Australian Energy Market Commission

RULE CHANGE

CONSULTATION PAPER

National Electricity Amendment (Global settlement and market reconciliation) Rule 2018

Rule Proponent(s)

Australian Energy Market Operator

7 June 2018

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Reference: ERC0240

Citation

AEMC 2018, Global settlement and market reconciliation, Rule Determination, 7 June 2018, Sydney

About the AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

Contents

1 Introduction

On 16 March 2018, the Australian Energy Market Operator (AEMO) submitted a rule change request to the Australian Energy Market Commission (AEMC or Commission). AEMO is seeking to apply a 'global settlement' framework instead of the existing 'settlement by differencing' approach for settlement of the demand side of the wholesale electricity market. AEMO considers that a global settlement framework will provide a level playing field for electricity retailers and enable AEMO to more accurately reconcile the wholesale electricity market. Along with the rule change request and proposed rule, AEMO also provided a 'high level design' document that proposes an operational design for global settlement.

This consultation paper has been prepared to facilitate public consultation on the rule change request and to seek stakeholder submissions.

This paper:

- sets out a summary of, and a background to, the rule change request
- identifies a number of questions and issues to facilitate the consultation on this rule change request
- outlines the process for making submissions.

Submissions on this consultation paper are due by no later than **Thursday, 5 July 2018**. Details on how to lodge a submission are contained in Chapter 6 of this consultation paper. A template is available to help stakeholders provide their views on the issues raised in the paper.

2 Background

This chapter provides background to the rule change request. It also explains:

- the link between the physical market and financial settlement of the wholesale electricity market
- the current settlement framework and its history
- how data flows between market participants
- the materiality of unaccounted for energy.

2.1 Background to the rule change request

This section provides an overview of how the structure of the electricity industry has evolved and current reforms.

2.1.1 Electricity industry structure

Prior to 1991, the electricity industry was under full government ownership and consumers paid regulated prices. Typically, generation and transmission were vertically integrated, and in some states distribution and retail were owned by local government.[1] Given the overall importance of energy as an input into the wider economy, a more competitive electricity sector was viewed as crucial for improving economic growth and employment opportunities in the economy.[2]

Government reforms during the 1990s structurally separated the electricity supply industry into competing generators and retailers, and monopoly transmission and distribution network service providers. Transmission, generation, distribution and retail arms were either corporatised or privatised.[3] This was in preparation for:

- the introduction of a uniform single wholesale electricity market across eastern and southern Australia
- customer choice in electricity supplier, initially for large customers (the first step in the transition to full retail contestability and the deregulation of retail pricing).[4]

Following these reforms and a staged transition, the National Electricity Market (NEM), commenced in December 1998.[5] At this time, retail competition was only available to large electricity customers. Small customers were exclusively served by their incumbent 'local retailer' - the retailer appointed to supply all customers in a distribution network

1 KPMG, *National Electricity Market - A case study in successful microeconomic reform*, 2013, p. 14. Available at www.aemc.gov.au. For example in New South Wales, the Sydney County Council acted as the electricity supply business for most of Sydney until 1991 - see Wilkenfeld, G and Spearritt, P, *Electrifying Sydney - 100 Years of EnergyAustralia*, Sydney, 2004, p. 8.

2 AEMC, *2017 Retail Energy Competition Review*, p. 38.

3 KPMG, *National Electricity Market - A case study in successful microeconomic reform*, 2013, p. 13. Available at www.aemc.gov.au.

4 Ibid, p. 9.

5 Ibid, p. 32.

(also called a 'local area'). Jurisdictional regulations prohibited new firms from entering the retail market.[6]

Retail energy markets began to change in 2002 when Victoria and New South Wales introduced full retail contestability in both their electricity and gas retail markets. Following these developments, other NEM jurisdictions opened up their retail energy markets to competition.[7] The introduction of full retail contestability and then, in most jurisdictions, retail price deregulation (Figure 2.1) has led to the emergence of independent retailers that compete with the local retailers.[8] Independent retailers include the new-entrant Tier 2 retailers and also the large incumbent retailers that were able to expand operations into other areas.

