

Position Paper: Sample metering and Controlled Load Profiles

Objectives

- Ensure ongoing settlement accuracy
- Support energy affordability by reducing unnecessary regulatory costs
- Ensure metering requirements are relevant and fit-for-purpose

Executive Summary

The Australian Energy Market Operator (AEMO) has responsibility for the National Electricity Market settlement process that reconciles the energy usage of a retailer's customers with the prevailing electricity spot price. However, for customers with accumulation meters, AEMO cannot determine directly how much energy a customer has used at a certain time for the purpose of market settlements.

The AEMO metrology procedures contain jurisdictional metrology material that requires each of the NSW Distribution Network Service Providers (DNSPs) to maintain 200 sample meters at residential and small business customer premises to collect energy usage data. A sample meter is a separate metering device installed on a customer's meter board, where that customer has a manually read accumulation meter and at least one controlled load (i.e. electric hot water heating and pool pumps).

The data from sample meters is used to compile a representative usage profile of the controlled load for small customers with accumulation meters. This controlled load profile (CLP) is used by AEMO in settlement with retailers. The settlement process ensures market generators are paid for the energy they provide to the National Electricity Market, and market customers pay for the energy they use, in accordance with the market rules.

The CLP was introduced to increase the accuracy of AEMO's reconciliation of the energy used by customers without interval meters. However, the requirement for the development of a controlled load profile has limited value in NSW.

The NSW Department of Climate Change, Energy, the Environment, and Water (DCCEEW) has heard from stakeholders that the CLP has limited value for settlements as the nature of controlled loads is found to be fairly predictable and consistent, and therefore estimating a CLP from a small sample has no value in improving settlement accuracy. Additionally, there does not appear to be any correlation between controlled load operation and the prevailing spot price for energy that would warrant a separate profile.

In addition, over the last two years, AEMO data shows smart meters have been replacing basic meters at a rate of over 17,000 each month. As well, the Australian Energy Market Commission (AEMC) as part of its review of metering services, released

recommendations for an accelerated smart meter rollout aiming for 100 per cent smart meter penetration by 2030. As a result, the number of customer connections with accumulation metering that need to be included in the CLP settlement process is reducing.

The requirement for DNSPs to maintain sample meters does not fit with their broader metering responsibilities under the Power of Choice metering reforms. These reforms transferred the role of installing smart electricity meters for small customers from DNSPs to retailers in December 2017. DNSPs have advised DCCEEW that the misalignment of metering responsibilities is making it increasingly costly and difficult for DNSPs to maintain sample meters.

When a retailer installs a smart meter at a premises with a sample meter, the new smart metering installation can no longer be used for CLP data collection, and the sample meter is removed. To comply with the AEMO metrology requirements, the distributor must identify another suitable customer connection point to install a sample meter.

DNSPs usually install a few spare sample meters (around 10–15) to ensure compliance with the requirements. However, DCCEEW understands distributors are finding that sample meters are being removed without prior notification to the DNSP and remaining compliant with the minimum 200 sample meter requirement is increasingly challenging.

In response to these issues being raised, DCCEEW reviewed and consulted on these issues in the paper, 'Promoting Innovation for Energy Customers', released in December 2021. DCCEEW received 40 submissions to this consultation paper.

This issue is being considered by the NSW Government as the CLP requirement is a jurisdiction-specific part of AEMO's Metrology Procedures. The NSW Minister for Energy is able to request jurisdictional changes to the Metrology Procedure by submitting Jurisdictional Metrology Material through the Energy and Climate Change Ministerial Council and having it undergo an AEMO rules consultation process.

This position paper synthesises the Controlled Load Profile and sample metering-related feedback received in these submissions and outlines the NSW Government response. The NSW Government will be undertaking next steps to implement the preferred recommendation.

Options considered

1. No change
2. Amend AEMO's metrology procedures to remove the controlled load profiles requirement – removing the need for sample meters.
3. Amend AEMO's metrology procedures to retain the controlled load profiles requirement for settlement purposes but instead utilise historical profiles – removing the need for sample meters.
4. Amend AEMO's metrology procedures to retain the controlled load profiles requirement but collect data for profiles from smart meters – removing the need for sample meters.

Recommendation: The NSW Government supports option 2, amending AEMO's metrology procedure to remove the controlled load profiles requirement and the need for sample meters.

