff tool – and some useful outputs

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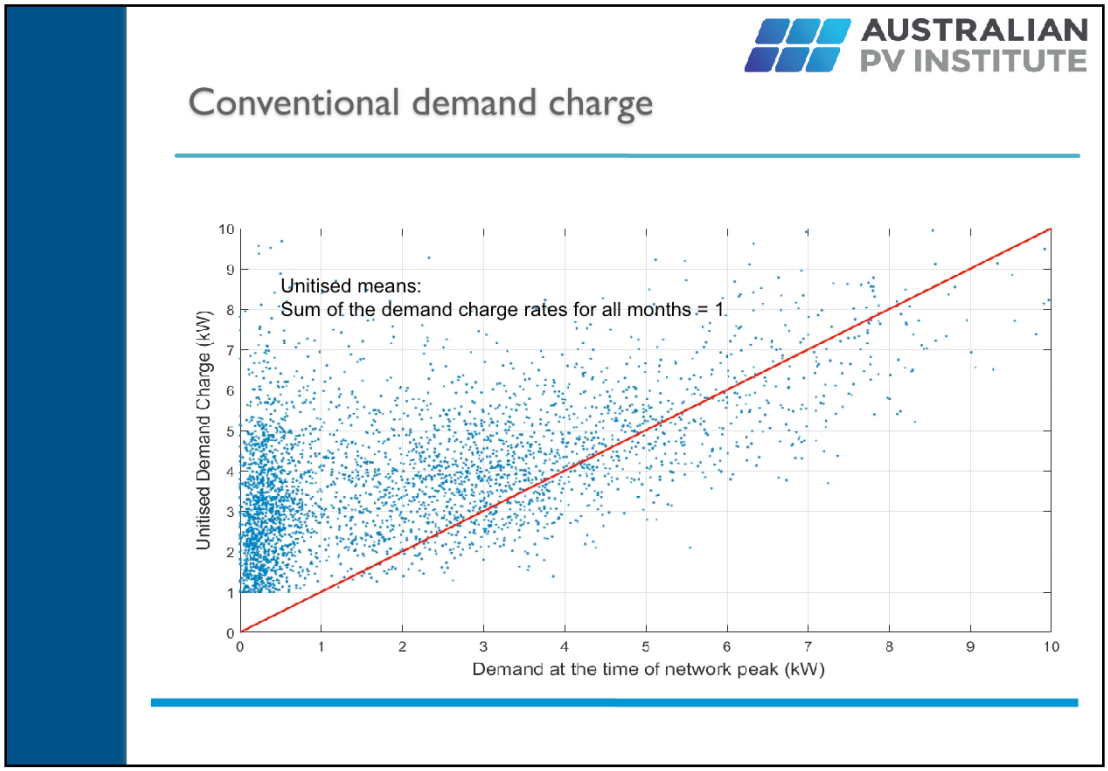
Centre for Energy and Environmental Markets & School of Photovoltaic and Renewable Energy Engineering (UNSW), IT Power (Australia), APVI