Figure 2.1 Progress of retail energy market reform across jurisdictions

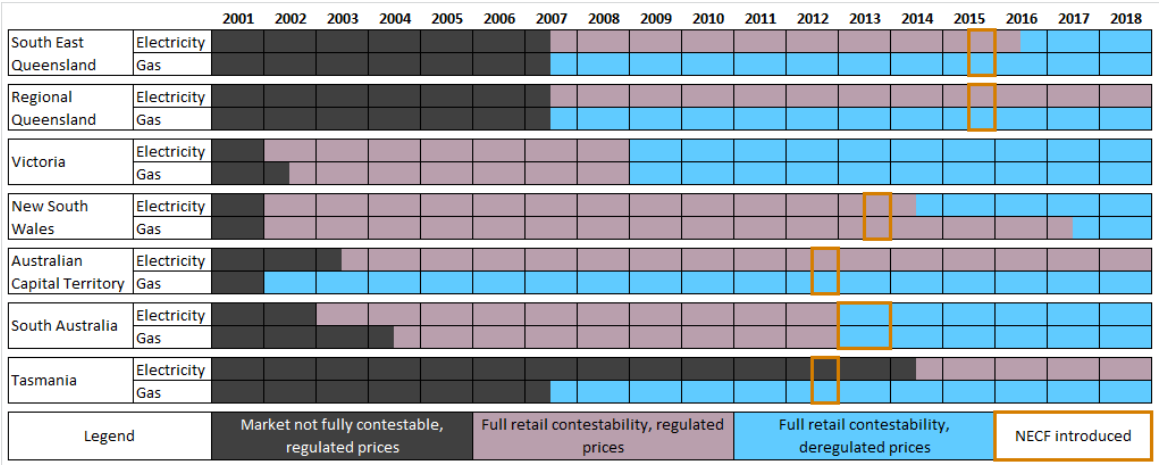


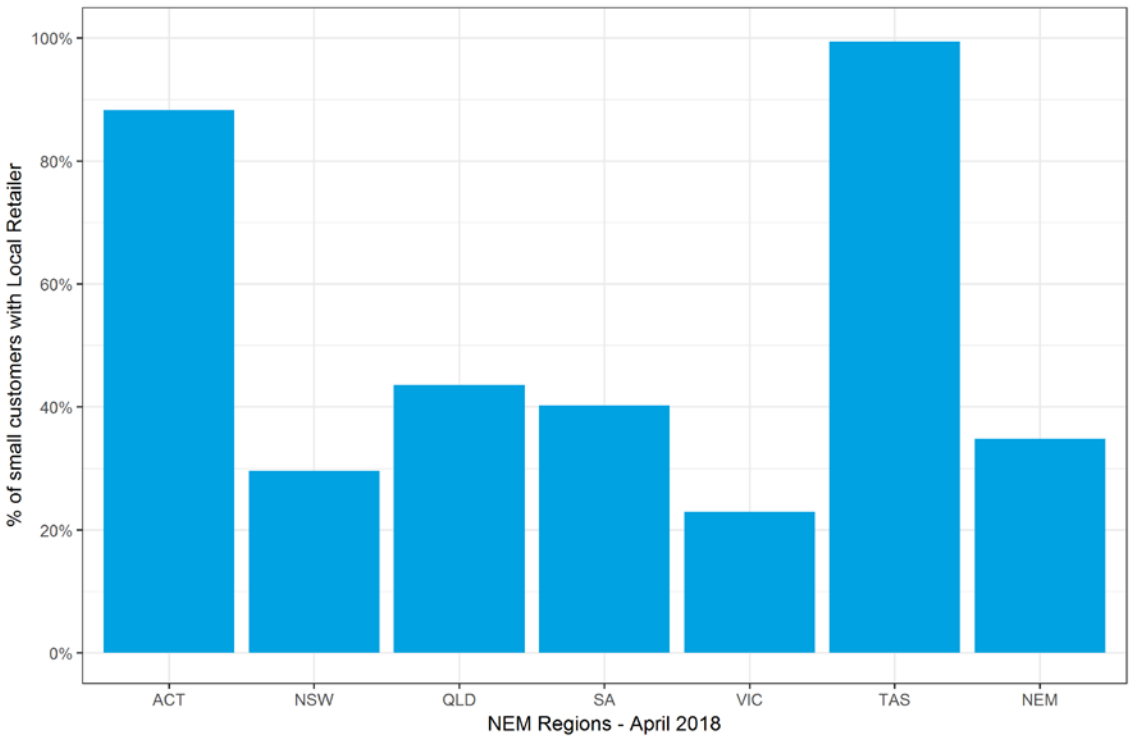
Figure 2.2 shows the proportion of small customers in each NEM region that are currently served by a local retailer as compared to those with an independent retailer. In the more populous states, more than half of small customers are served by independent retailers.

6 *AEMC, 2017 Retail Energy Competition Review*, p. 12.

7 Ibid

8 AEMC, *2017 Retail Energy Competition Review*, p. 130.

Figure 2.2 Proportion of small customers with the local retailer in each NEM region (April 2018)



Source: MSATS M71 Market Data

2.1.2 Energy sector transition

The NEM is currently undergoing a significant transition involving the adoption of generation technologies such as wind, solar and energy storage at the same time as the retirement of existing thermal generation. Work underway to manage the transition includes:

- setting the foundations for a competitive distribution market that would enable consumers to get the most value out of their rooftop solar panels, batteries and other distributed energy resources in the future[9]
- developing market frameworks which allow continued take-up of new generating technologies while keeping the lights on[10]

Major reforms in place that support the transition include competition in metering and five minute settlement. The competition in metering reform would also support global settlement. In addition, there is an opportunity to develop the IT system capability for global settlement in alignment with the design and build activities required for the introduction of five minute settlement.

9 See: AEMC, *Distribution market model*, August 2017 and AEMC, *Electricity Network Economic Regulatory Framework Review*, July 2017

10 See: www.aemc.gov.au/our-work/our-current-major-projects/system-security-and-reliability

Competition in metering

As part of the reforms that emerged from the Power of choice review,[11] the AEMC recommended that all future new meters installed should be advanced (or 'smart') meters. These meters are remotely-read and able to measure both how much electricity is used and when it is used, in near real time. On 26 November 2015 the AEMC made the *Expanding Competition in Metering and Related Services* rule.[12] From December 2017, this rule has required retailers to deploy advanced meters for small customers where new and replacement meters are required or where consumers are seeking access to advanced metering services.[13] Advanced meters provide consumers with greater opportunities to access new products and services to help them manage their electricity bills.

Another benefit of advanced meters is that settlement data becomes more accurate as the advanced meter fleet grows and the accumulation meter fleet retires. Since the start of competition in metering, more than 81,000 advanced meters have been installed at small customer connection points in the NEM (excluding Victoria), bringing the total number of small customer advanced meters to greater than 438,000.[14] This is in addition to the 2.8 million interval meters that were installed as part of the Victorian smart meter roll out. Advanced meters are now installed at 37 per cent of both small and large customer connection points across the NEM.[15]

Five minute settlement

On 28 November 2017 the AEMC made the *National Electricity Amendment (Five minute settlement rule) 2017* to align operational dispatch and financial settlement of the supply side of the wholesale electricity market at five minutes.[16] Market participants and AEMO are preparing for five minute settlement which will commence on 1 July 2021. Implementation of five minute settlement requires AEMO to update its systems and procedures, and NEM participants to:

- review and where necessary update existing contract terms and conditions
- upgrade metering to provide five minute granularity data (where required)[17]
- upgrade IT systems to store and process five minute granularity data.

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11 For more information on the Power of choice reforms see: https://www.aemc.gov.au/our-work/our-current-major-projects/power-choice

12 The *Expanding Competition in Metering and Related Services* final rule and determination can be viewed at: https://www.aemc.gov.au/rule-changes/expanding-competition-in-metering-and-related-serv

13 Large customers already need to have remotely-read metering installations.

14 Data supplied by AEMO for the period 1 December 2017 to 1 May 2018.

15 Ibid

16 The *Five minute settlement* final rule and determination can be viewed at: https://www.aemc.gov.au/rule-changes/five-minute-settlement

17 Meters that are not communication enabled (which make up the majority of small customer meters outside of Victoria) currently have their consumption manually checked every few months. Where necessary, AEMO currently profiles this consumption for a 30 minute period. This profile will be changed to a five minute period, without the meter needing to be replaced for five minute settlement.

2.2 Electricity distribution and the settlement process

Governments in participating jurisdictions are responsible under jurisdictional electricity legislation for:

- allocating 'local areas' to a distribution network service provider (DNSP)[18]
- appointing a local retailer (referred to in the National Energy Retail Law (NERL) as a 'local area retailer') for each local area.[19]

Within a local area, there are metered connection points that link the transmission network to the distribution network called transmission node identities (TNIs).[20] Also, every electricity network connection point within a distribution network has its own National Metering Identifier (NMI). Every small and large customer NMI in a local area must be referenced to the correct TNI. This enables market settlement to be performed at the TNI level.[21]

The role of the local retailer in the settlement process is discussed in section 2.3.

2.3 Current settlement arrangements

The NEM is a gross pool market operated by AEMO. All electricity supplied to the market and consumed by end users is transacted at the spot price for each trading interval[22] in each region. The market settlement process ensures that for each trading interval market generators are paid for the energy they provide to the NEM and market customers pay for the energy they use. Market customers are mainly electricity retailers who purchase wholesale electricity to on-sell to their retail customers.[23]

The current retail settlement framework, known as 'settlement by differencing', has been in place since the start of the NEM. Under this approach, all electricity is billed to the local retailer except for the loss-adjusted metered electricity that is consumed by the customers of independent retailers. This means that the local retailer for an area bears the cost and risk of all residual electricity losses, including unaccounted for technical losses and other retailers' commercial losses. Box 2.1 explains the different types of electricity losses that are considered in the settlement process.

