Oakley Greenwood

The potential for a revised approach to profiling to encourage greater levels of DSP among non-interval read residential consumers

Melbourne +613 9486 0897 Sydney +612 8006 8107 Adelaide +618 8331 1358 Brisbane +617 3263 7612

DOCUMENT INFORMATION

Project	The potential for a revised approach to profiling to encourage greater levels of DSP among non-interval read residential consumers
Client	Australian Energy Market Commission
Status	Research memo
Report prepared by	Lance Hoch (lhoch@oakleygreenwood.com.au)
Date	July 2012

Table of CONTENTS

1. Purpose and approach

The AEMC has noted that:

> *Where consumers have an accumulation meter, their total volume of electricity consumed over a period of time can be measured by reading the meter, but their pattern of consumption within that period is not measured. Hence, for the purposes of charging second tier retailers[1] the pattern is assumed to match an average daily profile. Therefore retailers will attempt to purchase electricity in the wholesale market to match the average consumption profile, and any over- or under-contracting will be charged against that profile. As a result, retailers do not benefit from consumers shifting consumption from peak periods where those consumers have accumulation meters.*

The AEMC decided to investigate this matter further as part of the *Power of Choice Review*, and requested a research memo providing:

1. A description of AEMO's current methodology to calculating load profiles
2. A description of what changes need to be made to move to more accurate load profiles (i.e., how could this option work, what are the design choices)?
3. A discussion on whether this option would be effective in changing retailers' incentives to do DSP, including a high-level commentary on the costs of doing this and possible impacts on retailers and consumer behaviour, taking into account the fact that:
   a. retailers may only be incentivised to change behaviour up to the new deemed profile and that any extra change in load profile above the new profile will not be rewarded, and
   b. this could be an interim solution before greater deployment of interval/smart meters across the NEM.

---

1 A second tier retailer is any retailer other than the retailer that served as the incumbent retailer in a given area prior to the commencement of FRC in that area. It is important to note that a second tier retailer is not necessarily a new entrant retailer to the NEM as a retailer who is a first tier retailer in one area can be a second tier retailer in another area. For example, AGL is the first tier retailer in South Australia, having purchased the retail business of the Electricity Trust of South Australia, which had previously served as a vertically integrated monopoly provider in South Australia. However, AGL is considered a second tier retailer in New South Wales.

Settlement is undertaken on a distribution area basis using a Net System Load Profile (NSLP) which is developed as follows:
1. The NSLP is established by removing all interval metered loads, or other loads as agreed in the settlement procedure for the NEM region including controlled loads and deemed unmetered loads;
2. Each second tier retailer is settled based on the aggregate load of its accumulation meter customers shaped to the NSLP and the applicable half-hourly wholesale market prices; and then
3. All remaining energy is assumed to have been served by the first tier retailer to accumulation metered customers, so is shaped to the NSLP and settled to the account of the first tier retailer based on the applicable half hourly wholesale market prices. As this makes clear, the first tier retailer bears any risks associated with any metering or profiling errors.

4. Consideration of whether information from interval read or smart metered consumers should be used in the setting of deemed load profiles for non-interval consumers, and whether AEMO's profiling and settlement methodology could be changed to do so.

5. Consideration of whether the current profiling methodology will continue to be effective as more interval meters are deployed to residential customers.

In sum, these questions seek to assess whether a revised approach to deemed load profiles could provide stronger signals to retailers to use demand-side initiatives to influence their customers' consumption patterns.

These issues are explored in the following sections of this memo:

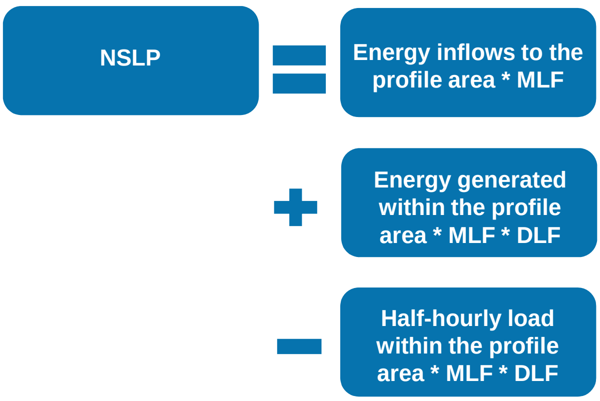
- Section 2 reviews how load profiles are currently developed in the NEM and briefly discusses alternative approaches from the UK and the US;
- Section 3 posits a set of rationale and criteria that could be used for considering alternative load profiling options in the NEM, and evaluates the current load profiling approach and three alternatives that could be employed in the NEM using those criteria;
- Section 4 comments on whether and the degree to which the deployment of more interval meters could be expected to impact on the effectiveness of the NSLP; and
- Section 5 provides final comments and conclusions.

