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Supplementary analysis on the customer impact of cost reflective network pricing

A report for the Australian Energy Market Commission

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Disclaimer

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1. Introduction

The Australian Energy Market Commission (AEMC) has engaged HoustonKemp to provide advice on the potential effect on consumers of moving to more efficient network tariffs. This advice supplements two projects undertaken earlier in the year by NERA economic consulting, which presented case studies that investigated the outcomes for customers arising under a range of different potential tariff scenarios.

This project comprises two tasks, namely:

- **Task 1 –** estimation of the benefits of moving to more efficient tariffs for residential customers with relatively high load factors (ie, relatively 'flat load profiles); and
- **Task 2** – an examination of the potential benefits for business customers that reduce their consumption in response to an introduction of critical peak pricing.

The remainder of this note is structured as follows:

- section 2 presents the results of our analysis for task 1; and
- section 3 presents the results of our analysis for task 2.

2. Effect on customers with flat load profiles

We have been asked to estimate the potential impact of moving to more efficient tariffs for residential customers with relatively high load factors (ie, relatively 'flat load profiles). In practice this has involved:

- examining customer consumption data for the sample of 200 residential customers, as used in the AEMC's network pricing study to identify the 20 per cent of customers with the 'flattest' load profiles;[1] and
- estimating the network charges for each of the customers identified in step 1 under a range of tariff structures, residual cost recovery methods and time spans:
  - the short term where customers do not adjust their consumption patterns;
  - the medium term where customers adjust their consumption in response to price changes.

2.1 Results

The following figures summarise the change in bills for the 20 per cent of customers with the flattest load profiles resulting from moving a more efficient set of tariffs. In particular:

- Figure 1 sets out the change in bills arising from a move to a time-of-use tariff;
- Figure 2 sets out the change in bills arising from a move to a critical peak tariff; and
- Figure 3 sets out the change in bills arising from a move to a capacity tariff.

Each figure comprises a table showing the average result for three different residual cost recovery scenarios, and a scatterplot of bill change for each individual customer. We note that negative values represent bill reductions, and positive values represent bill increases.

[1] Residential customers were selected by dividing each customer's 95th percentile of usage by average usage and then selecting customers with the lowest results.

Figure 1 – Change in bills for customers with flat load profiles (TOU tariffs)

Time frame	Average bill before time of use tariff	100% Supply charge recovery	50:50 Supply/usage Recovery	100% Usage charge recovery
Short term	$2,326	-$98	-$28	$43
Medium term	$2,326	-$82	-$24	$36

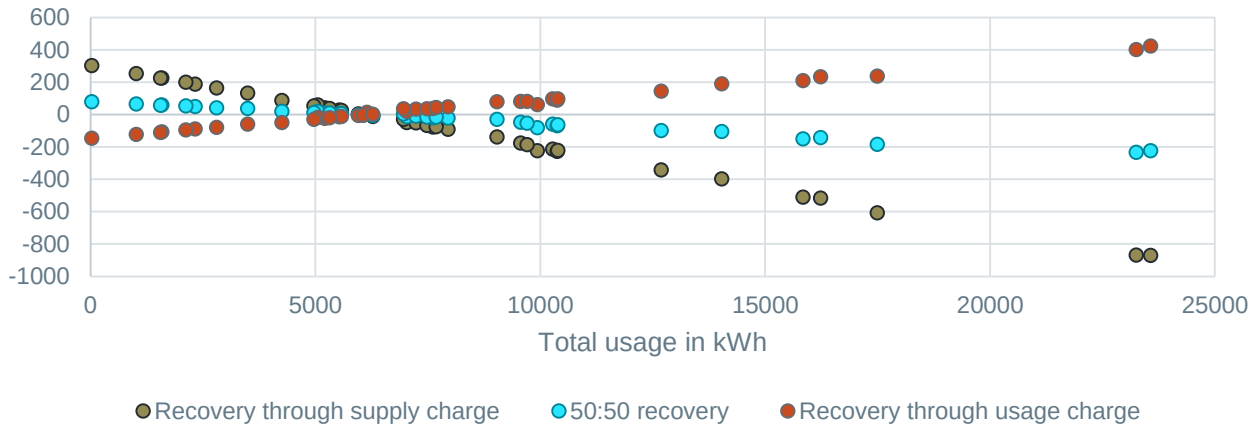


Figure 2 – Change in bills for customers with flat load profiles (critical peak tariff)

Time frame	Average bill before critical peak tariff	100% Supply charge recovery	50:50 Supply/usage Recovery	100% Usage charge recovery
Short term	$2,326	-$142	-$108	-$73
Medium term	$2,326	-$118	-$82	-$46

