26 August 2011

John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear John,

Review into Demand Side Participation in the National Electricity Market

SP AusNet welcomes the opportunity to make this submission in response to the AEMC's Issues Paper, which commences Stage 3 of the AEMC's review of Demand Side Participation (DSP) in the NEM.

SP AusNet reiterates its support for DSP solutions, where these provide the most efficient means of meeting consumers' energy service needs. Increasingly, there is an overwhelming community acceptance that energy must be produced and consumed more efficiently. SP AusNet believes that the current DSP review must be seen in the wider context of environmental concerns generally, and energy usage in particular. It is essential that the regulatory arrangements support DSP and do not provide impediments to its adoption.

SP AusNet response has focused on areas where it can provide the AEMC with hard data, real world experience or specific expertise. Therefore, the submission provides detailed commentary on:

- The design and introduction of network time of use tariffs;
- Technical knowledge of DSP solutions; and
- Improvements to the regulatory regime, particularly drawing on overseas experience.

SP AusNet key conclusions in these areas are summarized below.

Price Signals

SP AusNet considers that on the fundamental issue of whether price signals are the most effective facilitator of DSP, the evidence clearly shows that consumers are able and willing to respond. This suggests improvements to the Rules that enhance cost reflective price signals would itself dramatically improve DSP in the NEM.

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Technology change

The introduction of new technological capability does provide challenges to the existing regime including dealing with:

- System interoperability (ie different market participants systems);
- Operating models and boundaries between monopoly and competitive parts of the energy delivery chain; and
- Technical protection of the electricity grid once customer premises have the ability to interact in a two way direction with the grid.

It is clear that network businesses are potentially best placed to assess, optimise and manage risks and opportunities arising from some of these challenges. Therefore, from a policy perspective, it is imperative that networks are not restricted from actively participating in the DSP market if the long term benefit to the community is to be maximised.

Framework Changes

SP AusNet considers the following Rule or framework changes should be investigated and tested against the National Electricity Objective during this review including:

- Rules implementing stronger incentive frameworks for DSP should be revisited as it is questionable whether current incentives provide sufficient rewards for pursuing DSP that generate benefits to society as a whole through reduced carbon emissions or lower built network capacity;
- Consideration of Rule changes that strengthen the requirement for cost reflective tariffs and locational pricing signals by both participants and the Australian Energy Regulator;
- Revisiting recent (DNSP recovery of transmission-related charges) and proposed (Network Support Payments and Avoided TUoS for Embedded Generators) rule changes which have unintentionally made DSP by embedded generators increasingly difficult; and
- The regulatory frameworks treatment of innovation should be investigated in recognition that the building block approach to regulation, in its current form, is inimical to innovation and long term R&D by network businesses.

If you have further questions regarding the information provided, please contact Tom Hallam, Manager Economic Regulation on 9695 6617.

Yours Sincerely,

Charles Popple
General Manager Network Strategy and Development

1. Background and Overview

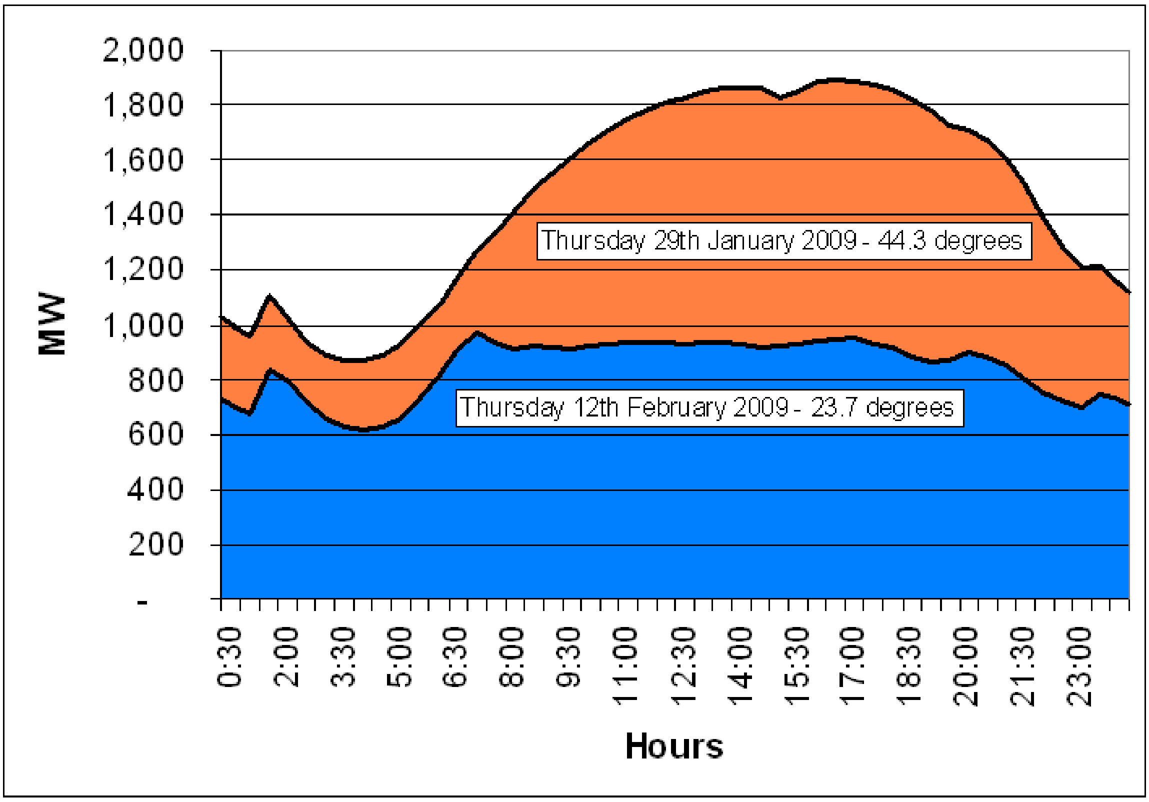
1.1 Background

The AEMC commenced its review of DSP in the NEM in October 2007. The objective of the AEMC's review is to identify whether there are barriers or disincentives within the Rules which inhibit efficient DSP in the NEM. SP AusNet has supported the objective of this review and participated in consultation throughout the process.

SP AusNet's Distribution Network distributes electricity to 610,000 customer supply points, across a mix of alpine, rural, urban and coastal areas across the eastern half of Victoria.

The northern, eastern and south eastern growth corridors of Melbourne are situated in SP AusNet's Distribution area. As such, demand growth and customer connection growth associated with Victoria's population and economic growth impact heavily on SP AusNet's network. Compounding this, demand associated with new housing developments tends to be relatively peaky due to the high and increasing penetration of air conditioning (cooling).

Figure 1: Total Network Demand on a Mild (24°) and Hot (44°) Day



Source: Excerpt from SP AusNet' AMS – 20-01 – Electricity Distribution Network

Resulting peak demand on SP AusNet's distribution network has been growing at the rate of 6.7% per year, considerably faster then energy consumption.

Consequently, SP AusNet has one of the peakiest network demand profiles in Australia. Therefore, SP AusNet's answers to the Issues Paper are from the perspective of DSP as a mechanism for peak shifting, in particular, as this would provide the most benefit to SP AusNet reducing network investment and long term costs to the community.

As such SP AusNet has been at the forefront of design and implementation of cost reflective time of use (ToU) tariffs for both industrial and small commercial and residential customers. In particular, SP AusNet has received AER approval to introduce the following two new types of Distribution Use of System (DUoS) tariffs:

- A Critical Peak Demand Price for large LV customers, HV customers, and sub-transmission customers; and
- Time of Use tariffs for Residential and Small Commercial Customers (taking advantage of the functionality of the smart meters being rolled out in Victoria). These tariffs are currently under moratorium subject to Victorian Government review.[1]

The factors underlying the design of these tariffs are included as Appendix 1 to this submission and are important for much of the discussion that follows.

SP AusNet also has a considerable level of embedded generation connected to its network and is one of the few DNSPs in Australia to have contracted significant network support from embedded generation in order to allow deferral of large transmission augmentation.

1.2 Overview of submission

SP AusNet's response follows the same structure of as the AEMC's Issues Paper:

- Section 2 addresses the AEMC's proposed methodology and assessment;
- Section 3 addresses consumer participation and DSP opportunities;
- Section 4 addresses market conditions;
- Section 5 provides commentary on market and regulatory arrangements; and
- Section 6 provides some brief observations on Other Energy Efficiency Measures.

SP AusNet makes no comment on wholesale market issues.

[1] One of the key aspects of this review is to establish impacts of ToU tariffs on vulnerable customer groups.

2. Methodology and Assessment

1. Chapter 3 outlines our approach to identifying "market and regulatory arrangements that enable the participation of both supply and demand side options in achieving an economically efficient demand/supply balance in the electricity market." Do you agree with our approach?

SP AusNet supports the AEMC's broad approach to assessing the costs and benefits of greater demand side participation. However, SP AusNet would sound a note of caution with respect to benefits from innovation. As the AEMC has found previously, there are insufficient incentives for participants to undertake research and development and innovation given the "cost of service" approach with periodic resets. Fully exploiting the potential of embedded generation and advanced interval metering will require substantial further R&D. In particular, NSPs have limited incentives to invest in R&D given they cannot retain the benefits of the significant investment and resources required past the next regulatory review. This issue is addressed in detail in Section 5 below.

2. How should the benefits of DSP be measured? Can they be accurately quantified?

The standard cost benefit approach underlying distribution network planning in Victoria is generally suitable for assessing DSP options. Over and above this, there is a need to ensure commercial incentives are aligned with longer term community costs and benefits.

For example, in Victoria, the value of customer reliability is embedded both in planning standards and in the AER's STPIS scheme. Therefore, in theory, a DSP option will have its reliability value appropriately accounted for relative to network solutions. However, this ignores the early stage of development of the demand management industry that results in:

- counterparties that are unable to take on the appropriate reliability risk on to their own balance sheet either due to size (venture capital start ups) or nature (for example, government bodies such as the CSIRO), leaving it with the DNSP; and
- the R&D nature of many demand management programs.

Deterring trials of solutions (that are the best way for data on the reliability trade-offs to be gathered) with reliability penalties is not to the long term benefit of electricity consumers and is, therefore, inconsistent with the NEO.

The same general analysis applies with regards to reflecting the true long term benefits from innovation arising from R&D expenditure undertaken by DNSPs and other DSP proponents.

3. What are appropriate discount rates to apply to DSP investments for the various parties across the supply chain?

Network options are assessed using the pre-tax regulated WACC as the discount rate. This provides the baseline against which non-network options can be assessed. Whether non-network options are realistic is then a commercial decision by potential proponents (including the DNSP itself). Potential payments by the DNSP to avoid the costs of the network solution must provide the proponent with sufficient revenues to meet that proponent's required hurdle rate. This issue is addressed in detail in Section 5 below.

4. Are there other issues which we should consider in our assessment process and criteria?

See detailed discussion in Section 5.

3. Consumer Participation and DSP Opportunities

5. What are considered the drivers behind why consumers may choose to change their electricity consumption patterns? Please provide examples or evidence where appropriate.

The strongest driver of consumer behaviour will be exposure to and awareness of a cost reflective price signal.

A well designed tariff regime should signal to consumers and potential investors the future cost of consumption providing a financial incentive for them to change their consumption and /or investment behaviour, if beneficial. This allows the community to maximise its use of its current resources, therefore, maximising community welfare.