2. Load profiling approaches used in Australia, the UK and the US

2.1. AEMO's methodology for calculating load profiles

The load profile that applies to residential (and small commercial) customers with accumulation meters is calculated on a net basis at the distribution system level. Figure 1 provides an overview of the calculation process.

Figure 1: Overview of the NSLP calculation process



Where: MLF = marginal loss factor, and
DLF = distribution loss factor.

In NSW, SA and the Energex distribution service territory, a controlled load profile (CLP) is also calculated to account for end-use loads that are controlled by the distribution network service provider (e.g., controlled water heating). This profile is calculated within each distribution service area from a sample of approximately 200 interval meters installed specially for this purpose. The CLP is used to convert the basic meter readings into the net consumption attributable to the consumption meter

The NSLP applies differently in the various NEM jurisdictions, based on the level to which interval metering has been undertaken. The threshold for load profiling in the various jurisdictions is as follows:

- 160MWh pa in VIC, SA, ACT
- 150 MWh pa in NSW
- 100 MWh pa in QLD.

2.2. The UK

The UK set up a Profiling Taskforce in 1994 to define the number and types of profiles to be used in settling the then Electricity Pool. The primary reason that a profiled solution was chosen was "to avoid the huge and prohibitive costs" of putting half-hourly metering into the premises of every customer. Adding to the barrier that cost comprised was the fact that the meters of most residential and small business customers in the country were located inside the buildings, making them very difficult to access for meter readings. As a result, most bills were based on estimates, and only one physical read of the meter was required each year.

A Profiling Taskforce developed the following eight generic profile classes to apply to all customers with loads below 100 kW maximum demand, each of which represented a 'large population of similar customers':

- 01 Domestic Unrestricted
- 02 Domestic Economy 7
- 03 Non-domestic Unrestricted
- 04 Non-domestic Economy 7
- 05 Non-domestic Maximum Demand 0-20% Load Factor
- 06 Non-domestic Maximum Demand 20-30% Load Factor
- 07 Non-domestic Maximum Demand 30-40% Load Factor
- 08 Non-domestic Maximum Demand >40% Load Factor)

However, even prior to the development of the profiles many of the customers in the UK market had meters more sophisticated than the simple accumulation variety, and it was this more sophisticated metering that supported the development of the profiles. Customers on the two Economy 7 tariffs already had two-register meters, and customers placed on the non-domestic load factor profiles were those that had already had demand register meters installed. Another difference between the UK and Australia at the time was that all UK electricity customers received monthly (rather than quarterly) bills.

The profiles were stratified by consumption and weighted across 12 grid supply point GSP areas within the country. Half hourly profiles were developed for each profile group for each of 3 day types (weekdays, Saturdays and Sundays) for each of 5 seasons (Autumn, Winter Spring, High Summer and Summer).

However, within a year the number of profiles grew to over 200.. This was due to two factors:

- The key driver was the retail market. In order to ensure that the profiles continued to represent 'similar customers', a new profile (or Standard Settlement Configuration) needed to be created whenever a new retail product with a different load-switching variation through pricing signals or load controls was introduced; and

- Any groups of customers who could make the case that their consumption differed in some discernible way from the larger group in which they were billed could also seek the creation of a new profile group.

The UK has subsequently moved to a universal metered solution. In October 2008 the UK Government announced its intention to mandate a rollout of electricity and gas smart meters to all homes, with the aim of completing the rollout by the end of 2020. The Office of Gas and Electricity Markets (Ofgem) led the phase one of the Smart Metering program, which was announced in December 2009.

Subsequently, in July 2010, Ofgem published the Smart Metering Implementation Programme - Prospectus. This document, which represents the joint views of the Department of Energy and Climate Change (DECC) and the Gas and Electricity Markets Authority (GEMA) of Ofgem, sets out proposals as to how the smart metering program will be delivered, including design requirements, central communications, data management and the approach to the rollout. In this second phase of the program, energy suppliers will be responsible for replacing over 53 million gas and electricity meters, involving visits to 30 million homes and small businesses. The mass rollout of smart meters is expected to start in 2014 and to be completed in 2019

2.3. The US (New England)

The New England Demand Response Initiative ('NEDRI') was created to develop a comprehensive, coordinated set of demand response programs for the New England regional power markets. It was funded by the US EPA, US DOE, ISO-New England, the New York ISO, and the Energy Foundation. NEDRI's membership therefore included the region's ISO, state and federal utility and environmental regulators, power generators and marketers, utilities, consumer and environmental advocates, and other stakeholder groups.