Workshop on Distribution Network Tariff Assessment and Design

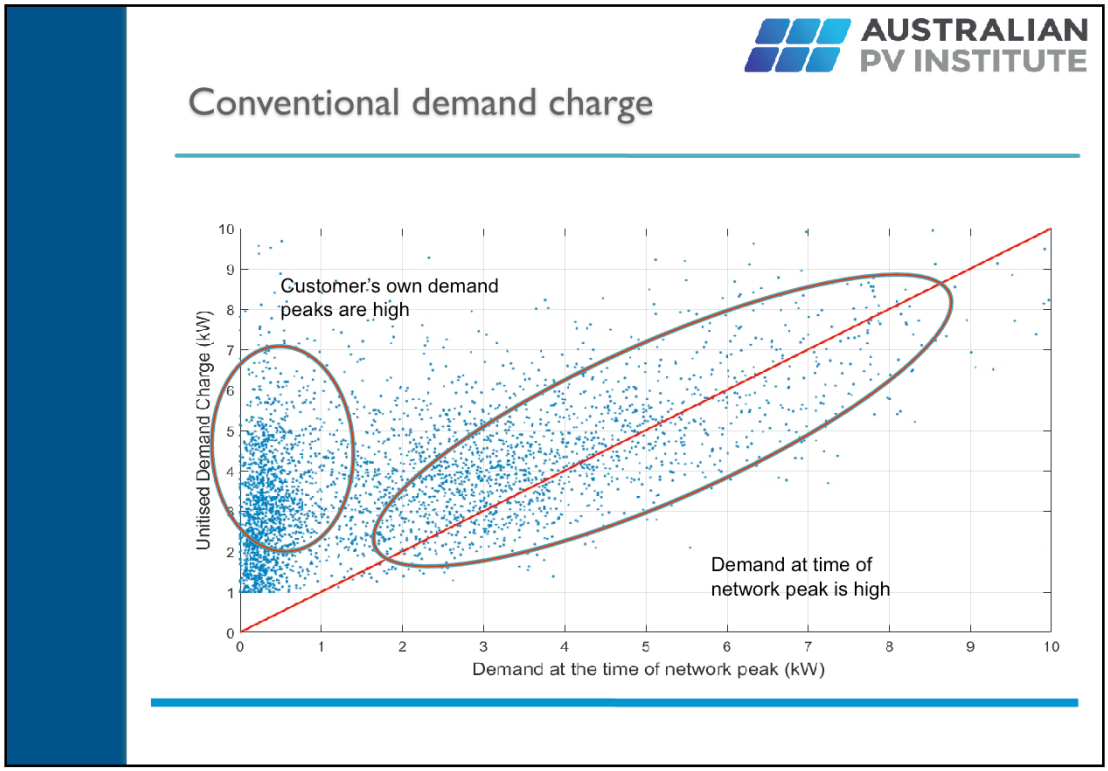
Sydney, **27 June 2017**



This chart is a graphical way to assess the cost-reflectivity of a demand charge tariff. It compares the unitised demand charge to each customer's demand at the time of the network's annual peak. Each blue dot corresponds to a single household in the SGSC database. We have used data from 3,876 households.

The unitised demand charge calculates the cost imposed on the customer using a demand charge where the sum of the demand charge rates equals 1. So for example, if an equal demand charge rate is applied in all months, the unitised demand charge rate = $1/12 per kW. If it is applied equally only in summer and winter months, it = $1/6 per kW.

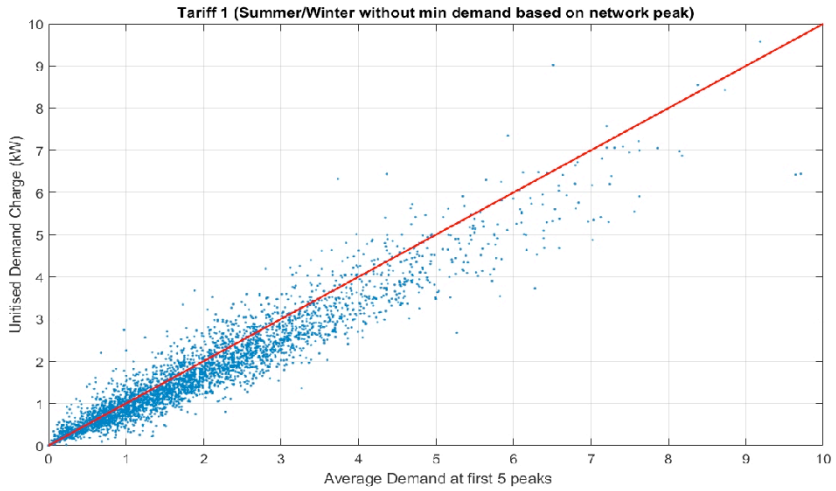
This is used because it makes it easier to compare the structure of different demand tariffs because it removes any differences due to demand charge rates.



If a tariff is cost-reflective, all the points would be on the red line. Those in the right hand circled area are reasonably close to being cost -reflective.

The households in the left circled area had high personal peaks and so received a high demand charge bill, even though they had low demand at the time of the network peak – indicating the demand charge is not cost-reflective.