It recommends these changes come into effect from 1 July 2024. This would coincide with the beginning of NSW DNSPs' new regulatory period and allow time for retailers to consider any implications from the removal of the CLP, as well as any necessary system changes.

Importantly, billing arrangements between retailers and customers are not affected by the CLP, or its removal, as they are based on meter readings of energy usage.

Background

Controlled load profiles for settlement

AEMO has responsibility for the National Electricity Market settlement process that reconciles the energy usage of a retailer's customers with the prevailing electricity spot price. This settlement process ensures market generators are paid for the energy they provide to the National Electricity Market, and market customers pay for the energy they use, in accordance with the market rules.

However, for customers with accumulation meters, AEMO cannot determine directly how much energy a customer has used at a certain time for the purpose of market settlements. To reconcile the energy used by customers who have an accumulation meter, AEMO builds an estimated pattern of the energy use of these customers, called a Net System Load Profile (NSLP).

In NSW, AEMO is required to also produce a profile estimate of the energy used by controlled loads on accumulation meters (known as a CLP). A controlled load is an electricity load connected to a device which receives electricity on a dedicated circuit, typically an electric hot water heating system or pool pump, that typically do not require constant power supply. The dedicated circuit can receive a "controlled load tariff" which supplies electricity during off-peak times typically at a lower rate.

The CLP is developed from sample meters which are devices installed on a customer's meter board, where that customer has both an accumulation meter and a controlled load. The data from these sample meters has been used to compile a representative usage profile of the controlled load for small customers to help AEMO to 'separate out' the energy used by these controlled loads from the rest of the unmetered energy that AEMO must reconcile (the NSLP).

AEMO metrology procedures require each of the NSW DNSPs to maintain 200 sample meters at residential and small business customer premises to collect controlled load energy usage data.

Why was the CLP introduced in NSW?

The CLP was introduced in 2002 to improve the accuracy of settlement of the NSLP for metering installations with accumulation meters, at a time when there were not many interval meters in NSW.

Controlled loads are settled by AEMO using the CLP, and the remaining load is settled using the NSLP. The rationale for using a CLP has been to separate energy load used during controlled periods, from non-controlled periods for connection points with accumulation meters. The intent of the CLP was to improve the accuracy of energy market settlement.

In particular, large customers can have particularly significant peaks in their consumption, including peaks from controlled load. At the time of the introduction of the CLP, large customers were able to have accumulation metering installations. Before the CLP, these energy costs were not able to be separated from the rest of the unmetered

energy load, and as such the costs were spread among the whole of the customer base. This benefited retailers with large customers, but disadvantaged retailers with only smaller customers with controlled loads. The CLP was introduced to reduce this distortion and cross subsidisation in the market.

Similar provisions were introduced in South Australia and Queensland in the same period, however not in Victoria, Tasmania and the ACT. In Victoria, due to the planned rollout of interval meters to all households, the CLP was not considered to be required. Tasmania and the ACT at that time had only a single retailer for their network, removing the need to identify which retailers were responsible to reconcile the energy usage of their customers.

Since the sample meter requirements were introduced, National Electricity Rules (NER) have enable accumulation meters (type 5 and 6 metering installations) be used to collect CLP data. This also provides potential alternatives to the sample meter arrangements.

Options

The consultation paper proposed three potential options to address issues around CLPs and sample metering. The advantages and disadvantages of options are discussed in below.

Option	Advantages	Disadvantages
1. No change	<ul style="list-style-type: none"> Preserves any value of the CLP. 	<ul style="list-style-type: none"> Cost of maintaining sample meters for DNSPs. Increasing inaccuracy of CLP for measuring actual consumption. Requires future action to remove the CLP once it is redundant or begins to have a negative impact on settlement.
2. Amend AEMO's metrology procedures to remove the controlled load profiles requirement – removing the need for sample meters.	<ul style="list-style-type: none"> Removes burden from DNSPs to maintain sample meters. Encourages retailers to move customers onto smart meters. Does not require a rule change. Aligns with Victoria, Tasmania and Australian Capital Territory (ACT). 	<ul style="list-style-type: none"> Uncertainty for some retailers around settlement impacts.