NEDRI's goal was to outline workable market rules, public policies, and regulatory criteria to incorporate customer-based demand response resources into New England's electricity markets and power systems. The Initiative considered a wide range of Demand Response (DR) resource options, including short-term price-responsive load, retail pricing and metering strategies, reliability-driven DR, and longer-term energy efficiency investments. The NEDRI final report[2] determined that even a 'relatively small amount' of short-term, price-responsive load could play an important role in real-time and day-ahead power markets, particularly with regard to 'enhancing system reliability where there are reserve shortfalls', and 'substantially reducing market-clearing prices during tight market conditions', thereby 'producing significant benefits to consumers'.

The report noted, however, that profiling as then practiced in the region, posed at least two significant barriers to the deployment of demand response, namely, that the use of a single load profile:

- reduces the incentive for any individual consumer to undertake demand response as any reduction in energy use at times of peak (or in any interval) is effectively spread over all hours of the billing period; the load reduction is not credited to the appropriate hour, and therefore cannot be valued appropriately, and
- provides no incentive to the retailer to change customers' load profile, as the benefit will be shared with all retailers.

The final report made 38 recommendations, including the following in relation to load profiling:

- Regulators should consider requiring distribution businesses to establish and maintain "special" load profiles to ensure that non-interval metered customers who want to participate in demand response programs receive the full financial benefits available from those programs, and that
- these load profiles should be adequate to support "rate design, class and subclass settlement, and other purposes (such as interruptible programs)".

The report noted that the benefits and costs of developing and implementing such profiles would need to be considered and specifically recommended investigation of whether smaller customers have the potential to change their consumption pattern sufficiently to warrant the effort that would be required to establish the new load profiles.

NEDRI's load profiling recommendation was not enacted.

3. Identification and evaluation of alternative approaches to load profiling in the NEM

Assessing whether a different approach to load profiling could provide benefits to the market in the form of increased demand response requires:

2 NEDRI, *Dimensions of Demand Response: Capturing Customer Based Resources in New England's Power Systems and Markets, Report and Recommendations of the New England Demand Response Initiative*, August 2003.

- identification of alternative approaches to load profiling, and
- development and application of a set of criteria by which the potential benefits and costs of those approaches can be assessed.

These issues are addressed in this section of the report. Consistent with the questions posed by the AEMC, the assessment has been undertaken on a high-level, qualitative basis.

3.1. Alternative approaches identified

Three alternative load profiling approaches were identified that could potentially assist in encouraging greater levels of demand-side participation within the NEM. It should be noted that each of them would require that interval metering be installed on a sample of customer loads to establish the group load profile. These sorts of samples could be undertaken in a manner similar to the way the controlled load profile is currently maintained.

The three alternative approaches identified are:

- ***Separate load profiles for residential and small business customers*** that do not have interval metering – Residential and non-residential customers are generally identifiable by the network and/or retail tariff that is applied to them. This makes identification of the customers to be included in each group relatively straightforward. The immediate rationale for the separation of these groups is their likely average consumption profile: on average, it could be expected that residential customers will have a higher proportion of their electricity consumption in off-peak (evening and weekend) hours. This seems reasonable due to the fact that households are inhabited during those hours, whereas many small business operate primarily in standard business hours (though the expansion of weekend trading will have made this proportion less weighted to peak periods than would have been the case 15 or 20 years ago). Separation of these two customer groups would therefore potentially result in two profiles with smaller internal variances than that of the single profile (i.e., the NSLP) currently used to characterise the load of these groups in aggregate.
- ***Separate load profiles for groups of customers that are likely to have similar load shapes*** – One readily identifiable improvement on the use of separate load profiles for residential and small non-residential customers is the creation of additional profiles to provide even lower intra-group variance. Possible groupings could include:
    - Small non-residential customers could be further disaggregated and profiled according to their hours of operation using, for example, the following groupings:
        - Monday to Friday operations, primarily business hours
        - Monday to Friday operations with extended hours
        - Operations with weekend operations
    - Residential customers could be further disaggregated and profiled with regard to any or all of the following:

- Appliance stock – homes with and without air conditioning would be a logical separation, though other end-uses might also be of interest, for example homes with PV arrays.

- Household occupancy pattern – which could correlate with the use of certain discretionary end-use equipment, and for which household composition (e.g., households with pre-school children, households in which people are at home during business hours) might serve as a surrogate.