Coincident demand charge

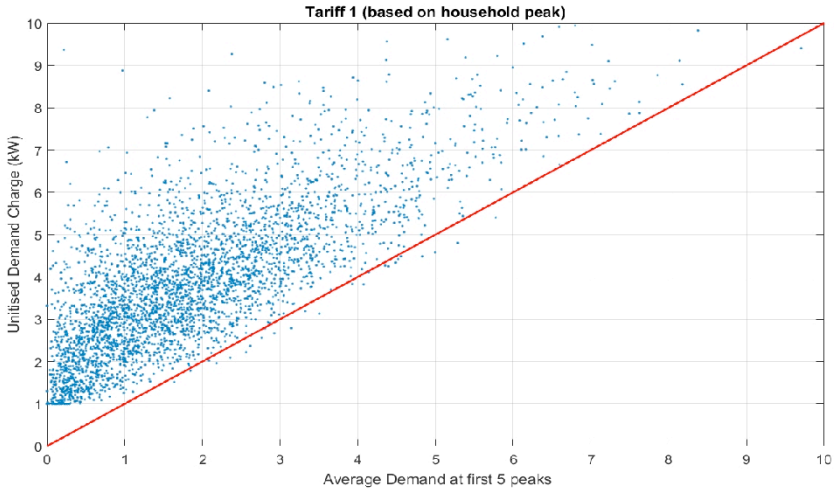


Here, the demand charge rate is applied to the household demand at the time of the network peak – and so it is more cost reflective.

The variation occurs because the unitised demand charge is applied to the coincident demand in each summer/winter month, whereas the x axis is the average demand during the 5 highest network peaks, 2 of which are in Jan.

Note that the y axis is now showing that the unitised demand charge is compared to the household's average demand during the top 5 network peaks. Later analysis showed that the optimal number of peaks for comparison is actually 8. This number will change depending on the load data.

Conventional demand charge: 5 network peaks



This chart compares the conventional demand tariff on the first slide to the household average demand at the time of the 5 highest network peaks, and it can be seen that the correlation is much better. But it is still not as good as for the coincident demand tariff, as shown on the next slide.

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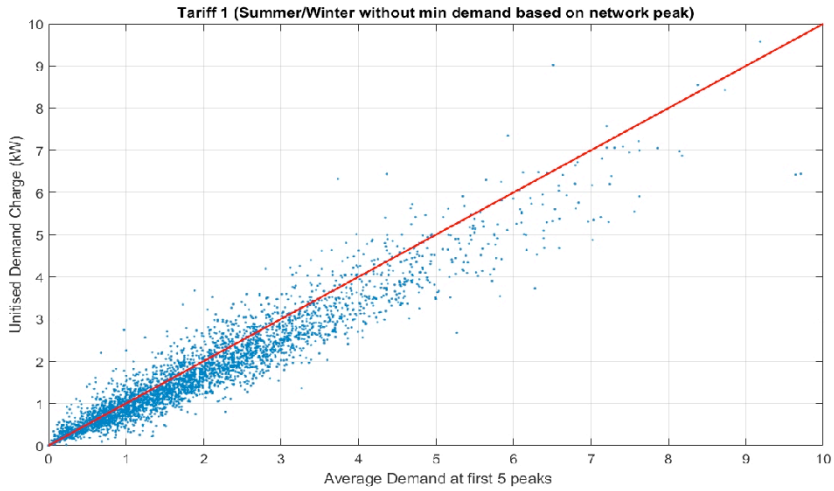
Coincident demand charge: 5 network peaks



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AER now agrees

- "An important element to setting a cost reflective demand charge is to ensure that customers are not charged a peak demand when they are not contributing to it. We consider demand charges should send signals to customers when their usage or peak consumption matches the peak on the network" (p53)
- "We encourage distributors to investigate alternative measures of demand for the next round of tariff structure statements having regard to each measure's ability to send price signals to customers that are more closely aligned with peak demand and utilisation on the network, rather than aligned with the individual customer's peak demand. (p139, AER's Final Decision of TSSs of NSW DNSPs)