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18 A local area is defined in NER, Chapter 10 as "the geographical area allocated to a Network Service Provider by the authority responsible for administering the jurisdictional electricity legislation in the relevant participating jurisdiction.

19 NERL, s. 11.

20 TNIs apply to every connection to a transmission network, including for example large generating systems and smelters. However, only TNIs associated with distribution networks are relevant to the proposed rule change. See AEMO NEM Transmission node identities, www.aemo.com.au/Datasource/Archives/Archive1501.

21 An exception is where customer meters are referenced to a virtual transmission node (VTN). This is discussed in more detail in section 5.2.

22 Trading intervals in the NEM are currently 30 minute periods, reducing to five minute periods in July 2021 as a result of the *National Electricity Amendment (Five minute settlement) Rule 2017 No 15*. The Five minute settlement final rule and determination can be viewed at: https://www.aemc.gov.au/rule-changes/five-minute-settlement

23 Remaining market customers tend to be large industrial electricity users such as smelters. See current market registration lists at www.aemo.com.au.

Box 2.1 Types of electricity losses

Technical losses mainly consist of power dissipation in electricity system components such as distribution lines and transformers. Technical losses are estimated by applying estimated distribution loss factors (DLFs) and transmission marginal loss factors (MLFs). The DLFs used in settlements are single, annual values that represent average network losses. They are calculated by the relevant DNSP using methodologies that are approved by the Australian Energy Regulator (AER). The AER also approves the DLFs.

Unaccounted for technical losses are the difference between the estimated losses calculated with DLFs and the actual losses that occur in the distribution network.

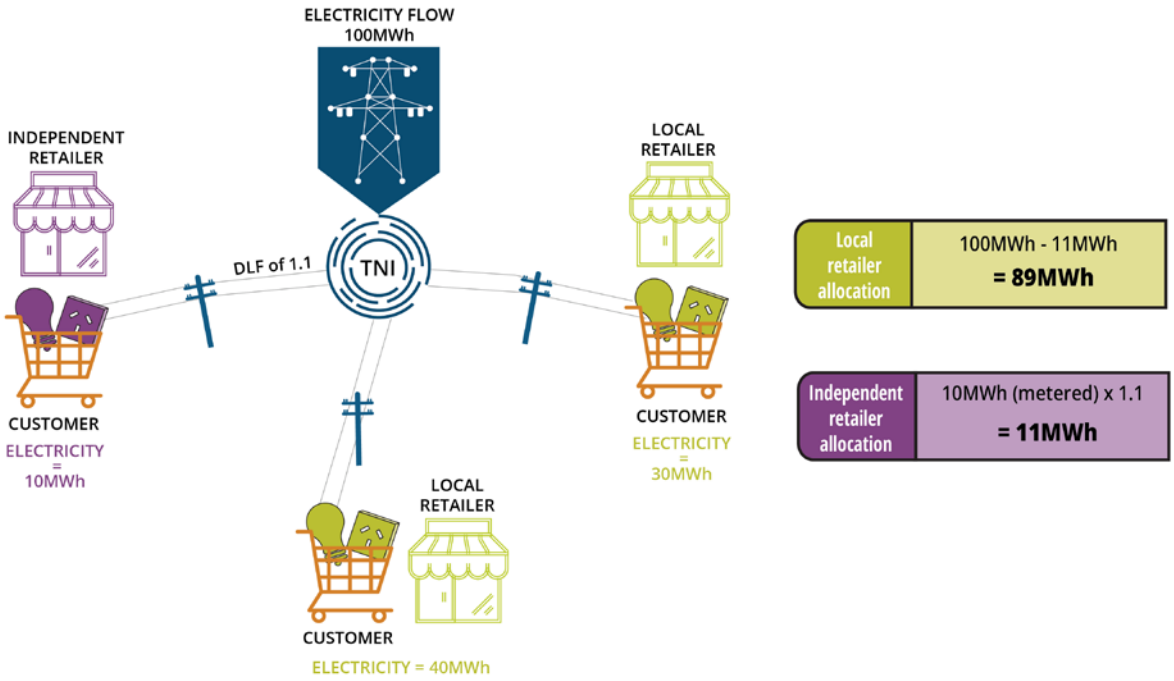
Commercial losses mainly consist of unaccounted for unmetered connections, electricity theft, malfunctioning metering equipment and errors in accounting and record-keeping.

Estimation errors associated with profiling accumulation metering. Energy usage data from accumulation meters cannot be used in its raw form for wholesale settlement purposes. This is because the market is settled on 30 minute trading intervals (and from July 2021, five minute trading intervals) whereas an accumulation meter reading is a single reading relating to several months of usage. To estimate accumulation metering energy volumes for settlement, AEMO calculates and applies the 'net system load profile' (NSLP) for each trading interval. The difference between the estimated volumes and actual volumes are estimation errors.

Unaccounted for technical losses, commercial losses and estimation errors associated with accumulation meter profiling are collectively '**unaccounted for energy**' (UFE). UFE can be a surplus or a deficit.

Figure 2.3 is a simplified example of settlement by differencing. It shows two retailers serving customers from a TNI within a local area - the local retailer (A) and an independent retailer (B). Independent retailer B is invoiced on the basis of the electricity metered at its customers' connection points, adjusted by the relevant DLF (estimation of technical losses). Local retailer A is invoiced on the amount of electricity that was measured at the TNI minus the electricity invoiced to the independent retailer.

Figure 2.3 Simplified example of settlement by differencing



Source: Adapted from AEMO, High level design, p. 6.

In reality the settlement equation is more complex. This is because the number of independent retailers in a local area and the DLF values vary. Settlement calculations also need to account for:

- type 7 metering installations, such as electricity street lights. Type 7 metering installations are used to determine the consumption of loads where it is not practical or economic to meter on a connection by connection basis, but whose energy consumption can be calculated to a reasonable level of accuracy using an algorithm. Type 7 metering installations can apply to contestable loads and therefore can be served by local or independent retailers. The electricity associated with type 7 metering installations is captured in AEMO's Market Settlement and Transfer Solution (MSATS) database and is included in the wholesale market settlement process.
- unmetered loads, including traffic lights (in most jurisdictions) and bus shelter and road signage lighting. It is also not practical or economic to install a meter for these loads. These loads are not contestable and are the financial responsibility of the local retailer. Unmetered loads form part of UFE at settlement so local retailers pay for them but can recover their costs through off-market agreements. In many cases, the local retailer will have an off-market agreement with a local council or other relevant party for unmetered loads. The agreement would be based on an estimation of the electricity consumption of the applicable unmetered loads.

Table 2.1 shows how different categories of electricity are allocated among the local retailer and independent retailers under settlement by differencing.

Table 2.1 Allocation of electricity to retailers under settlement by differencing

Cost category	Paid for by Local retailer?	Paid for by Independent retailers?
Metered electricity	Yes	Yes
Calculated technical losses (DLF applied to metered electricity)	Yes	Yes
Type 7 metering installations	Yes	Yes
Unmetered loads	Yes	No
Unaccounted for technical losses (part of UFE)	Yes	No
Commercial losses (part of UFE)	Yes	No
NSLP estimation error (part of UFE)	Yes	No

2.4 Industry data flows for settlement

Settlement processes are dependent on metering data. Table 2.2 shows the data flows that underpin settlement by differencing.

