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(Re)designing Cost-Reflective Tariffs

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APVI Workshop "Cost-Reflective Pricing – some different perspectives"

Sydney, **1st June 2016**

CRP is very complicated

- Tariffs divided into: transmission, distribution, retail/wholesale
- Distribution:
  1. Augmentation costs – SRMC and LRMC? decreasing demand peak?
  2. Sunk/residual costs – how to allocate? historical responsibility?
  3. O&M costs – just a per kWh charge?
- How to:
  1. Calculate & allocate each of these
  2. Design tariffs that people want to take up, use and keep!
- Tariffs consist of structure and price components
- Here focus on
  - **Structure**, and how to design a tariff so that a household's bill correlates to its contribution to the demand peak and augmentation costs
  - **Residual costs**?

DNSP's demand charge tariffs in TSSs

- Demand charge-based tariffs from all DNSPs in Qld, Vic, ACT, Tas, SA, but not yet NSW

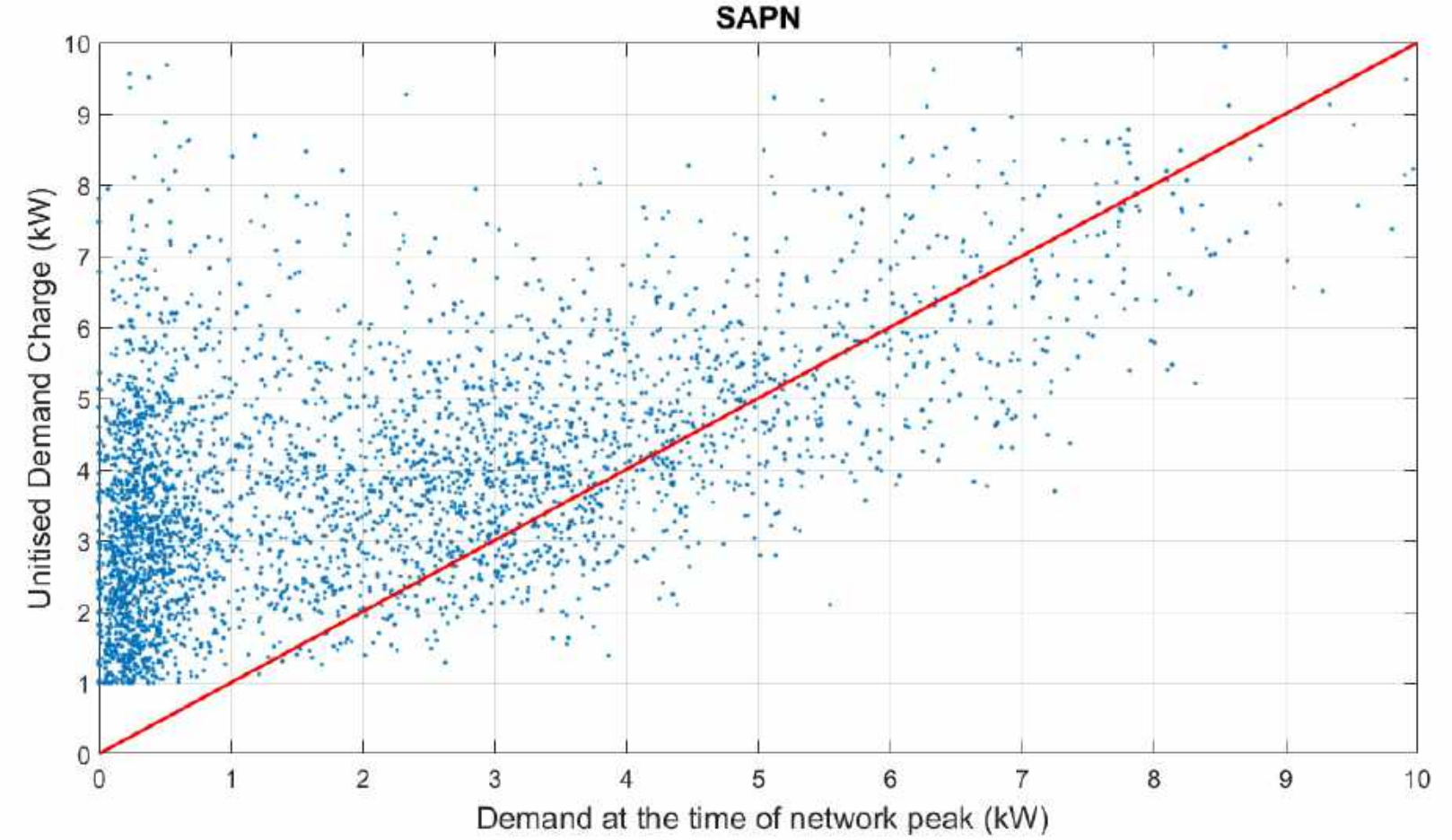
SAPN's Low Voltage Residential Actual Demand Tariff – DUOS 2017/18 (incl. GST)

Capacity - peak	Peak demand from 4 – 9pm (based on max half-hour demand) in each summer month. Every day. **Rate:** $15.8358/kW/month (Nov – March)
Capacity – off peak	Peak demand from 4 – 9pm (based on max half-hour demand) in each non-summer month. Every day. **Rate:** $7.9162/kW/month (April – Oct)
Energy	7.909c/kWh any time
Fixed	A min 1kW off-peak capacity charge

Comparing DNSPs demand charge tariffs

Characteristic	DNSP
Demand charge applied to 4 highest demand days in month	Ergon
Demand charge applied to single highest demand day in a month	Rest
Same demand charge all year	Energex, ActewAGL
Different rates in summer/non-summer months	Rest
Two peak periods in each day	ActewAGL, TasNetworks
Min demand charge as fixed daily charge	Ergon, SAPN, United Energy

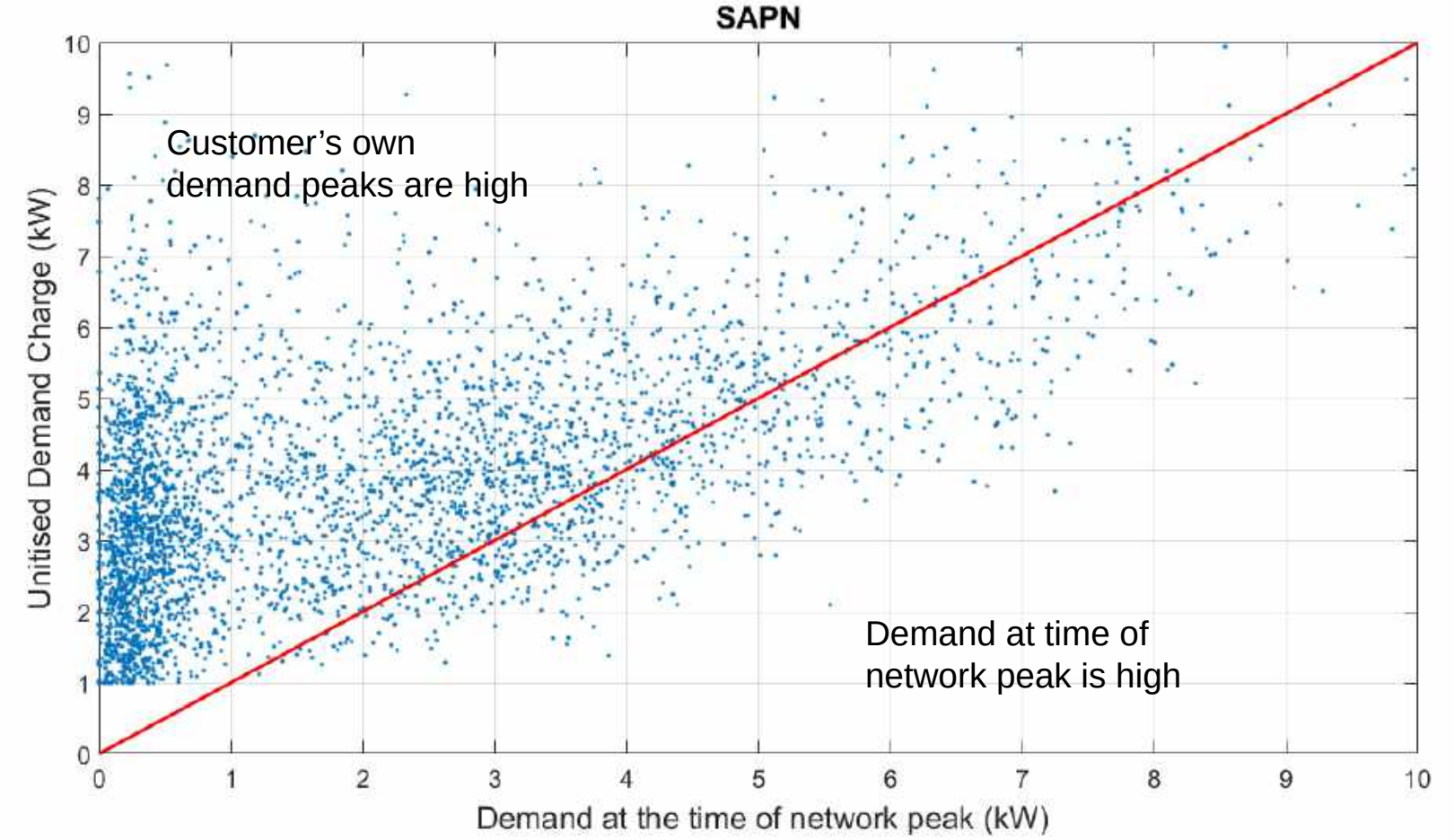
Assessing demand charge tariffs



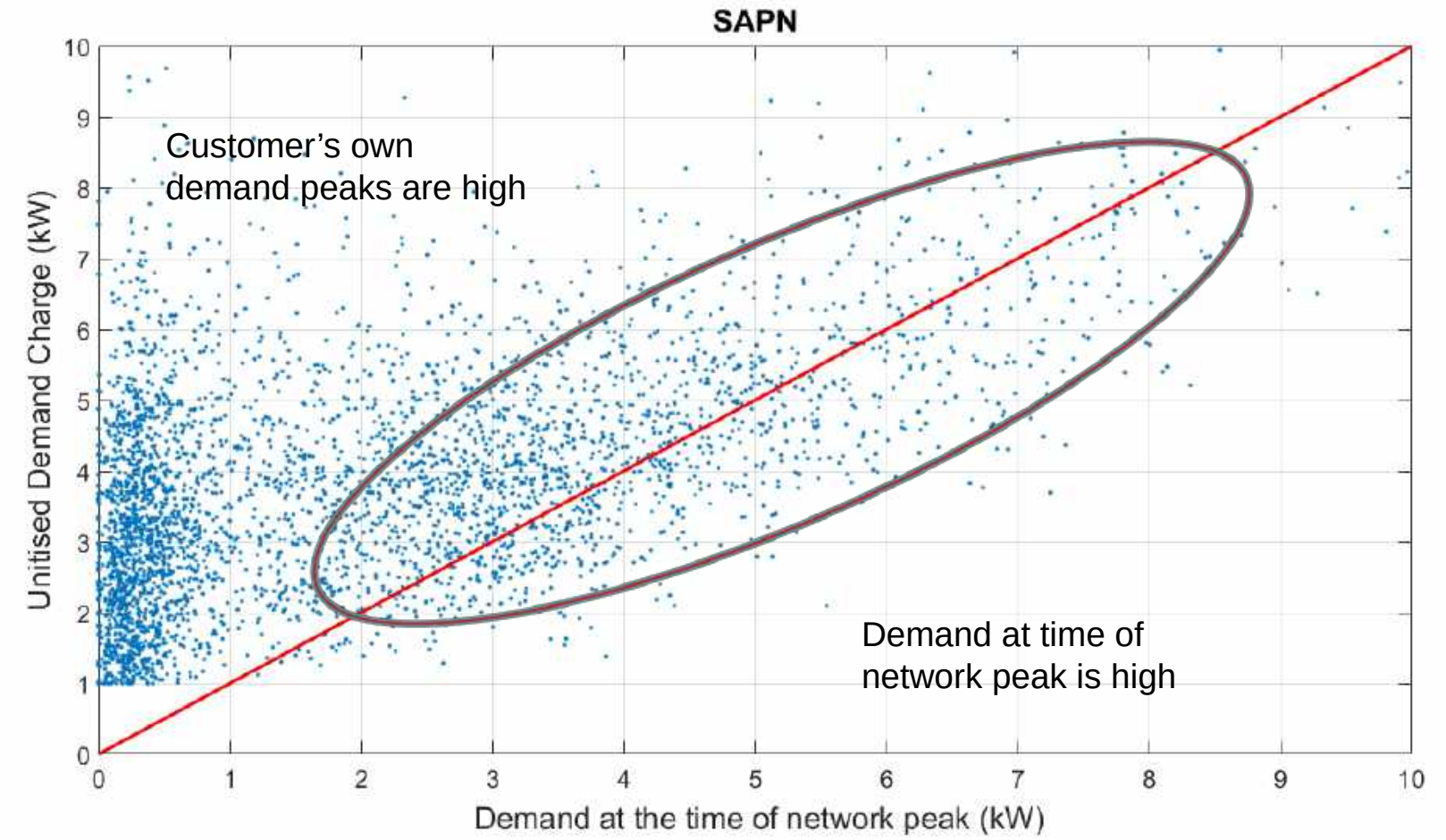
Unitised demand charge

- Monthly demand rates converted to equivalent kW value
- Sum of monthly demand charges = 1kW
- eg 1. If demand charge rate is same each month, unitised demand charge in each month = 1/12 kW
- eg 2. If demand charge rate is twice as large in 6 months as in the other 6, then unitised demand charge
  - in higher months = 2/18 kW
  - in lower months = 1/18 kW
- Provides a visual correlation between what customer pays and the costs they impose on the network
- Also makes different tariffs easier to compare