Other drivers will be secondary but nonetheless important. For example;

- The provision of information to customers, both with regards to the price and options to respond, will also be important as a better informed consumer is more likely to respond to the pricing signal. It should be noted that better price signals will in themselves encourage the provision of this information as it will create a "product" to sell;
- Availability of technological developments such as: home energy management systems connected to smart meters or other aggregation facilities; the integration of electric vehicles into the home for both charging and peak demand mitigation; and the placement of storage in the network at substation level or on SWER lines;
- Customer convenience will also play an important part in participation and the degree to which this is facilitated by technological developments (ie set-and-forget options) will help determine the level of participation; and
- Reliability of the proposed DSP solutions and the ability of the consumer to choose reliability/cost trade-offs.

6. Chapter 4 lists some plausible DSP options that are currently used or could be used by consumers. Are there any other plausible DSP options currently used by consumers that have not been identified? Please provide description of measures and examples, where available.

Three potential DSP options that should be included are:

- Use of storage – energy storage is not commonly used presently but, with improvements and decreasing unit costs in power electronics and battery technologies, small scale energy storage is likely to become cost effective relative to rising peak energy costs. Unit costs of $300/kVA and $200 /kWh are projected for the short to medium term;
- Community solutions – Combined District Heating and Cooling (DHC) represent a series of proven, reliable, cost and carbon effective technologies that are already contributing to global heat and electricity demand overseas. Combined Heat and Power (CHP) plants contribute up to 50% of electricity in some countries such as Demark but have not yet had a significant impact in Australia. Various policy and

regulatory measures adopted overseas have driven the high adoption rates. These include:

- Financial and fiscal support;
- Utility supply obligations – market-based mechanism using certificate trading to guarantee a market for CHP electricity; and
- Local infrastructure and heat planning incorporated in building regulations.

- Power factor correction options – Imbalances in power factor lead to inefficient power consumption. Currently larger customers, typically on demand tariffs, are implementing correction options to reduce consumption. Increasing carbon efficient technologies such as solar and compact fluorescent lighting are exacerbating harmonic issues. As an example Germany now requires solar installations over 10kW to provide an inverter which can address this issue.

7. Are there any DSP options that are currently available to consumers, but are not commonly used? If so, what are they, and why are they not commonly used (i.e. what are the barriers to their uptake)? Please provide examples and evidence if available.

Many DSP options are not taken up by consumers or offered up by proponents because the lack of a price signal and consequent lack of incentives.

8. Are there other DSP options that are not currently available to consumers, but could be available if currently available technologies, processes or information were employed (or employed more effectively) in the electricity (or a related) market?

Smart meters make available a whole suite of DSP measures available to consumers: including:

- Provide consumers with more granular and timely information so they can optimise their energy use
- Opportunity for greater range of tariffs allowing greater consumer choice and more cost reflective pricing
- More effective activation and deactivation of energy supply to premises
- Proactive grid side identification of outages increasing energy supply reliability

4. Market Conditions

4.1 Market conditions and areas for investigation

9. What are considered the relevant market conditions to facilitate and promote consumer take up of cost effective DSP?

From the perspective of peak shifting (the most beneficial DSP for SP AusNet's network), the market conditions required are:

- Cost reflective peak and off-peak tariffs;
- Provision of information and education to customers; and
- Meters that measure time of consumption.

In Victoria both are place for industrial customers. For residential customers the metering technology is being rolled out but tariffs are currently under moratorium subject to Government review.

In addition, the financial conditions arising from the GFC have increased incentives for private networks to reduce capital expenditure.

Information on appliance power use is not necessary. Direct control of appliance by the network would clearly be beneficial for peak shifting but is not necessary for it.

10. Are there any specific market conditions which may need to be in place to enable third parties to facilitate consumer decision making and capture the value of flexible demand? Please provide examples and evidence as appropriate.

For relatively peaky networks such as SP AusNet's, the presence of cost reflective time of use tariffs is the key requirement for the development of healthy third party competition. This is because the difference between the peak and off tariff rates will offer significant benefits from changed customer behaviour in effect creating a valuable product to sell. In future, these tariffs will need to be come increasingly dynamic in order to align with the long run marginal cost.

For example, after SP AusNet introduced its critical peak demand tariff for industrial customers it is aware of 17 third party customer consultants and agents offering value added services to these large customers in order to help them minimise their costs under the new tariff. This is in addition to the 22 retailers that operate in this market.

11. What market conditions (technologies, processes, tariff structures, information etc) are needed, that are not currently employed in the electricity market, to make other DSP options available to consumers?

Outside of Victoria the energy market will lack appropriate tariff structures, limit retail competition and/or lack the required metering infrastructure to encourage full use of DSP options.

4.1 Customer incentives to respond

12. Do you consider retail tariffs currently reflect the costs to a retailer of supplying consumers with electricity?

SP AusNet's comments are only based on the network component of retail tariffs in its own distribution area.

Industrial customers

In SP AusNet's distribution area, industrial network ToU tariffs are cost reflective and these tariffs are being passed through by the retailer. The retail market for large industrial customers is highly competitive illustrating that allowing retail competition itself rather than regulation is the best guarantee that pricing signals are passed through to consumers.

The SP AusNet experience shows retailers who fail to pass on these signals effectively exclude themselves from the market as a retailer can only hedge the tariff by mirroring it. This is because customers who would benefit from the new tariff will leave retailers who don't mirror it leaving them only customers who would be penalised by the new tariff. This leaves the retailer unable to recover the costs required to be passed through to the DNSP.

Small commercial and residential customers

As mentioned previously, SP AusNet has approved ToU tariffs for small commercial and residential customers, however, they are currently subject to a moratorium on their introduction. That moratorium extends to both DNSPs and retailers. As such, current retail tariffs do not reflect the costs of supplying a particular small customer class with electricity (although clearly retail tariffs will recover the retailers (and networks) costs on average).

As explained above, if ToU network tariffs are introduced retailers are effectively unhedged unless they mirror the network tariff, providing a similar strong incentive for retail tariffs to reflect network tariffs without further regulation.

13. Are any changes needed to retail price regulation to facilitate and promote take up of DSP?

Once the introduction of small customer time of use tariffs are allowed by Governments and they are technically feasible through the introduction of interval meters, retail competition should drive more efficient DSP price signals without further regulatory changes.

Of greater concern is existing government regulation or threats of regulation. Two key examples of potential counterproductive regulation include:

- Protection of small commercial and domestic customer segments from full retail contestability; and
- Voluntary rather than compulsory roll out of time of use tariffs where appropriate metering exists.

The second approach defeats the fundamental purpose of the community investing in smart meters. Voluntary introduction leads to the following three effects.

Firstly, customers that clearly win from the new tariffs with no or minimal change in behaviour will take up the new ToU tariffs. These customers are unlikely to be the causers of the demand peak that are driving up network costs.

Secondly, customers that would be heavily penalised under the ToU tariff because they were causers of the peak would elect to remain on the existing non cost reflective tariffs. Whilst over time, the average price charged to these customers is likely to increase, as customers that have a lower cost to serve move off these tariffs and on to ToU tariffs, there is still an issue around the lack of cost reflection in the old tariff components, and therefore, the signalling capability of this old tariff more broadly.

Thirdly there would be a substantial pool of customers who would have changed behaviour if subject to a ToU tariff but who remain indifferent while they can remain under existing tariffs.

The third effect is a clear dead weight loss to society, as the counterfactual to this situation would be for these customers to be faced with a cost reflective ToU tariff as part of a mandatory roll out of ToU tariffs, and, assuming that these customers have a normal demand curve, they would respond accordingly to this price signal such that allocative efficient outcomes would ensue.

The first two effects are a wealth transfer, from an allocative efficiency point of view. However, these transfers may have significant detrimental effects on dynamic efficiency as the combination of the two may lead to the networks both:

- Losing substantial revenues and thus not being able to make appropriate investments in their network (unless these voluntary customer transfers have been forecast perfectly at the time of the price review process – a practical impossibility);

- While achieving no long term reduction in network costs as the peak continues to rise.

Such an outcome appears to be antiethical to good public policy.

14. Do the charges to retailers for use of transmission networks reflect the value of that use?

Retail charges to customers clearly recover the costs of operating the transmission networks, however, while locational price signals are embedded in transmission charges to DNSPs they are not passed through by DNSPs in the Network Use of System (NUoS) charges passed through to retailers (NUoS = DUoS + transmission charges).

This is because locational network tariffs are not utilised by DNSPs on equity and fairness grounds (resulting in for example, the cross subsidisation of rural customers and high reliability CBD customers by urban customers). Thus, network tariffs reflect the long run marginal cost characteristics of a tariff class (ie residential or small commercial) not the costs at a specific location on the network.

However, it should be noted the locational signal is preserved for embedded generators that defer transmission investment through avoided TUoS payments and network support payments.

15. Do the charges to retailers for use of distribution networks reflect the value of that use?

From an allocative efficiency perspective, theoretically, the most efficient DUoS marginal price signal would involve the DNSP sending a variable price signal that:

- targets demand (as opposed to energy) on certain critical peak demand days; and
- which varies by a customers' location.

The former is a reflection of the fact that demand that occurs during a certain small number of peak periods is the primary driver of network augmentation, whilst the latter is a reflection of the fact that different parts of the system will have different existing levels of 'spare capacity', different growth rates in peak demand, and different forward looking augmentation costs, all of which lead to the long run marginal cost of supply differing between different regions. Therefore, any cost reflective variable price signal should, in theory, reflect these different location-based characteristics.

Industrial customers

However, for large industrial customers, SP AusNet did not propose to introduce a ToU tariff with locational signals, as:

- disaggregating charges by location for this customer class is inconsistent with current implied definitions of equity and fairness; and
- some locational signals are sent by the initial connection charge for a new customer when it connects to the DNSPs network (although the issues associated with connection charges are discussed in more detail below).

Small commercial and residential customers

Likewise, in coming to the ToU tariff design for small commercial and residential customers, SP AusNet did not propose introducing a tariff with locational signals, as:

- residential and small commercial customers are more likely to better understand and therefore respond to energy charges as opposed to demand based charges;
- for these customer classes there is a nexus between a customer's maximum energy and their demand (eg: a customer that has a high maximum demand during peak periods is also likely to have high energy consumption during those periods), and, therefore, the overall allocation of costs to different customers should be fair, despite the absence of a demand-based charge for this customer group;
- an energy based tariff is more consistent with the Government's Carbon Pollution Reduction Scheme, which is seeking to incentivise customers to reduce their overall energy consumption, as opposed to just their demand at certain peak periods; and

- disaggregating charges by location for this customer class is inconsistent with current implied definitions of equity and fairness.
- some locational signals are sent by the initial connection charge for a new customer when it connects to the DNSPs network (again the issues associated with connection charges are discussed in more detail below).

Therefore, SP AusNet's approved energy based Time of Use tariff is designed to best reflect the system utilisation during peak periods, without having to disaggregate that price signal by either peak day demand, or by location.

Location signals for connection

SP AusNet would highlight that the AER's initial draft national *Connection Charge Guidelines: for accessing the electricity distribution network* proposes to weaken further locational signals in the NEM which will certainly be to the detriment of incentives for customers to undertake DSP initiatives while considering the most efficient way to connect to a distribution network. This appears to be fundamentally at odds to the aim of minimising the long term costs of the provision of electricity to consumers.

SP AusNet refers the AEMC to the its submission on this matter on the AER website (http://www.aer.gov.au/content/index.phtml/itemId/748937).