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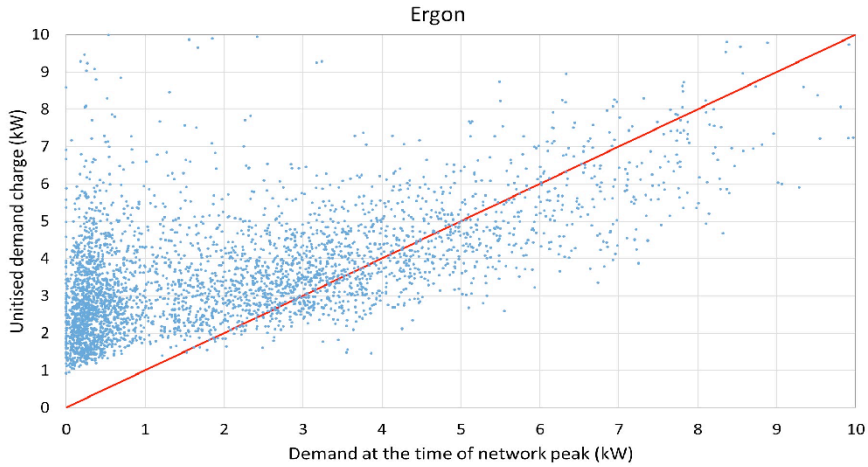
Other DNSP tariffs are very similar



It has been recommended that Ergon's approach, which is based on averaging the top 4 household peaks in each month, might result in a more cost-reflective tariff, but it can be seen that it just results in the same type of scatter as the conventional demand tariff on the first slide.

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Coincident demand pricing

Problem	In fact ….
Is *ex post* (after the fact)	All electricity bills are *ex post*.
Customer won't know when network peak is	Ask a DNSP or customer when the customer's own peak will be in the coming month – no idea. However, the DNSP will have a pretty good idea what time the network peak will be. Can tell customer.

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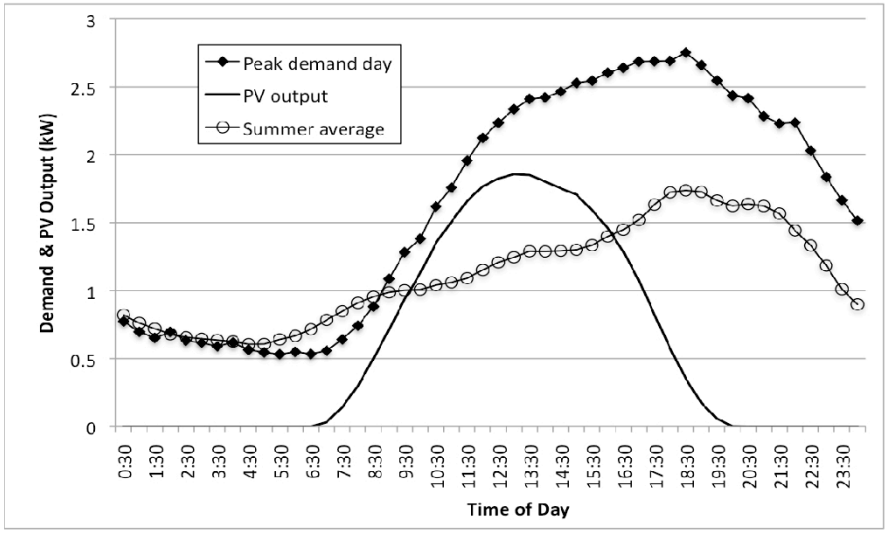
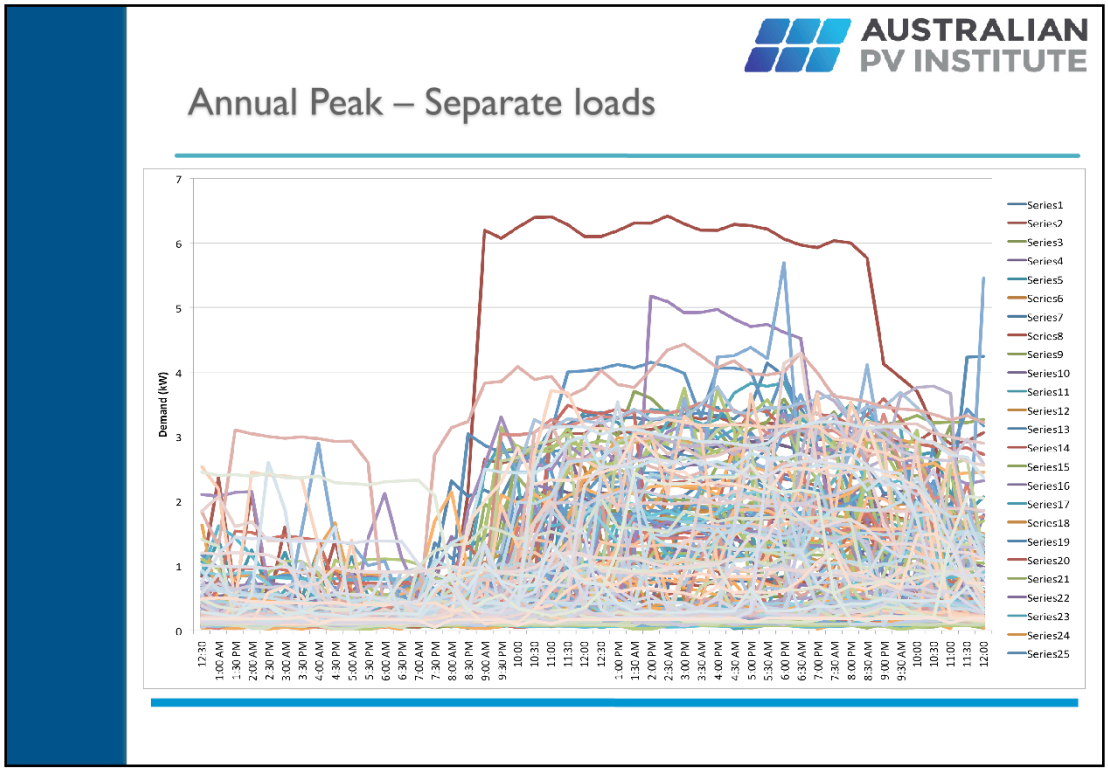
Annual Peak – weekend (Dataset A)