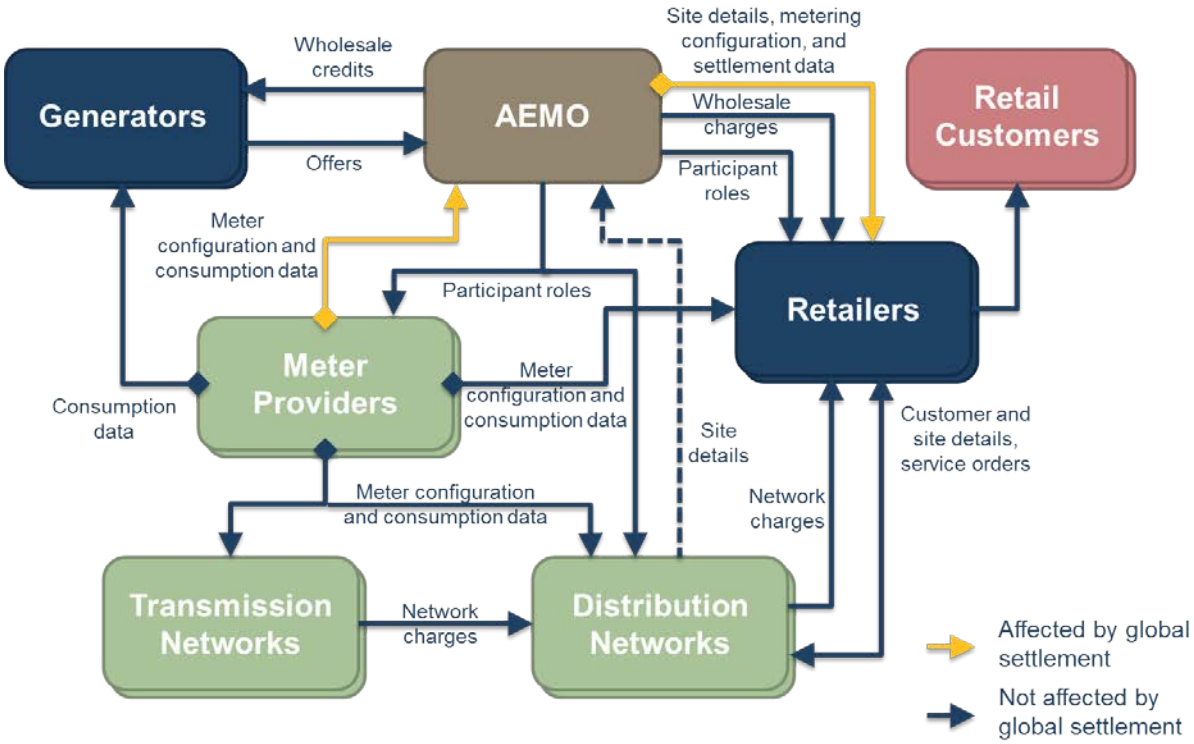
Table 2.2 Industry data flows under settlement by differencing

Market entity	Data flows in relation to each TNI
Metering data providers (MDPs)	MDPs sends metering data in a rich data format (known as then Meter Data File Format (MDFF)) to: • financially responsible market participants (including local retailers, independent retailers, generators) • relevant DNSP MDPs send metering data in a simplified data format (known as then Meter Data Management (MDM) file format) to AEMO.
Local retailer	Receives from MDP: • metering data for connection points where the local retailer is the financially responsible market participant i.e. metering data relating to its customers • metering data for connection points where the local retailer is *not* the financially responsible market participant i.e. metering data relating to all other customers assigned to the TNI for the purpose of settlement statement reconciliation
Independent retailers	Receives from MDP: • metering data for connection points where the independent retailer is the financially responsible market participant i.e. metering data relating to its customers

Market entity	Data flows in relation to each TNI
AEMO	Receives from MDP: • metering data relating to independent retailers' customers • generation data relating to generator supply and embedded generation Does *not* receive consumption data relating the connection points where the local retailer is also the financially responsible market participant
Distribution network service providers	Receives from MDP: • metering data for all connection points on its distribution network
Generators	Receives from MDP: • metering data for connection points where the generator is the financially responsible Market Participant

Figure 2.4 depicts the high-level data flows required by market participants for settlement. It also shows the data flows that would be affected by a change to global settlement from settlement by differencing.

Figure 2.4 National electricity market data flows



Source: AEMO, High level design, p. 13.

2.5 Current level of unaccounted for energy

Under the current settlement framework, AEMO is unable to perform a full reconciliation of all energy being settled because it does not always receive metering data relating to local retailers' customers. Therefore it cannot estimate UFE in each local area or across the NEM. AEMO claimed in the rule change request that information provided to it from the New Zealand Electricity Authority indicates that UFE in the New Zealand market has reduced to 0.8% of total energy settled per annum since the adoption of a global settlement framework in that market in 2008 for the reasons described in Box 2.2.[24] UFE was not measured in New Zealand prior to the introduction of global settlement.

The AEMC has attempted to gather information about the size of UFE in Australia. Cost estimates for distribution areas ranged from $0.003 to $0.30 per MWh of generation. As a proportion of generation, UFE estimates range from 0.003 to 1.1 per cent. Note that these estimates are themselves based on approximations and therefore should be used cautiously.

The World Bank tracks annual 'electric transmission and distribution losses' as a percentage of generation output for most countries.[25] Transmission and distribution losses are defined as 'losses in transmission between sources of supply and points of distribution and in the distribution to consumers, including pilferage.'[26] This definition is broader than that of UFE (comprising commercial losses and unaccounted for technical losses) because it also includes technical losses. Therefore the level of the international data on electricity losses is only a guide to the level of UFE for those countries as the UFE will be less.

The data are collected from national energy agencies by the International Energy Agency (IEA), adjusted by the IEA to meet international definitions and published by the World Bank. The data set currently spans the period 1960 to 2014. It shows that in 2014 the world average for losses was 8.3 per cent of wholesale market volume and the reported result for Australia was 4.8 per cent. The 2014 results for countries with electricity markets broadly comparable to Australia's were:

- New Zealand 6.5 per cent
- United Kingdom 8.3 per cent
- Ireland 7.9 per cent.

24 AEMO, Rule change request, p. 9.

25 World Bank website at https://data.worldbank.org/indicator/EG.ELC.LOSS.ZS, viewed 24 May 2018.

26 Ibid

Box 2.2 Case study: Implementation of global reconciliation in New Zealand

In the period 2001 to 2004, retailers estimated that unaccounted for energy in the New Zealand electricity market was in the order of NZD $10 million to $30 million per month. These costs were being shouldered by incumbent retailers under the settlement by differencing regime. This drove the industry to collaborate on a design for 'global reconciliation' (similar to AEMO's proposed design for 'global settlement' in the NEM).