16. Do all consumer groups, including vulnerable consumers benefit from having cost reflective prices in place? If not, are any special provisions required to protect certain classes of consumers?

SP AusNet understands the concerns around the impact of ToU tariffs on vulnerable customers; however it wishes to point out that the extent to which vulnerable customers would or would not suffer under a proposed ToU tariff structure will actually be a function of the specific design of the proposed ToU tariff structure. A badly designed ToU structure may in fact lead to vulnerable customers being adversely impacted, however, a well designed ToU tariff structure will not only be more cost reflective, but also, lead to the majority of vulnerable customers being better off.

More specifically, a ToU tariff structure that imposes a peak and/or high shoulder charge upon usage throughout much of the day time (7am – 10pm), and across much of the year (e.g., all weekdays throughout the year), will inevitably lead to issues for customers who have a flat load profile – which tends to be the load profile associated with most vulnerable customers.

Conversely, a ToU tariff structure that is much more granular, and only imposes a high peak and/or shoulder charge for a small amount of time throughout the year, with the large majority of usage being at off peak rates, is not only more cost reflective, but it is also more likely to lead to vulnerable customers benefiting from its imposition. This is because these customers generally have relatively flat load profiles across the daytime (because they are more often at home throughout the day), and across the year (because they are less likely to have multiple air-conditioners going during peak summer periods), which means that:

- A much lower proportion of their overall energy consumption will be consumed during defined peak periods, relative to the average customer, which means the higher peak price has a lower impact on their overall bill than it does on the average customer;

- Their higher than average consumption during defined off-peak periods than the average customer (because they are at home more often than not during the day when the off peak periods apply) means that they benefit more from the imposition of the off peak charge during these periods, relative to the average customer; and

- The latter also allows them to take advantage of minor behavioural changes on days where a higher peak and/or shoulder period charge is applied to usage during the afternoon. This means that because they are at home more often during the day, they actually have a greater opportunity to undertake some load shifting to significantly lower bills, relative to most other households (for example, shifting electricity consumption associated with a dishwasher or washing machine from peak to off peak times during the day).

Overall, SP AusNet reiterates that it is the design of the ToU tariff that will determine the extent to which vulnerable customers may or may not be adversely affected – not the imposition of the ToU tariff itself. A well designed time of use tariff that reflects the usage of a distributors system will lead to a ToU tariff that only imposes a peak and/or shoulder tariff on a very small proportion of usage, which in turn means it will be more cost reflective, and much less likely to impact vulnerable customers because of their flatter load profile.

SP AusNet's approved ToU tariff would see off-peak charges levied around 85% of the time throughout the year, with peak period tariffs only being applied around 4% of the time throughout the year.

4.2 Consumer willingness to respond

Trials of smart meters and ToU tariffs have occurred in many places around the world. All illustrate that there is significant customer willingness to respond to appropriate price signals (especially when combined with an education campaign). The extract below details some of the peak load responses from recent Australian and international trials.

Trial	Peak Load Impact
Ontario Energy	Ranged from 5.7% for TOU-only participants to 25.4% for CPP participants
Country Energy, Australia	Reduction of 30% across peak periods
EnergyAustralia	Reductions on days with a CPP event of between 5.5% and 7.8%
California Statewide	Reductions in demand ranging from 13-27%
Norway	8-9% reduction at peak

SP AusNet has attached a document entitled *International Smart Meter Trials Selected Case Studies Smart Tariffs and Customer Stimuli* which summarises the results of these trials.

SP AusNet's experiences with industrial customers from the introduction of its own critical peak tariffs confirm a large customer response can be expected with the right incentives. This is dealt with in detail in Section 4.3.

17. To what extent do consumers understand how they can reduce their electricity bill? What information do consumers need in order to increase their understanding of how they can reduce and manage their electricity consumption and hence bills?

Industrial customers

Industrial customers have a good understanding of price signals and or the commercial benefits from energy efficiency themselves and have informed agents in the marketplace willing to act on their behalf in exchange for a commercial benefit.

Small commercial and residential customers

First and foremost this customer group needs a cost reflective price signal. This will in itself motivate information gathering.

Nonetheless, small commercial and residential customers' existing understanding of how to reduce electricity bills is probably limited. For these customers, the DNSPs, retailers and Government have a responsibility to make information cheaply, easily and simply available via community education campaigns.

18. What issues are associated with provision of existing information in the market? Are there arrangements that could improve delivery of such information? If so, how and by whom?

A smart (interval) meter is the fundamental piece of equipment required to empower customers as it provides the consumption and price data in enough detail to allow intelligent responses by the demand side of the market. These meters have functionality to allow real time price and consumption information if desired. However, to achieve some of the benefits the smart meter requires supporting technologies that are currently immature – in-house display, web portal, etc.

For large sophisticated industrial customers this is sufficient. As stated above, for small commercial and residential customers, the DNSPs, retailers and Government have a responsibility to make information cheaply, easily and simply available via community education campaigns.

19. Could better information be provided to consumers on the actual consumption of individual appliances and pieces of equipment? If so, what information could be provided and in what form?

Yes, again broad simple community education programs are justified. For example, there are various easily accessible options available for providing real time information to customers on what energy appliances use from supermarkets (see discussion in Section 4.3).

20. Are retailer and distributor business models supportive of DSP?

Private sector DNSP business models respond to the incentives put in place by the regulatory framework. Therefore the question becomes is the regulatory framework supportive of DSP options. This is discussed in detail in Section 5 below.

21. What incentives are likely to encourage research and development of other parties to promote efficient DSP?

Incentive regimes are discussed in detail in Section 5 below.

22. Are there any regulatory, cultural or organisational barriers that affect take up of DSP opportunities?

Regulatory barriers are discussed in detail in Section 5 below.

23. What form of commercial contracts/clauses are required for facilitating and promoting efficient DSP?

SP AusNet has no comment on this issue at this stage.

4.3 Consumer ability to respond

SP AusNet is dubious of claims that there will be strong customer inertia in the face of cost reflective price signals such as time of use tariffs. In particular, no large capital investment is necessary for small customers to allow a response.

Industrial customers

For example, in 2011, SP AusNet introduced a critical peak tariff for its large industrial customers replacing a more typical (for Australia) industrial demand tariff that charged customers according to their maximum demand regardless of whether this was coincident with the system maximum demand (details of the tariff are provided in Appendix 1). In theory, the more cost reflective pricing is easier for customers to respond to, as they only have to alter their consumption for between 1 to 5 days, and for 4 hours within those days, to get a benefit.

In practice early indications suggest this assessment was overwhelmingly correct, however, the 2011 Victorian summer was mild so caution must be taken before intimating any observed demand reduction was due just to the new tariff. Nonetheless, the 2011 summer period saw a marked response from customers to the new critical peak tariff. Over 66% of the 1800 customers subject to the new tariff reduced their consumption from the nominal value[2] assigned by SP AusNet representing a net 88MW reduction in demand. Of these, over 300 customers reduced their demand by more than 50% and around 75 customers achieved reductions above 90%. Typical customer responses are shown in the figures below (application of the critical peak tariff shown as a red shaded band).

[2] The nominal value was used to set the initial payments under the tariff.

Figure 1: Customer response to 5-day critical peak tariff (shaded area)

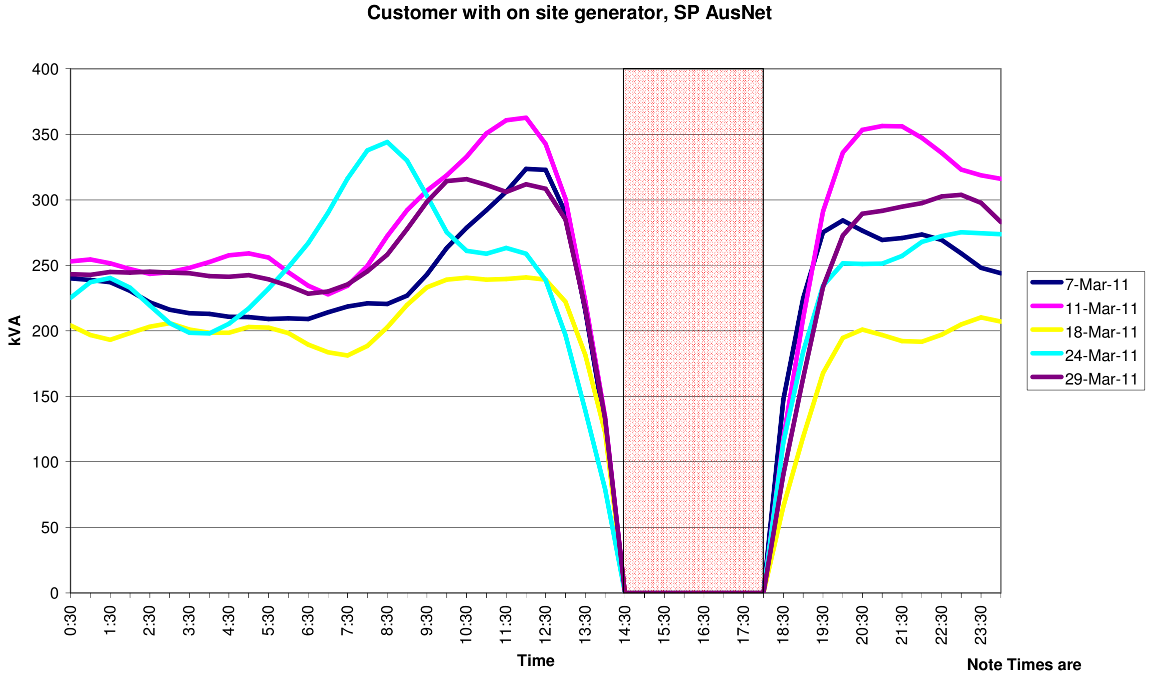
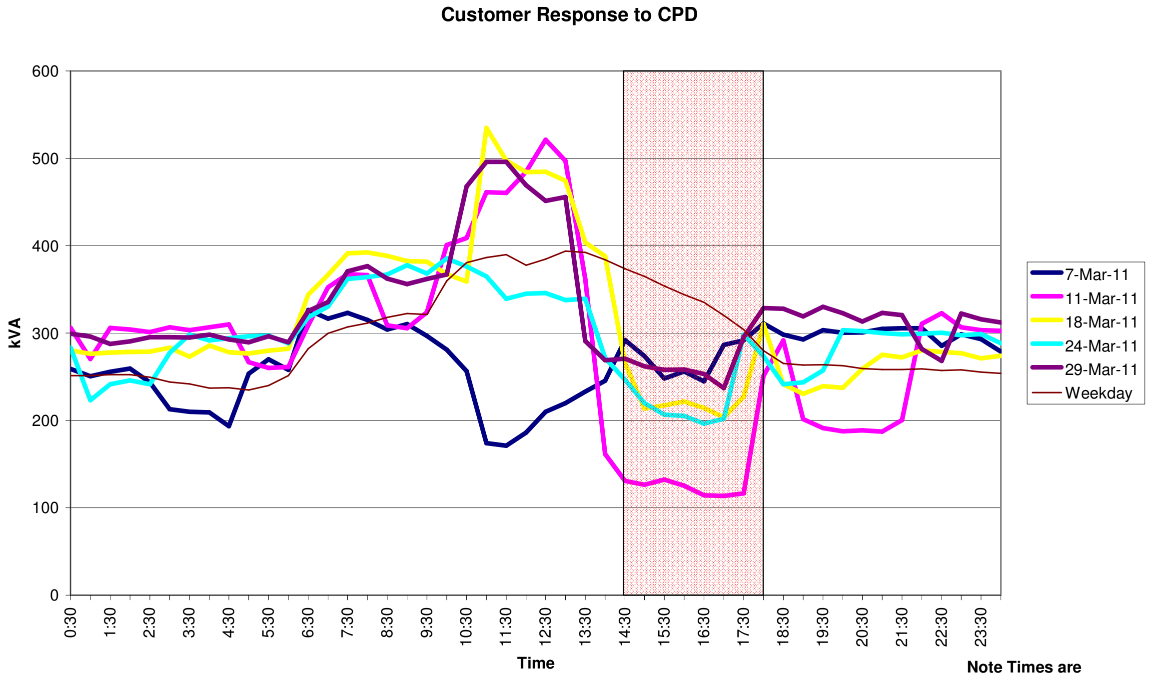


Figure 2: Customer response to 5-day critical peak tariff (shaded area)



Small commercial and domestic customers

For smaller less sophisticated customers the large bill impact from the introduction of ToU Tariffs is an effective communication mechanism in itself and provides significant incentive to reduce energy consumption. For example, under SP AusNet's residential ToU Tariff, a 5% reduction in energy, concentrated on peak periods, saves $90 per annum a 25% bill reduction in network costs.