- Climate zone – this is addressed to some extent at present by the fact that profiles are undertaken at the distribution service area level, though a number of distribution service areas (and not only the larger ones) contain two or more distinct climate zones. An obvious example is provided in the range of climates within Ergon Energy's distribution service area, which stretches from the tropical north to the temperate areas in the southeast of the state, but also includes arid inland portions of the state.

The South Australian Council of Social Services (SACOSS) submitted a proposal to the AEMC as part of the *Power of Choice* review that recommended the creation of a separate load profile for residents of public housing. The rationale presented for this load profile was as follows:

- The NSLP on which the price for these customers is currently based, represents the (load-weighted) average of all non-interval metered in South Australia, most of whom are residential customers.

- South Australia's total load and NSLP (to an even greater extent) are strongly dominated by sharp summer peak demands that also have a material impact on average price.

- Residents of public housing, who comprise approximately 50,000 of the state's 800,000 residential electricity users, "have less capacity to generate cooling demand than the average household due to having dwellings with smaller than average floor areas, lower penetration of air-conditioning and small air conditioners when they do" (page 11). As a result, this group "is likely to have an aggregate load factor in the 45-50% range implying that their load profile may be materially cheaper to supply than the NSLP" , which the authors estimate to be in the 30-35% range (page 10 of SACOSS submission).

- Based on these load factors, a separate load profile could result in energy bill savings in the order of 10-20% for these customers who demonstrably have a limited ability to pay and run the risk of disconnection (and the attendant risks that heat waves could pose to households within this group with aged, ill or very young household members).

Based on these considerations, the authors recommend that a separate load profile be developed for these customers using a sample-based metering approach similar to the approach used in developing the controlled load profile, and that that profile then be used as the basis for energy price offers to, and settling the bills of, these customers.

Essentially, this comprises a proposal for a load profile group being created because (a) there is a definable set of customers (public housing residents) with an aggregate load profile that is demonstrably different from the NSLP, and (b) these customers have a lower capacity to pay, and are vulnerable to a variety of disadvantages (e.g., negative health impacts) from electricity price increases. In other words, there are important equity and socioeconomic concerns that could be addressed through the use of this profile.

- ***Creation of demand response program load profiles samples*** – Interval metered samples of participants in demand response programs could provide a statistically average load profile impact for the use of specific end-use control or substitution technologies. That impact could then be assumed for other customers that take up the same control or substitution technology. Customers who participate in direct load control would be a very good example of such a profile. An interval metered sample could be used to establish the average percentage reduction in peak period consumption that participation in the program produces, and that percentage could be applied to the aggregate consumption of the accumulation metered customers participating in such a program on a retailer by retailer basis.

3.2. Evaluation of alternative approaches

3.2.1. Criteria

The following criteria were developed for use in assessing the current and alternative load profiling approaches in terms of their potential value and practicality for providing stronger signals to retailers to use demand-side initiatives to influence their customers' consumption patterns:

- Accuracy (fairness, supports user-pays principle)
- Provides price signals to inform consumer decision-making about changing their consumption profile
- Provides a basis for demand management programs for non-interval metered customers
- Cost effectiveness (avoids the cost of metering where profiling can provide an acceptable alternative considering the other criteria)
- Does not create a barrier to further technological improvement
- Ease of implementation
- Provides an incentive for the retailer to engage in demand management with its customers.

3.2.2. Application of the criteria to evaluate the alternatives

Table 1 commencing on the following page applies these criteria to the current load profiling approach and the three alternatives presented above. Following Table 1, the SACOSS proposal for a public housing load profile is assessed using the same set of criteria.

Table 1: Evaluation of the current and alternative load profiling options

Criteria	Current load profiling approach (NSLP)	Residential and small non-residential profiles	Load shape segment profiles	Demand response program profiles
Accuracy (user pays/fairness)	***Poor*** -- current load profile has significant inter- and intra-class subsidies; Intra-class subsidies are likely to exist between, for example: • Inter-class subsidies are likely to exist between residential and non-residential customers, based on the differences in their respective load profiles - Appendix A provides a graphic example in which small commercial customers have a much flatter load shape during the day, but residential customers have a much higher proportion of their total consumption in off-peak hours • Intra-class subsidies are likely to exist between, for example: o AC and non-AC residential customers o Residential customers with different household occupancy patterns o Commercial customers with different operating schedules	***Better than current approach*** as it would at least eliminate any cross subsidies between residential and non-residential customers and therefore be more accurate	***Potentially very good*** -- particularly if the load shape segments used provide lower in-group variance for each of the final segments than currently exists in the NSLP, though there is also a significant potential for gaming where the segments are based on deemed or self-reported characteristics, and to the extent that this occurs, it would also potentially disadvantage the host retailer within each profile area (as it would inherit the sum of any inaccuracies in the profile)	***Better than current approach***, but limited to program participants and may suffer from inaccuracies if the base load profile is still taken as the NSLP; could also potentially disadvantage the host retailer within each profile area (as it would inherit the sum of any inaccuracies in the profile)