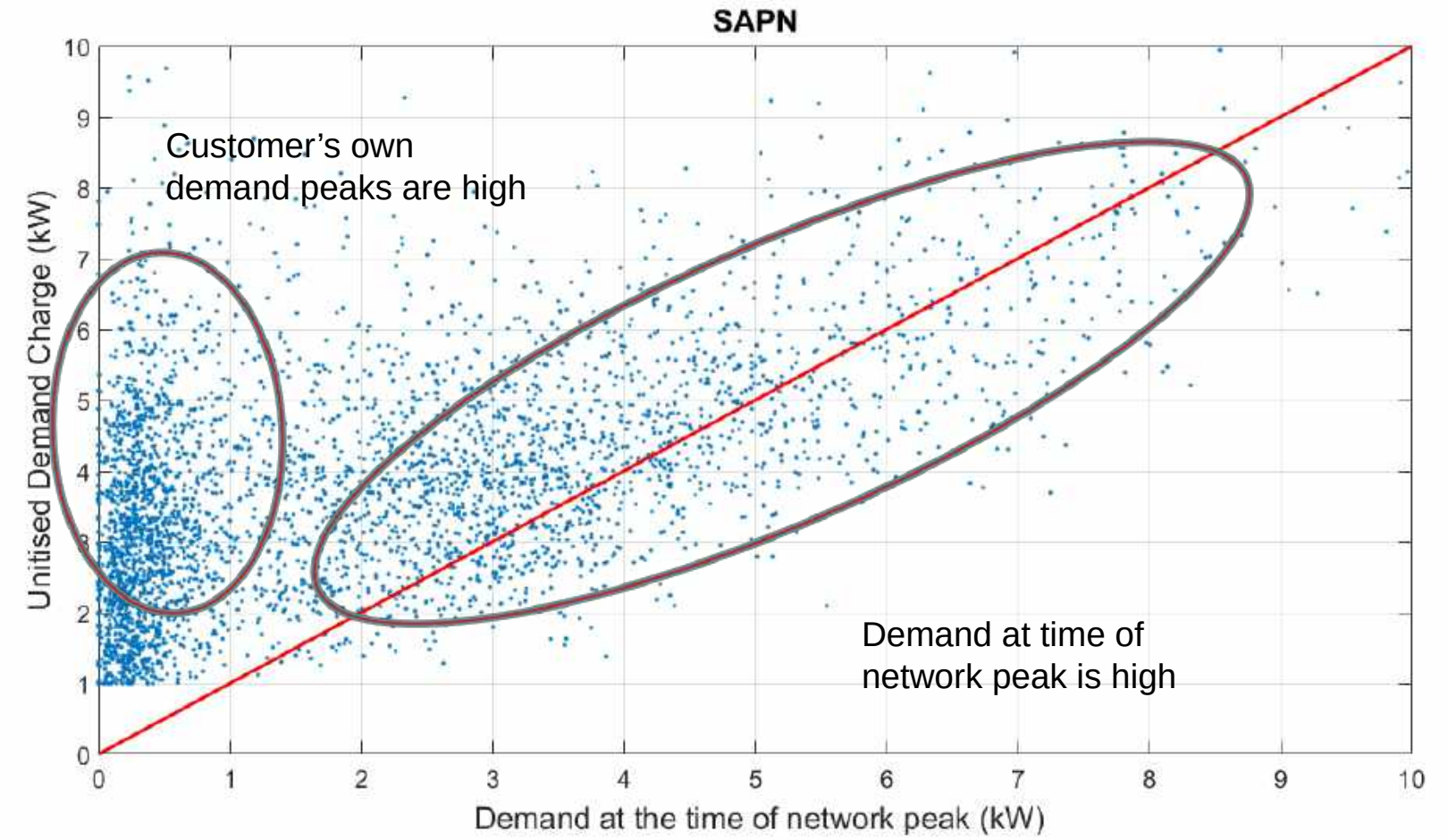
Unitised demand charge



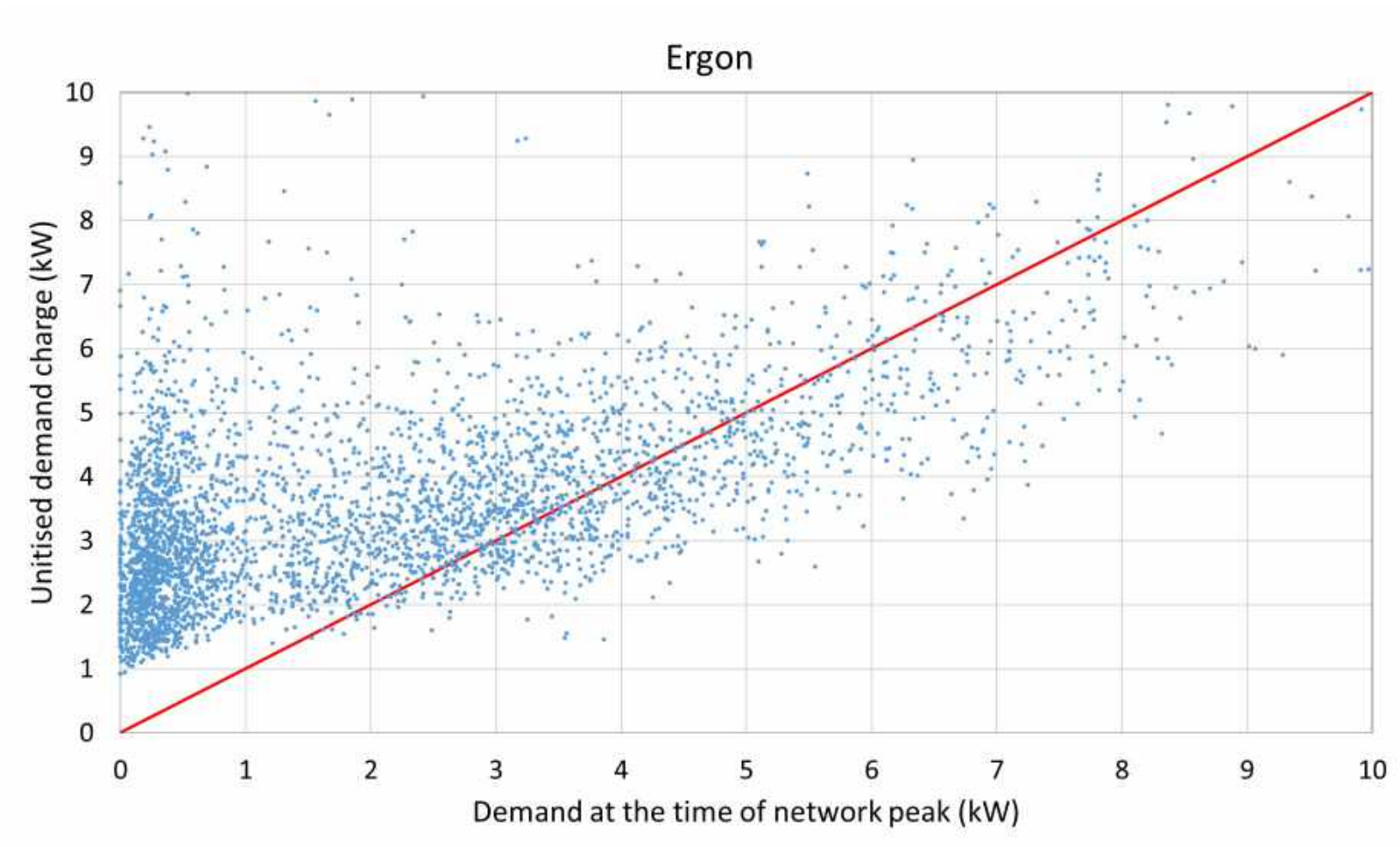
Unitised demand charge



Unitised demand charge



Other DNSP tariffs are very similar



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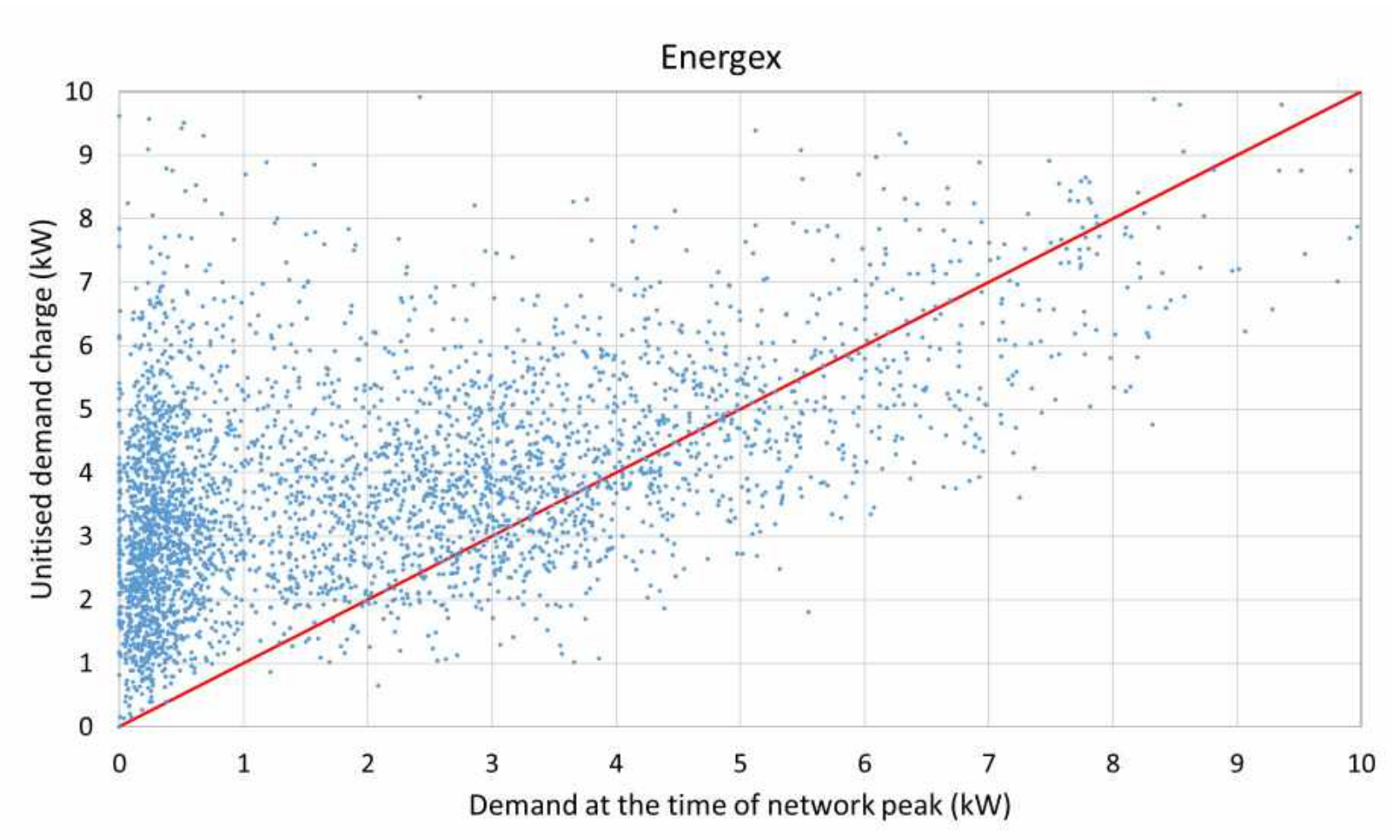

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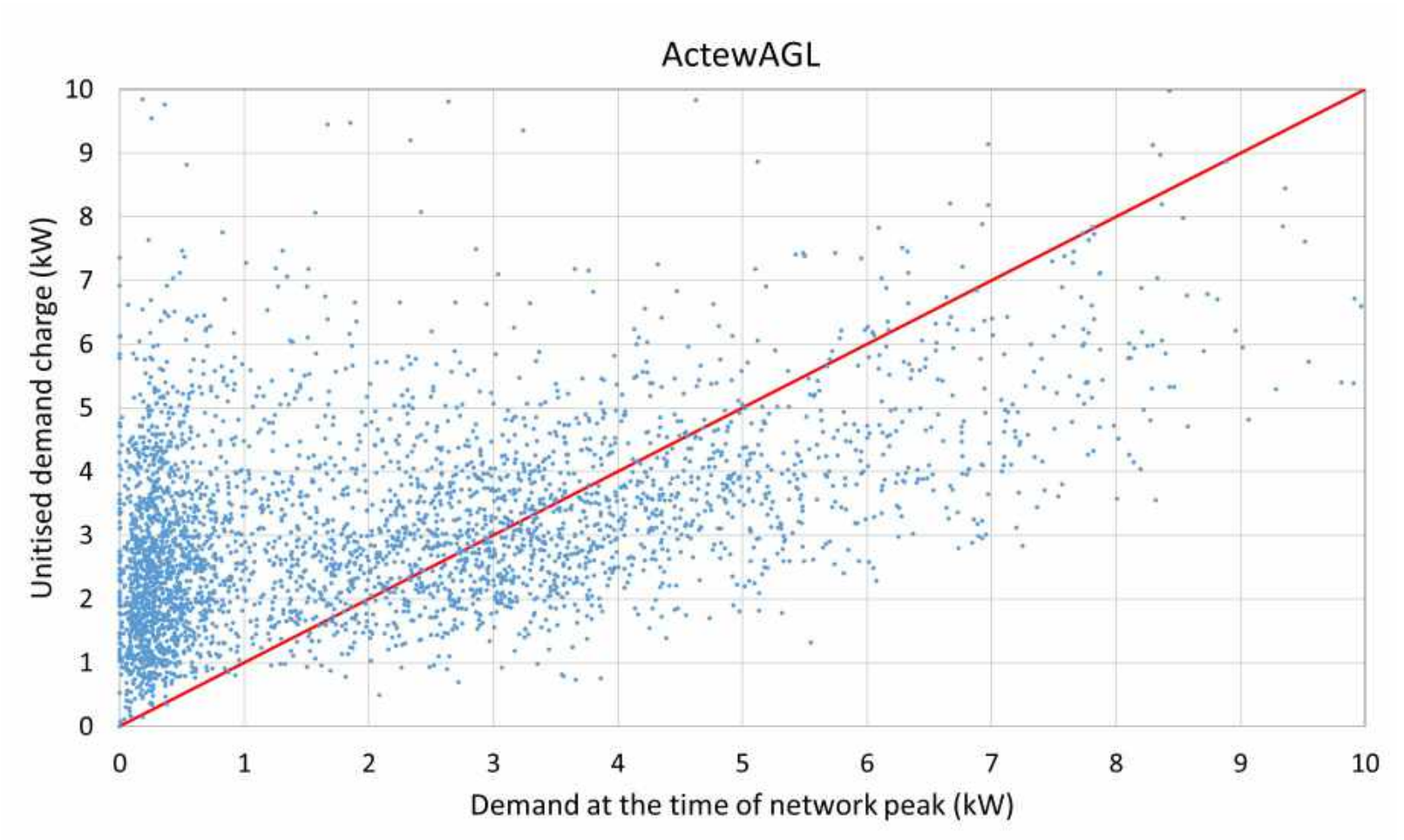

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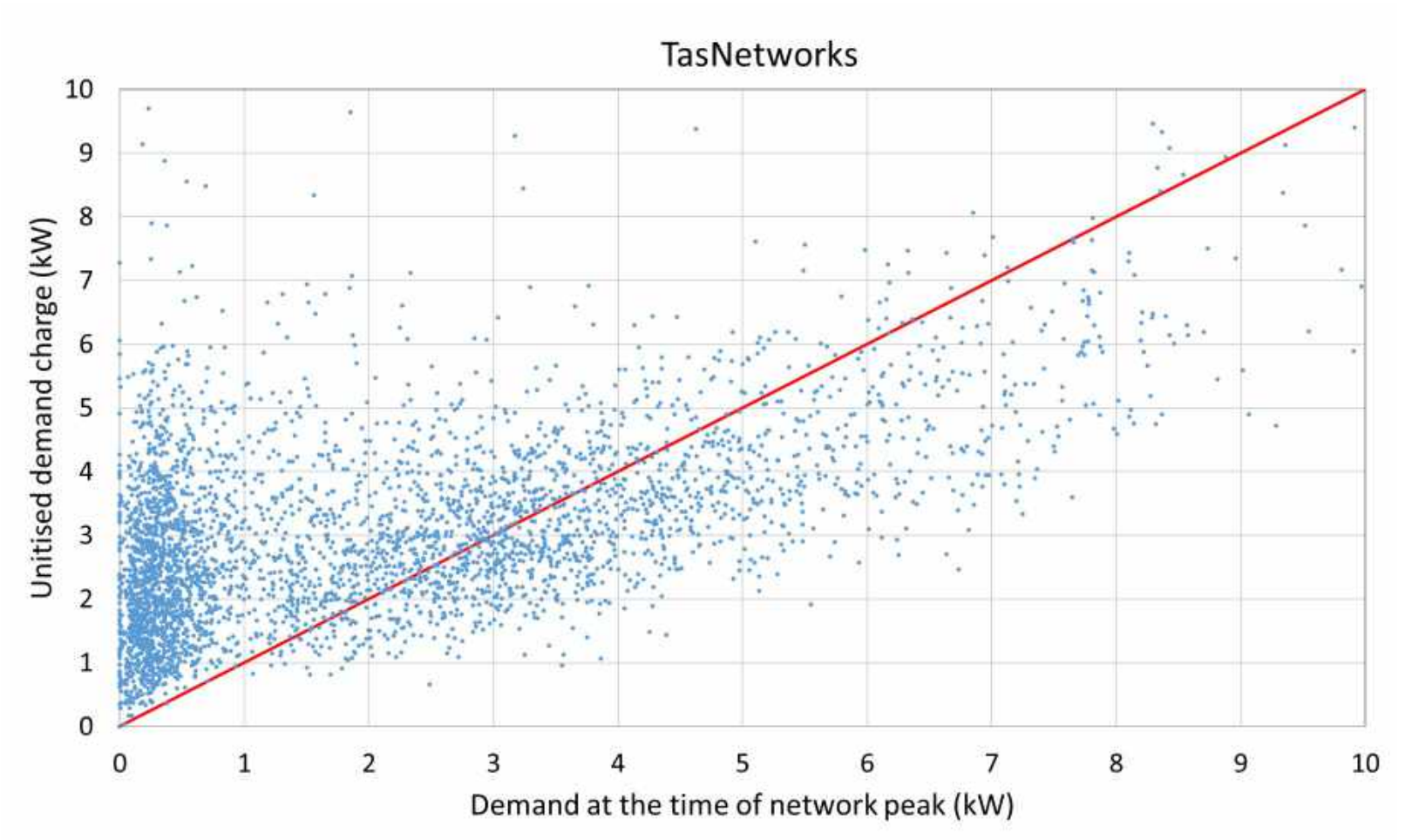
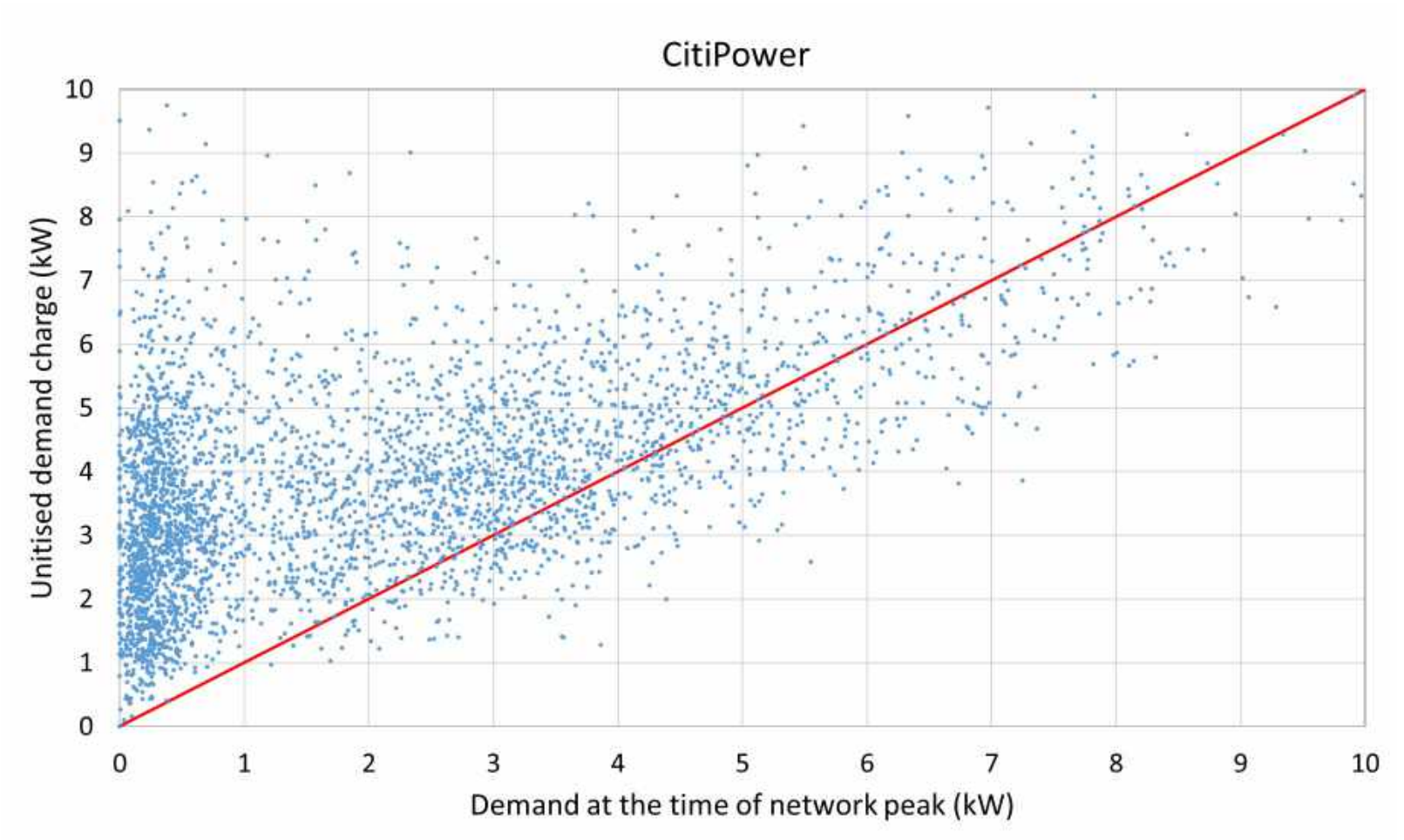
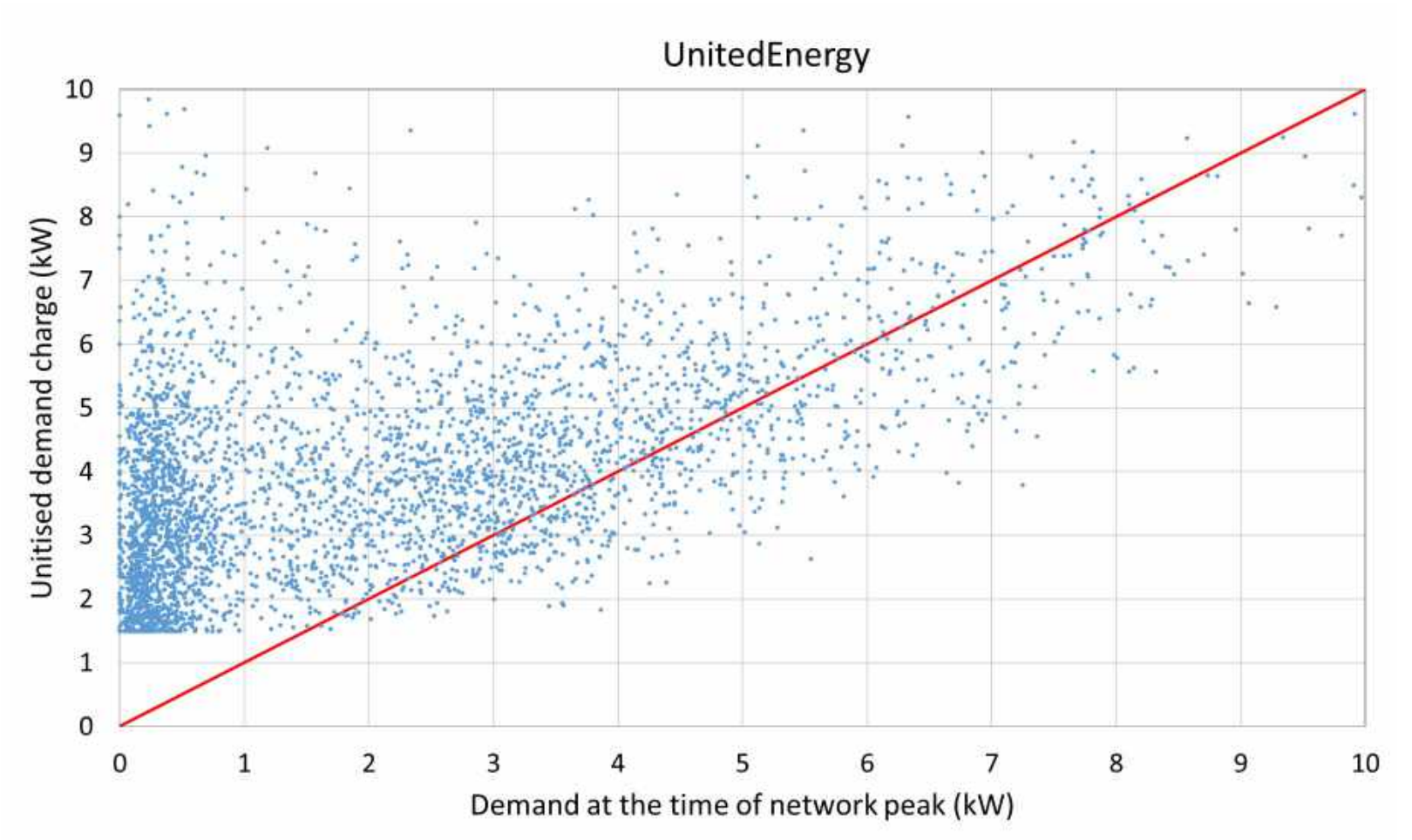