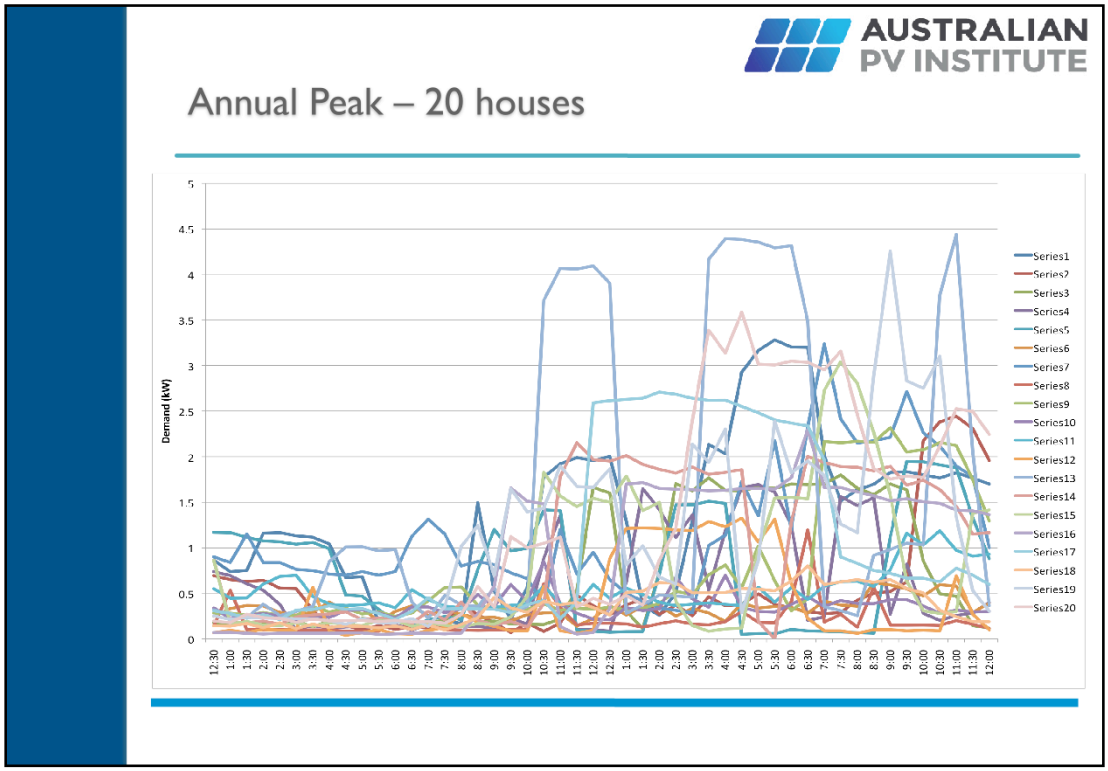


This is used to show that although the aggregated (network) peak may look very smooth …



… but when you look at individual loads, they are nothing like the average – this is for 150 houses.