Criteria	Current load profiling approach (NSLP)	Residential and small non-residential profiles	Load shape segment profiles	Demand response program profiles
Provides signals to inform consumer decision-making about changing their consumption profile	***Poor*** - the current profile does not provide any signal to the customer to improve his/her load shape; any unit of consumption that is reduced has the same value (TOU tariffs improve on this signal to some extent, but still do not really signal real time or location based costs incurred in the electricity supply chain)	***Poor*** - would not provide any better signal than the current approach	***Better than current approach*** to the extent that it motivates customers to change their load shape in order to move to a better (i.e., lower cost) profile	***Good*** - would provide a tangible value for undertaking the demand-side actions for which load shape impacts had been developed
Provides a basis for demand management programs for non-interval metered customers	***Poor*** - the NSLP does not provide a means by which the consumer or the retailer can benefit from a change in the consumer's load shape (other than reduced consumption volume)	***Poor*** - there is no reason that the creation of the two customer profiles based on customer type would change current practice	***Better than current approach*** to the extent that it would create a reason to undertake demand-side actions that would allow the customer to move to a different profile (which would provide an incentive and benefits to the retailer as well)	***Very good*** - quite similar to the load shape segment approach but more closely tied to the actual uptake of a demand-side change
Cost effectiveness (avoids the cost of metering where profiling can provide an acceptable alternative considering the other criteria)	***Mixed*** - the current approach has avoided the cost of metering, though given its performance on the other criteria it would be difficult to say that the current approach provides a wholly acceptable alternative	***Better than current approach*** -- very little incremental cost, and slightly better performance on several of the other criteria as compared to the current approach	***Potentially very high costs*** - as experienced in the UK, due to the proliferation of segments, the potential for gaming by customers, and the consequent need for monitoring and verification	***Moderate costs*** - limited to the need to create and meter a program sample group
Does not create a barrier to further technological improvement	***Good*** -- there is no reason to believe the current profiling approach in and of itself has created a barrier to the use of interval metering	***Good*** - would not significantly change the current approach and would therefore be unlikely to pose a barrier to further technological improvement	***Poor*** - could potentially reduce the perceived value (and potentially increase the perceived risk) of the introduction of metering	***Poor*** -- could potentially reduce the perceived value (and potentially increase the perceived risk) of the introduction of metering

Criteria	Current load profiling approach (NSLP)	Residential and small non-residential profiles	Load shape segment profiles	Demand response program profiles
Ease of implementation	*Good* - any difficulties in the approach have been worked out; the NSLP is generated as an on-going part of the NEM processes	*Good* - assignment to one or the other of the two profiles would presumably be mandatory as customers for each group are readily identified based on tariffs (at least at present); samples for creating the profile would presumably be undertaken using the same general approach as presently used for the controlled load profile	*Potentially very difficult* - due to the potential for the number of segments to grow and the associated need for profile creation, monitoring and verification, and the potential for gaming by customer groups • Assignment would presumably be on an opt-in basis - could make the residual NSLP increasingly unattractive, but could provide a rationale for entry by demand management service providers (including retailers) • Mandatory assignment would be possible but would be contentious and would require re-assignment whenever occupancy of a premise changes, or even when end-use equipment changed	*Good* - the need for the development of a profile would be triggered by the introduction of a program within the profile area
Provides an incentive to the retailer	*Poor* - the nature of the NSLP means that the benefit of any change in load profile of any retailer's non-interval metered customers will be shared with all retailers	*Poor* - does not materially change the current lack of incentive due to sharing of any benefit produced by the load shape change	*Better than current approach* - in that it would provide a reason to move customers to a better profile where possible (in that it would provide a means by which the retailer could acquire and retain customers), and the profile itself would provide benefit to both the customer and the retailer	*Very good* - like the load shape segment approach it would provide a reason to move customers to a better profile where possible, and the profile itself would provide benefit to both the customer and the retailer, but would have the added benefit of including evidence of the take-up of a specific demand-side measure, so would be even more likely to denote a real change in load shape