Importantly, these small customers have an ability to respond to these signals and reduce their bills with just minor behavioural changes (this important when assessing impacts on vulnerable groups that cannot make capital investments in energy efficiency). For example:

- Adjusting air-conditioner temperatures (each 1℃ increase in the thermostat setting will save about 10% on a customer's air-con energy usage)

- Turning air conditioners on earlier on hot days (it operates more efficiently when the outside air temperature is cooler).

- Timing of dishwashers, washing machines, clothes dryers can be moved to off-peak times; and

- Non essential items such as pool pumps can be moved / switched off.

Further relatively minor investment (with short payback periods) can further enhance small customers' ability to save energy or shift their peak consumption. For example:

- Remote control powerboards (about $15)

- Timers for appliances ($10)

- Ceiling fans ($40 plus installation)

- Fans ($30)

- In home display units ($90)

24. Are there specific issues associated with investment in infrastructure that is needed for consumers to take up DSP opportunities?

As shown above, no large capital investment is required for a consumer response to ToU Tariffs.

In terms of an organised consumer DSP response (ie professional aggregators) ToU tariffs provide the incentives for these business models to be realistic.

Technology issues associated with some DSP issues are dealt with in Section 4.4 below.

25. Do you consider that the issue of split or misaligned incentives has prevented efficient investment in DSP from taking place?

Incentive regimes are discussed in detail in Section 5 below.

26. What are potential measures for addressing any issues associated with split or misaligned incentives?

Incentive regimes are discussed in detail in Section 5 below.

27. What are the specific issues concerning ease of access to capital for consumers and other parties?

SP AusNet is not aware of any issues associated with consumers' access to capital that is specific to DSP.

4.4 Technology and System Capability

28. What are the significant energy market challenges in optimising the value of technology and system capability to facilitate an efficient level of DSP?

Challenges include:

- System interoperability (ie different market participants systems) will be the biggest challenge in integrating an efficient and effective energy market system. The degree of granulometry will also be an important factor – eg allowing individual solar customers to bid into the NEM is unlikely to be feasible.

- The operating model to establish boundaries of the customer HAN and interaction with DNSPs, retailers and other third parties is as yet undefined due to the immature state of markets.

- Determination of the security chain required for protection from the customer premise to the electricity grid and to connected systems (eg back offices) will be complex and take time. For example the current interaction between customer and retailer is unlikely to provide sufficient confidence in identifying customer access to the grid. Hence, new mechanisms will result in process transformation from current practices.

It is clear that network businesses are potentially best placed to assess, optimise and manage risks and opportunities arising from some of these challenges at the lowest cost. Therefore, from a policy perspective, it is imperative that networks are not restricted from actively participating in the DSP market if the long term benefit to the community is to be maximised.

29. Do current technology, metering and control devices support DSP? If not, why not, and what are considered some of the issues?

Current network technology only partially supports DSP and concentrations of DSP can give rise to issues that were not considered in the original one-way power flow design of distribution networks. For example, embedded generation, particularly photo voltaic panels, can give rise to local voltage issues and the DNSP is forced to replace network control devices to compensate.

With regards to the current Victorian Smart meter rollout, current meters do not include the full functionality required to switch loads and demand manage in the home and aggregate DSR (although it can be enabled at additional cost).

30. How can issues relating to weak and/or split incentives be addressed to ensure that the benefits of smart grid technologies are aligned and felt across the electricity supply chain, including by consumers?

Incentive regimes are discussed in detail in Section 5 below.

31. How can pricing signals/tariff arrangements be made complementary with smart grid technologies to facilitate efficient DSP in the NEM?

Location based DNSP use of system charges with accurate capacity and peak demand charges would be more complimentary with efficient DSP (for example, peak control measures such as battery storage), however as highlighted in previous discussions on pricing, there are alternative considerations with this approach.

Rebates/benefits for customers who allow direct control of energy intensive appliances under certain conditions is another possibility, although who funded such payments would be a key issue.

32. In maximising the value of technologies, such as smart grids for DSP, what are the issues relating to consumer protection and privacy?

These issues have been canvassed extensively in the AMI Policy Committee coordinated by the Victorian Department of Primary Industries (DPI). SP AusNet suggests the AEMC contact the DPI for a better understanding of the issues that have arisen as part of the Victorian SMART meter roll out.

5. Market and Regulatory Arrangements

33. To what extent do parties have appropriate incentives to put in place the systems, technologies, information flows etc that facilitate efficient DSP?

Private sector DNSP's are capital constrained under current funding conditions. As such, the current financial market provides incentives to implement policies and solutions that reduce capital expenditure. In addition, the AER regulatory regime provides capital expenditure efficiency incentives.

Therefore, incentives exist for DNSPs to undertake and support DSP initiatives. In particular, the introduction of well designed cost reflective time of use network tariffs send the appropriate price signals to DSP proponents.

However, it is questionable whether current incentives provide sufficient rewards for pursuing DSP that generate benefits to society as a whole through reduced carbon emissions or lower built network capacity. For example, it is not obvious under the current regime that DNSPs can sell energy generated by DSP back into the market, therefore, leading to a misalignment of private and public benefits. As previously stated, SP AusNet considers it is imperative that networks are not restricted from actively participating in the DSP market if the long term benefit to the community is to be maximised.

While there are opportunities for DSP in the current regulatory framework, it continues to be our view that a DSP-specific incentive would be required to drive significant change and development in this area. It is also considered that seed funding and real financial rewards would be needed to assist in the development of the relatively infant embedded generation and demand side response sectors. Generally, financial incentives are the most effective way to achieve target DSP outcomes, rather than providing cost-recovery mechanisms.

Therefore, SP AusNet:

- Supports the exclusion of DSP opex from the efficiency carry over mechanism to encourage DSP and avoid penalising DNSPs for implementing a DSP option;
- Considers that the NER should clarify that DSP and network capex should be treated on equal footing and explicitly allow for all actual DSP capex to be included in the RAB, consistent with the ex ante capex approach in the current regulatory framework;
- Supports the introduction of a DSP specific exclusion from the STPIS schemes penalties. This is justified because of the early stage of development of the demand management industry results in:
    - counterparties that are unable to take on the appropriate reliability risk on to their own balance sheet either due to size (venture capital start ups) or nature (for example, government bodies such as the CSIRO), leaving it with the DNSP; and
    - the R&D nature of many demand management programs.

With regards to stronger DSP incentives, the following potential schemes should be trialled:

- a $/kW incentive rate (or revenue driver) to encourage the connection of distributed generation to the network (as implemented in the UK at £1.50/kW/yr by Ofgem). This would encourage DNSPs to explore innovative solutions which may involve installing distributed generation in key network locations.

- A wider implementation of the NSW D-factor scheme that allows DNSPs to recover:

  - approved non-tariff-based demand management implementation costs, up to a maximum value equivalent to the expected avoided distribution costs (as defined in the determination);

  - approved tariff-based demand management implementation costs; and

  - approved revenue foregone as a result of non-tariff-based demand management activities.

- A longer term goal to introduce a higher-powered incentive scheme similar to the S-factor that would recognise the value to society of reduced energy consumption by providing an additional revenue stream for network businesses to pursue. It would effectively share the benefits of cost-effective or socially beneficial energy reduction. A shared benefits incentive scheme would involve:

  - An appropriate measurable target to set (net benefits achieved, energy or capacity saved);

  - A fair quantum of reward;

  - The marginal incentive rate;

  - Caps or floors to mitigate the risks of the incentive; and

  - Further investigation of incentive schemes for DSP be undertaken.

34. Are there aspects of the NEL or the rules which prevent parties taking actions that would otherwise allow for more efficient levels of DSP?

The AEMC has made or proposed two rule changes which have made DSP by embedded generators increasingly difficult.

DNSP recovery of transmission-related charges

In March 2011 the AEMC made rules entitled DNSP recovery of transmission-related charges which made it practically impossible for a Victorian DNSP to strike network support contracts that substitute for transmission connection augmentation.

Specifically, the rule change excluded network support agreement payments from being able to be passed through via the annual pricing proposal process. Instead these payments were to be recovered via a pass through process established under the DNSP's Determination. The network support pass through event would have to be established in a

Determination as the Rules do not contain a general pass thorough provision for these types of costs.

However, as the Rule was implemented just five months after the AER Final Determination for Victorian DNSP's, no such specific pass through provision can exist in Victoria until after 2015.

This was problematic for the multiple proponents that were canvassing very competitive non network options to SP AusNet at the time. SP AusNet Distribution's inability to recover costs under the regime the AEMC has put in place makes these otherwise sensible proposals commercially impossible to pursue (SP AusNet is pursuing ways to contract around problem via the transmission business).

SP AusNet would canvas that these rules be re-examined as part of this review.

Network Support Payments and Avoided TUoS for Embedded Generators

Secondly the AEMC is proposing MCE initiated Rule changes entitled Network Support Payments and Avoided TUoS for Embedded Generators. The basis of this rule change appears to be a misconception that embedded generators are receiving two payments for the same service. SP AusNet has provided evidence that this is not the case, at least in Victoria. It is important that any Rule change not deny embedded generators legitimate payments for network augmentation deferral benefits in different parts of the network.

SP AusNet refers to its submission on this Rule change submitted on the 21 July 2011 for further details.

35. Are there market failures which mean regulation is needed in some areas to ensure appropriate market conditions are in place?

It is now being recognised in at least one other international jurisdiction that the building block approach to regulation is inimical to innovation and long term R&D by network businesses. The regime results in a market failure, as the rewards for innovation are truncated or non-existent in the standard incentive framework associated with this regulatory approach.

Below is a brief description of the changes made in the UK regulatory regime to address this weakness. While not necessarily in agreement with all outcomes of the UK review, SP AusNet considers that similar focus on innovation incentives should be incorporated into this review.

Innovation Incentives for energy distributors in the UK regulatory framework

In recent years, Ofgem has increasingly focused on how to promote innovation through the regulatory framework. This focus has been driven largely by the understanding that significant innovation will be needed if the UK is to achieve its ambitious carbon pollution reduction targets, and the recognition that, under the existing regulatory framework, firms were not investing in R&D to the required degree.