Other DNSP tariffs are very similar



Other DNSP tariffs are very similar



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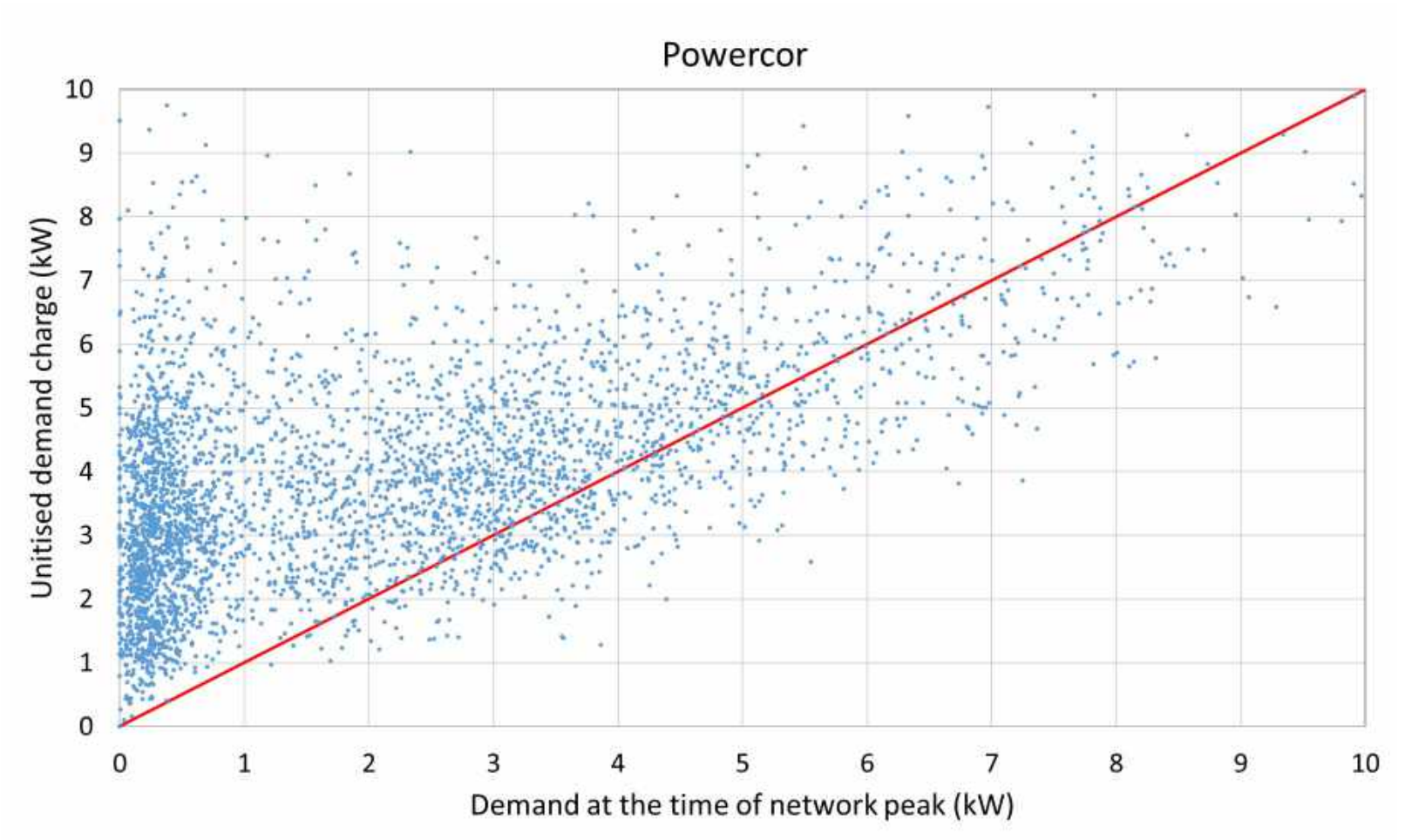
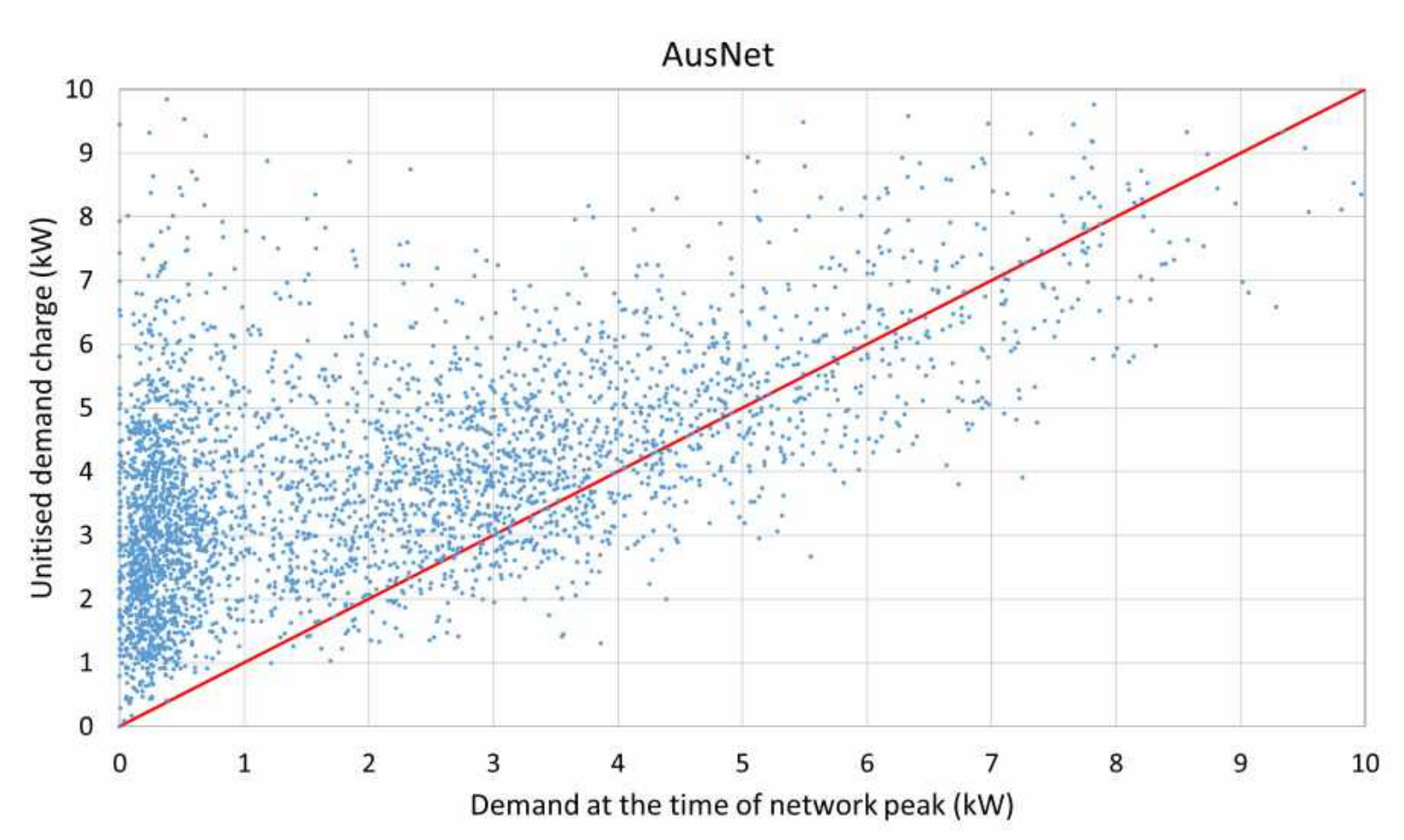
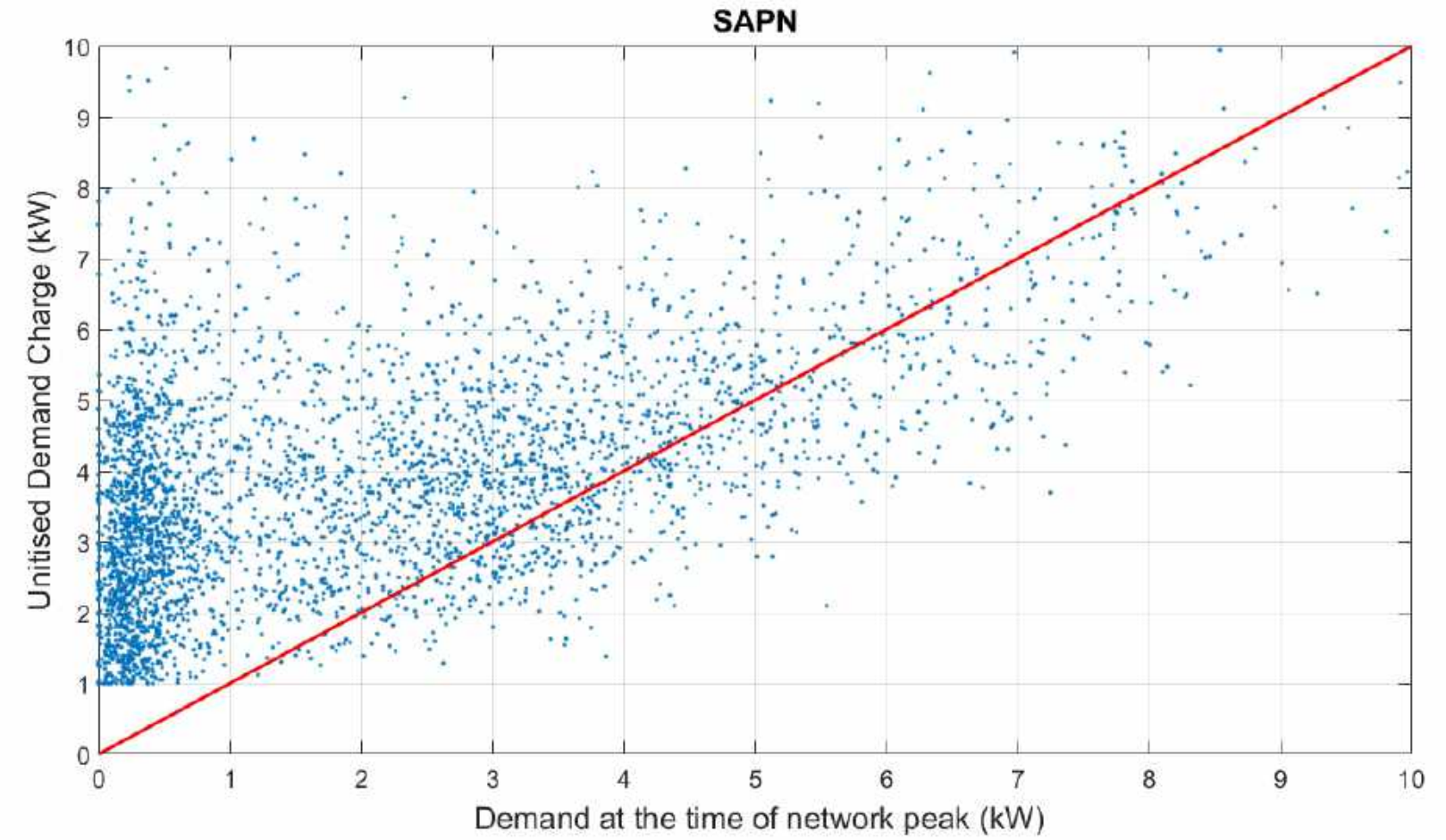