The rule change took 18 months and tendering for the settlement system took another year. Global reconciliation began on 1 May 2008 although some parts of the market are still settled by difference due to the configuration of certain networks.

The New Zealand Electricity Authority began measuring UFE from the start of global reconciliation, and note that it has decreased over time. This is largely related to:

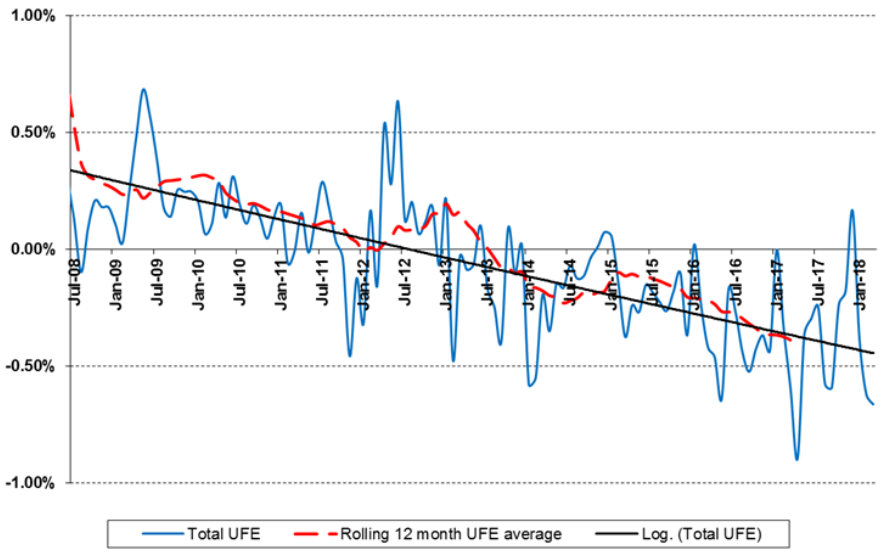
- revision of some DLFs
- more accurate settlement data as a result of the advanced metering infrastructure (AMI) rollout. About 78% of meters are now interval meters, with some networks having 90% penetration while others are around 45-50%
- better data handling practices

Figure 2.5 shows:

- the absolute change in UFE as a proportion of total market load over time
- the rolling 12 month average change in UFE
- the decreasing trend in UFE.

This data is calculated for grid connected local networks that are reconciled using the global reconciliation methodology. Secondary networks are not included. It is also subject to wash-ups that may cause minor variations up to 14 months into history from the current time.

Figure 2.5 Unaccounted for energy in New Zealand's local networks



Source: New Zealand Electricity Authority

3 Details of the rule change request

In its rule change request, AEMO seeks amendments to the rules to apply a 'global settlement' framework to the retail side of the wholesale market instead of the existing 'settlement by differencing' approach. AEMO considers a global settlement framework will provide a level playing field for electricity retailers and enable accurate reconciliation by AEMO of the demand side of the electricity market.

This chapter provides an overview of the issues identified and the proposed solution in the rule change request. It also outlines the expected costs, benefits and effects of the proposed rule.

The rule change request included a proposed rule and a 'high level design' document that proposes an operational design for global settlement.[27]

3.1 Issues identified in the rule change request

In its rule change request, AEMO provides its rationale for the rule change. A number of key points raised in the rule change request are summarised below.

3.1.1 Allocation of UFE

AEMO notes that local retailers are fully exposed to commercial losses and to errors in the calculated technical losses.[28] That is, the local retailer for each local area bears the cost and risk of all the UFE but it is unable to manage these costs, except for its own commercial losses. Consequently, UFE costs are passed through to the local retailer's customers, not to all customers in the local area. This makes retail electricity prices less efficient because they are not cost-reflective of customers' consumption or use of the network. It also means that retailers are not trading on the same terms in the NEM. According to AEMO, the current allocation of UFE to local retailers means there is no incentive for independent retailers to reduce commercial losses and metering inaccuracies because:

- independent retailers are only charged for loss-adjusted metered electricity, not UFE
- local retailers cannot identify or resolve these losses except in respect of their own customers.[29]

When the NEM commenced operation in 1998 the majority of customers were still with their local retailer, and the local retailer and distributor were vertically integrated. Settlement by differencing was an appropriate approach at this time given the market structure and the available metering and IT system capabilities. AEMO notes that in the early stages of retail competition, using a settlement by differencing approach was practical and reasonable 'where the relatively small volume traded by an independent

27 The rule change request and the high level design may be found on the AEMC website, www.aemc.gov.au.

28 AEMO, Rule change request, p. 5.

29 Ibid

retailer was simply subtracted from the total injection into a distribution network area.'[30]

3.1.2 Wholesale market reconciliation

Under settlement by differencing, AEMO is unable to perform full settlement reconciliation because it only receives TNI supply data and consumption metering data relating to independent retailers' customers (see Table 2.2). AEMO would also need consumption metering data relating to local retailers' customers to fully reconcile the market.

AEMO claims that being unable to fully reconcile settlement means that errors and anomalies in settlement are not easily identified. This means settlement errors may be continued outside of the six month window within which market participants must raise billing disputes with AEMO.[31] AEMO notes that this has resulted in disputes that have required resolution outside the NEM settlement process.[32]

3.1.3 Data access

AEMO notes that access to metering data is different for local retailers and independent retailers. Independent retailers receive metering data for their own customers within a local area. However, local retailers are able to access all metering data in their local area for the purpose of settlement statement reconciliation.[33] AEMO considers that there should be 'transparency for all retailers in the allocation of energy values for settlement in the NEM.'[34]

3.2 Proposed solution in the rule change request

The rule change request from AEMO proposes that a global settlement framework be implemented to address the identified issues with settlement by differencing. According to AEMO, there is an increasing need to implement global settlement now that independent retailers hold a significant market share.[35] As with the current settlement framework, global settlement would apply to the market customer (demand) side of the market and not the generator (supply) side.

Compared with settlement by differencing where the local retailer bears all UFE, global settlement would share UFE across all retailers in a local area. Retailers would still be responsible for their own customers' electricity consumption.