The following paragraphs provide an assessment of the SACOSS proposal for the creation of a public housing load profile using the same criteria as above:

- Accuracy (fairness, supports user-pays principle)

  Good. The customers to be included in this load profile would seem to constitute a distinct population and, to the extent that these customers exhibit a load profile that is statistically distinct from the NSLP, such a load profile could be seen as providing a more accurate user-pays based price signal for these customers. This benefit would be even more significant if (a) the profile of these customers entails a lower cost to serve now, and (b) the NSLP is likely to become peakier due to the creation of other profiles or customers with better than average profiles taking up meters and thereby making the NSLP peakier than it is now.

  An issue of fairness could arise, however, with regard to low-income customers who are excluded from the recommended load profile because they do not live in public housing. These customers would not benefit from the load profile and might actually be slightly disadvantaged by it to the extent that the removal of this profile from the NSLP reduced the load factor of the NSLP and thereby increased the average cost to serve of the NSLP. The materiality of this issue will depend on (a) the number of low-income customers that do not live in public housing, and (b) the extent to which the removal of this profile increases the cost to serve of the NSLP.

- Provides price signals to inform consumer decision-making

  No improvement over current situation. Neither of the resulting profiles (the public housing profile nor the residual NSLP) will provide a signal to the customer to improve his/her load shape. The public housing load profile may result in a lower cost, but it won't provide a price signal for these customers to shift load away from peak. To the extent that removal of the public housing load increases the cost to serve of the NSLP, it may engender a price response from those customers, but without a time-based signal this would be likely to be responded to through general energy efficiency or conservation strategies, neither of which are likely to have materially beneficial impacts (and may have negative impacts) on the load factor of the NSLP.

- Provides a basis for demand management programs for non-interval metered customers

  Poor. There is no reason to believe that the creation of the new public housing load profile would change current practice.

- Least cost (avoids the cost of metering where profiling can provide an acceptable alternative considering the other criteria)

Possibly good. Use of the public housing load profile would avoid the cost of metering for these customers. This would be good for those customers if the savings provided by the profile exceeds the net savings provided by metering minus the cost of the metering. This is the result that the authors of the SACOSS proposal think is most likely. If they are right then this approach might provide greater net benefits than a metered approach if the only benefits to be considered are customer bill savings. However, if the meters also provide other direct customer benefits – or indirect customer benefits through their impact on network operations – the substitution of the profile for a metered solution may sacrifice some benefits for these customers.

Another consideration is the amount of in-group variance within the public housing sample. If there is a relatively small amount of variance in shape across the sample, there will be little intra-group cross subsidy. If the variance is larger, use of the profile will increase the cross subsidy (though it may still be smaller than that in the NSLP).

- Does not create a barrier to further technological improvement

  Potentially poor. To the extent that the public housing load profile provides lower cost bills for these customers and the installation of a meter would not produce additional savings that exceed the cost of the meter installation, it could act as a barrier to subsequent installation of the meter. As suggested above, this could sacrifice other benefits to either or both these customers or the distribution system.

- Ease of implementation

  Good. This profile could be established and maintained using a sampling approach similar to the controlled load profile method. The fact that the proposed population is and is likely to remain a well-defined group (public housing residential units) also makes implementation easier. Some thought would need to be given to stratification within the sample to the extent that there are distinctly different types of housing stock within the group, and some means would need to be included for incorporating representatives of new units added to the stock over time. These do not constitute materially difficult issues.

- Provides an incentive to the retailer

  Poor. The creation of the public housing profile would not change the current lack of incentive to retailers due to the fact that the benefit resulting from a change in the customers' load profile – whether on the public housing or residual NSLP – that resulted from a retailer initiative would be shared with all other retailers serving that type of customer.

In sum, the creation and use of a public housing profile:

- is in accordance with user-pays principles and would improve equity within the market
- is consistent with stated social policy goals of providing support to vulnerable consumers
- is unlikely to be either difficult or costly to do
- but is very unlikely to increase demand-side participation at all, and could reduce the impetus for advanced metering for this group, though the magnitude of this effect and its importance to these customers or the system as a whole might be minor.

4. Continued effectiveness of the NSLP as interval meters are deployed

The AEMC also sought comment on whether the current NSLP profiling approach will continue to be effective as more interval meters are deployed to residential and small business customers. Our view is that there is no reason to believe that its effectiveness or accuracy will change.