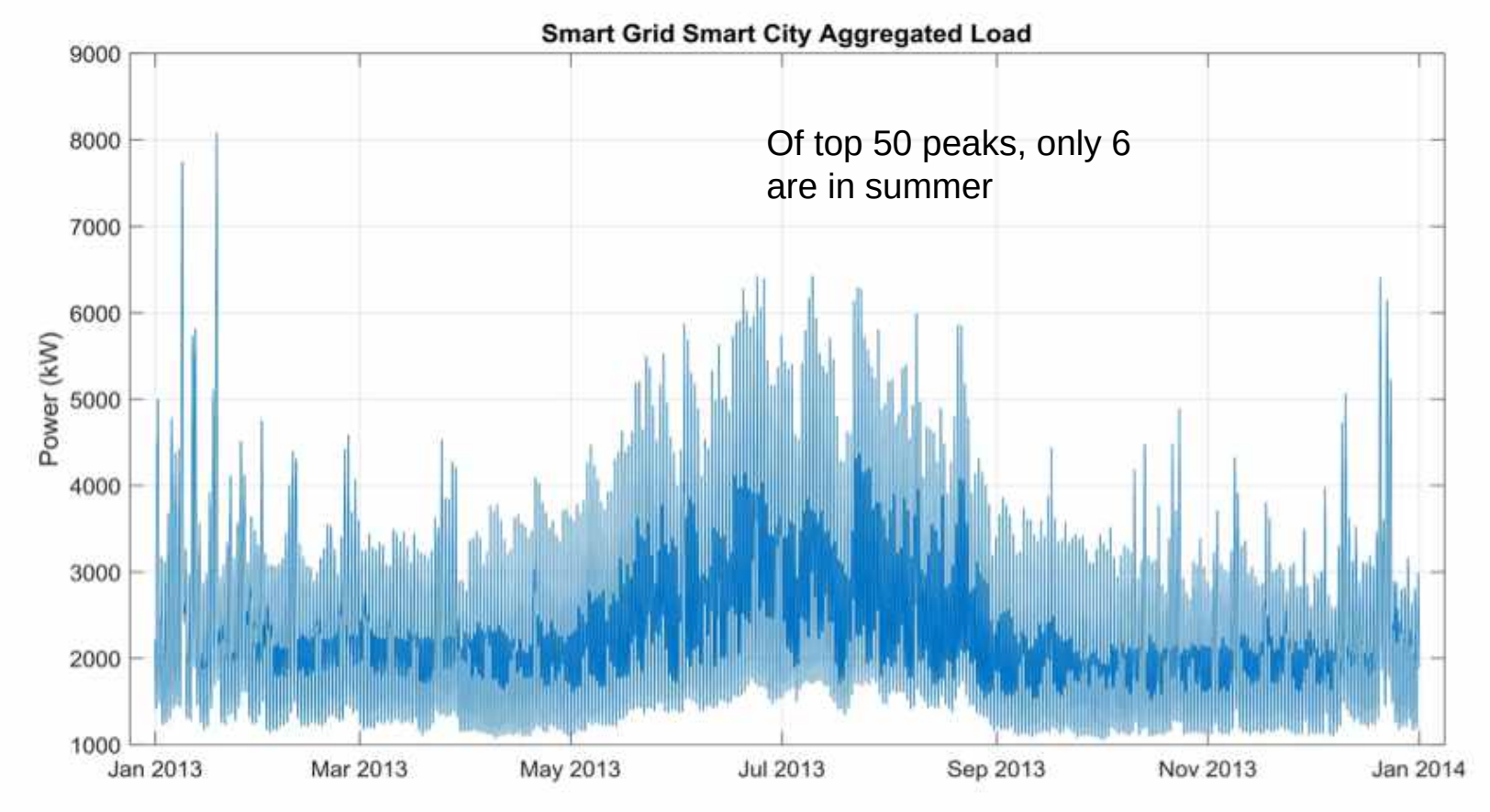
Other DNSP tariffs are very similar



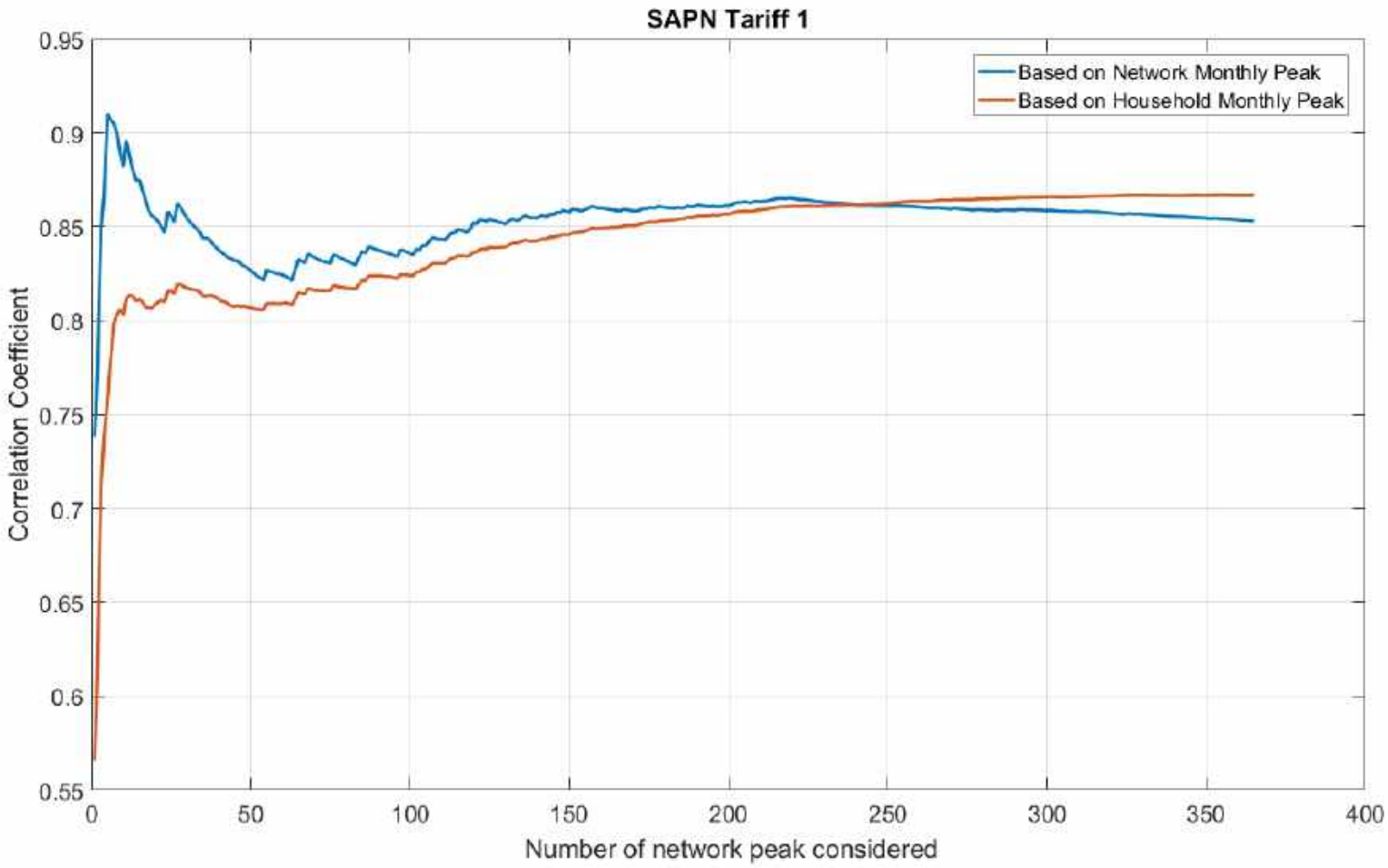
Unitised demand charge



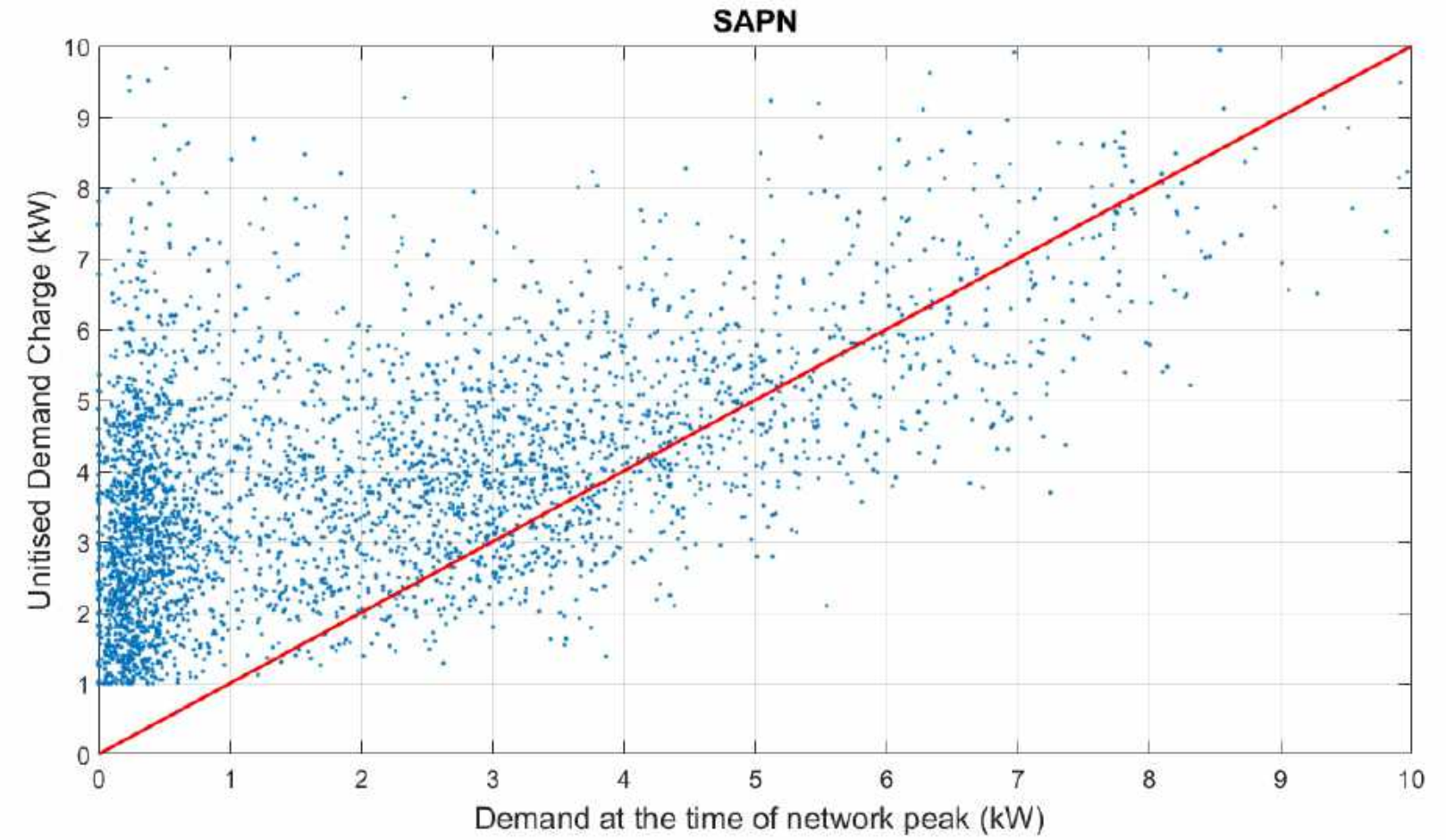
Aggregated (network) demand



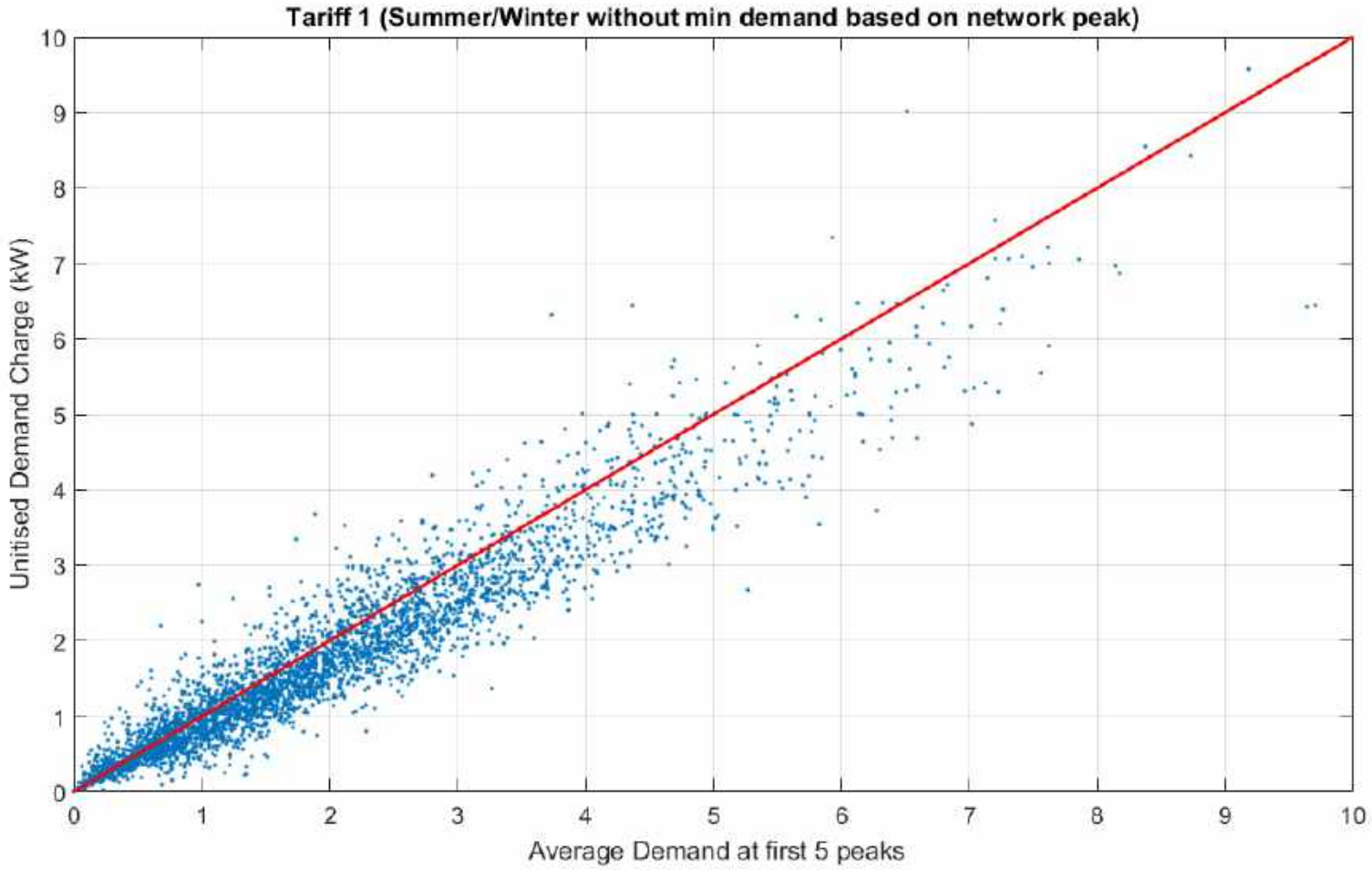
CC vs number of peaks



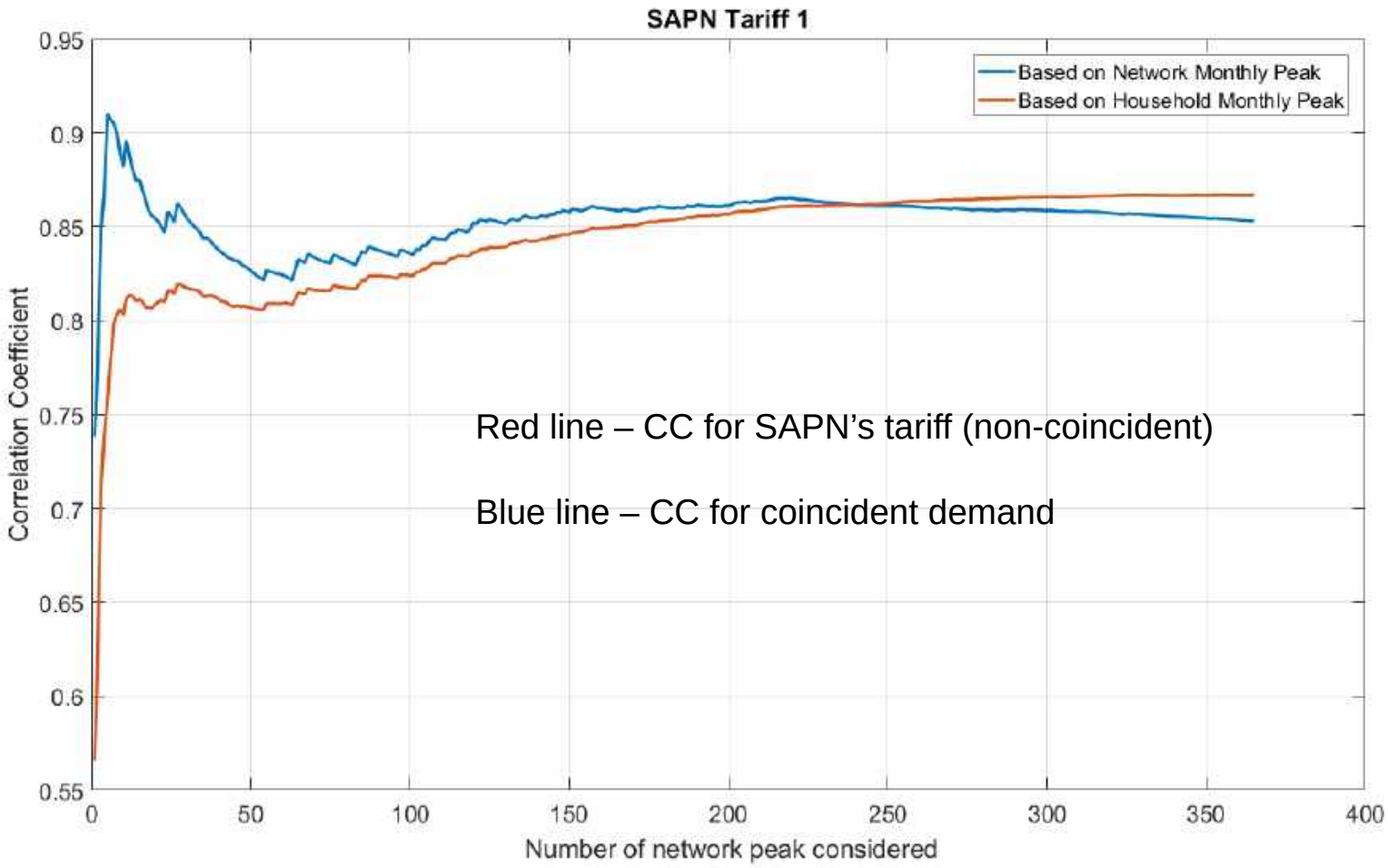
Low CC


SAPN
Unitised Demand Charge (kW)
Demand at the time of network peak (kW)
0
1
2
3
4
5
6
7
8
9
10

High CC


Tariff 1 (Summer/Winter without min demand based on network peak)
Unitised Demand Charge (kW)
Average Demand at first 5 peaks
0
1
2
3
4
5
6
7
8
9
10

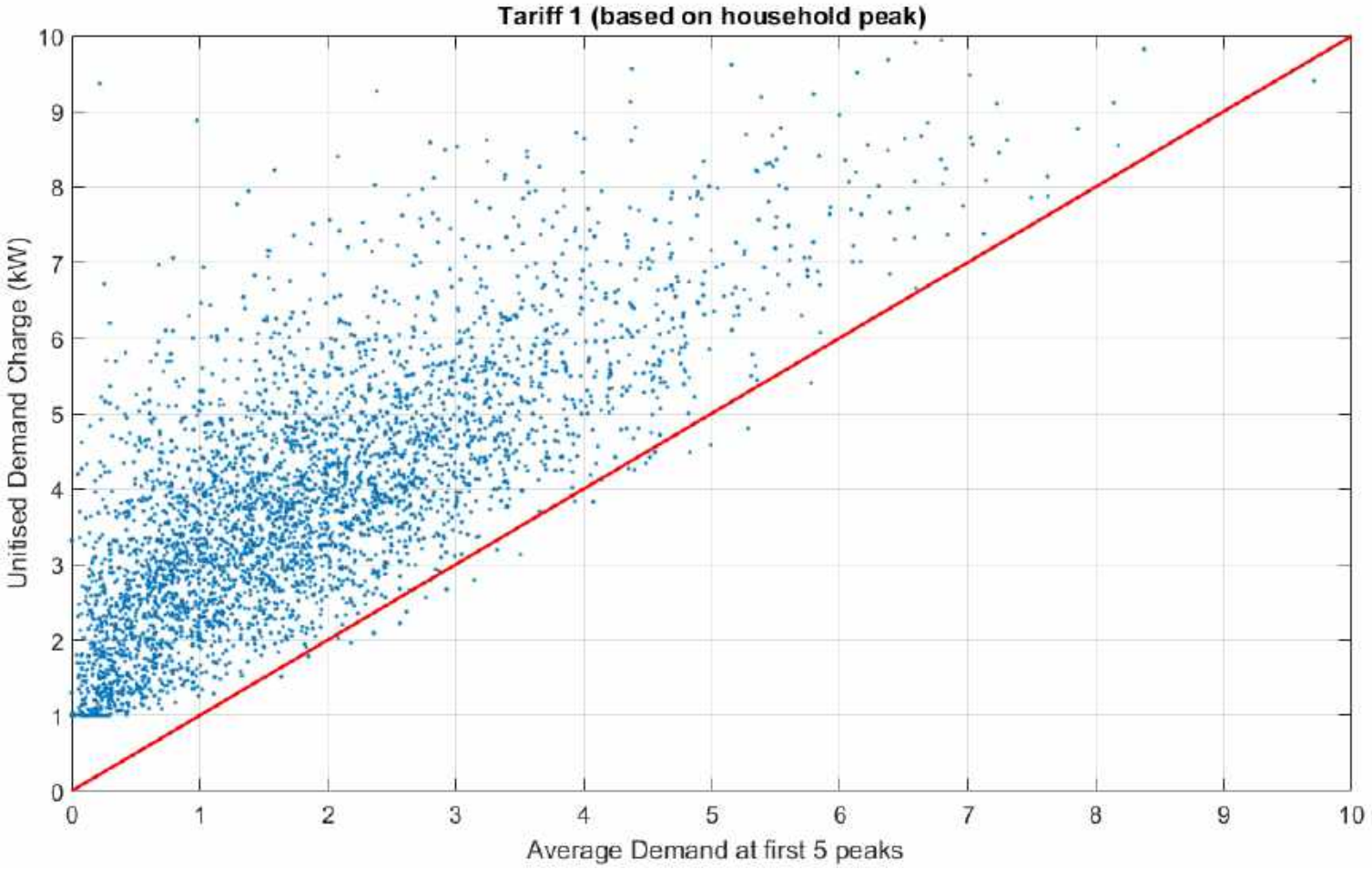
CC vs number of peaks



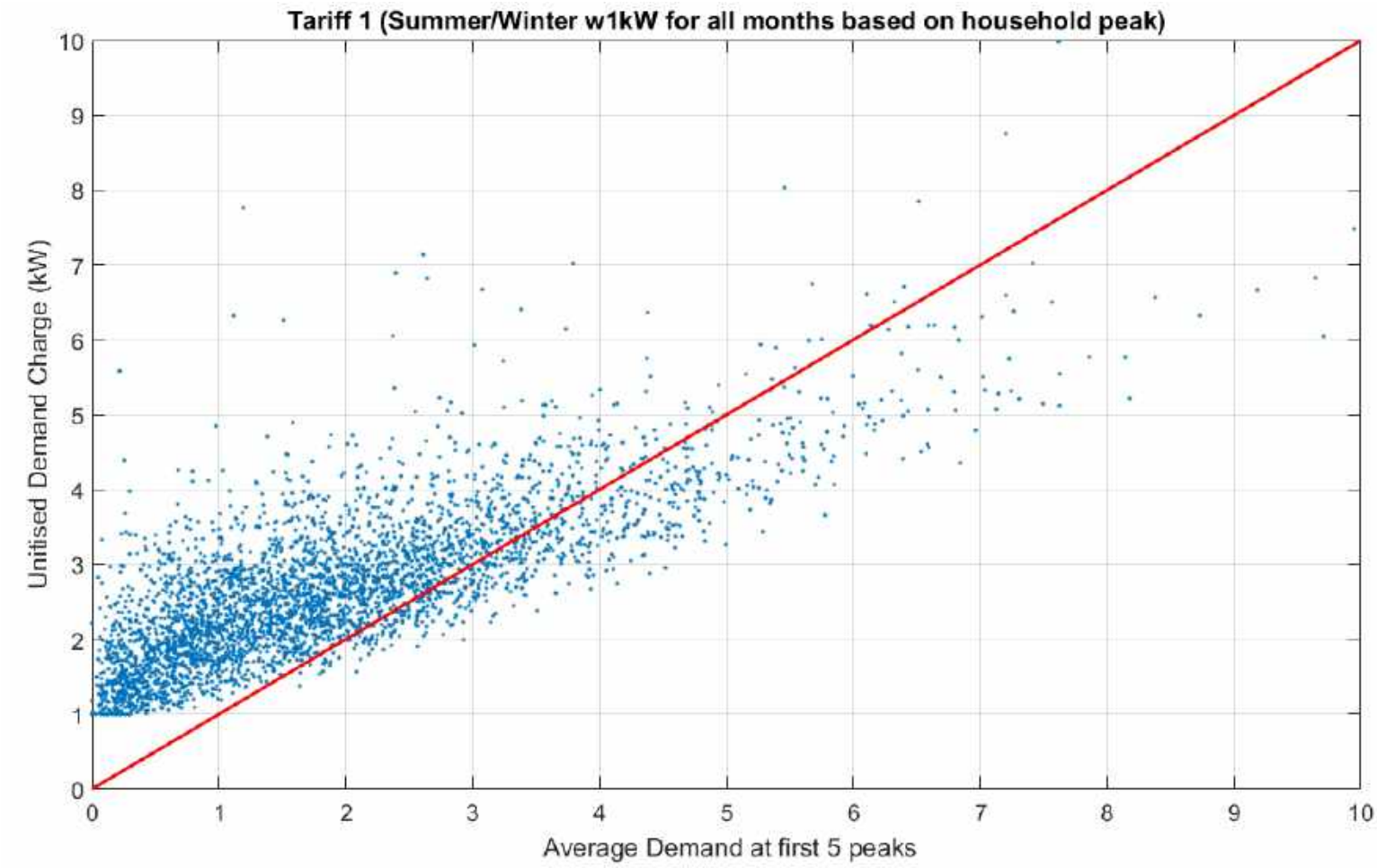
Red line – CC for SAPN's tariff (non-coincident)