At a high level, AEMO's proposed global settlement methodology requires:

- measurement of total electricity supplied from the transmission system to the TNI and embedded generation (same measurement as for settlement by differencing)

30 Ibid, p. 2.

31 NER, clause 3.15.18(b).

32 AEMO, Rule change request, p. 5.

33 Ibid

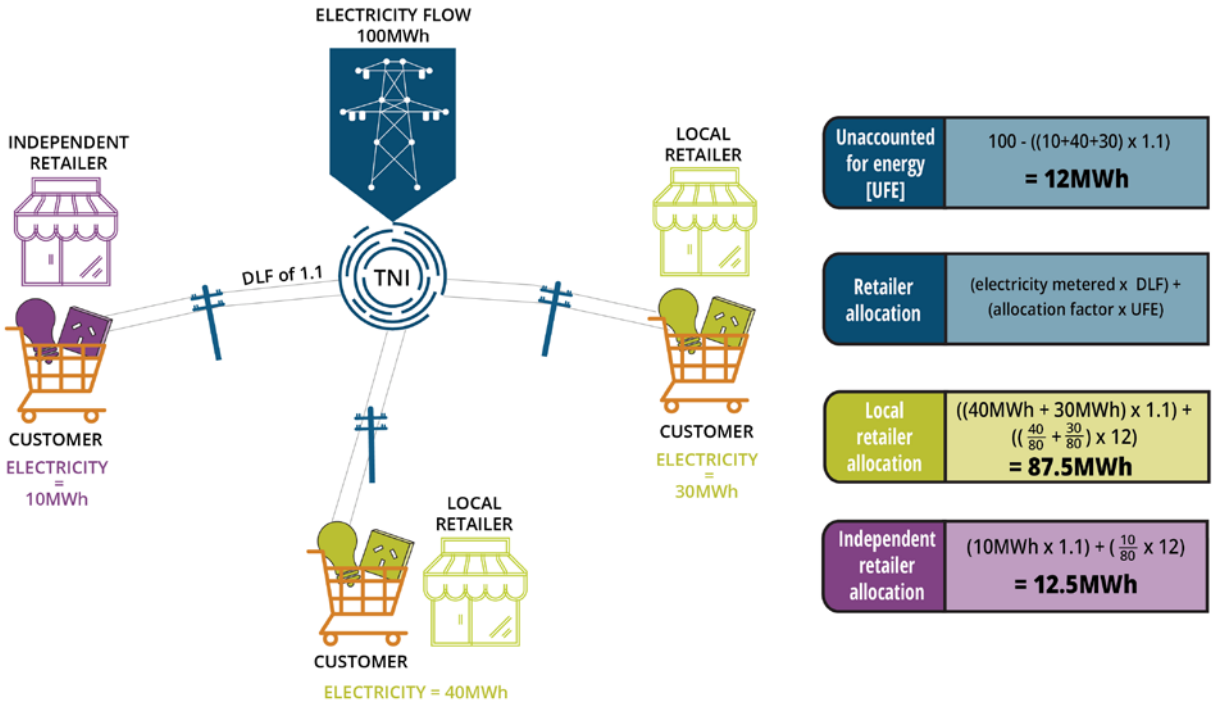
34 Ibid, p. 7.

35 Ibid

- measurement of total electricity consumed by the metered loads referenced to that TNI, adjusted by the relevant distribution loss factor (estimation of technical losses, same measurement as for settlement by differencing)
- calculation of the UFE amount (commercial losses and unaccounted for technical losses) by subtracting the total electricity consumed from the total electricity supplied (new calculation)
- allocation of UFE to all of the retailers operating at the TNI based on a pre-determined set of criteria. AEMO propose that UFE is allocated based on each retailer's proportion of total energy consumption for the area (new calculation)
- calculation of each retailer's settlement amount as the sum of its loss-adjusted energy consumption and share of UFE (new calculation).

Figure 3.1 is a simplified example of global settlement. It shows two retailers serving customers from a TNI within a local area - the local retailer (A) and an independent retailer (B). Both retailers are invoiced on the basis of the electricity metered at their customers' connection points, adjusted by the relevant distribution loss factor (estimation of technical losses) plus their share of UFE.

Figure 3.1 Simplified example of global settlement



The global settlement calculation would be subject to similar complexities as settlement by differencing (see section 2.3), such as the number of retailers serving a TNI, variation in DLFs and treatment of calculated loads and unmetered declared loads.

3.3 Expected costs, benefits and effects of the proposed rule

AEMO expects that global settlement would address the issues with settlement by differencing it identified in the rule change request. It considers the benefits of global settlement to be:

- treating each retailer equally in the settlements process by providing a fairer allocation of UFE
- accurate reconciliation of the market which will allow settlement anomalies to be more easily identified. This would reduce the likelihood of settlement errors needing off-market settlement, dispute resolution and legal proceedings.[36]

AEMO also suggests that by allocating UFE to all retailers there will be an incentive for all retailers to reduce commercial losses and therefore costs to consumers.[37]

AEMO notes that if global settlement was implemented in line with its high level design, the only material cost of the change would be in AEMO making changes to market systems and data formats. It considers that the implementation cost would be moderate and only incremental to the five minute settlement implementation costs,[38] assuming that the IT system capability for global settlement was developed in alignment with the design and build activities for five minute settlement.[39]

AEMO also notes that it 'has identified potential savings for retailers currently engaged in attempts to reconcile their settlement statement and for Metering Data Providers, who would no longer be required to support and deliver an AEMO settlement-specific data format'.[40]

36 Ibid, pp. 7-8.

37 Ibid

38 Refer to the *Five minute settlement* rule change at: https://www.aemc.gov.au/rule-changes/five-minute-settlement

39 AEMO, Rule change proposal, p. 9.

40 Ibid

4 Assessment framework

The Commission's assessment of this Rule change request must consider whether the proposed Rule promotes the National Electricity Objective (NEO).[41]

4.1 Rule making test

4.1.1 Achieving the NEO

Under the NEL the Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective (NEO).[42] This is the decision making framework that the Commission must apply.

The NEO is:[43]

> "To promote efficient investment in, and efficient operation and use of, electricity services for the longer term interests of consumers of electricity with respect to -
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system."

The objective captures the three dimensions of efficiency: productive (efficient operation), allocative (efficient use of) and dynamic efficiency (efficient investment).[44]

4.1.2 Making a more preferable rule

Under s. 91A of the NEL, the Commission may make a rule that is different (including materially different) to a proposed rule (a more preferable rule) if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule will or is likely to better contribute to the achievement of the NEO.

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41 From 1 July 2016, the National Electricity Rules (NER), as amended from time to time, apply in the Northern Territory, subject to derogations set out in the National Electricity (Northern Territory) (National Uniform Legislation) (Modifications) Regulations. Under those Regulations, only certain parts of the NER have been adopted in the NT. For the version of the NER that applies in the Northern Territory, refer to : http://www.aemc.gov.au/Energy-Rules/National-electricity-rules/National-Electricity-Rules-(Northern-Territory). As the proposed rule related to parts of the NER that currently do not apply in the Northern Territory, the Commission will not be assessing the proposed rule against additional elements required by the National Electricity (Northern Territory) (National Uniform Legislation) Act 2015.

42 Section 88 of the NEL.

43 Section 7 of the NEL.

44 Productive efficiency means goods and services should be provided at lowest possible cost to consumers; allocative efficiency means that the price of goods and services should reflect the cost of providing them, and that only those products and services that consumers desire should be provided; dynamic efficiency means arrangements should promote investment and innovation in the production of goods and services so that allocative and productive efficiency can be sustained over time, taking into account changes in technologies and the needs and preferences of consumers.

4.2 Proposed assessment framework

The Commission uses an assessment framework to evaluate whether the proposed rule, if made, is likely to promote the NEO. The framework may be refined during the assessment process. Based on a preliminary assessment of this rule change request, the likely relevant aspect of the NEO is the "efficient use of electricity services".