The fact that a meter is installed on a facility and its load is removed from the NSLP will not change the effectiveness of the remaining NSLP as a means for settling non-interval metered loads. It may, however, change:

- the variance of the load shapes that remain on the NSLP,
- the cost to serve of the NSLP and therefore its economic attractiveness to the customers that remain on it,
- whether a given customer is subsidising or being subsidised under the NSLP, and
- the amount of risk (due to profiling and meter data errors) the NSLP poses to the first tier retailer.

These are equity and accuracy issues, rather than effectiveness issues, however. The NSLP will remain just as effective as ever as a procedure for settling non-interval metered loads.

These effects can be considered more closely by reference to the manner in which the deployment might proceed[3]. For example:

- Meters deployed to new construction and at the end of current meter life – This would be a logical means for deploying interval metering over time. The fact that newly constructed facilities did not join the NSLP would not seem to pose an issue for the NSLP's effectiveness or equity. The deployment of interval meters as older meters fail would similarly not change the effectiveness of the NSLP, though to the extent that meters may have been installed as different neighbourhoods were built or connected to the grid, they may also fail at similar times. The removal of age cohorts of facilities from the NSLP at the same time could change the NSLP where there was a relationship between the age of the facility and its load shape. For example, where interval meters tend to be installed first on older homes, the NSLP could become less peaky if those homes tended to have poor thermal integrity and a higher penetration of older, less efficient air-conditioning equipment.
- Meters deployed geographically – This would also be a logical and efficient means for deploying interval meters. It could pose a similar impact as that discussed with regard to end-of-life deployment, and would perhaps have an even greater likelihood of doing so. However, that could be mitigated by selecting the areas in which meters are to be deployed so as to smooth the impact on the NSLP to the extent possible.

---

3 It should be noted that each of the deployment paths discussed here would also entail differing meter installation costs and different costs for the installation of two-way communications. Neither of these costs are considered here in assessing impacts of the deployment paths on the effectiveness of the NSLP.

- Meters deployed in order of decreasing consumption volumes – This is how contestability and therefore (at a gross level) the installation of interval metering has proceeded, for the most part, throughout the NEM. Such a means for deployment would not seem to pose a danger to the effectiveness of the NSLP. However, there is a point at which the potential savings to the customer of load shape changes is likely to become too small to justify the cost of the meter. In such cases, the NSLP may be a more cost-effective means for settling customer consumption than the cost of interval metering, particularly where the costs of the profile settlement system are already sunk, as is the case in the NEM. This could pose a barrier to the completion of universal metering, which would also potentially forego certain benefits of smart metering that rely on universal or near universal metering. In addition, there might still be significant variance within the profile group, meaning that there will still be cross subsidies between customers within the group.

- Meters deployed as customers request them – In the event that meters are deployed as customers request them it would be safe to assume that customers with load profiles that are lower cost to serve will leave the NSLP first. This will allow them to pay their actual cost to serve, and will tend to make the cost to serve the NSLP go up, thereby likely increasing the retail price of electricity to the customers remaining on the NSLP. However, it must be recognised that this would not make the price charged to those customers less fair in aggregate. And, as the cost goes up, it will create sufficient reason for customers with slightly less favourable load shapes than the first group – but more favourable than the new average load profile – to also take up an interval meter. This would seem to be a virtuous cycle with everyone's profile – including the NSLP – becoming more accurate (that is, being characterised by reduced variance). The exception to this is where the customer cannot afford to pay for the meter, or the level of savings obtainable would not defray the cost of the meter.

- Meters deployed randomly – If meters are deployed randomly, the NSLP should change very little, and therefore its equity impacts, accuracy and effectiveness would not be expected to change significantly at least while the number of consumers still on the NSLP was sufficiently large.

In summary, it does not appear that continued deployment of interval metering will necessarily pose a threat to the effectiveness of the NSLP, though it could may the NSLP less attractive for the remaining customers. Because of the use of differencing in the settlement system, any residual risk associated with the profile will continue to rest with the first tier retailer. There is no reason to assume that the level of risk will necessarily increase, however, and if fewer customers remain on the NSLP the absolute level of load that can be affected by the risk will also decrease.

5. Conclusions

The considerations discussed in the previous sections lead to the following observations:

- The current load profiling method does not provide an effective basis for the introduction of demand management initiatives aimed at encouraging non-interval metered customers to alter their lad shape. In fact, it should be recognised that any single load profile removes the incentive for customers on it to change their load profile, as their bill will still be based on the aggregate shape of the profile. Reductions in energy consumption – regardless of impact on load shape – are the only way for a profiled customer to reduce his/her electricity bill.