At Ofgem, the focus on innovation began during the fourth price review for the electricity sector with the introduction of a number of incentive schemes including the Innovation Funding Incentive. At the most recent price review, the Low Carbon Networks (LCN) Fund was introduced – a major change in the way innovation was funded. The LCN model was then adopted and extended in the recent review of the regulatory regime, "RPI-X@20". In the new regulatory framework, known as RIIO, innovation has been further promoted within the funding model, reflecting the view that innovation will be of central importance to the future of Britain's energy networks.

RIIO – The new regulatory framework

The RPI-X@20 review has produced a new regulatory framework for energy in the UK, known as the RIIO model. RIIO stands for 'Revenue = Incentive + Innovation + Outputs' and is intended to encourage innovation through the price control framework itself (enabled by the outputs-led approach, and longer price control periods) as well as through a separate time-limited Innovation Stimulus package. The new framework will be applied from the next Transmission and Gas Distribution decisions to be implemented in April 2013.

The Innovation Stimulus is viewed as a necessary time-limited package due to the uncertainty around the commercial benefits of innovation in the sustainable energy sector. The stimulus builds on and develops the competition-based approach of the Low Carbon Networks Fund, extending them to other parts of the energy networks with broader access by other parties. It is expected that in time, the RIIO framework will provide the necessary incentives toward innovation and hence the innovation stimulus package could be wound down.

Innovation initiatives in DPCR4

As part of the Distribution Price Control Review 4 (DPCR4), three incentive schemes were introduced for the 2005-2010 regulatory period: the Innovation Funding Incentive (IFI); the Distributed Generation Incentive; and Registered Power Zones (RPZ).

In particular, the IFI was a mechanism designed to encourage electricity distributors (known in the UK as DNOs) to invest in R&D activities. The program allowed DNOs to capture more of the benefits generated from R&D than they traditionally would under the price control framework. This is because under the scheme they are allowed to retain a share of the savings generated by their R&D programs (currently set at 80%) on an ongoing basis (i.e. into new regulatory periods).

In a 2009 Working Paper looking at innovation in the UK's energy networks, Ofgem found that under the first three years of IFI, annual R&D expenditure among electricity distribution networks had increased from around £1 million to over £11 million.

Low Carbon Networks Fund

The Low Carbon Networks (LCN) Fund was established as part of the most recent electricity Distribution Price Control Review (DPCR5) for the 2010-2015 regulatory period. The LCN Fund, which provides £500 million ($750 million) over five years, significantly alters the way innovation is funded in the UK electricity sector and substantially increases the amount of funding that is available.

The LCN Fund was set up specifically to promote the innovation required to achieve Britain's ambitious environmental targets at the best value for money as it is anticipated that large expenditure will be required in the energy sector to achieve these targets.

The LCN Fund is aimed to fund investigations of how best to:

- Efficiently connect renewable generation.
- Meet the needs of small-scale and intermittent generation.
- Address an increase in the use of electric vehicles, heat pumps, smart domestic appliances and other low-carbon technologies.
- Use smart meter data to improve network performance and reduce costs.
- Incentivise customers to reduce their carbon footprint and cut bills, by managing their energy demand.

Funding split

Unlike previous innovation incentives, the LCN Fund provides direct finance for research and development, including through a competition for the funding of large scale projects. There are three components to the LCN funding pool.

- First Tier - Up to $24 million per annum spread across all electricity distributors to spend against set criteria.
- Second Tier – Up to $41 million per annum for projects that win annual competition
- Discretionary Funding Mechanism (Prize) - A discretionary reward totalling up to £100 million over the five year period, can be awarded by Ofgem for successful project completion and exceptional projects.

How the competition works:

An independent panel of experts judges against set criteria as well as an overarching objective of providing a balanced portfolio of projects. Ofgem makes final decision on consideration of recommendations by the expert panel.

Tier 2 Funding criteria:

The degree to which the solution being trialled:

- accelerates the development of a low carbon energy sector
- has a direct impact on the operation of the distribution network
- has potential to deliver net benefits to existing and/or future customers
- generates new knowledge that can be shared amongst all network operators.

The degree to which the project -

- demonstrates a robust methodology and readiness

- involves other partners and external funding
- is relevant and timely.

Current Status

Ofgem are currently considering entries for Year 2 of competition, with winners to be announced in November. Ofgem’s assessment of the scheme at the time of their decision on Year-1 projects was very positive.

> *“The Authority was impressed with the quality of submissions received, particularly since this was the first year of the fund. We consider that in preparing their project proposals all DNOs embraced the kind of changes which the LCN Fund was designed to stimulate. Regardless of the decision on funding, successful partnerships have been formed, allowing for a greater appreciation of the role which DNOs can play in facilitating low carbon developments elsewhere in the supply chain. We hope that these partnerships will both continue and flourish. “*

6. Other Energy Efficiency Measures

SP AusNet believes many of the current policies that are administered by State Governments fail to generate all the possible community benefits available because of a lack of coordination with DNSPs.

For example, most State Governments have in place schemes that encourage the installation of solar panels as a way to abate green gas emissions. However, as these schemes are indiscriminate, concentrations of solar panels in particular areas of the network in fact result in higher network investment being required rather than mitigating constraints increasing the overall cost to the community from these schemes.

If, however, these schemes were administered by DNSPs that directed installation to areas where network constraints could be relieved exactly the same greenhouse gas mitigation would occur and significant network costs would be avoided maximising the benefit to the community from the scheme.

Appendix 1: SP AusNet Time of Use Tariffs

SP AusNet Critical Peak Demand Tariff

Historically, SP AusNet levied an 'anytime' demand tariff upon customers consuming more than 160 MWh per year. This tariff was based on the maximum anytime demand recorded by that customer, and this demand was only re-set if the customer:

- recorded a higher maximum demand, thus leading to a higher KVA being used to set tariffs from that point forward, or
- sought a demand adjustment to reflect their revised energy consumption characteristics.

The key drawback associated with the existing tariff structure was that a customer was charged a 'demand' tariff on their peak 'demand', even though that demand might not have been co-incident with SP AusNet's system peak. For example, demand at midnight on a Sunday night in May was charged the same 'Demand Charge' as if it occurred at 4 pm on the peak summer day.

From 2011, SP AusNet has introduced a 'Critical Peak Demand Price' for those customers that consume more than 160 MWh per year. The following table outlines the key components of this tariff.

Table 1: SP AusNet's approved Critical Peak Demand Tariff

<160MWh (large LV, HV and Sub-transmission customers)	
Tariff Component	**Proposed Tariff**
Demand Charge	The demand charge will be based on the average of customer's maximum kVA recorded on the 5 nominated peak demand weekdays during the Defined Critical Peak Demand Period.
Defined Critical Peak Demand Period	Days must be in summer (+ March), and the days will be nominated and communicated to customers at least one day in advance. The period only includes between 2pm-6pm on that nominated day. The 5 maximum's are averaged and used as the basis for the demand charge for the next 12 months.
Energy Charge	Similar to existing charges
Standing Charge	Similar to existing charges

The key reasons for replacing the anytime demand tariff with this Critical Peak Demand Price were that it:

- Better targeted the demand that is actually causing system capacity constraints, as it focuses only on demand during peak times of the peak day;

- Overcame the inequities whereby a customer was charged a ‘demand’ tariff on their peak ‘demand’, even where that demand was not contributing to the overall system peak, and therefore, was not contributing to SP AusNet’s future augmentation costs;

- Was likely to be easier for customers to respond to, compared to the historic tariff. In particular, under the proposed tariff, customers could reduce their costs by reducing consumption at system peak times rather than requiring a permanent step-down in electricity consumption. This proposed tariff therefore provided more scope for customers to change their consumption in response to the price signal (eg: use of back up generation on those days, changed hours of operation on those days); and

- Was linked to ‘past’ peak demand, therefore, reducing the administration costs associated with undertaking demand adjustments for existing customers.

SP AusNet’s communicates the nominated day via SMS and email. It was noted that the use of ‘advance communication’ stems from a suggestions made by a retailers during a one-on-one retailer forums that SP AusNet held to discuss its proposed new tariffs before they were implemented emphasising the importance of education sessions with customers before the new tariff was implemented.

The aggregate estimated effect of the tariff was a saving in the peak summer demand of 76 MVA per annum from 2011.

SP AusNet Small Customer Time of Use Tariffs

SP AusNet has received approval from the AER to introduce a Time of Use Tariff for small commercial and residential customers from 2010. However, SP AusNet has agreed with the Victorian Government to a moratorium on their introduction. The following table outlines SP AusNet’s proposed tariff structure in detail.

SP AusNet’s approved energy based Time of Use tariff is designed to best reflect the system utilisation during peak periods, without having to disaggregate that price signal by either peak day demand, or by location.

SP AusNet has modelled the impact that its 2010 Time of Use tariff structure will have once rolled out to all residential and small commercial customers between now and 2013. This impact concludes the tariff will achieve both:

- ‘Load redistribution’ - the amount of energy that is redistributed to lower priced energy components (eg: off peak energy) in response to a change in the relative prices of different energy components (eg: peak energy price/off peak energy price).

- ‘Load lost’ - the extent to which the consumption of energy will cease as a result of a price rise being applied to that product; and

While the first effect is the most important from a DNSP point of view the second effects aligns with current government carbon abatement and energy efficiency policies.

Table 15.2: SP AusNet's approved Time of Use Tariff (under moritorium)

LV Tariffs (<160 MWh)	
Tariff Component	**Proposed Tariff**
Summer Peak Demand Period	2pm-6pm weekdays between December and March, with the price broadly based on an estimate of SP AusNet's long run marginal cost (LRMC) of supply.
Summer Shoulder Period	The 'shoulder' period consumption will be based on energy consumed between 12pm-2pm and 6pm-8pm weekdays between December and March, with the price being broadly based on a ratio of average utilisation during this period on peak demand days (eg: around 85%) multiplied by the summer peak demand charge.
Winter Peak Demand Period	4pm-8pm weekdays in Winter (June-August), with the price being broadly reflective of the ratio of winter peak day demand to summer peak day demand multiplied by the summer peak demand charge.
Off Peak Charge	An off-peak charge will be applied to all other usage.
Standing Charge	A different standing charge will be maintained between different groups of customers (eg: residential and small commercial) to ensure overall revenue is retained within upper and lower bounds.

International Smart Meter Trials

Selected Case Studies

Smart Tariffs and Customer Stimuli

The following smart meter trials are summarised in this note :

1. **Ontario Energy Board Smart Price Pilot**
2. **Country Energy Smart Metering Trial, New South Wales, Australia**
3. **Energy Australia Strategic Pricing Study**
4. **California Statewide Pricing Pilot**
5. **Norway Trial**
6. **Tempo Tariff, EdF France**
7. **California Information Display Pilot**

The trial results are classified into **quantitative** results i.e. measurable, and the **qualitative** or intangible results.

The quantitative results have been further broken down into:

- Peak Load Reduction
- Overall Electricity saving

Peak Load Reduction can be defined as a measured reduction in the electricity used during peak or critical peak periods. This may either be a shifting of usage to other time periods, or may be an absolute saving.

Overall Electricity saving is where there has been an actual reduction in the overall electricity used, not just a shifting from peak periods.