The settlement process plays an important role in providing transparency and confidence to market participants. An accurate settlement process provides market participants, both generators and market customers, with confidence that the amounts of money that they earn or pay for electricity are reflective of electricity generated or consumed and are calculated correctly. This promotes efficiency as there is less time and resources spent on querying the results of settlement. It also means that costs related to prudential requirements, as well as any residual uncertainty in the settlement revenue or payment, are set at efficient levels as these are based on the amounts calculated in the settlement process. In addition, competition in the electricity market may be more efficient if the NEM settlement system treats all market participants as equally as possible.

Stakeholder views are invited on the proposed assessment framework which includes the following criteria to assess whether the proposed rule is likely to promote the NEO, namely the effect the rule has on:

- **Prices that reflect the cost of supply and value of its use** - the extent to which the proposed changes would improve the accuracy of the settlement outcomes, and whether this is likely to promote more efficient use of electricity services. To promote efficient outcomes in the electricity market, retail charges should accurately reflect the quantity of electricity consumed and prices should not include inefficient cross-subsidies. An increased ability for AEMO to reconcile settlement errors, and increased incentives on retailers to identify sources of commercial losses, are likely to improve the accuracy of the settlement outcomes.
- **Price and quantity risk allocation** - the potential of the proposed rule to provide more efficient risk allocation and greater incentives to identify sources of commercial losses. Risks should be allocated to the parties who have incentives and ability to efficiently manage them. Metering errors and unidentified sources of commercial losses lead to UFE within a distribution network. Currently these risks are allocated to the local retailer who is generally unable to manage these risks.
- **Regulatory and administrative burden** - the effect on market participants' regulatory and administrative burden that may arise if the proposed rule were to be implemented. Through this rule change process, the Commission seeks to understand the magnitude and distribution of the costs. The costs associated with the proposed changes would involve once-off costs to transition, as well as on-going costs associated with the new framework.

5 Issues for Consultation

Taking into consideration the assessment framework, a number of issues have been identified for initial consultation. Stakeholders are encouraged to comment on these issues as well as any other aspect of the rule change request, including the proposed assessment framework.

5.1 Unaccounted for energy

AEMO have identified the unbalanced allocation of UFE, whether it is a surplus or a deficit, as an issue with settlement by differencing and have proposed that global settlement would address this issue. This section considers ways to allocate UFE, pricing effects of sharing UFE, secondary pricing effects and calculating UFE.

5.1.1 Allocating volumes of unaccounted for energy

This section describes potential ways to allocate UFE. As described in Box 2.1, UFE comprises unaccounted for technical losses, commercial losses and estimation errors associated with the NSLP. Unaccounted for technical losses are the difference between the estimated losses calculated with DLFs and the actual losses that occur in the distribution network. Therefore they are attributable to customers as they relate to use of the network. NSLP estimation errors are somewhat attributable to accumulation meter customers. Commercial losses by nature are not attributable to customers. However, the component parts of UFE cannot be independently measured meaning that part of UFE is attributable to customers. Therefore sharing UFE so that it is potentially passed through to all customers in a distribution area is more cost-reflective than attributing it to the local retailer under settlement by differencing.

Allocation of UFE to retailers

Under AEMO's high level design for global settlement, all retailers would be allocated UFE (whether positive or negative) based on the proportion of 'accounted-for' volume of electricity allocated to each retailer in the local area, where 'accounted-for' electricity comprises:

- electricity recorded and calculated at metering installations
- declared energy
- calculated DLFs.[45]

AEMO notes that this is the simplest allocation and the method that it favours. Other possible ways to allocate UFE are discussed below.

Allocation of UFE based on proportion of peak or average demand

Allocating UFE to retailers based on their proportion of peak or average demand would potentially reflect retailers' 'wear and tear' on the distribution network more closely as well as sharing the burden proportionally across retailers. This approach is likely more complex to implement than AEMO's proposal for not much, if any, additional gain in

45 AEMO, High level design, p. 11.

the equitable sharing of UFE. This is because the proportions of allocated UFE would most likely be similar across retailers, but higher during peak times.

Allocation of UFE to DNSPs

Placing the financial responsibility for UFE on DNSPs would have a similar outcome to the current situation where one party bears responsibility for UFE but cannot manage it.[46] The difference in this case, is that the positive or negative UFE cost would likely be passed through to *all* customers in a local area (currently only the local retailer's customers are exposed to UFE) but it would still not be cost-reflective of individual retailers' customer loads. Although it would be a simpler method of apportioning UFE, this approach would weaken the incentive on retailers to reduce commercial losses as they would be provided less detailed information on its size and location. However, it would still enable AEMO to calculate the UFE and use it to improve the quality of the settlements data.

Allocation of UFE through the intra-regional settlements residue

An approach could be to settle all distribution connected loads on the basis of the price, metered energy and loss factors. This would mean that UFE would be included in the intra-regional settlements residue[47] of the associated region, rather than allocated to the retailers assigned to the TNI. The UFE would be shared across the customers in the region through the change in the transmission use of system (TUOS) charges. This approach would have similar outcomes to allocating UFE to DNSPs. That is, it would be a simpler method but provide a weaker incentive for retailers to reduce commercial losses because TUOS charges are passed through to all customers by DNSPs.

Other considerations for allocating UFE

Under AEMO's design, UFE would be allocated to all retailers within the distribution network area that is supplied from a given TNI. Currently, a few TNIs are connected to distribution networks that contain a high proportion of generation. For example, rural areas that have large solar or wind farms but low levels of demand, or urban areas with a significant amount of embedded generation.

The increasing penetration of distribution-connected generation means that parts of the distribution network may become more dominated by generation in the future. This means that a high proportion of the UFE would be due to the unaccounted for technical losses associated with generation and could represent a material proportion of the energy settled at the TNI.[48]

46 DNSPs could drive improvements unaccounted for technical losses as they are responsible for setting DLFs.

47 The intra-regional settlements residue occurs as a result of transmission losses within the wholesale market.

48 In the extreme, there may be no retailer load within that part of the network and therefore, under global settlement, no retailer accountable for the UFE.

Issue 1 Allocating volumes of unaccounted for energy

1. **To what extent is the full allocation of UFE to local retailers an issue?**
2. **What are the UFE costs and volumes for local retailers?**
3. **What are your views on AEMO's high level design for global settlement, generally and in relation to allocation of UFE?**
4. **What other UFE allocation methods could be suitable and why?**

5.1.2 Effect on pricing of unaccounted for energy costs

Under AEMO's design, UFE would be a new and ongoing cost for independent retailers. Conversely, the local retailer would in most cases see a reduction in UFE costs. The effect on customer pricing would depend on how or whether retailers choose to pass through these costs. This in turn would be influenced by the level of retail competition in the region. Scenarios of how retailers would deal with UFE include:

- independent retailers could raise prices and local retailers could reduce prices in line with changes to their UFE exposure
- independent retailers could raise prices to pass through the new UFE costs and local retailers could maintain prices or raise prices to match those of independent retailers, potentially increasing margins
- UFE costs are small enough that local retailers and independent retailers absorb the costs and there is no effect on customer pricing.