- This disincentive also applies to the retailer serving profiled customers, because any improvement gained in the load profile of the retailers' customers will be shared with all other retailer in proportion to their share of the profiled customer load.

- Alternatives to the single NSLP exist, but in most cases, would appear to be characterised by either a relative lack of effectiveness with regard to encouraging demand-side actions on the part of small customers or the retailers that serve them, or potentially very high transaction costs. They could, however, provide a more equitable basis for the development of retail prices and settlement of consumption at the wholesale level. More specifically:

  - Splitting the current NSLP into two profiles could be done relatively easily and could make each of the two resulting profiles more accurate from a user-pays perspective, but it would not overcome any of the existing disincentives posed by the NSLP to demand management initiatives;

  - The use of load shape segments or demand response program profiles could provide an incentive to customers to change their consumption patterns – and an incentive to retailers to help them do so. However, the load shape segments that would seem to be possible in the NEM would most likely have to be based on customer occupancy patterns or possibly technology stock holdings. Such definitions would be very open to gaming and would therefore impose very high administrative costs for profile development, verification and monitoring. Demand response program profiles would be easier to administer.

    - Load shape segments could provide financial incentives to both end-use customers, retailers and even third-party service providers to undertake demand-side actions, but without metering they also require significant implementation and maintenance costs and the potential for gaming, with all residual errors being delivered to the first tier retailer;

    - Demand management program profiles could reduce the number of profiles (as compared to the load shape segment approach) but would have other problems, most notably establishing an accurate pre-load shape from which to assess the demand management program impact. Errors here (though likely to be smaller in aggregate than could result in the load shape segment approach due to the smaller number of load profile groups likely to be developed) would still accrue to the first tier retailer;

    - In addition, both the load shape segment approach and the demand management program approach could reduce the perceived value (and increase the perceived risk) of the deployment of interval metering among end-use customers and retailers using those profiles.

- The proposal that public housing may warrant the development of a separate profile is worth further consideration and investigation. To the extent that it can be shown that such a profile is materially different to the NSLP and is not characterised by an undue level of internal variance, it would provide a fairer basis for pricing electricity to the members of this readily definable group.

  - Assuming that the profile was also lower cost to serve than the NSLP there would also be an equity argument for applying the more representative profile to this customer group which is comprised of households with lower disposable income and therefore lower capability to pay. On the other hand, if the profile proved to entail a higher cost to serve, the equity argument would be to abandon it as a means for settling the consumption of this group.

  - Consideration should be given to installing meters in a statistically valid sample of public housing units at no cost to the customers. This would allow determination of whether this group has a different load profile from the NSLP and whether that profile entails a lower or higher cost to serve.

    This public housing profile would have to be established separately in each jurisdiction, and further consideration might have to be given to the materiality of climate zones and the construction quality of the public housing within each jurisdiction.

    As within any profile, customers with greater consumption will tend to be preferred by retailers to smaller customers. This is because they are likely to provide higher net margins to the retailer, all other things being equal. This is so because (a) all customers on a given profile have the same weighted average whole electricity cost to serve, and (b) larger volume customers provide the retailer a greater absolute level of revenue and therefore gross margin (because the retailer's cost to serve the customer after wholesale electricity purchase is largely fixed). The only other significant factor with regard to this customer segment would be collection costs and credit risk. To the extent that larger customers on this profile would impose higher collection costs or credit risk, it could undo the usual preference of retailers for higher volumes in profiled customers.

Given these considerations, there does not seem to be a strong case for considering significant changes to the load profiling approach at this time other than possibly (a) the split of the NSLP between residential and non-residential customers, and (b) the development of a public housing load profile.

Final decisions regarding this, however, will need to take into account a number of other considerations, most importantly, the likelihood and timing of the deployment of interval metering to the remainder of small customers. If this is going to happen within a reasonable time, the costs and effort of implementing profiling approaches dedicated to encouraging demand response are probably not warranted. However, if it is unlikely that interval meters will be widely deployed in the foreseeable future and it is deemed that material benefits can only be achieved if demand response is accessible from small customers[4], then further consideration of an alternative profile approach may[5] be justified.

4 This is likely to be the case with regard to network benefits. Because the benefit of demand reduction in networks is spatial, many zone sub areas may only be able to benefit from demand response if it comes from smaller customers.

5 There may be alternatives other than profiling. The proposed demand-side mechanism explained in chapter 2 of the *Power of Choice* draft report could result, over time, in the deployment of interval metering by aggregators.

Appendix A

Figure 2: Composition of Energex system peak demand – 24 Jan 2006