Sustainability First and Engage Consulting Limited

May 2008

Summary

Trial	Peak Load Impact
Ontario Energy	Ranged from 5.7% for TOU-only participants to 25.4% for CPP participants
Country Energy, Australia	Reduction of 30% across peak periods
EnergyAustralia	Reductions on days with a CPP event of between 5.5% and 7.8%
California Statewide	Reductions in demand ranging from 13-27%
Norway	8-9% reduction at peak

Trial	Meters and Tariffs	Quantitative Results	Stimuli Used	Qualitative Results
Ontario Energy Board Smart Price Pilot (OSPP)	Smart meters and Time Of Use (TOU) tariffs including Critical Peak Price (CPP) and Critical Peak Rebate (CPR)	Load shifting during critical peak hours ranged from 5.7% for TOU-only participants to 25.4% for TOU and CPP No significant load shifting from On-Peak periods as a result of the TOU price structure alone. A 6.0% average conservation effect across all customers - 6.0%, 4.7%, and 7.4% for TOU, CPP, and CPR customers, respectively.	Refrigerator magnet with TOU pricing tables Conservation brochure with conservation tips Monthly usage statements	Customers liked the monthly usage statement and refrigerator magnet Bi-monthly billing was not seen as adequate for smart meters Presenting TOU prices and periods in a clear, concise and durable format was important Participants often duplicated the magnet information near thermostats, where they would be making decisions about running major appliances
Country Energy, NSW, Australia	Smart meters and TOU tariffs including CPP	CPP events triggered up to 30% load decrease, though effect reduced over time. Load shifting, not conservation	LCD Display - hourly, weekly, monthly spend Display had LED 'traffic lights' to show the tariff level.	Positive customer feedback – liked traffic lights
EnergyAustralia	Smart meters and TOU	Reductions in total daily energy use on days with a	Connected display of Peak	None identified

Strategic Pricing Study	tariffs including CPP	CPP event of between 5.5% and 7.8% mainly due to a reduction in air conditioning.	Pricing info	
California Statewide Pricing Pilot	Smart meters and TOU tariffs including CPP	CPP rates produced reductions in demand ranging from 13-27% for CPP-V trials Little reduction in consumption for CPP-F customers. Load shifting reduced to almost zero in the ToU group by end of the second year	Web-based bill analysis Monthly scorecard of costs Mail reports for non-web customers	Customers that received information were seen to alter energy consumption patterns initially only.
SINTEF Energy Research, Norway	Smart meters and TOU tariff Automatic load control of water heaters	Average electrical peak-load reduction of 500 watts per customer	Hourly meter readings Discounts for auto load control	Customers appeared unresponsive to a spot price
Tempo Tariff, EdF, France	Smart meters and TOU tariff Automatic load control Demand subscription	None	Meter had 'traffic lights' display to show the tariff level. SMS alert option	None
California Information Display Pilot	Energy orb and CPP tariff	Residential customers using the energy orb reduced demand during critical events	Energy orb that changed colour with price Detailed Monthly usage Bill analysis report	Very small sample – 62 customers. Over two-thirds of the residential customers said the orb changed their behaviour, but not the commercial customers. Only two customers said they would pay over $25 for the orb.

1. Ontario Energy Board Smart Price Pilot (OSPP)

Trial design and key features

- Trial run by the Ontario Energy Board – the regulator;
- Ran from August, 2006 - February 28, 2007;
- Participants - 375 of Hydro Ottawa's residential electricity customers; plus a control group of 125 customers. All participants had smart meters that had been installed prior to August 2006;
- 90% of participants had air conditioning ; 82% gas heating; 9% electric heating;
- Customers were placed into one of three pricing groups or a control group:
- The existing RPP TOU prices (3.5c/kwh; 7.5c/kwh; 10.5c/kwh);
- Adjusted RPP TOU prices with a critical peak price (CPP – 30c/kwh, but off peak rate reduced to 3.1c/kwh);
- RPP TOU prices with a critical peak rebate (CPR) - a refund of 30¢ for every kWh reduction below their "baseline" usage during the critical peak hours.
- Control group - 125 customers who had smart meters but continued to pay regular tiered (non-TOU) prices.

Trial objectives

Ontario Energy Board had three main objectives for the trial:

- To assess the extent to which various time-sensitive pricing structures cause a shift of electricity consumption to off-peak periods as measured by the reduction in peak demand;
- To assess the extent to which each price structure causes a change in total monthly electricity consumption;
- To investigate the understandability of and acceptability by residential consumers of each pricing structure and the communications associated with each.

Stimuli Provision

- Customers received monthly Electricity Usage Statements in addition to their bi-monthly electricity bills. Upon enrolment, participants were provided with a refrigerator magnet, and a PowerWise electricity conservation brochure;
- Refrigerator magnet - provided a table of the prices, times, and seasons for the participant's price plan;
- PowerWise brochure - provided a variety of conservation tips for electricity consumers during peak times or anytime;

- Monthly Electricity Usage Statements - showed electricity supply charges on their respective pilot price plan. These statements emphasized the amount of electricity consumed (in each pricing period) and the TOU price of electricity (in each period by day).

Quantitative results

Peak Load Reduction

- A statistically significant shift in load away from peak periods was measured during On-Peak periods on two critical peak days called in August for all three price groups. No statistically significant shift was detected during the critical peak days declared in September or January;
- The load shifting during critical peak hours across all four summertime critical peak days ranged from 5.7% for TOU-only participants to 25.4% CPP participants;
- Load shifting away from the On-Peak period for all days in the pilot, not just critical peak days, was also analyzed. These results showed no applicable statistically significant load shifting from On-Peak periods as a result of the TOU price structure alone.

Overall Electricity Saving

- The analysis compared the usage of the price message and control groups before the pilot, then after going on the pilot;
- These results show a 6.0% average conservation effect across all customers. 6.0%, 4.7%, and 7.4% for TOU, CPP, and CPR customers, respectively. All of the results are statistically significant.

Qualitative results

- Survey and focus groups were conducted to assess participants' views of the pilot.
- Participants particularly valued the monthly usage statement and refrigerator magnet as the most useful resources to help understand the TOU prices, overshadowing the fact sheet, brochure, or any other pilot communications materials;
- There was a consensus among participants that bi-monthly billing frequency was not adequate within the context of smart meters and TOU pricing;
- The focus groups underscored the importance of presenting TOU prices and periods in a clear and concise format, and a durable and reproducible form - virtually all participants found the prices understandable "because of the magnet";
- Participants often duplicated the information on the magnet to post in kitchens, laundry rooms, and near thermostats, where they would be making decisions about running major appliances such as dishwashers, laundry machines, and air conditioners.

2. Country Energy Smart Metering Trial (NSW, Australia)

Trial design and key features

- Energy Efficiency trial started in 2004;
- Voluntary participation - Residential sector - 200 homes;
- Smart meters + in-house displays + time of use tariffs;
- LCD Display provides customers with information about the amount of electricity they are using, and how much it is costing (hourly, weekly, monthly);
- Display also had LED 'traffic lights' to show the tariff level;
- A beeping sounds alerts customers to the start of a critical peak period;
- Designed to test customer response to tariffs that reflect system costs;
- Off-peak (green - 7.03c/kwh), shoulder (green - 12.7c/kwh), on-peak (amber - 18.87c/kwh) and critical peak (red - 37.74c/kwh) rates;
- Critical peak may occur a maximum of 12 times a year; customers given 2 hours notice;
- In winter the peak period was from 7 am to 9 am and 5 pm to 8 pm to coincide with the period of maximum use of domestic space heaters;
- Households who responded to price signals saved money;
- Three surveys and a focus group to obtain feedback1. Also a 'Trial Helpline'.

Trial objective

The main objective of the trial was to understand the customers' willingness to change their electricity consumption patterns if provided with information about consumption patterns and costs at different periods throughout the day.

Stimuli Provision - in-house displays

- Each participant was supplied with a smart meter, a powerline interface module with GSM capability, a home energy monitor, and a back office software system capable of managing the data provided;

[1] Interval Meter Technology Trials and Pricing Experiments - Issues for Small Consumers. Institute for Sustainable Futures. University of Technology, Sydney, for Consumer Utilities Advocacy Centre. July 2006

- The home energy monitor was equipped with an LCD display with traffic light signalling to indicate high, medium and low price periods and was also capable of displaying real time costs and consumption information;
- Quarterly bills also provided additional information on comparative usage and consumption;
- During the trial participants were informed of critical peak pricing events via email SMS text messaging and via the home energy monitor;
- These events were indicated via a red LED and an audible warning on the home energy monitor.

Quantitative results

Peak Load Reduction

- The first critical peak event March 2005 yielded a 30% reduction in load;
- Demand decreased significantly during the CPP periods, but increased after the end of the periods;
- Overall results showed a reduction of 30% across peak periods.

Overall Electricity Saving

- Overall results indicated that participants reduced their energy consumption by an average of 5%.

Qualitative results

- The majority of customers achieved a saving on their electricity bill;
- The conclusion was mixed, but mainly positive results – but load shifting rather than conservation;
- Customer feedback largely positive – all participants keen to continue use of trial equipment; 80% welcomed / tolerated critical peak;
- Customers who claimed little knowledge about energy efficiency at the start, claimed high/very high understanding by the end;
- Traffic lights worked well to inform customers of different tariff periods;
- No specific information on impact of in-home displays.

3. Energy Australia Strategic Pricing Study

Trial design and key features

- Took place in 2006-07;
- Covered 750 residential customers and 550 business customers;
- All have a smart meter; some have an in-house display connected to the meter;
- The experimental groups comprise:
  - a control group;
  - a group provided only with information about peak load reductions;
  - a group placed on a seasonal TOU tariffs;
  - one group placed on a medium critical peak pricing tariff with an in-house display; and
  - two groups placed on a high critical peak pricing tariff with and without an in-house display.
- Critical peak prices were particularly high - $1 or $2/kwh.

Trial objectives

The main objectives of the Energy Australia research were to:

- Measure peak load reductions from price signals - to estimate capital and maintenance deferral, lower energy costs;
- Measure elasticity (own price, cross price and substitution) within consistent and acceptable ranges;
- Test new tariff products, assess take-up potential;
- Gain experience in managing customer communications;
- Examine effect of education and information, no price signal;
- Compare customer response:
  - Between business and domestic customers;
  - Between different price points;
  - Between customers with and without in-house displays.

Stimuli Provision - in-house displays

The trial was divided in to three groups:

- One trial group received information via in-house displays that received peak pricing information;
- A further trial group were placed on a seasonal pricing plan; and
- The third trial group received information only.

Quantitative results

Peak Load Reduction

- Demand decreased significantly during CPP periods, but increased after the end of the periods;
- In summer, CPP tariffs achieved reductions in consumption during critical peak periods equivalent to reductions in total daily energy use on days with a CPP event of between 5.5% and 7.8%;
- Much of this saving came from reduced use of air conditioning;

Overall Electricity Saving

- There was not a great deal of shifting of consumption from the critical peak period to shoulder, off-peak or non peak periods, so the majority of the reductions in CPP periods seen, resulted in electricity conservation;
- The trial also found that energy consumption during the critical peak period was between 21% and 25% of the total average daily consumption on non-critical peak day.

Qualitative results

- There is no information on the differences between the groups or the impact of the displays.

4. California Statewide Pricing Pilot

Trial design and key features

- Ran from July 2003 to December 2004;
- 2,500 customers;
- Several different rate structures were tested:
  - a traditional time-of-use rate (TOU), where price during the peak period was roughly 70 percent higher than the standard rate and about twice the value of the price during the off-peak period;
  - two varieties of critical peak pricing (CPP) tariffs, one that had fixed CPP and day ahead pricing (CPP-F) and one that had variable CPP and day of notification(CPP-V). The peak period price during a small number of critical days was roughly five times higher than the standard rate and about six times higher than the off-peak price;
- An information only group was included in the pilot - customers were given educational material on how to reduce loads during peak periods, and were notified when critical days were called but were not placed on time varying rates.