Blue line – CC for coincident demand

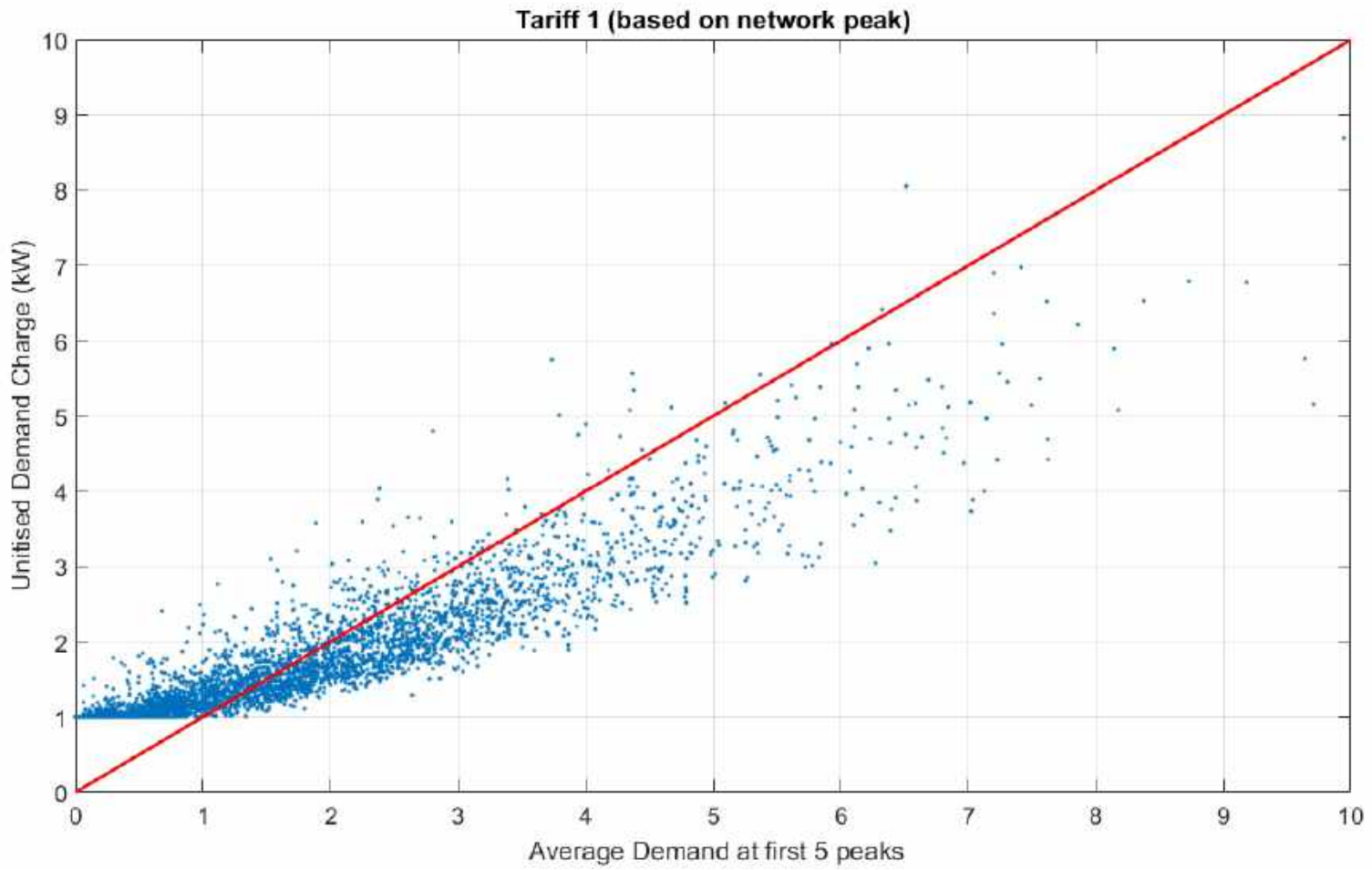
UDC compared to first 5 network peaks



DC only during summer and winter



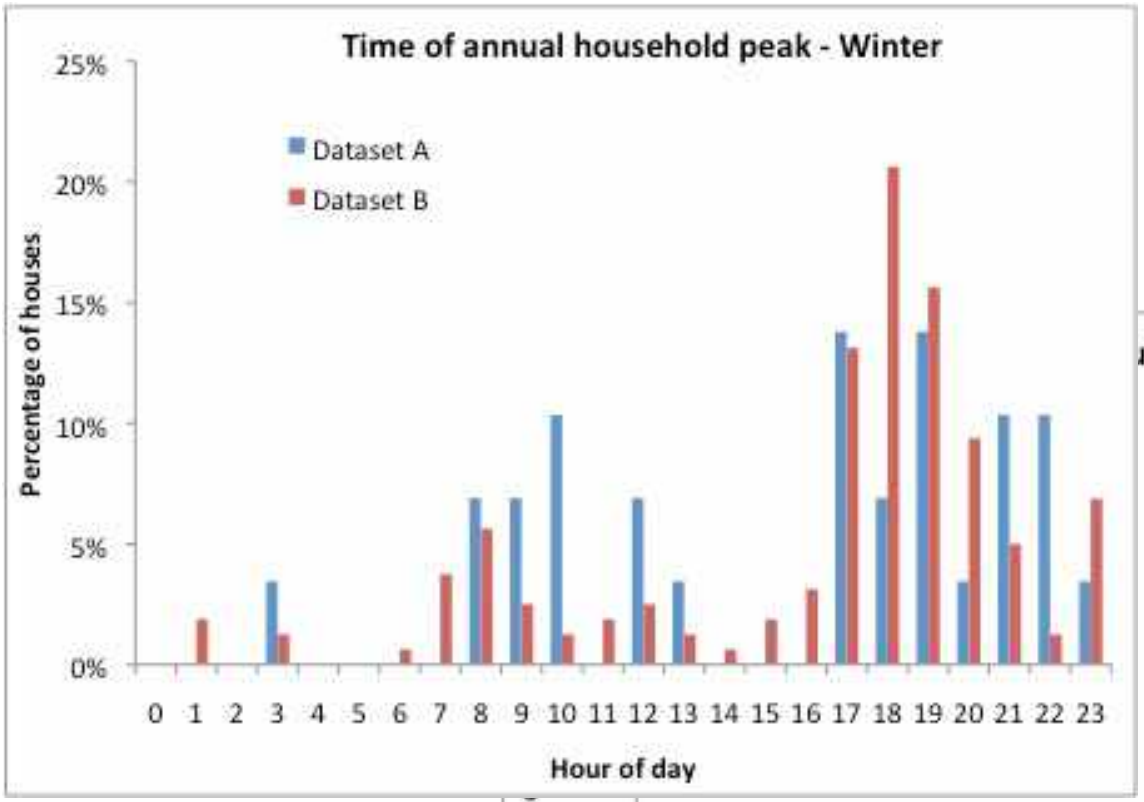
DC applied to coincident demand (all year)



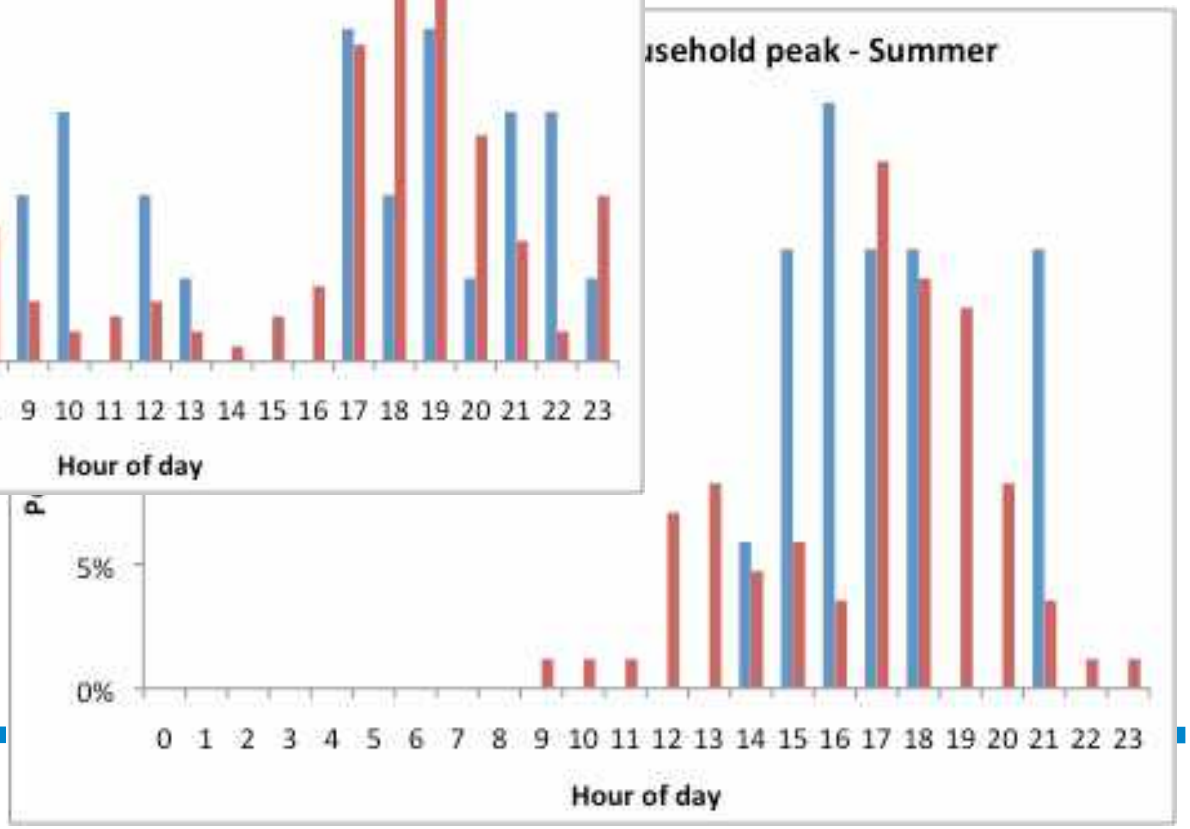
Coincident demand pricing

Problem	In fact ….
Customer won't know when peak is	Customer's own peak can occur at any time of day and all through year. Network peak is much more predictable.
Tariff too complicated	Tariff identical to standard demand charge tariff ie. Charge applied between eg. 4.30 to 7.30 during summer/winter months.
Is ex post (after the fact)	All elec bills are ex post. From customer's point of view is the same. Difference is that the DNSP has to

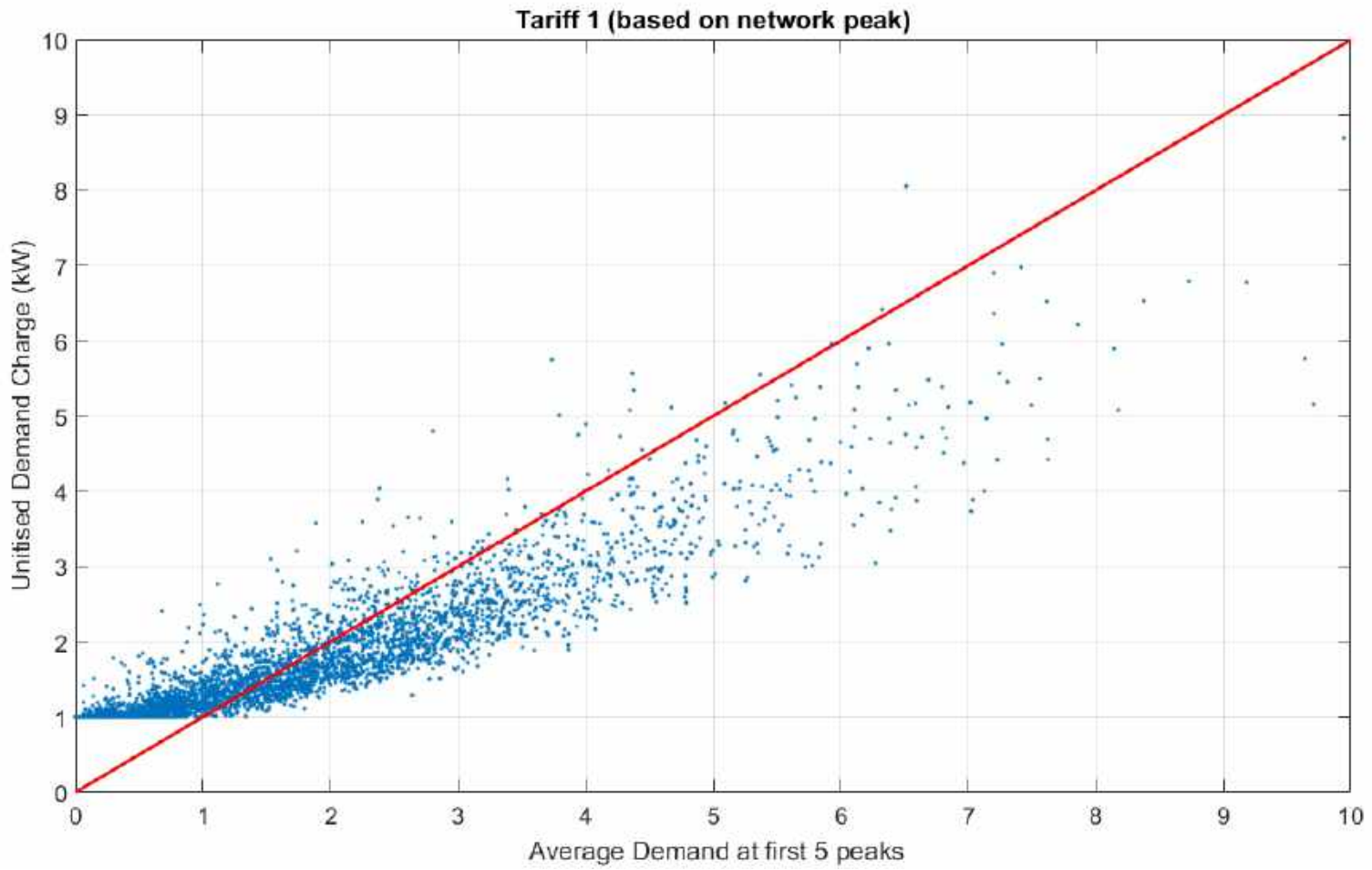
Summer peaks are more aggregated



Both same time and same day



DC applied to coincident demand (all year)



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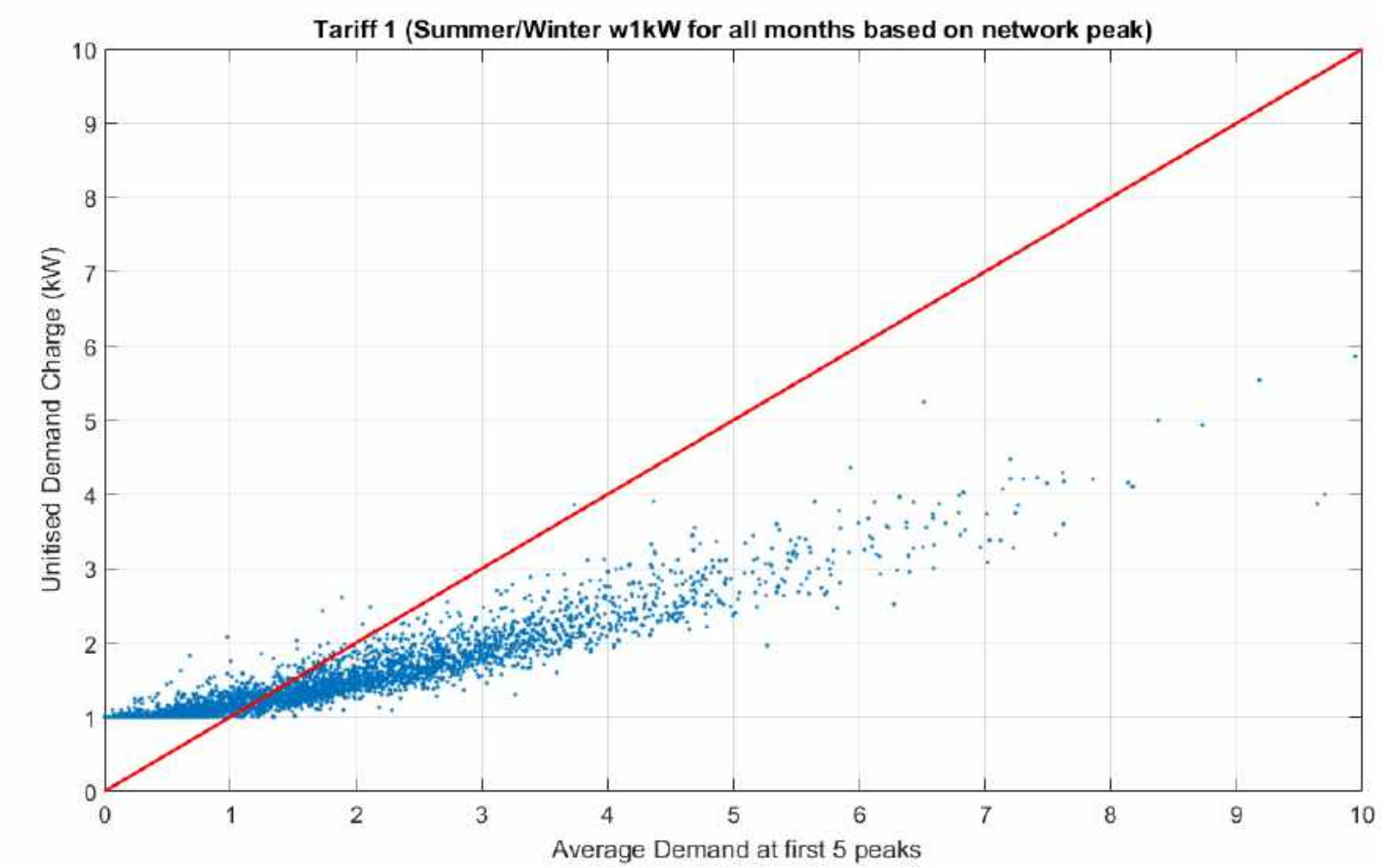
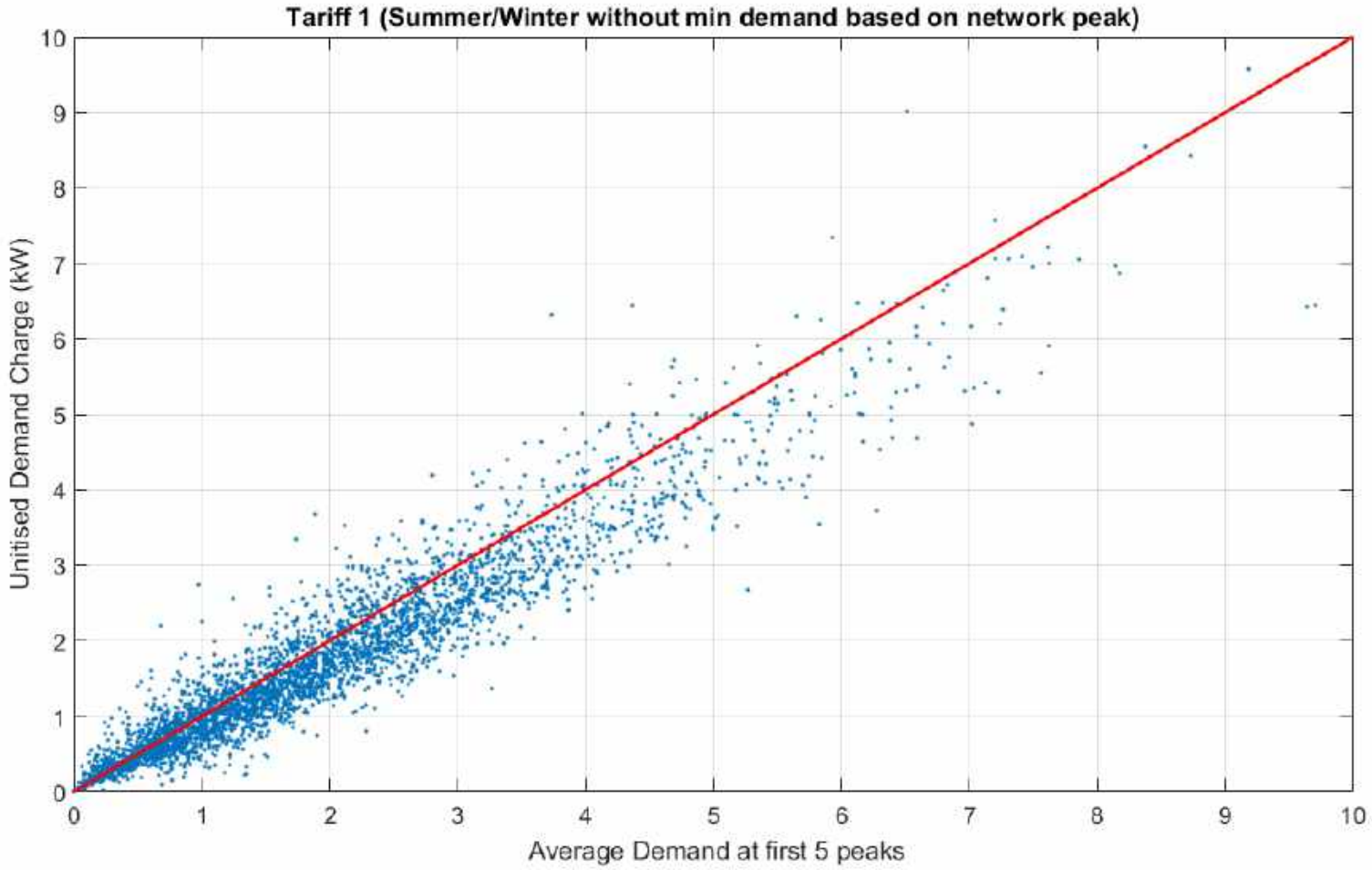
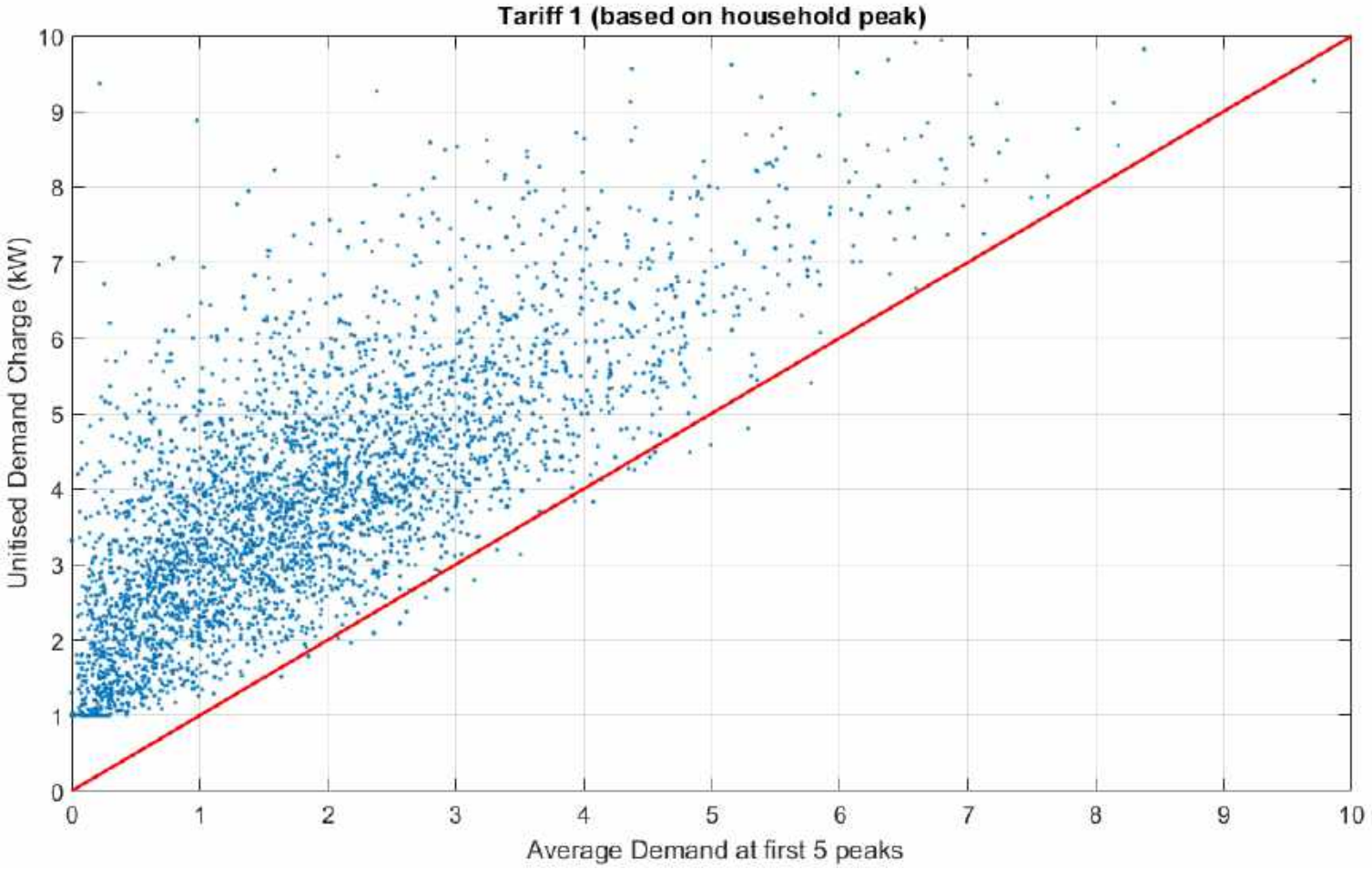
DC applied to coincident dem summer & winter