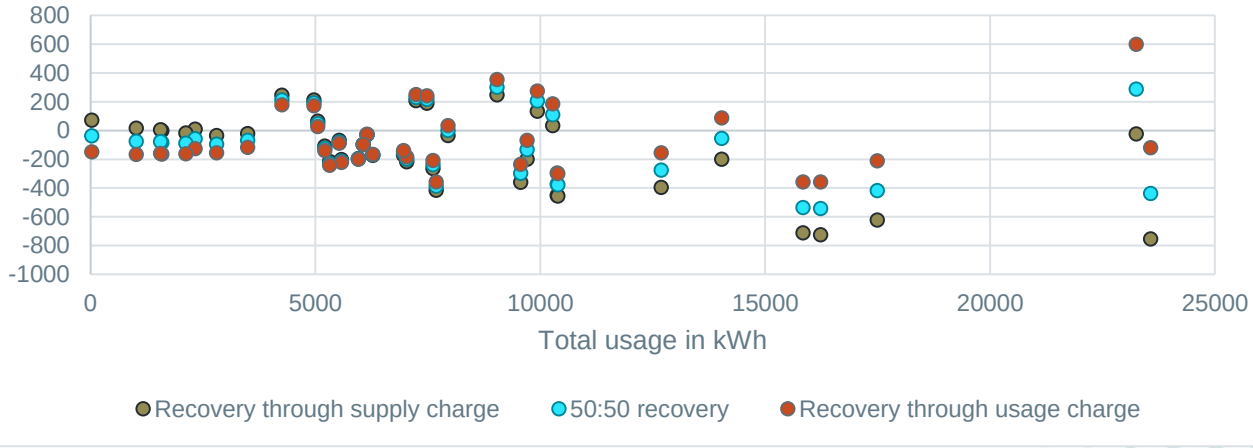
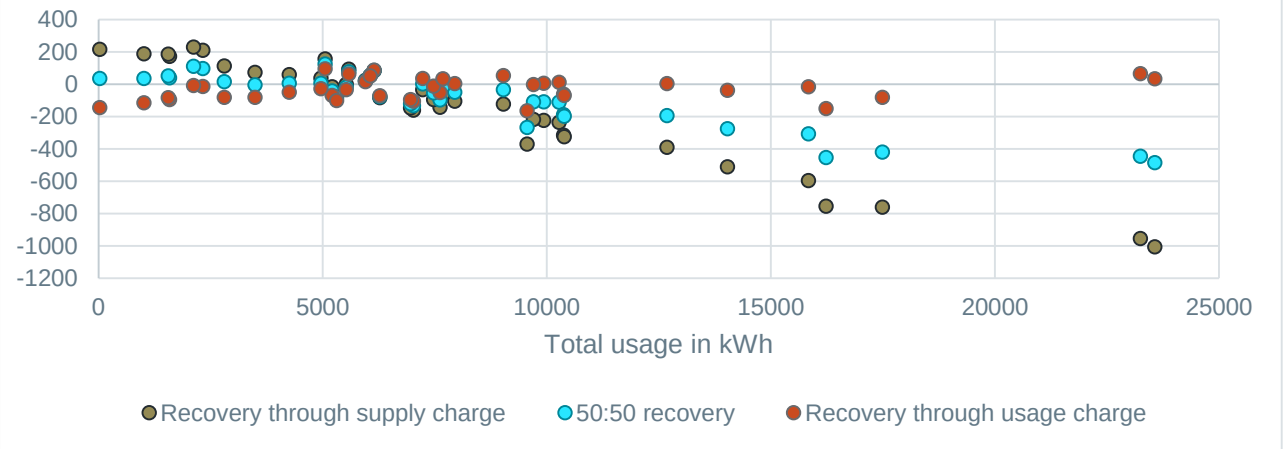


Figure 3 – Change in bills for customers with flat load profiles (peak capacity tariffs)

Time frame	Average bill before peak capacity tariff	100% Supply charge recovery	50:50 Supply/usage Recovery	100% Usage charge recovery
Short term	$2,326	-$145	-$89	-$32
Medium term	$2,326	-$119	-$68	-$15



2.2 Interpretation of results

We observe the following:

- The 20 per cent of residential customers with the flattest load profiles tend to receive significant reductions in network bills as a result of moving to more efficient tariff structures. By way of example, where residual costs are recovered evenly through supply and usage charges, these customers can expect an average reduction of $28 under time of use tariffs, $108 under critical peak tariffs and $89 under capacity tariffs.
- In all cases, benefits are greater in the short term than the medium term, which is attributable to the demand response of all customers. Each tariff provides a price signal during peak times, and so over time all customers tend to exhibit 'flatter' load profiles. Customers with the flatter load profiles have lower consumption at peak times, and so benefit less from this effect.
- There are clear relationships between total usage and benefit for each method of residual cost recovery, as is evident from the three scatterplots. In particular:
  - customers with lower usage receive the greatest benefits when residual costs are recovered through usage charges; and
  - customers with high usage benefit when residual cost is recovered through supply charges, because each unit of usage attracts a lower charge.