Trial objectives

The main objectives of the California State Wide pilot were:

- to research the impact of ToU programmes alongside two variances of Critical Peak Pricing (CPP);
- to determine customers' responses to time varying rates and impact on energy consumption by rate period; and
- to develop models that allow these impacts to be predicted under different pricing models.

Stimuli Provision – web based billing information

- Participants on the pricing pilot were provided with a Web-based energy bill analysis system;
- Based on customer provided survey information and hourly meter data, customers received a monthly bill "Scorecard" with a personalized examination of the costs of air conditioning, lighting and other appliances during critical peak periods, and what could be saved by managing how those appliances are used;
- The information group had a personalised Web page for each participant, as well as monthly e-mails and notices the evening before a "Critical Peak" day, when rates are especially high from 2 to 7 p.m.;
- Customers without Internet access received mail reports.

Quantitative results

Peak Load Reduction

- The CPP rates produced reductions in demand ranging from 13-27%;
- The 27% response was achieved where direct load control (mainly for air conditioning) was used (in these cases two thirds of the response is due to load control and one third to behavioural response);
- Within the CPP-F trial group load shifting was observed with a shift in energy usage of 13.1% from peak periods on critical days, it also concluded that no overall reduction in energy consumption occurred on an annual basis within this trial group;
- TOU responses were much lower – 0-6%;
- Load shifting was also initially observed in the ToU group, however, in the second year of the trial this effect was seen to reduce to almost zero. If these results are accurate (sample sizes were small) then they are potentially important for informing the ToU rates that will need to be put in place to have any sustainable impact;
- The greatest load shifting was observed in the CCP-V customers. It was concluded that this was a result of the up-take of enabling technology. This group were offered three enabling technologies electric heater controls, pool pump controls, or smart thermostats;
- CCP-V customers were split into two further groups ones that were offered the choice of technology (Track A) and ones that had smart thermostats fitted in a previous trial (Track C). The load shifting observed in track A customers equated to 16% the load shifting observed in track C customers was 27%.

Overall Electricity Saving

- No overall reduction in energy consumption occurred on an annual basis within the CPP-F trial group.

Qualitative results

- The customers that received information/education were seen to alter energy consumption patterns initially, however there was no response in the second year of the trial;
- Households with central air conditioning were more price responsive and produced greater absolute and percentage reductions in peak-period energy use than did households without air conditioning;
- Demand response impacts were lower in the winter than in the summer;
- There was essentially no change in total energy use across the entire year based on average prices. That is, the reduction in energy use during high-price periods was almost exactly offset by increases in energy use during off-peak periods;
- No information is available about the effectiveness of the bill information, comparing the participating customers to a control group of similar customers on the same rate.

5. Norway Case Study – Time of Day Tariff with Automated Load Control, SINTEF Energy Research, Norway – plus very small pilot (41 households) with fridge magnets

Trial design and key features

- A three-year study of over 10,000 customers in two Norwegian network areas, (over 75% households), from 2001 – 2004;
- Main features were:
  - hourly meter reading;
  - two-way communication;
  - time-related tariffs[2]; and
  - 50% of households to be given automated load-control of electric water heaters via the two-way meter communications link.

Trial objectives

The objective of this trial was to evaluate different incentives to stimulate flexibility in electrical load-shifting and consumption, linking to both network and to power-market prices.

Stimuli Provision – fridge magnets

- A small selection of the pilot (41 households) were each given a fridge magnet as a reminder about when it was high-cost to run appliances such as the dish-washer and washing machine;
- Automated load control of water heaters.

Quantitative results

Peak Load Reduction

- In the pilot, observed demand-response reflected an average electrical peak-load reduction of 500 watts per customer (600 when network losses included). This represented an 8-9% reduction at peak, mainly assumed to be via automatic load control of water heaters;
- Customers with a time-differentiated network tariff and / or spot-price-related power products registered a reduction in consumption of up to 1

[2] Tariffs incorporated: a fixed element ; a network loss element ; and, a variable time-of-use element activated only in peak hours (weekdays 9-11 and 17.00h – 19.00h). The time-of-use element contained a peak-network element for households (0.15 eurocents per kWh) and a 10 euros per KW for industrial consumers only. In addition, suppliers piloted different options of an hourly spot price ; a fixed price with a discount for automatic load control at times of high spot price ; and a combination of a fixed price and spot price.

kWh/hour in high price periods;

- Without automated load-control, customers appeared unresponsive to a spot price;
- The study concluded that there was a potential for generating peak-load reduction across Norway of 600 MW, based on scaling up the pilot to the 2 million household customers in Norway.

Overall Electricity Saving

- In a separate, very small (41 households) Norwegian pilot, with automated load control of water heaters, customers also reduced consumption of their 'responsive' electrical appliances.

Qualitative results

- Customers responded better to predictability, in respect of load reduction (i.e. known and understood price-periods);
- The four Norwegian pilots experienced more technology-related problems than anticipated at the outset.

6. Tempo Tariff – EdF, France – Critical Peak Price Tariff with SMS and Traffic Light System

Trial design and key features

- This combined a demand subscription, a ToU background tariff, and CPP with automated load control;
- Customer subscribed to a demand level of 9kVA or more. (This is the norm - all residential and small commercial consumers in France subscribe to a pre-agreed demand level which they cannot exceed);
- EdF communicated price level by sending signal to home – 300 blue non-critical days ; 45 white semi-critical days ; 22 red critical days. Weekends – always blue;
- Signal sent at 20.00h one-day ahead to a meter / display plugged into socket because signal sent by power-line carrier – meter showed traffic light system display. (Customer also had option of SMS alert);
- Display capable of showing both current and cumulative consumption;
- Customer was able to programme space and water heating controls in response to the electricity price for a given colour and time of day.

Trial objectives

The objective of this trial was to evaluate the impact on consumption of a demand subscription in combination with ToU and CPP tariffs.

Stimuli Provision – traffic light system / SMS

- The customer was provided with a meter/display that showed traffic light system display;
- Customer also had option of SMS alert.

Quantitative results

Trial discontinued.

Qualitative results

None.

7. California Information Display Pilot - Energy Orb together with Detailed Monthly Usage and Bill Analysis[3]

Trial design and key features

Energy Orb

- Feedback device produced by Ambient Technologies – a small glass ball that changes colour as prices change. (Developed for stock-market portfolio management originally);
- California Information Display Pilot4 - energy orb used with CPP rates;
- Orb changed colours as the tariff increased – and flashed for four hours prior to a critical peak;
- 62 customers in pilot. Small sample size - not statistically significant.

Detailed Monthly Usage and Bill Analysis Report / Newsletter

- In addition to measuring orb impact, California Information Display Pilot measured impact of monthly 'newsletter' for customers with AMI. The 'newsletter' was sent by mail, e-mail or via web-access;
- The newsletter provided:
  - Detailed breakdown of customer usage pattern for previous month;
  - Suggestions for reducing energy bills'
- Newsletter drew from bill inputs and pre-pilot customer survey information to give comparisons in 'report-card' format against customer's prior month's usage - and to compare customer usage with other customers;
- Newsletter provided customer-specific information about critical peak consumption and benefits of load-shifting.

California Bill Analysis Pilot, 2005 – Web-based Information[5]

- Nexus Energy Software trial in 2005 of web-based feedback on the demand impact from bill-analysis for customers on residential CPP tariffs;
- 152 customers in the trial with 118 in the control group;
- Bill analysis presented customized content to participants via a website based on their home energy survey data and monthly bill data. It also provided personalized recommendations for achieving energy savings.

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[3] Edison Electric Institute. Quantifying the Benefits of Dynamic Pricing in the Mass Market. Brattle Group (Faruqui A and Wood L). Jan 2008

[4] Nexus Energy Software, Opinion Dynamics Coroporation and Primen 'Information Display Pilot, Final Report' January 2005.

[5] Council of Australia Government and Australia Ministerial Council on Energy. Federal CBA Report. March 2008. NERA Report for Workstream 4 on Consumer Benefits and Appendix. p 135. NERA source cited as presentation by NEXUS. 18 April 2006.

Trial objectives

The objective of the trial was to assess the change in customer behaviour of the energy orb in conjunction with web-based or mailed bill analysis.

Stimuli Provision

- An energy orb that changed colours as the tariff increased;
- Bill analysis either by mailed report or via the web.

Quantitative results

Peak Load Reduction

- Residential customers using the energy orb reduced demand during critical event – and also during prior-4 hour period;
- However, the average load reductions across the peak-period of customers receiving bill analysis were not found to be statistically significant.

Overall Electricity Saving

None identified.

Qualitative results

Energy Orb

- 70% residential customers said the orb changed their behaviour – but not commercial customers;
- Only two customers said they would pay over $25 for the orb;
- Customers indicated that the energy orb was a more effective tool than the newsletter for inducing behaviour change.

Detailed Monthly Usage and Bill Analysis Report / Newsletter

- 30% of customers (residential and commercial) said that the newsletter led to changes in their behaviour. The remaining customers said it did not change their behaviour, or even did not recall the newsletter.

California Bill Analysis Pilot, 2005 – Web-based Information[6]

- 77% of participants visited the website at some point. (Nexus suggest that for comparable utility websites offering bill information around 1-3% of a population visits a website on their own when informed of its benefits);
- 46% of survey respondents said they took actions during the critical peak periods that they would not have if they had not received the bill analysis;
- 49% of respondents stated that they took additional actions during regular peak periods because of the bill analysis.

[6] Council of Australia Government and Australia Ministerial Council on Energy. Federal CBA Report. March 2008. NERA Report for Workstream 4 on Consumer Benefits and Appendix. p 135. NERA source cited as presentation by NEXUS. 18 April 2006.

Appendix A - Advantages of Potential Stimuli in conjunction with Time-Varying Tariffs

The table below compares the cost, ease (to customer and supplier) and likely benefit of the various stimuli used in the trials.