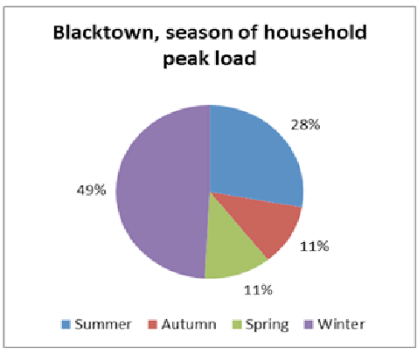
This means it is very hard to pick in advance when a customer's own peak will be.

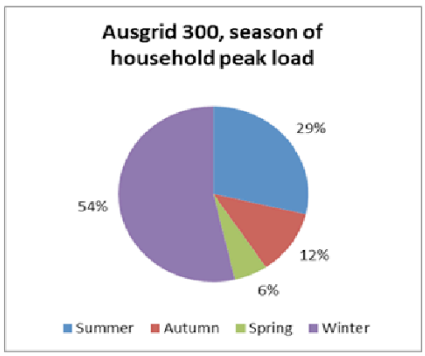


For just 20 houses

Summer peak?

- Aggregated (network) peak is in summer, but ….





It is hard to even tell which season a customer's annual peak will be in. For both these datasets, although the network peak is in summer, about half the household annual peaks occur in winter.

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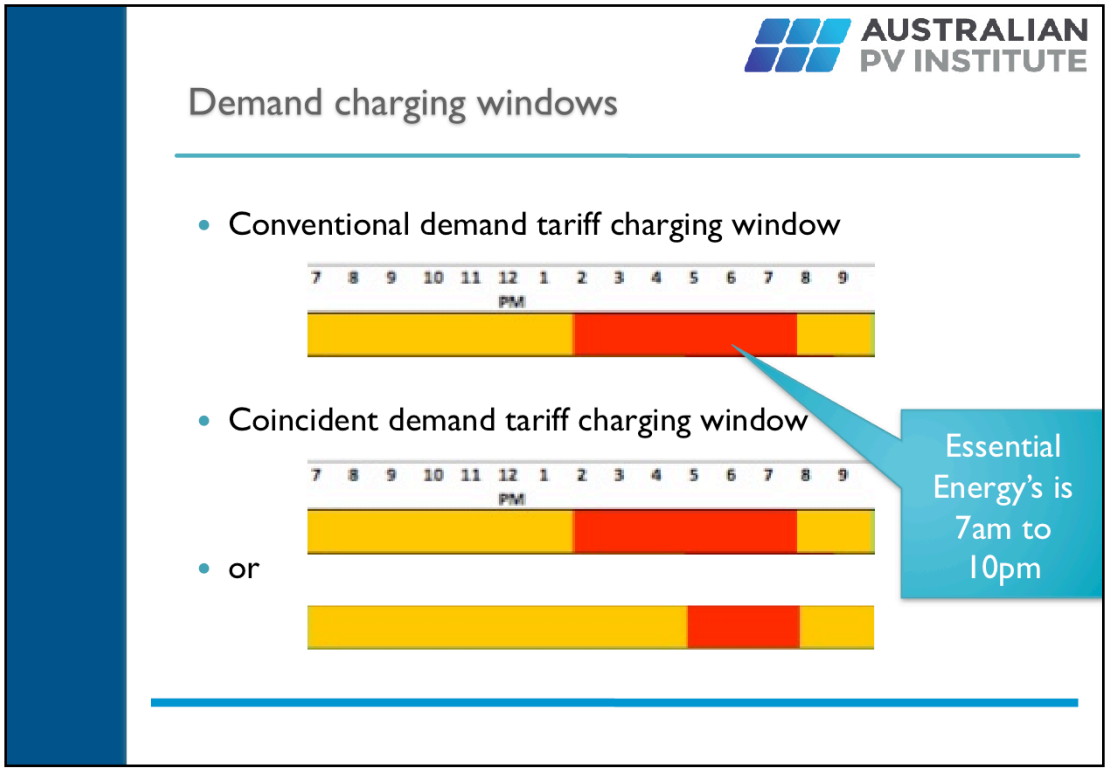
Coincident demand pricing