	<ul style="list-style-type: none"> • Resolves the need to amend CLPs in the future when they become redundant (due to replacement of accumulation metering) or start to negatively impact energy settlement. 	
<p>3. Amend AEMO’s metrology procedures to retain the controlled load profiles requirement for settlement purposes but instead use historic profiles – removing the need for sample meters.</p>	<ul style="list-style-type: none"> • Removes burden from DNSPs to maintain sample meters. • Does not require a rule change. 	<ul style="list-style-type: none"> • Increasing inaccuracy of CLP for measuring actual consumption. • Requires future action to remove the CLP once it is redundant or begins to have a negative impact on settlement.
<p>4. Retain the controlled load profiles requirement and collect data for profiles from smart meters – removing the need for sample meters.</p>	<ul style="list-style-type: none"> • Preserves any value of the CLP. • Removes burden from DNSPs to maintain sample meters. 	<ul style="list-style-type: none"> • Requires a rule change and potentially additional smart meter specifications. • May be unnecessary if CLP no longer required. • Requires future action to remove the CLP once it is redundant or begins to have a negative impact on settlement. • Will not reflect or represent unallocated controlled load usage profiles of existing non-smart meter connections (e.g. using sample meter data would develop a CLP based on energy usage for things like EV charging, where the CLP profile is applied for technologies on non-smart meters (pre-2017 technologies that are primarily pool pumps, etc).

Stakeholder views

Most stakeholders indicated support for action being taken to remove the requirement for sample meters. No stakeholders indicated opposition to action being taken. Most stakeholders with a preferred option, preferred amending AEMO's metrology procedures to remove the controlled load profiles requirement completely (option 2). Most stakeholders considered CLPs were either no longer valuable or soon would not be.

The value of the controlled load profile and sample meters

Most stakeholders that indicated a preferred option, preferred amending AEMO's metrology procedures to remove the CLP requirement completely (option 2).

Globird Energy was the only stakeholder to prefer option 3 – retaining controlled load profiles for settlement purposes but basing them on historical profiles.

Metering provider, **PLUS ES** stated smart meters already deliver comprehensive interval metering data, rendering the sample meter irrelevant and obsolete. PLUS ES also questioned whether CLPs are still required with the implementation of Global Settlement and 5-minute interval data.

Red Energy said sample meters are a key part of the settlement process and suggested examining the issue further following global settlement being implemented. **Alinta** also considered further work was needed 'to determine whether the role for sample meters no longer exists and, if so, what is the most efficient transition path to their removal'.

AEMO said in the foreseeable future the CLP and sample metering requirements will no longer be relevant to market conditions or arrangements. It said as the number of customers who have both controlled loads and manually read metering installations decrease, there will be a point in time where there are insufficient manually read metering installations from which sample metering 'representative candidates' can be sourced, and similarly few to which the resulting CLP would need to be applied in market settlement. It highlighted that profiling in settlement has not been designed to be applied for small numbers of metering installations and in particular, CLPs are unsuited for such an arrangement. AEMO supported quick action to remove sample metering and CLP requirements, noting 'prolonged use [of CLPs] might negatively impact market settlement as any data used to calculate the CLP is likely to be increasingly unrepresentative of actual consumption.'

The **NSW DNSPs** jointly supported Option 2. The NSW DNSPs noted maintaining sample meters requires them to incur avoidable costs, such as from upgrading communication functions to 4G. DNSPs noted each network will eventually run out of spare sample meters (some have already), meaning they would have to install network devices on meter boards downstream of the revenue meter (noting there is limited space). The networks noted that with the implementation of global settlement any perceived settlement risk will be shared between all retailers.

Energy Australia supported removing CLPs and sample metering requirements.

The **Clean Energy Council (CEC)** said the current approach will become increasingly irrelevant and supported shifting from CLPs.

Costs of using smart meters to determine CLP

EnergyAustralia was not aware of the costs of using smart meters to determine CLPs and was unsure why this settlement information cannot be derived from the controlled load information AEMO already receives for NSW smart meter customers with connected controlled loads.

PLUS ES said maintaining the sample meters for data otherwise readily available via remotely read smart meters has costs.

DNSPs said using advanced meters with off-peak for controlled load profiles would have minimal costs.

Solar Analytics considered using smart meters to determine the CLP would have a net benefit if information from the CLP is available to consumers and their authorised representative and they are able to change tariff structures.