Feedback / Stimulus	Ease to Deploy	Cost	Ease for Consumer	Examples –Annex A for Detail	Customer Experience / Feedback	Potential Energy Saving Impact
Basic Printed Information **(leaflets, bills)**	✓✓✓	Low	Easy to understand / retain.	California Pricing Pilot – had info only sub-group Ontario	D/K	California – no change shown in info-only group
In-Home Display – can give info to customer about : -Consumption -Price of electricity in real-time -Messages from supplier to customer	✓✓	UK estimate (Sustainability First Report 2007) – c. £25 per display – plus possible installation cost – if not installed at same time as meter – or if not self-installed.	Small consumer electronics sometimes not user-friendly. Could be a tendency to over-complicate (KWh, carbon, cost-info, daily, weekly, monthly).	Limited pilot experience with time-varying tariffs -Country Energy. NSW - Energy Australia - UK Energy Demand Reduction Research	D/K D/K Not yet	Country Energy - Load-shifting rather than conservation

Feedback / Stimulus	Ease to Deploy	Cost	Ease for Consumer	Examples –Annex A for Detail	Customer Experience / Feedback	Potential Energy Saving Impact
Printed Consumption Reports	Investment in new processes to generate individual printed report & mail-out –& link to individual meter data	Could be material	Likely to be easy to understand / retain – ongoing reminder.	-Ontario – monthly Electricity Usage Statements as well as bi-monthly electricity bill. -California – only when customer did not have web-access.	D/K	Ontario – both peak and conservation effect.
Web-based Information / Feedback	Considerable experience in I&C sector – increasing off-the-shelf packages.	May be more economic than printed monthly consumption reports.	Highly dependent on: - internet access – pre-defines customer profile in sample - customer willingness to engage	California Pricing Pilot Denmark – Electricity Saving Trust Scheme - Elsparefonden (see their website).	California – Nexus report suggests that – almost three-quarters of sample visited web-site at some point. - around half took action during critical peak as a result.	California – load-shift not conservation
Tariffs – Visual Reminders –eg fridge magnets	✓✓✓ clear concise, visible, durable eg magnet 'Clock-face' display of	Low	✓✓✓	Ontario Norway – 41	Focus groups – very positive on magnet Norway - Positive feedback on magnet	Ontario – conservation effect. Norway – conservation effect exceeded automatic load-control of

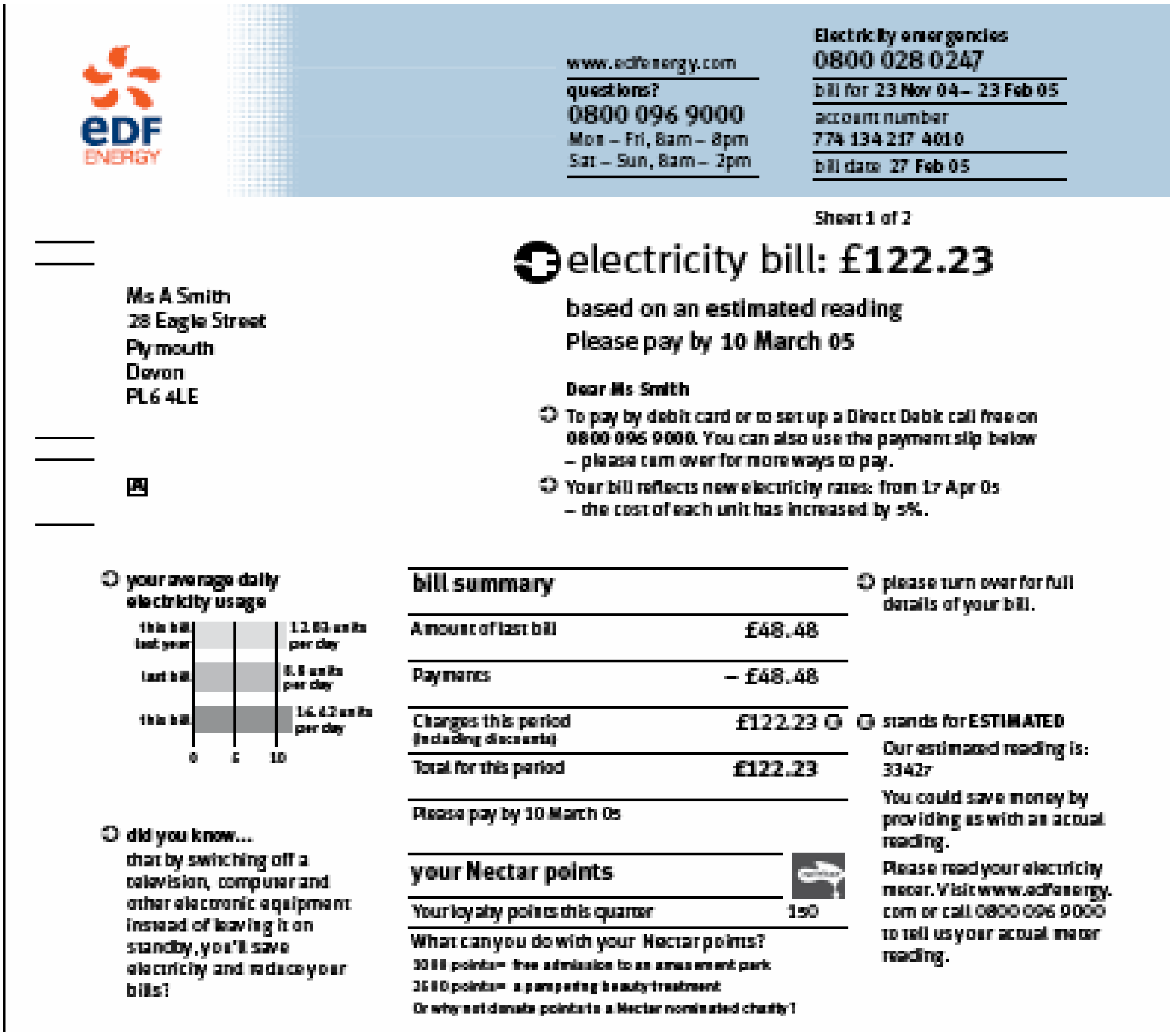
Feedback / Stimulus	**Ease to Deploy**	**Cost**	**Ease for Consumer**	**Examples –Annex A for Detail**	**Customer Experience / Feedback**	**Potential Energy Saving Impact**
	prices, times (Norway)			electrically heated homes		electric heating / hot water
Pilot Helpline	✓✓✓	Low	✓✓✓	Country Energy	D/K	D/K
CPP Alerts **- SMS** **- Email** **- Traffic-lights on meter / IHD** **- Colour-Changing Orb**	Some form of alert – or combination of alerts – necessary to advise customer of critical event.			Country Energy CPP – traffic lights France – Tempo tariff – included SMS-text plus traffic light system on meter. California Info Display Pilot.		California CPP – included automatic load control.

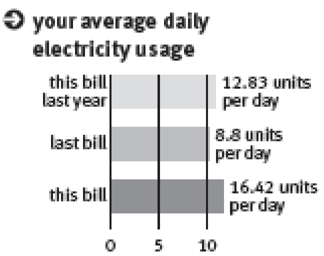
Appendix B - Samples of Bills and Statements

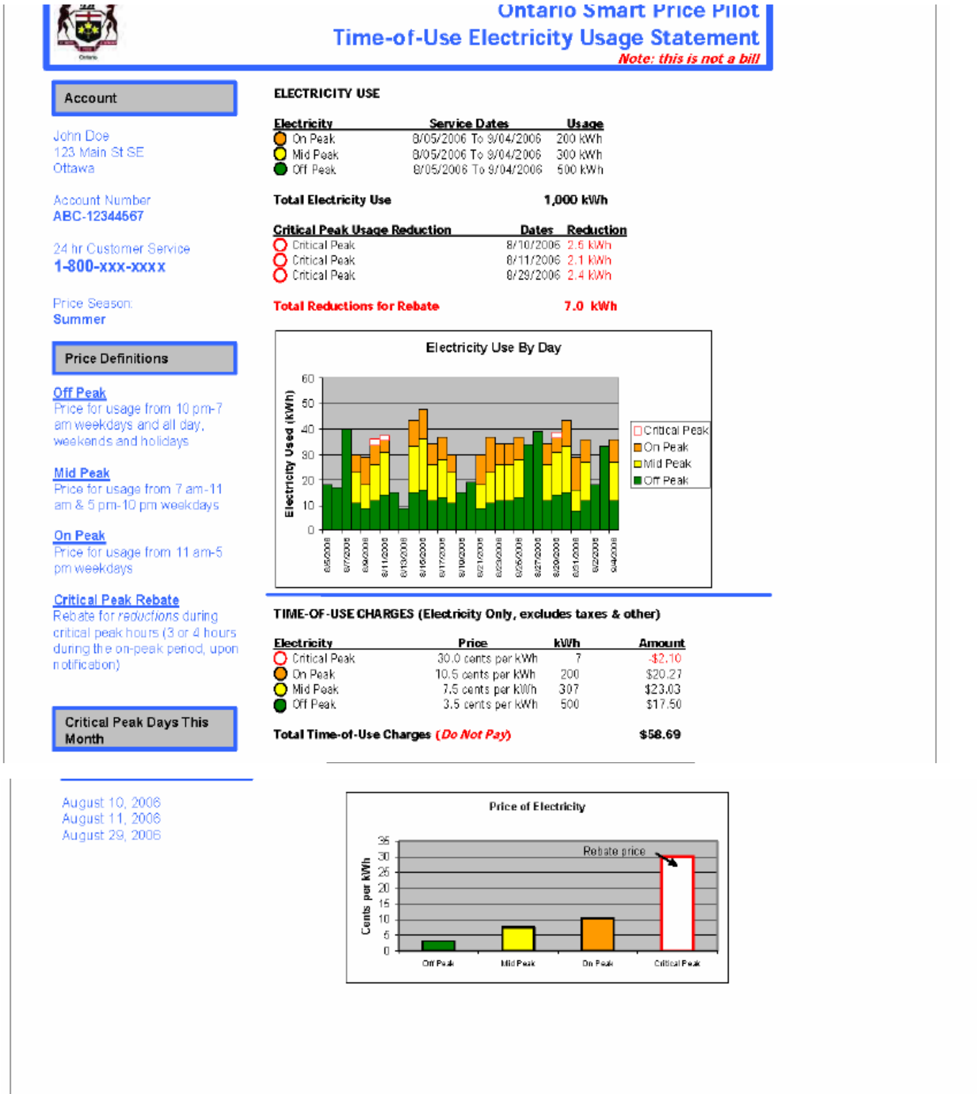
This appendix shows two examples of electricity bills and the consumption information that can be provided.

1) The first bill includes basic information about daily use and comparison of this with the customer's previous bill and with the same time last year. It also includes nectar points which are used as an incentive/stimulus for reducing consumption.

2) The second bill contains more sophisticated analysis including day by day analysis of usage and consumption by time of day including CPP usage / rebates.







Ontario Smart Price Pilot
Time-of-Use Electricity Usage Statement
Note: this is not a bill

Account

John Doe
123 Main St SE
Ottawa

Account Number
ABC-12344567

24 hr Customer Service
1-800-xxx-xxxx

Price Season:
Summer

Price Definitions

Off Peak
Price for usage from 10 pm-7 am weekdays and all day, weekends and holidays

Mid Peak
Price for usage from 7 am-11 am & 5 pm-10 pm weekdays

On Peak
Price for usage from 11 am-5 pm weekdays

Critical Peak Rebate
Rebate for *reductions* during critical peak hours (3 or 4 hours during the on-peak period, upon notification)

Critical Peak Days This Month

August 10, 2006
August 11, 2006
August 29, 2006

ELECTRICITY USE

Electricity	Service Dates	Usage
On Peak	8/05/2006 To 9/04/2006	200 kWh
Mid Peak	8/05/2006 To 9/04/2006	300 kWh
Off Peak	8/05/2006 To 9/04/2006	500 kWh
Total Electricity Use		**1,000 kWh**

Critical Peak Usage Reduction	Dates	Reduction
Critical Peak	8/10/2006	2.5 kWh
Critical Peak	8/11/2006	2.1 kWh
Critical Peak	8/29/2006	2.4 kWh
Total Reductions for Rebate		**7.0 kWh**

TIME-OF-USE CHARGES (Electricity Only, excludes taxes & other)

Electricity	Price	kWh	Amount
Critical Peak	30.0 cents per kWh	7	-$2.10
On Peak	10.5 cents per kWh	200	$20.27
Mid Peak	7.5 cents per kWh	307	$23.03
Off Peak	3.5 cents per kWh	500	$17.50
Total Time-of-Use Charges (*Do Not Pay*)			**$58.69**

Sample Smart Price Pilot Program Final Statement – Customer with *Savings* on Time-of-Use Prices