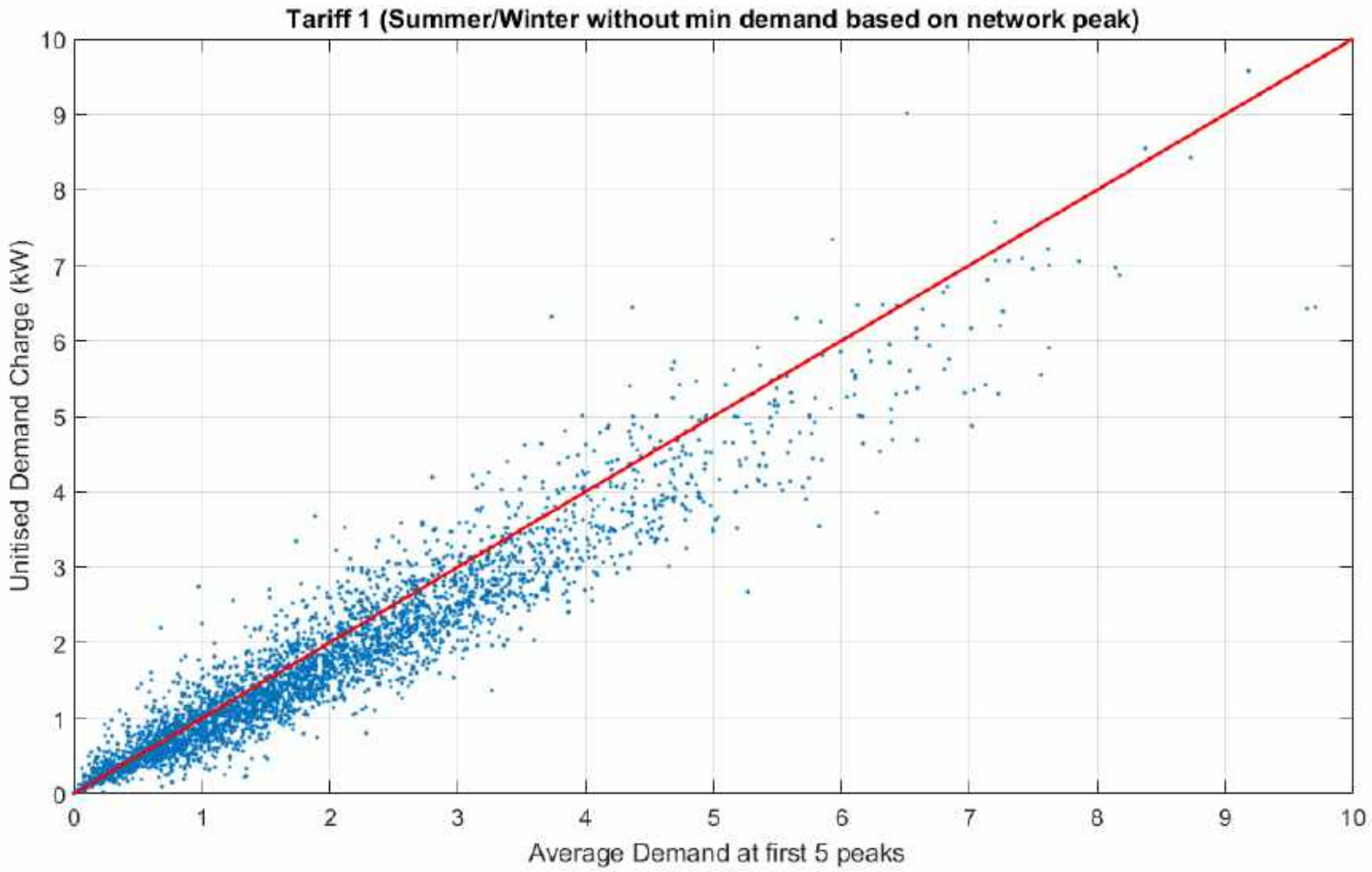
Then no 1kW min charge



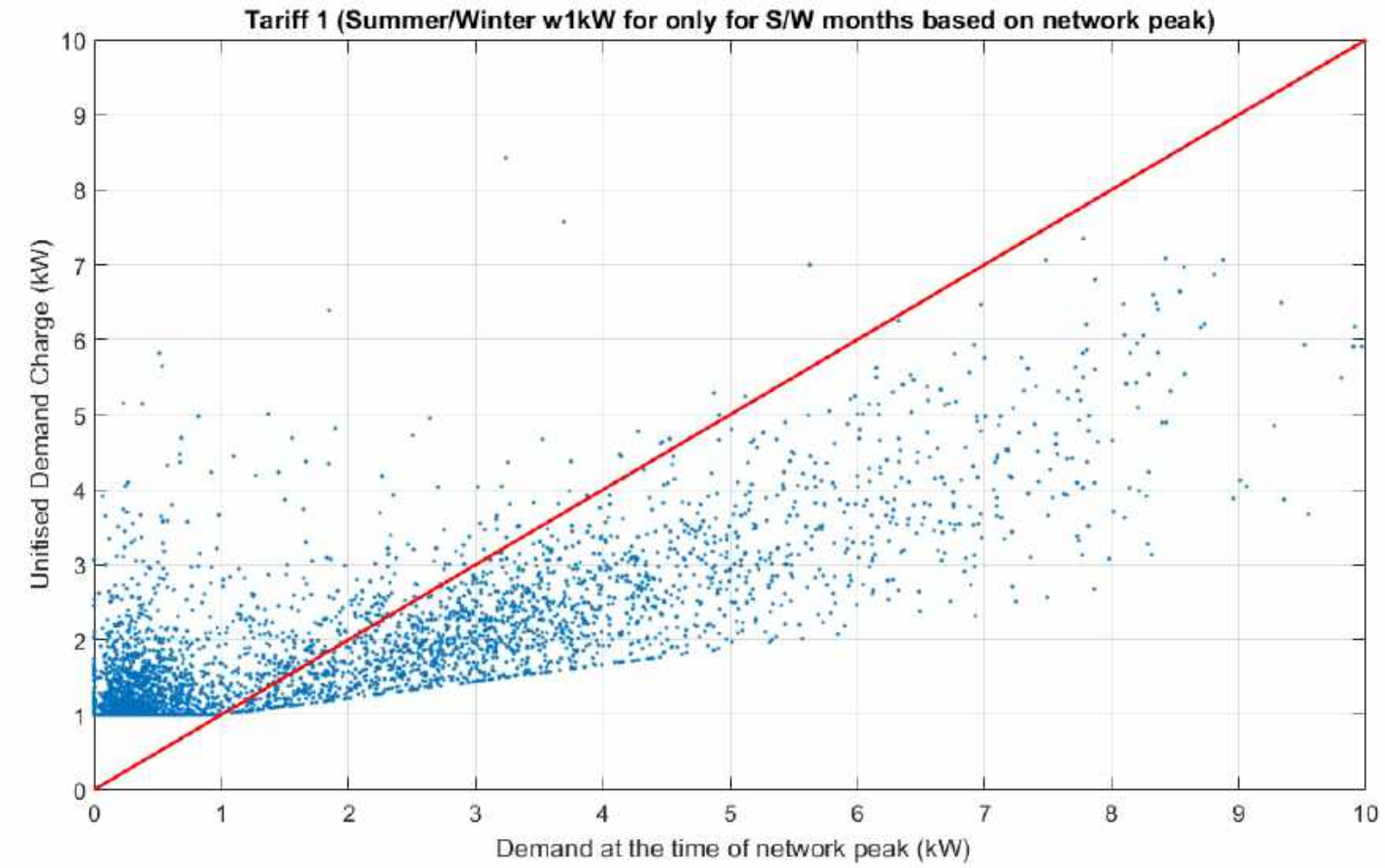
Original SAPN demand charge tariff



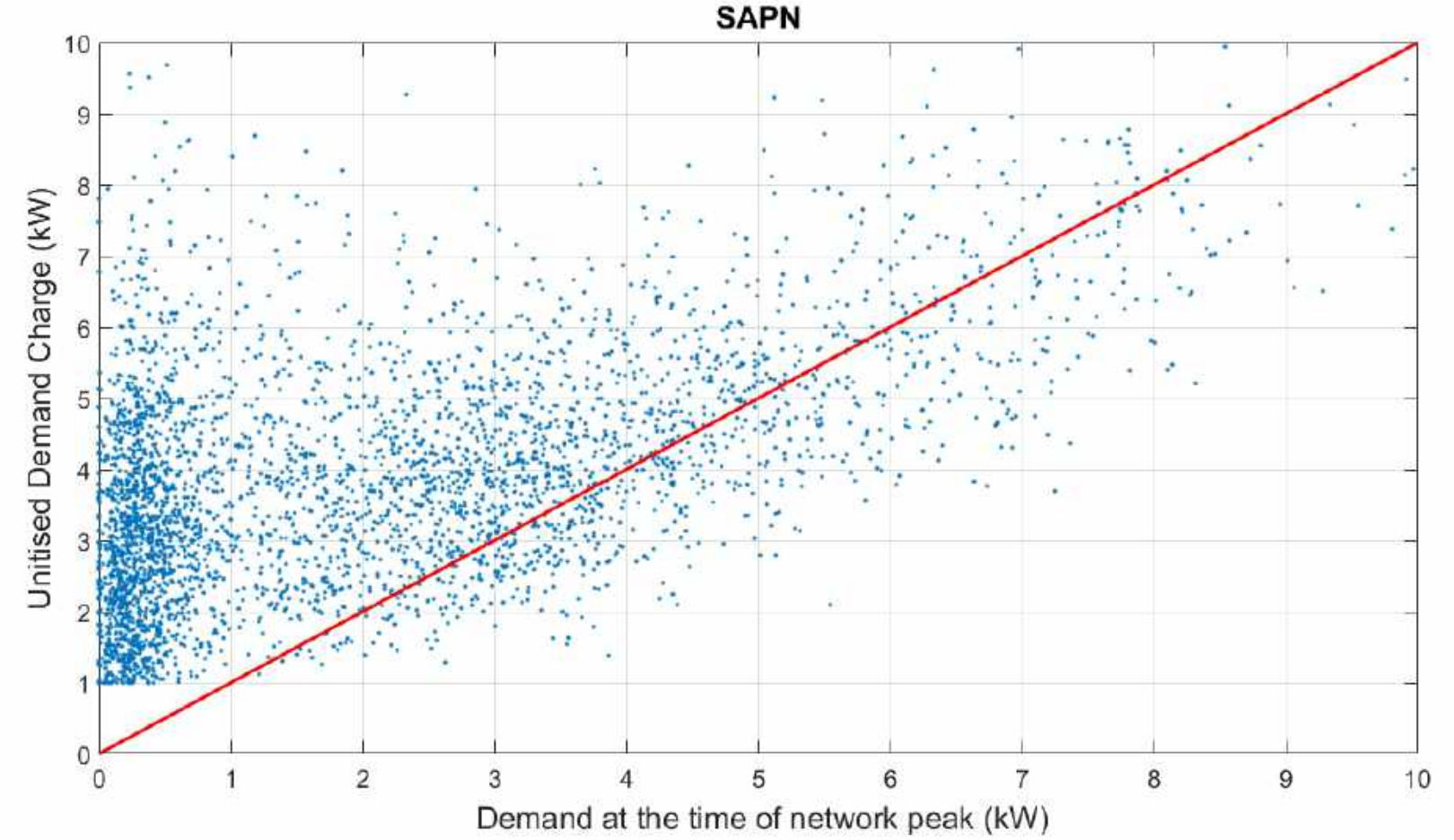
Coincident dem, summer/winter, no 1kW



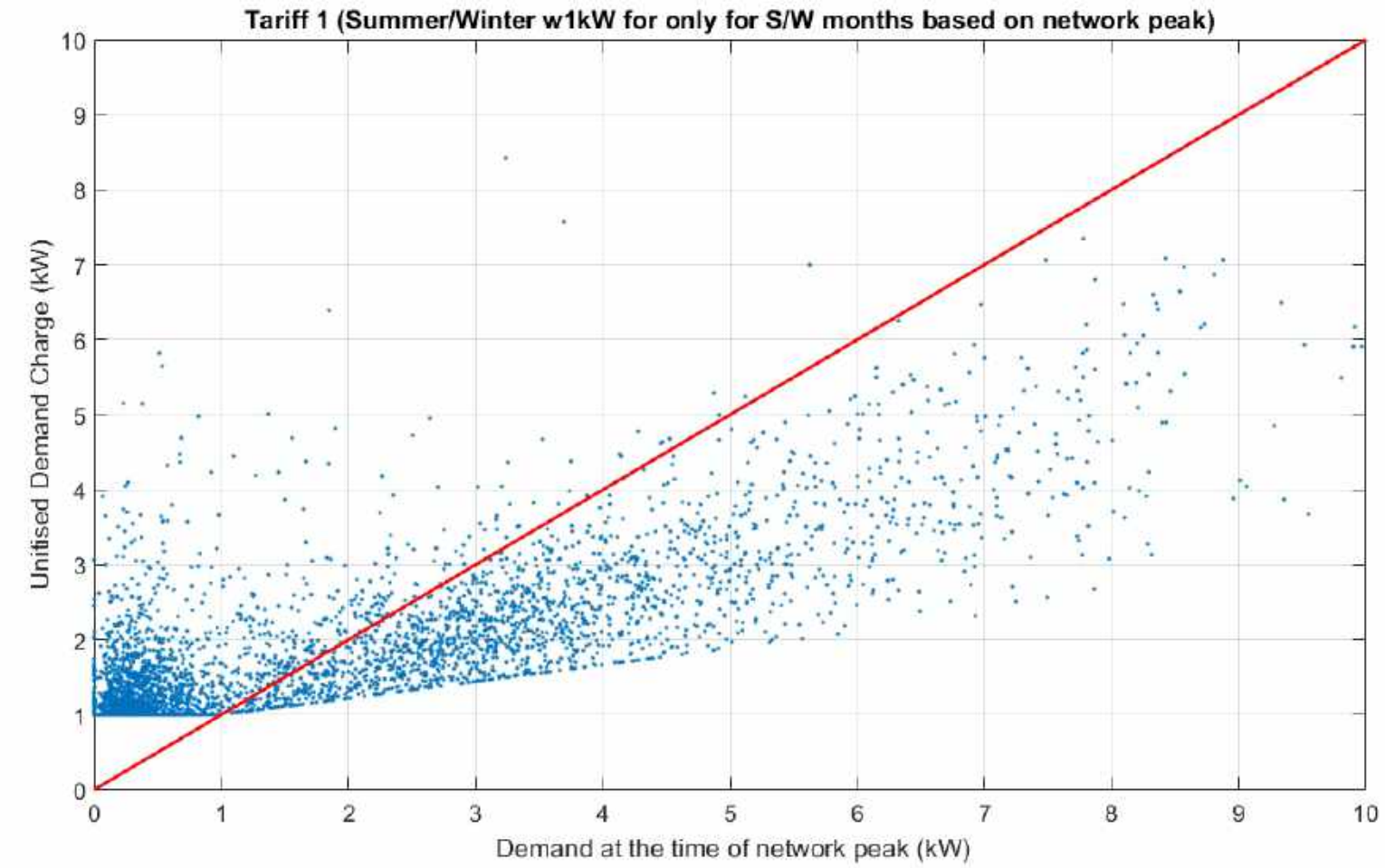
As previous but compared to single peak



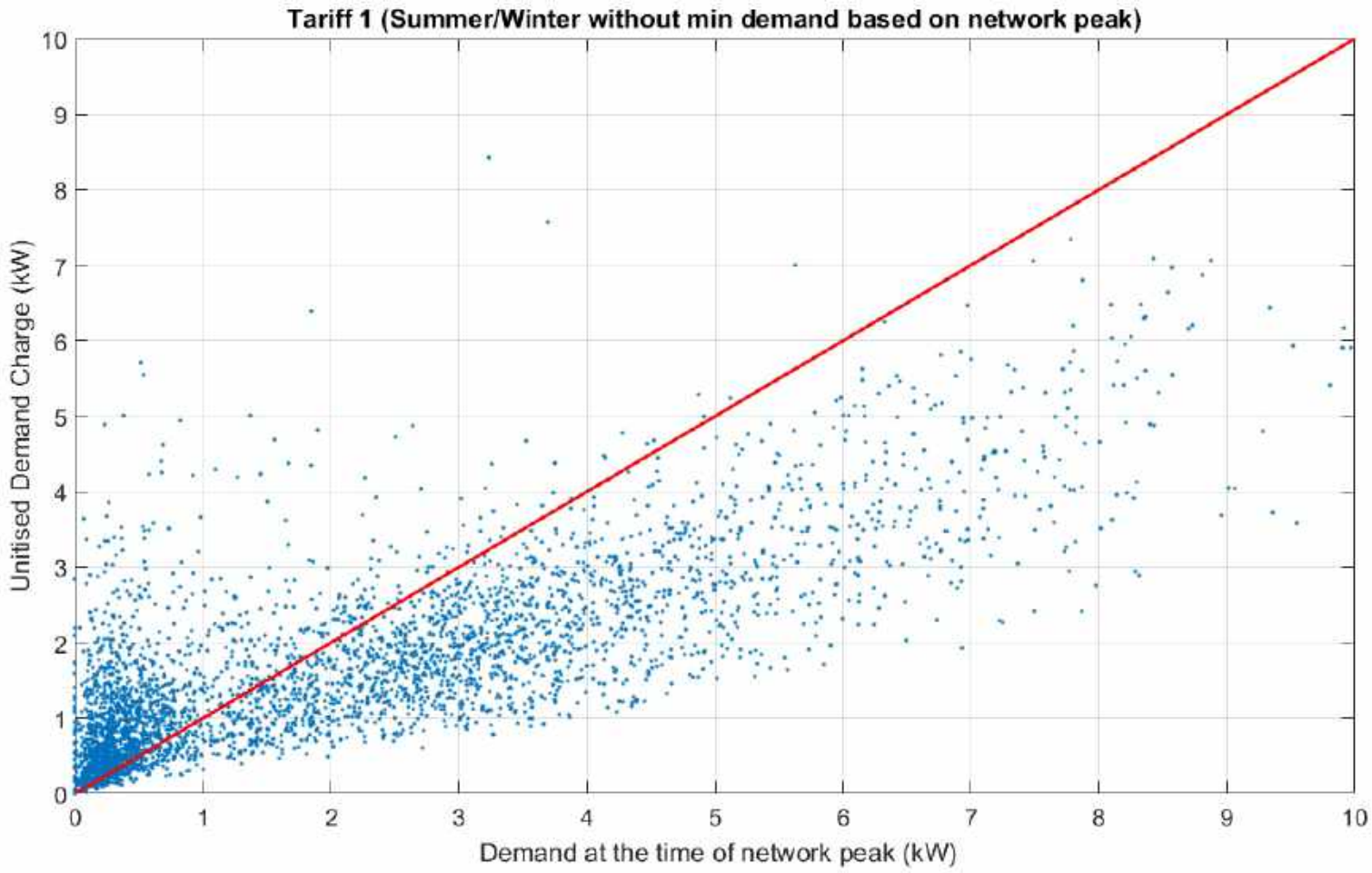
Original SAPN demand charge tariff



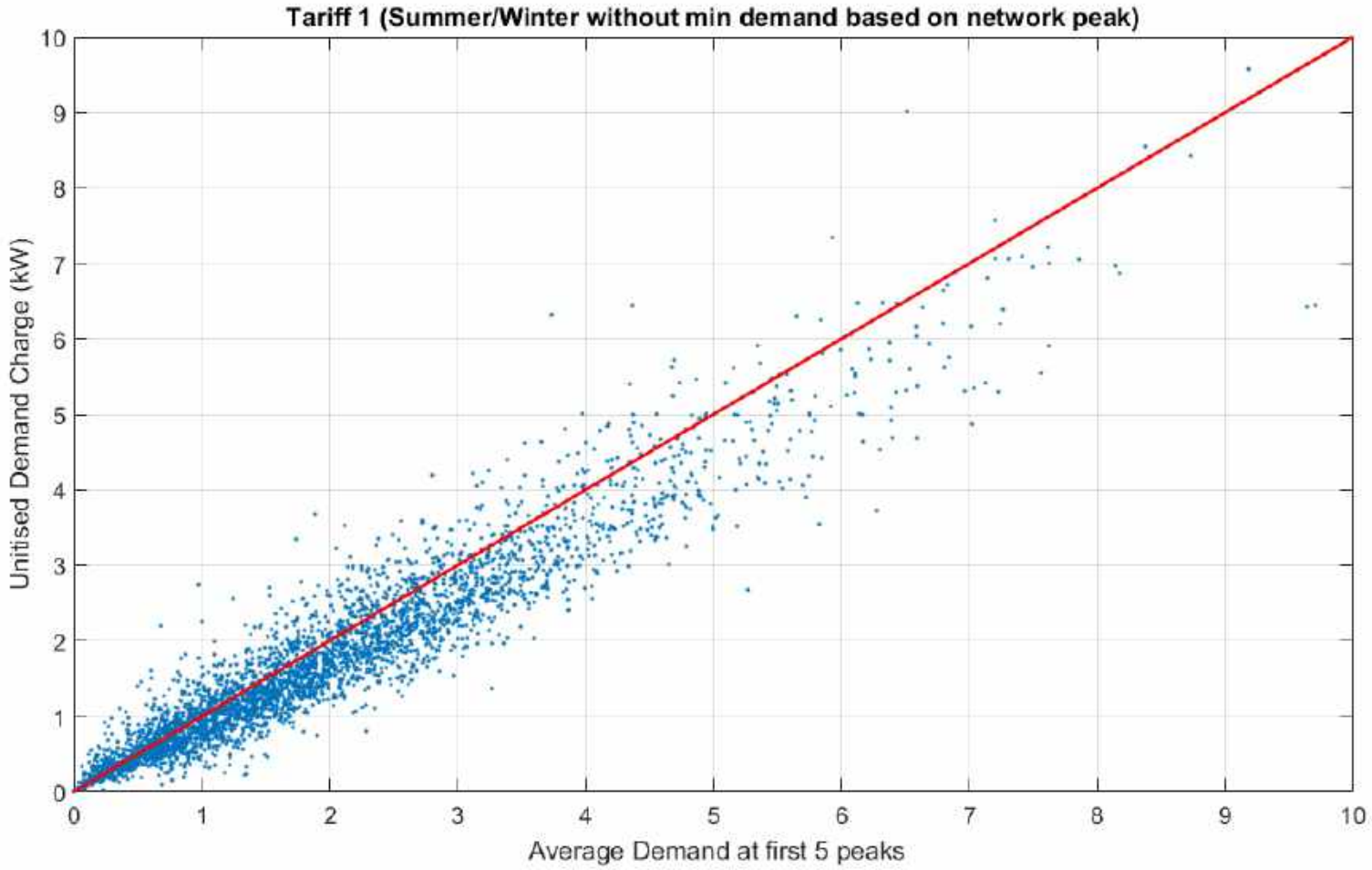