Alternatives to the CLP

Stakeholders suggested a range of alternatives to retaining the CLP.

AEMO suggested expiring current Jurisdictional Metering Material provisions between 12-24 months from February 2022 in accordance with NER clause 7.16.4. This will end existing sample metering and CLP requirements in NSW.

Solar Analytics suggested replacing CLPs with dynamic operating envelopes.

CEC recommended replacing the CLP with a daylight hour 'solar sponge' tariff.

PIAC considered that DNSP responsibility for meter installation and metering services should be restored, making the issue of sample meters redundant.

DNSPs supported removing the CLP requirement completely from AEMO's metrology procedures as the simplest and most cost-effective solution.

Analysis

The value of the CLP for settlement is limited and increasingly diminished

DCCEEW has heard from stakeholders the CLP has limited and diminishing value for settlement as accumulation meters decline and new settlement systems come into effect. As noted previously, the CLP has limited value for settlements as the nature of controlled loads is found to be fairly predictable and consistent, with controlled loads in NSW operating with a degree of consistency across all 48 half-hour intervals of the day. Therefore estimating a CLP from a small sample has no value in improving settlement accuracy. Additionally, there does not appear to be any correlation between controlled load operation and the prevailing spot price for energy that would warrant a separate profile.

The value of the CLP will continue to further diminish as the number of controlled loads on accumulation meters decline.

Small sample size issues will worsen as smart meter uptake reduces accumulation metering installations to source representative candidates from and to apply the resulting CLP to. AEMO noted in its submission, profiling in settlement has not been designed to be applied for small numbers of metering installations and in particular, CLPs are unsuited for such an arrangement. Profiling in NEM settlement works effectively when there are volumes of connection points that are being profiled. When volumes of energy being treated by the NSLP decrease, such as by accumulation metering being replaced by smart meters over time, inaccuracies can have a material effect on settlement outcomes.

Global Settlement may further reduce the need for the CLP. Following the commencement of Global Settlement in May 2022, losses that are unaccounted for in the settlement process are allocated equally to all retailers. This provides additional incentives for retailers to minimise inaccuracies in the recording and reporting of energy usage, encouraging smart meter uptake.

In addition, DCCEEW is aware that all large customers in NSW now have interval meters, meaning that the CLP is no longer required to remove the cross subsidisation of the energy use of these customers by small customers that it was introduced to resolve.

DCCEEW expects that removing the CLP would have no impact on settlement accuracy in NSW.

Some states that have controlled loads do not require a CLP and this has not been identified as being problematic. Victoria, Tasmania and ACT, all settle using only the NSLP and have not raised concerns about inaccuracy of settlement.

As some states do not use a CLP for settlement, removing it in NSW would make settlement more consistent across jurisdictions, removing complexity for retailers operating across multiple states and for AEMO.

Importantly, the use or otherwise of CLPs does not impact how retailers bill customers as this is based on meter readings and usage, regardless of the type of metering installation at the customer's premises.

While some retailers have suggested the CLP is important and should be retained, they have not specified what financial impact removing it will have on them. Some have suggested AEMO simulate a settlement period without the CLP. However, AEMO considers retailers are better placed than it to analyse settlement impacts as the information needed to do so is largely commercial and in confidence. In any settlement period, the impact will depend on a retailer's share of controlled load customers in the network, the actual CLPs for any given day, the prevailing spot prices in that day, and contract positions.

The requirement to maintain sample meters is increasingly burdensome for distribution networks

DNSPs have told DCCEEW about the increasing cost and difficulty in replacing sample meters. Smart meter uptake has seen existing sample meters be increasingly displaced, often without a DNSP's knowledge. The introduction of smart meters has also reduced the pool of available sample meter connection points for DNSPs. As a result, identifying sites and maintaining these meters is increasingly costly.

DCCEEW considers maintaining sample meters will become untenable in future as smart meter uptake increasingly displaces existing sample meters, often without a DNSP's knowledge, and reduces the pool of available sample meter connection points. This will make it more difficult to find and maintain a representative sample of data for the CLP, potentially undermining its accuracy.

DCCEEW also considers the relative cost of maintain sample meters will become unjustifiable as the number of accumulation meters for which they are required falls. Without intervention, current arrangements would result in DNSPs maintaining a sample meter for each remaining accumulation meter. Before reaching that extreme, sample meters would serve a diminishing number of controlled loads, with the cost per customer of retaining them increasing each time an accumulation metered controlled load is replaced.