Problem	In fact ….
Is *ex post* (after the fact)	All electricity bills are *ex post*.
Customer won't know when network peak is	Ask a DNSP or customer when the customer's own peak will be in the coming month – no idea. However, the DNSP will have a pretty good idea what time the network peak will be. Can tell customer.
Tariff too complicated	Tariff identical to standard demand charge tariff eg. Charge applied between 2pm to 8pm during summer/winter months.



A coincident demand tariff can have exactly the same charging window as a conventional demand tariff – and so from the customer's point of view is the same ie. this is the time to reduce demand if possible. In fact, because the network has a good idea when the network demand peak will be, the charging window can be even smaller.

Note that conventional demand charge tariffs are currently being approved with very large charging windows.

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Coincident demand pricing

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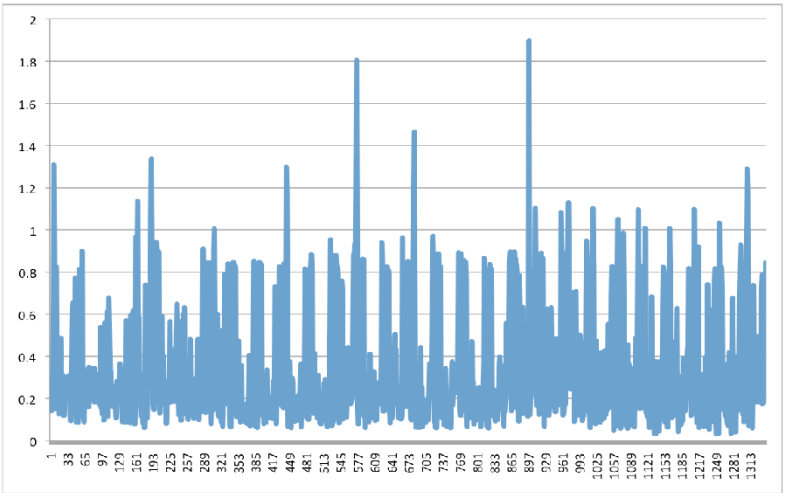
Tariff too complicated	Tariff identical to standard demand charge tariff eg. Charge applied between 2pm to 8pm during summer/winter months.
Thus, a coincident demand tariff could provide **greater** certainty to the customer – regarding the **timing** of the charge.	

But, greater variability regarding the customer's demand?



However, it is likely there will be more variability in the level of the customer's coincident demand than there will be in the value of their own peak.

This chart shows a randomly selected customer for Feb, and it can be seen that their own peak demand may vary between 1 and 2kW.

However, in theory, the value of their coincident demand could vary between 0 and 2kW. This could increase the likelihood of bill shock.

Case 1 = standard flat rate tariff

Case 2 = coincident demand tariff

Case 3 = conventional demand tariff

This shows that the conventional demand tariff results in greater variation that the flat rate tariff, and the coincident demand tariff in turn results in slightly greater variation. Thus, although the coincident demand tariff does indeed show increased potential for bill shock, it is only slightly greater than that of the conventional demand tariff.

Note also that the bill shock goes both ways – bills can also decrease.

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Response?

- This variability is unavoidable when you go from a flat tariff to a demand charge tariff (conventional or coincident)
- Rather than doing everything you can to avoid having cost-reflective pricing …
- Make pricing cost-reflective, then minimise price shocks
  - Averaging over 3 months per bill helps (or having bills that span months with and without demand charges)
  - Opt-in
  - Transitional tariffs – **Doesn't mean starting with a bad design then improving the design**. It means starting with the right design and gradually increasing the demand charge component ($/kW)
  - Provide advice about how to minimise demand
  - Provide technologies that help to minimise demand (info displays, load limiters, batteries)


Thank you
Questions?