Coincident dem, summer/winter, no 1kW



With 1kW min removed



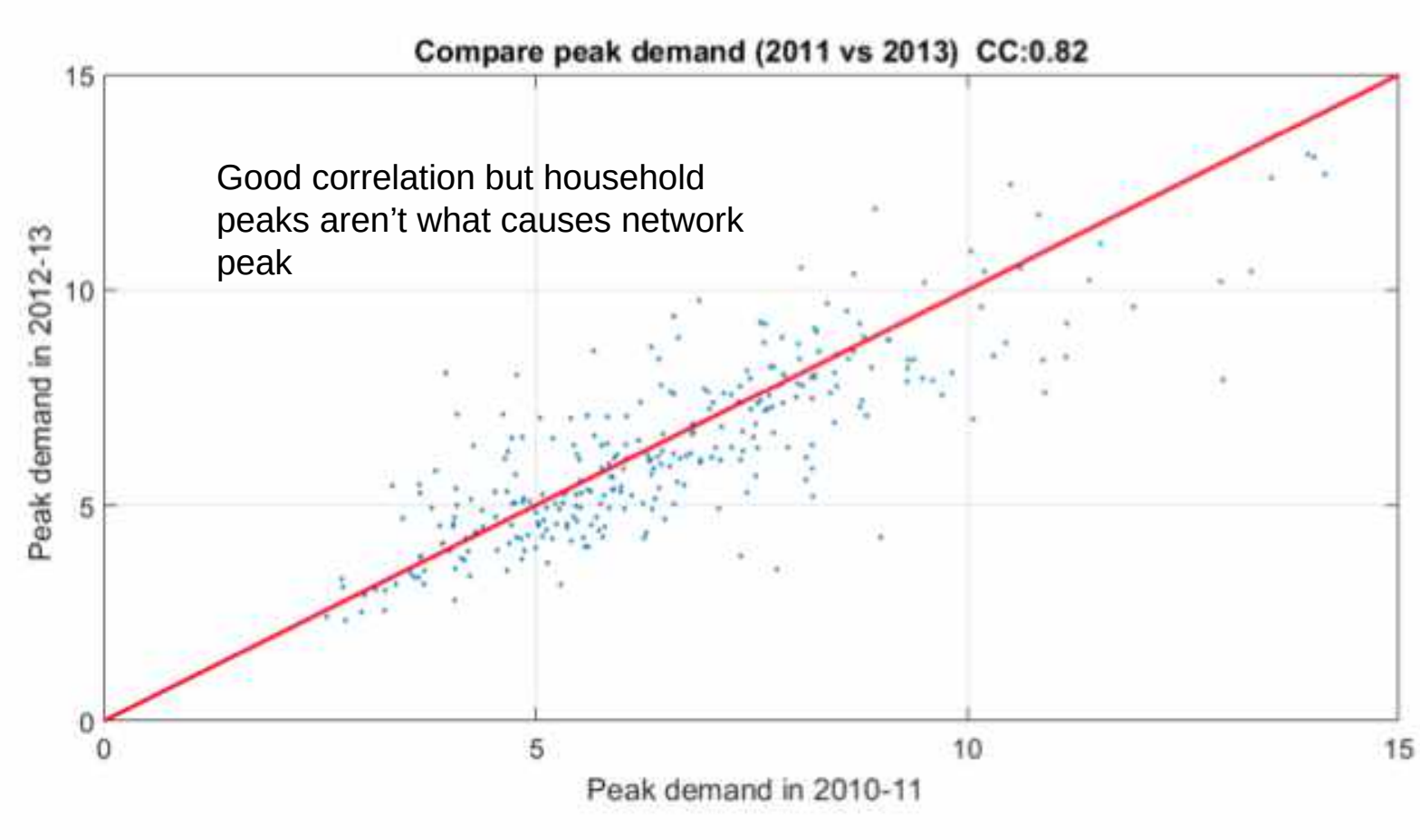
Then no 1kW min charge



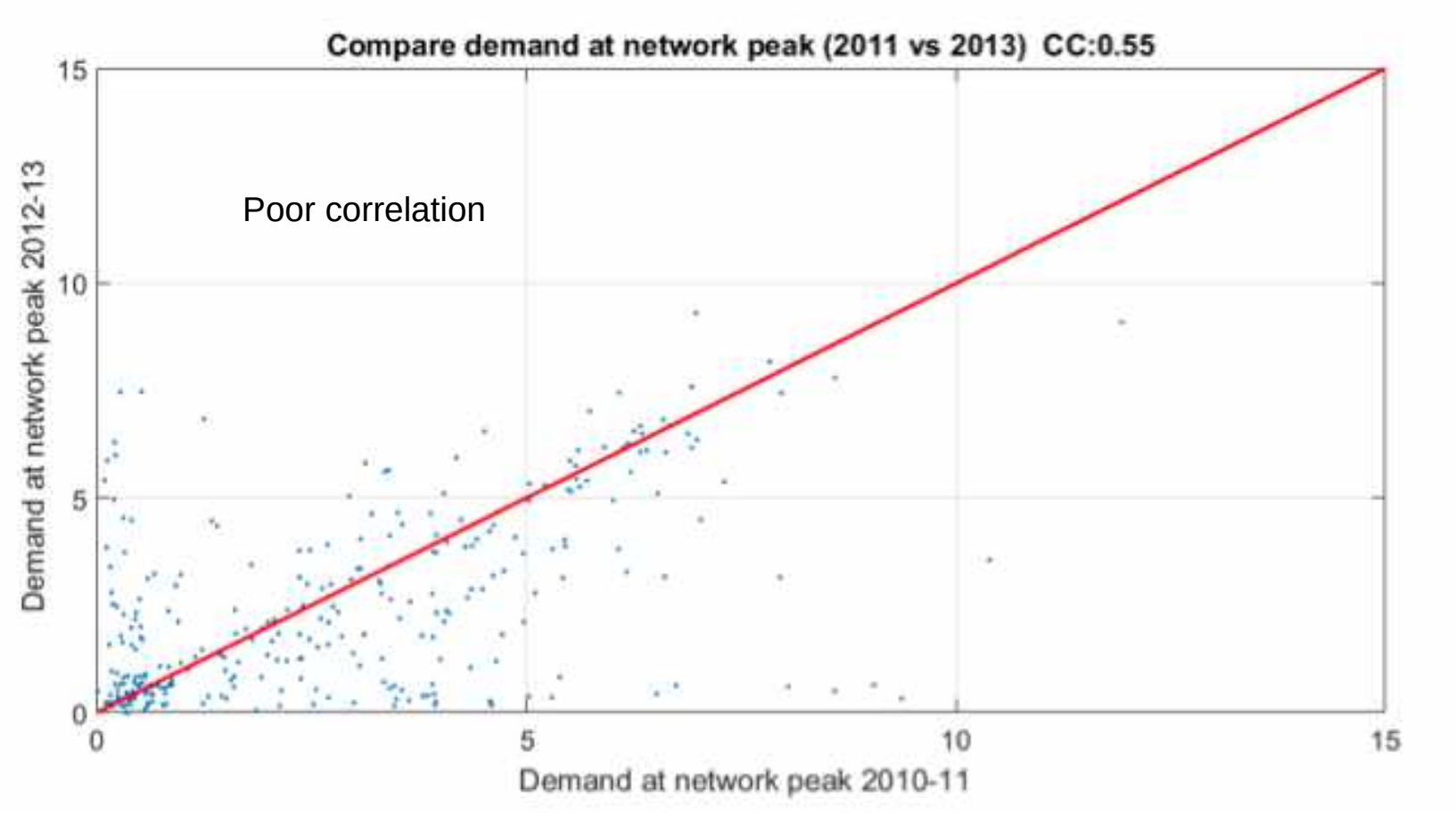
Conclusions

- Demand charges more cost-reflective if applied to coincident demand in summer and winter (for this dataset, but for other datasets the same principle applies)
- Comparisons to the '5 peaks' assumes some demand response
- Approach would work equally well for a rebate-based tariff