The NSW Government recommends abolishing sample meters and the CLP

The NSW Government recommends changing AEMO's metrology procedures to abolish the CLP and remove the need for sample meters. It recommends these changes come into effect from 1 July 2024 to coincide with NSW DNSPs' new regulatory period and to allow considerable preparation time for retailers and any other potentially affected parties.

This recommendation can be achieved by the NSW Minister for Energy requesting that AEMO amend, from 1 July 2024:

- Metrology Procedure Part A: National Electricity Market to amend 12.8.2 (a) and (c) to remove NSW as a jurisdiction for which AEMO must prepare a CLP.

- Metrology Procedure Part B: Metering Data Validation, Substitution and Estimation to remove section 11.2.1 concerning preparing CLPs in NSW, and editing 11.3.1 concerning applying CLPs in settlement to remove reference to NSW.

The NSW Minister for Energy can request amendments to the metrology procedure by submitting jurisdictional metrology material through the Energy and Climate Change Ministerial Council to AEMO. AEMO must then conduct a rules consultation process in relation to that material. Jurisdictional metrology material can then be included in the metrology procedure.

Removing the CLP requirement is supported by most stakeholders, including AEMO, one large retailer (EnergyAustralia), and NSW DNSPs. As well as removing the unsustainable requirement on DNSPs to maintain sample meters, removal of the CLP requirement encourages smart meter uptake, is administratively simple and could be implemented by AEMO once ministerial approval is given, avoiding the need for a rule change, which would be required for Option 4.

The removal of the CLP requirement is further supported by the AEMC's Review of the Regulatory Framework for Metering Services. The AEMC's final determination recommended an accelerated smart meter uptake to reach 100 per cent by 2030 with retailers and metering providers retaining responsibility for smart metering services. An accelerated smart meter rollout will further reduce any perceived need for the CLP, and ultimately make it redundant, as premises with smart meters do not need to be settled using the CLP and increased smart meters will reduce the pool of potential sample meter connection points.

DCCEEW does not consider it is worthwhile to maintain the CLP without sample meters. Using historical usage or smart meter data to determine CLPs are not viable alternatives, as explained below.

Option 3, calculating a CLP from historical data, removing the need for sample meters, is not appropriate as the historical CLP will be increasingly inaccurate. The CLP varies daily and would not be certain to have any bearing on actual controlled load consumption into the future, particularly as new technologies such as electric vehicles change small customers' usage patterns. As such it is not clear whether historical CLPs would offer any settlement accuracy benefit compared to if there was no CLP. This option was not the preference of any stakeholder. However, AEMO considered it could have merit as a short term measure ahead of removing the CLP in the medium term.

Option 4, creating the CLP from smart meter data would address the issues associated with DNSPs maintaining sample meters, however it would likely be a complex and burdensome solution, and is unlikely to improve settlement accuracy.

Currently a CLP is calculated for each network area and a single party is responsible for collecting data and maintaining sample meters. Transferring these responsibilities to retailers would present a range of coordination, control and ownership issues. If the CLP was for the network area, responsibility for collecting data would need to be shared between retailers, requiring a mechanism for coordination and decision making between

them. Under this arrangement, it may be difficult to ensure ongoing responsibility for maintaining sample data from a premises if the retailer changes as retailers are not a constant participant at small customer connection points in NSW.

Giving AEMO CLP responsibility would likely address these coordination and decision-making issues. However, as retailers are responsible for smart meters, this would again create a situation where the responsibility for maintaining sample meters is separated from broader metering responsibilities. Further, AEMO does not consider a CLP is necessary and does not support creating the CLP from smart meter data.

Finally, Option 4 may not create an accurate CLP as it will not be representative for controlled load usage for existing non-smart meter connections. That is, using smart sample meter data would develop a CLP based on energy usage for technologies including things such as EV charging, however the CLP is applied for technologies on non-smart meters installed prior to December 2017, primarily pool pumps and hot water systems.

Conclusion

The NSW Government supports amending AEMO's metrology procedure to remove the controlled load profile and sample meter requirements. The government has coordinated the provision of a request to AEMO to amend its jurisdictional metrology procedures for NSW to implement this reform.