3. Benefits for businesses from critical peak pricing

We have been asked to estimate the potential benefits of moving critical peak tariffs for commercial customers, incorporating a demand response to critical peak pricing. This has involved:

- liaising with Ausnet Services to identify the responsiveness of business customers to the introduction of critical peak pricing, ie, the change in the profile of consumption effected by the shift to critical peak pricing for business customers; and
- estimating the change in network charges arising from the introduction of critical peak pricing for customers in the sample of commercial customers collected for the AEMC's earlier network pricing study, assuming a percentage customer response similar to the outcomes in Ausnet Services' network

The following sections examine the results of this analysis over both the short and medium term. The short term analysis examines the effect on customer bills assuming no demand response. In contrast, the medium term analysis incorporates the expected demand response and the network benefits of reduction of usage during peak periods.

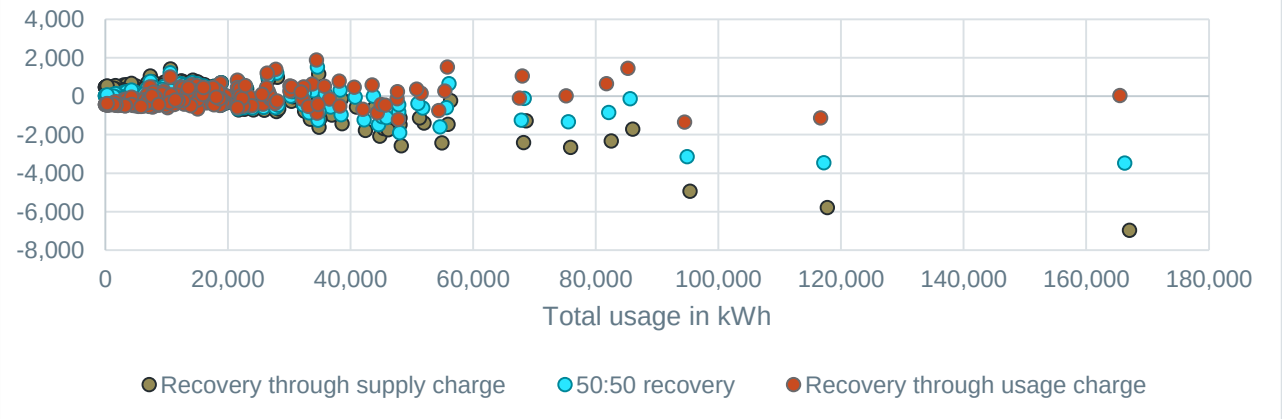
3.1 Short term

Our short term analysis assumes no demand response to critical peak tariff price signals, and so average bills do not change because the total revenue that the distributor must recover remains unchanged. The results of this analysis establish a 'base case' against which we can compare medium term outcomes.

Figure 4 presents the proportion of customers that have lower and higher bills for each residual cost recovery method, as well as a scatterplot showing the change in bills for each customer.

Figure 4 – Change in bill for commercial customers under critical peak tariffs (short term)

	100% Supply Charge Recovery	50:50 Supply/Usage Recovery	100% Usage Charge Recovery
% of customers with higher bill	69%	52%	39%
% of customers with lower bill	31%	48%	61%



3.2 Medium term

Our medium term analysis incorporates the additional elements of:

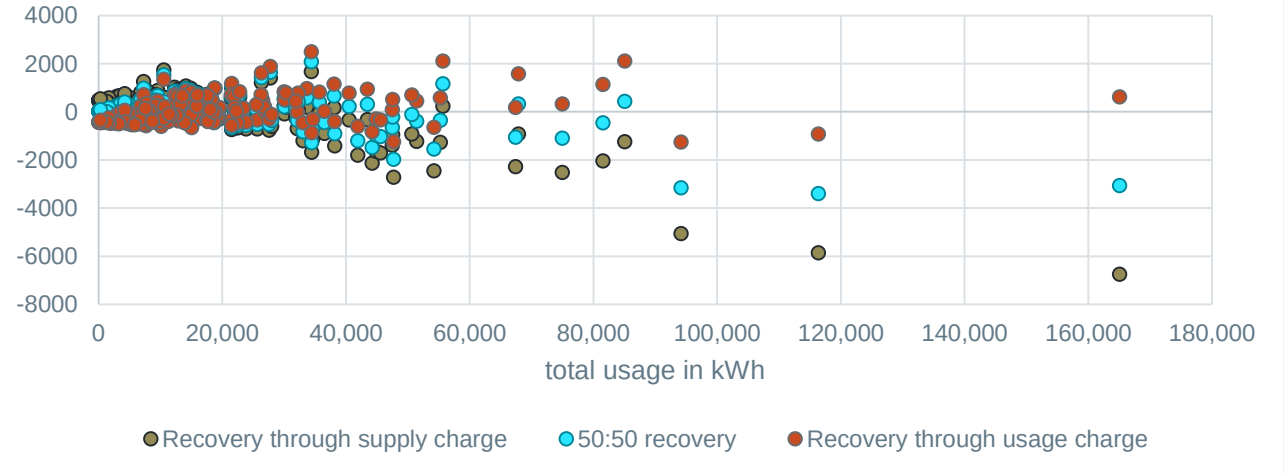
- a customer demand response to the price signal provided by the critical peak tariff; and
- the network benefits of demand response in terms of reduced network expenditure.

We have assumed a uniform level of responsiveness to the critical peak tariff of 13 per cent, in line with outcomes for small commercial entities in Ausnet services distribution area. We note that this is a simplifying assumption – in reality customers will exhibit different levels of responsiveness depending on their characteristics and their appetite to invest in demand response technologies. Figure 5 presents the results of our analysis.

It is important to note that the critical peak component only recovers the LRMC element of the network charge, and that residual costs are recovered via an energy charge and a fixed charge. The bill reductions are therefore influenced by the assumed level of LRMC. Were LRMC to be higher, the resulting bill reductions would be correspondingly higher as well.

Figure 5 – Change in bill for commercial customers under critical peak tariffs (medium term)

	100% Supply Charge Recovery	50:50 Supply/Usage Recovery	100% Usage Charge Recovery
Average bill before critical peak tariff	$6,229	$6,229	$6,229
Average change in bill	-$79	-$101	-$121
% with higher bill	33%	54%	65.5%
% with lower bill	67%	46%	34.5%



3.3 Bill changes with decreasing peak usage

We have explained that we have assumed a uniform level of customer responsiveness, and that this is a simplifying assumption. A relevant question is the potential for an individual customer to reduce their peak consumption, and so their bill.

Figure 6 sets out the average bill changes for a business customer that decreases their peak consumption (eg, by 10 per cent, 20 per cent etc.). Our results are based on 50:50 recovery of residual costs from supply and usage charges. To demonstrate the relationship between LRMC and the change in bills, we have included three alternative estimates of LRMC, ie, $100, $250 and $350 per kW per annum.

Figure 6 – Average bill changes with decreasing peak usage

Decrease in Peak Consumption	Average Change with $100 LRMC	Average Change with Original $160 LRMC	Average Change with $250 LRMC	Average Change with $350 LRMC
10%	0%	0%	-4%	-10%
20%	0%	0%	-6%	-13%
30%	0%	-2%	-8%	-15%
40%	0%	-3%	-10%	-18%
50%	0%	-4%	-12%	-21%
60%	0%	-5%	-14%	-23%
70%	0%	-6%	-16%	-26%
80%	-1%	-8%	-18%	-29%
90%	-2%	-9%	-19%	-31%
100%	-3%	-10%	-21%	-34%

3.4 Interpretation of results

The results of our analysis illustrate that:

- Over the medium term, a shift to critical peak pricing will lead to decreases in average customer bills through reduced network expenditure. AusNet's experience demonstrates that the price signal provided by critical peak pricing can sufficiently reduce peak consumption (ie, by an average of 13 per cent for commercial customers) leading to substantial reductions in network expenditure.
- In the short term, critical peak pricing is most advantageous for customers that can best reduce their consumption during peak times. Commercial customers who decrease their peak usage in response to critical peak tariffs have the potential to reduce their bills by between 3 and 34 per cent, depending on the prevailing level of LRMC.
- AusNet's experience shows an average of a 13 per cent reduction in critical peak usage for smaller commercial customers, but individual customers may be able to achieve significantly greater reductions. For example, of the 1800 customers on AusNet's critical peak pricing:
  - 66 per cent showed regular demand responses;
  - 300 reduced demand by more than 50 per cent; and
  - 75 customers reduced demand by more than 75 per cent.

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