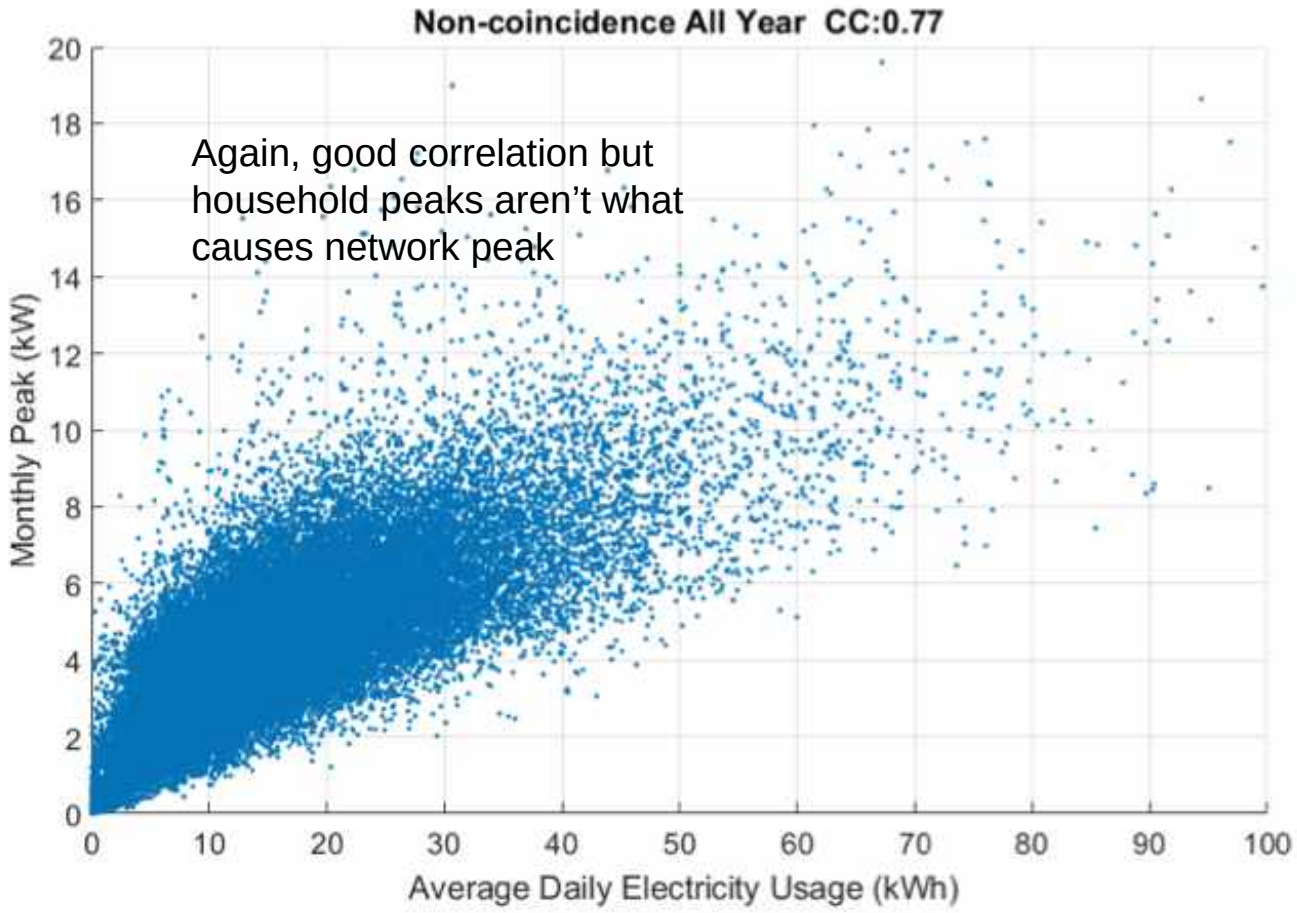
Residual costs ... peak to peak



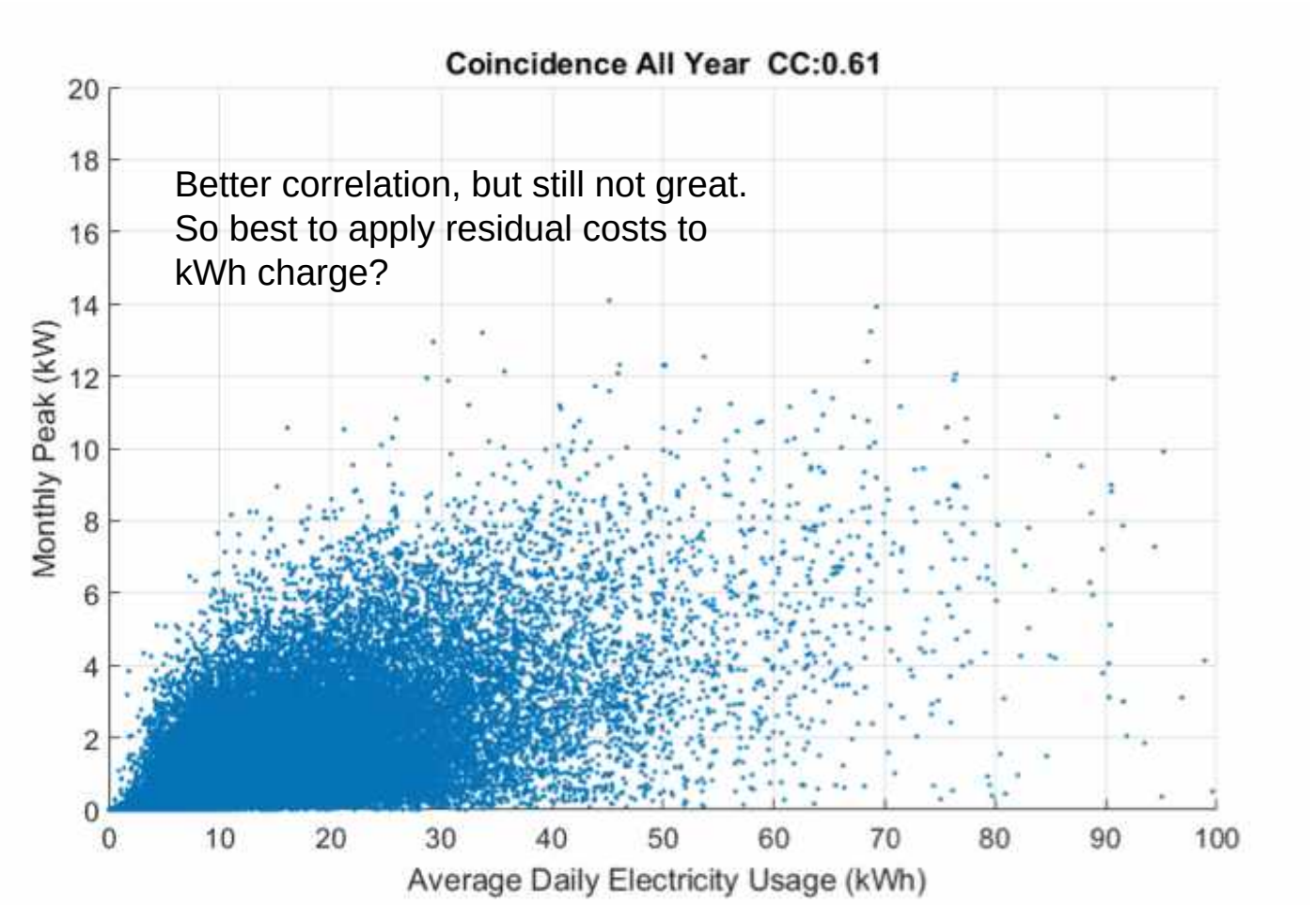
Residual costs … coincident peaks



Residual costs … kWh vs own peaks

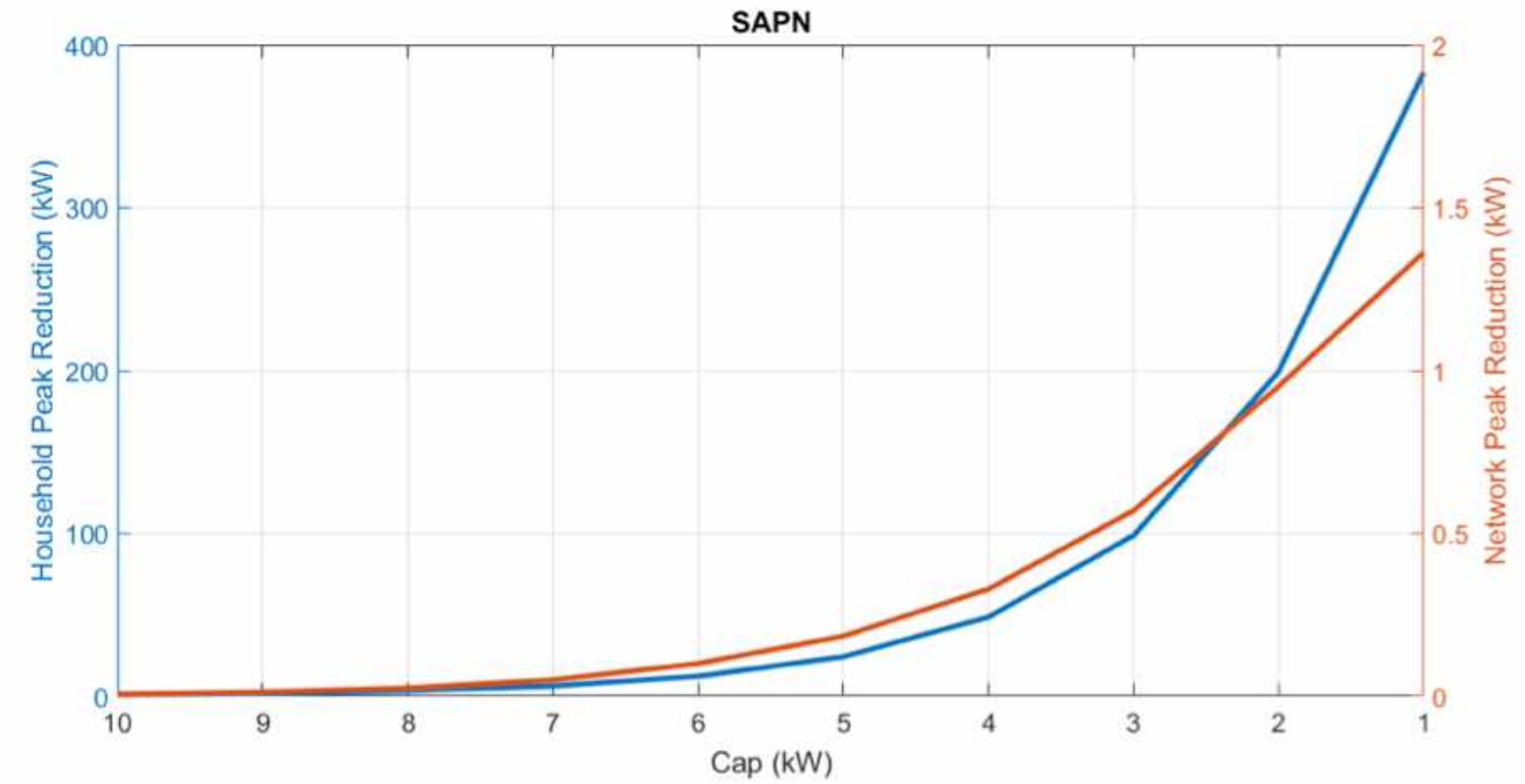


Residual costs … kWh vs coincident peaks

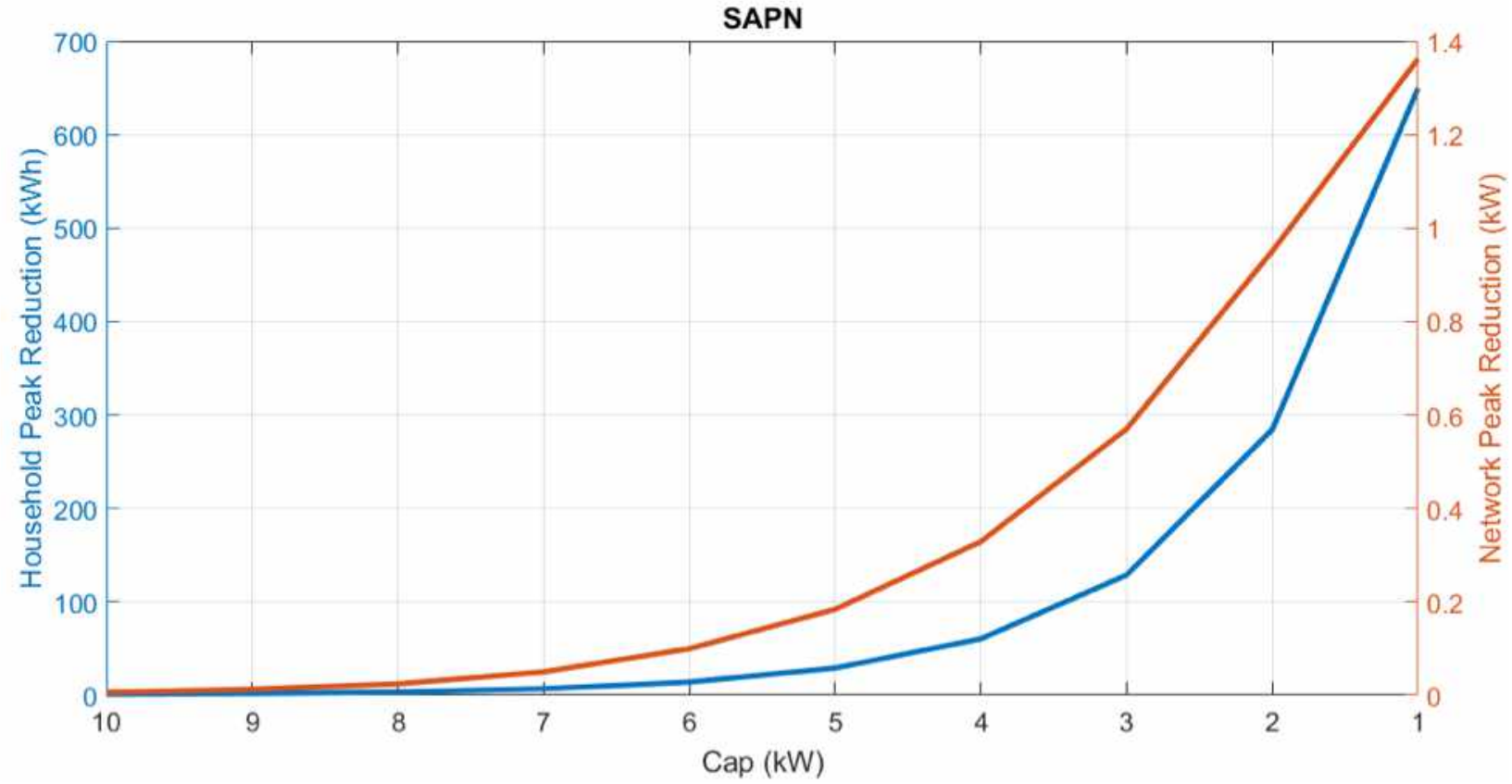



Thank you
Questions?

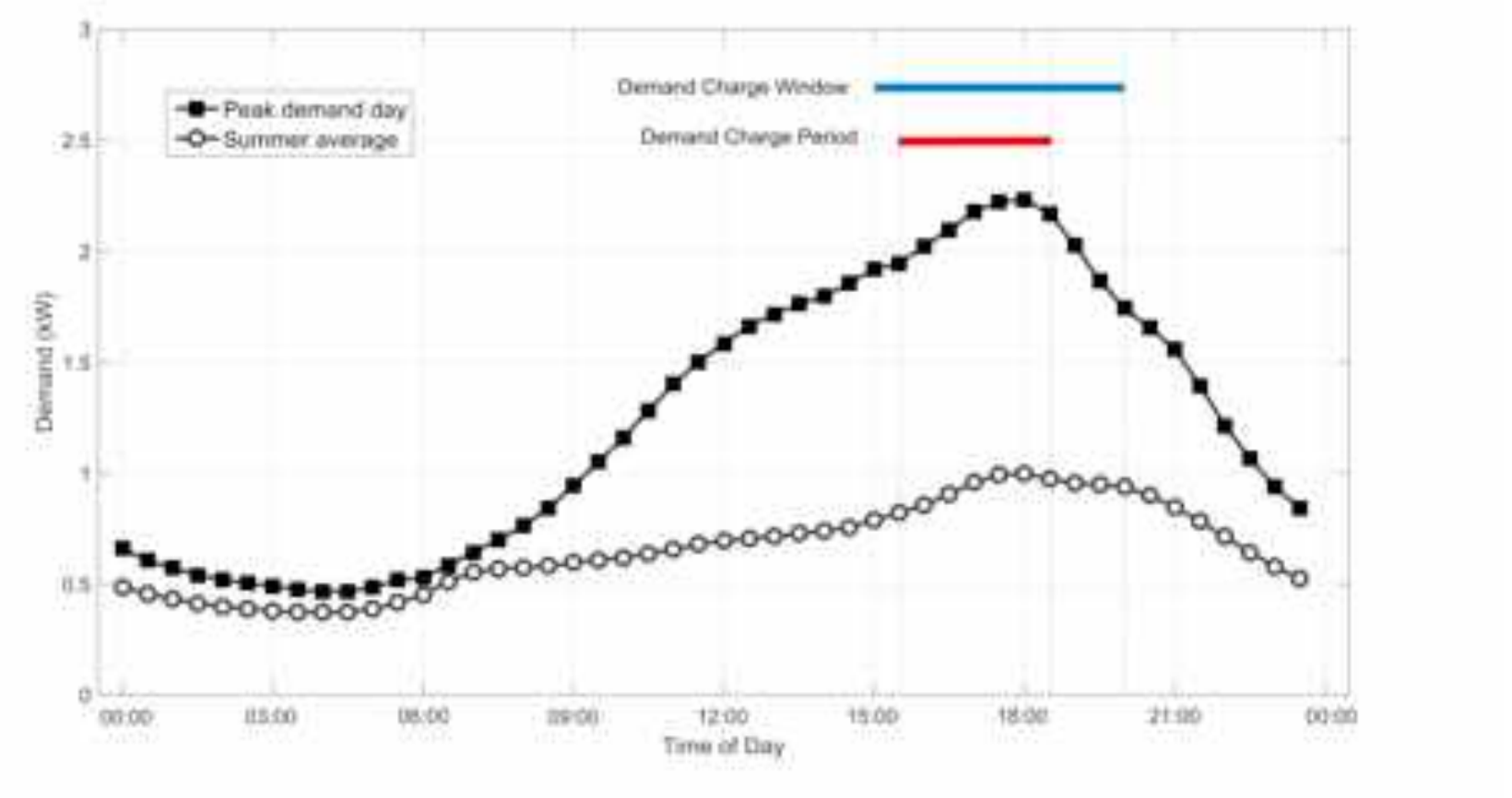
Mismatch - kW


SAPN
Household Peak Reduction (kW)
Network Peak Reduction (kW)
Cap (kW)
400
300
200
100
0
2
1.5
1
0.5
0
10
9
8
7
6
5
4
3
2
1

Mismatch - kWh



Possible demand charge tariff



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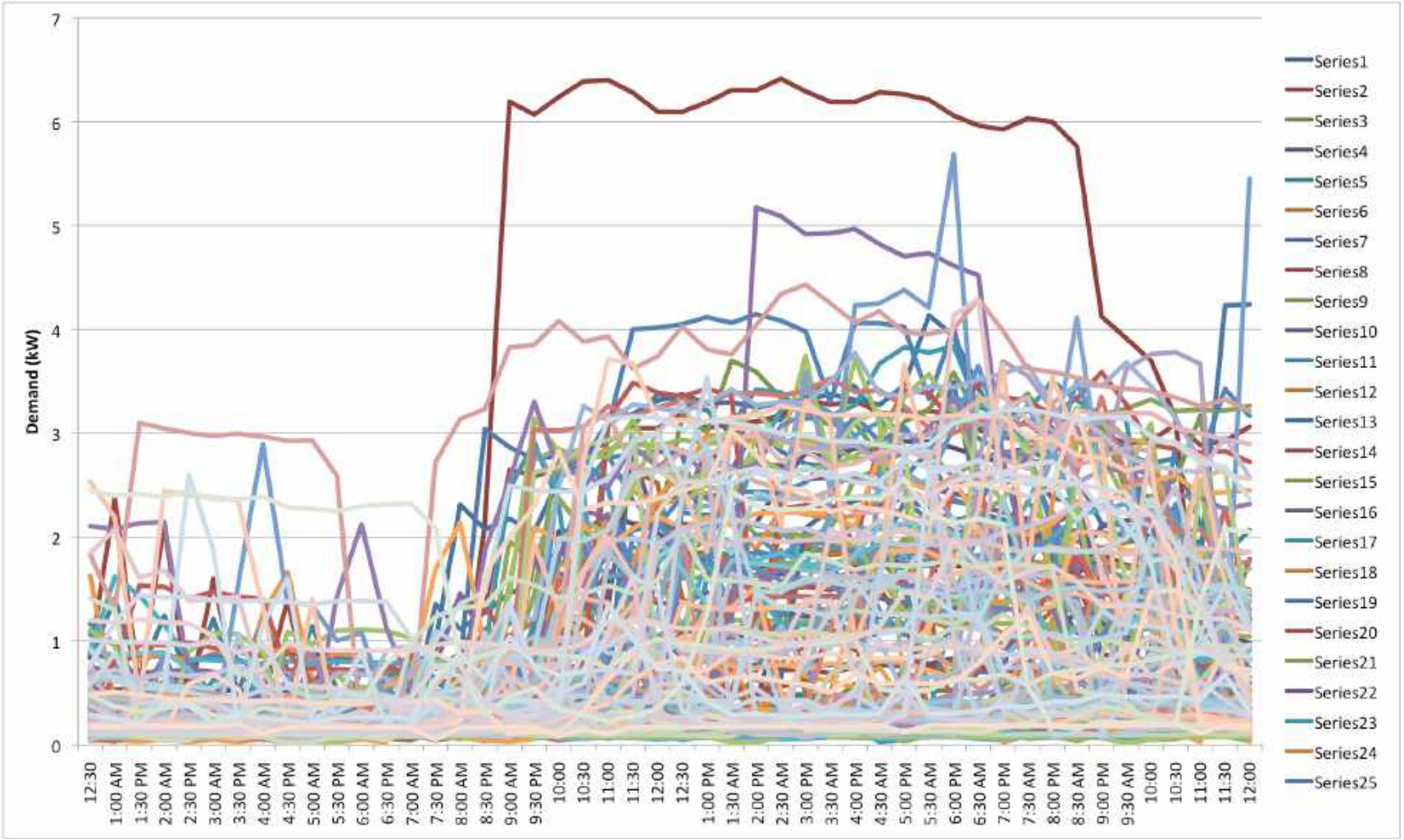
Annual Peak – Separate loads



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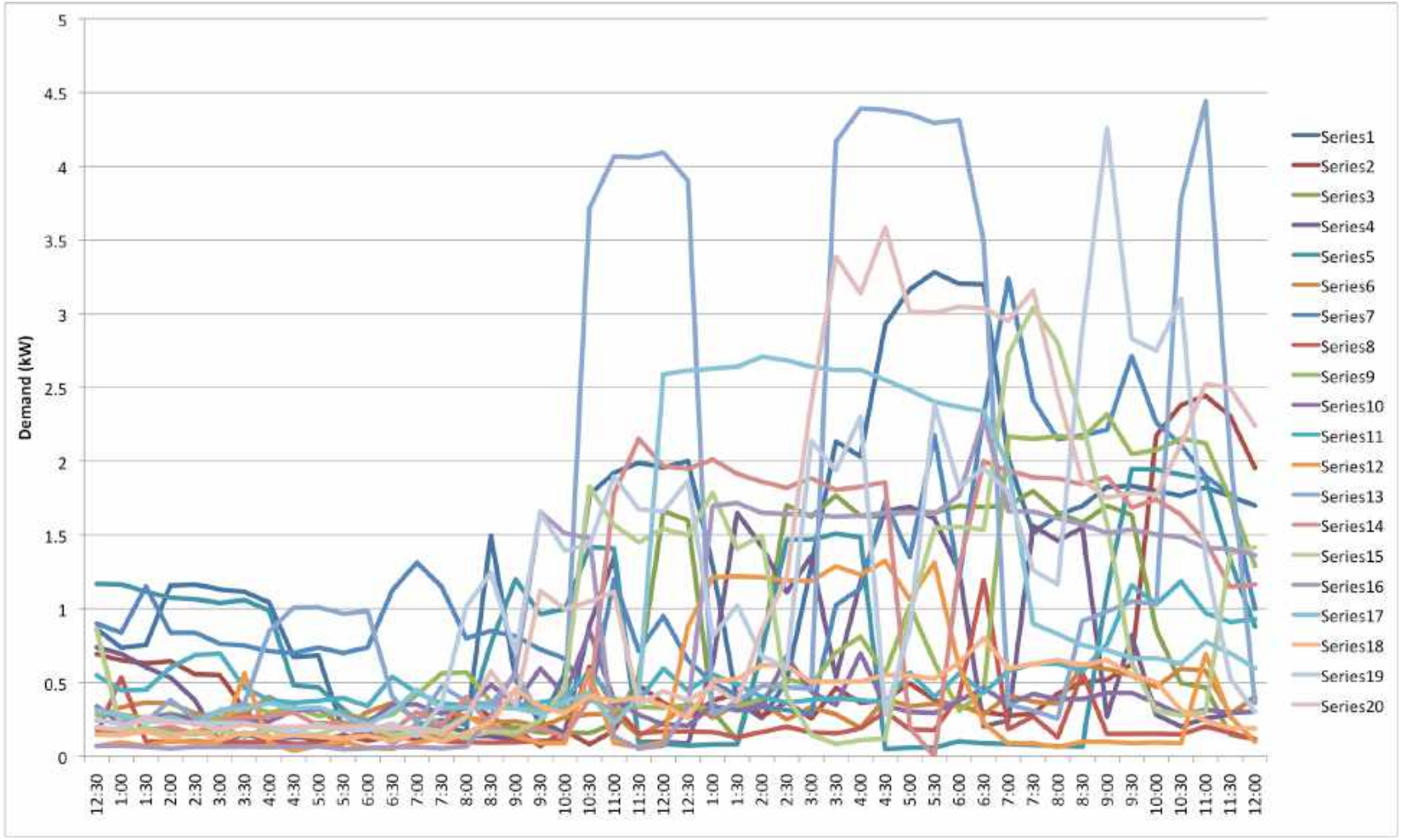
Annual Peak – 20 houses



Summer peak?

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