The level of UFE would affect the overall amount that retailers would need to absorb or pass through to their customers. Under AEMO's proposed design, if one retailer addresses a source of UFE then all retailers would benefit in proportion from the reduction in UFE. Similarly, an increase in UFE would be felt across all retailers.

Issue 2 Effect on pricing of unaccounted for energy costs

1. **How will local and independent retailers respond to change in the financial responsibility for UFE? In what way and to what extent?**
2. **Do you consider that a move to global settlement would affect retailer competition, and if so, how? How could these effects be addressed?**

5.1.3 Secondary price effects

The level of UFE may also affect retailers' liable loads under the Large-Scale Renewable Energy Target (LRET), the Small-Scale Renewable Energy Scheme (SRES) and some jurisdictional environmental schemes.[49] Liability for these schemes is related to a retailer's customer load and the costs of purchasing certificates to acquit a liability is passed through to customers. Any increase or decrease in UFE could affect the level of

[49] Examples of jurisdictional environmental schemes include the New South Wales Energy Efficiency Scheme and the Victorian Energy Upgrades scheme.

liability under these schemes depending on whether UFE is included in the liability calculation. There would likely be a consequent effect on pricing if UFE was included in the liability calculation.

AEMO notes that global settlement would not affect NEM market fees for retail activities because from 1 July 2019 these will be based on a per connection point basis, unlike general NEM fees that will still be based on MWh consumed. However, non-energy charges and fees that are calculated or apportioned based on electricity allocated through settlement *would* take into account the allocation of UFE.[50]

Issue 3 Secondary price effects

1. **What are your views on the levels of any secondary price effects from global settlement?**
2. **How would UFE be treated under the LRET, the SRES and jurisdictional environmental schemes?**
3. **Under the proposed global settlement design, what information would be needed on settlement statements to support liability calculations for the LRET, the SRES and jurisdictional environmental schemes?**

5.1.4 Calculating unaccounted for energy - unmetered loads

The approach to calculating UFE is set out in section 3.2. Broadly, UFE is calculated at the TNI by subtracting the loss-adjusted metered electricity consumed from the total electricity supplied. AEMO note that where the current local retailer has reached an agreement with a local authority (or other such party) for the energy delivered to unmetered loads, these loads will need to be identified and removed from the UFE calculation to avoid double counting.[51]

AEMO suggest two options for managing unmetered loads:

- The Minister of the participating jurisdiction may submit changes to jurisdictional metrology material that require AEMO to update the Metrology Procedure with new categories of unmetered loads that can be treated as contestable type 7 metering installations. Once established as a type 7 unmetered load, calculations would need to be determined to facilitate the treatment of the load in AEMO's Market Settlement and Transfer Solution (MSATS) for settlement.
- The retailer and DNSP agree the quantum of energy being traded for the unmetered loads within the local area and declare that total load to AEMO for use in settlement.[52]

50 AEMO, High level design, p. 12.

51 AEMO, High level design, pp. 11-12. See also section 2.3 for an explanation of unmetered loads and how they are distinct from type 7 metering installations.

52 AEMO, High level design, p. 12.

Issue 4 Calculating unaccounted for energy - unmetered loads

1. **What are your views on the proposed method for calculating total UFE for a local area?**
2. **How should unmetered loads be managed?**
3. **What other categories of loads need to be considered in the UFE calculation?**

5.2 Treatment of virtual transmission nodes

The rule change request proposes to remove the local retailer role from the NER because global settlement does not differentiate between retailers.[53] The proposed rule also removes the direct financial responsibility for virtual transmission nodes (VTNs) from local retailers, resulting in a distortion to the UFE calculation. Consequently, VTNs need to be considered in the context of global settlement.

This section explains the current use of VTNs before exploring options for the treatment of VTNs under global settlement.

5.2.1 Current application of virtual transmission nodes

MLFs are used in settlement calculations to account for the technical losses in the transmission system. Generally, customers further from the regional reference node are subject to a higher MLF than those who are closer. VTNs are a way of averaging MLFs for transmission connection points so that jurisdictions can apply VTNs where locational pricing signals are not appropriate.

There are also practical and physical reasons why VTNs are used. For example, having a VTN means that individual NMIs can be assigned to a VTN for simplicity. This has been done in the past to simplify the settlement of some NMIs where the supply to these customers has been switched between TNIs for operational reasons.

VTNs relate to two or more physical transmission nodes. The local retailer that is financially responsible for a VTN is the same local retailer who is responsible for the physical transmission nodes that constitute the VTN. The AER approves VTNs for use in settlement. South Australia, New South Wales, the ACT and Tasmania use VTNs as shown in Table 5.1.

53 Removing the local retailer from the rules is not straightforward because there is a requirement in the NERL for participating jurisdictions to nominate local area retailers. This requirement also affects certain provisions in the NEL. It is likely that global settlement can be implemented without removing the concept of local area retailer.

Table 5.1 Regional use of virtual transmission nodes

Region	VTN codes	Purpose
New South Wales	NEV1, NEV2, NEV3	In New South Wales, VTNs apply only in the Ausgrid distribution area. They are used to simplify the application of MLFs for geographically dispersed calculated and unmetered loads. Each VTN is used for (a) traffic lights; and (b) a legacy lighting program for 50 to 60 business customers.
ACT	AAVT	The VTN applies to all ACT customers except for embedded networks, large customers and interstate transfers. It simplifies the application of MLFs by removing the need to map individual connection points to TNIs.
South Australia	SJP1	Under South Australia's 'country equalisation' policy,[54] the AER must "ensure that the prices charged to small customers for network services in relation to distribution services in the State are not subject to variation on the basis of location"[55] when making a distribution determination or approving a pricing proposal. As part of this, the South Australian legislation requires the AER to determine any transmission loss factor using a single VTN for all small customers that has been calculated by the transmission network service provider.[56]
Tasmania	TVN1, TVN2	The VTNs apply to all customers in Hobart and Launceston except for large customers (who have their own MLF). They simplify the application of MLFs by removing the need to map individual connection points to TNIs.

Currently, energy attributed to VTNs is not part of the settlement by differencing calculation because a VTN itself is not a physical connection point. NMIs assigned to VTNs are settled by:

- each retailer who is responsible for one or more NMIs assigned to a VTN being *charged* on the basis of the DLF-adjusted metered energy for the NMI, scaled by the MLF of the VTN.
- the local retailer for the VTN being *credited* on the basis of the total DLF-adjusted energy consumed for all NMIs associated with the VTN, scaled by the MLF of the VTN.

5.2.2 Options for the treatment of virtual transmissions nodes under global settlement

Depending on how VTNs are treated under global settlement, DNSPs may incur a once-off cost associated with mapping existing VTN customer meters to a TNI so that costs could be attributed to each NMI. Potential options for the treatment of VTNs under global settlement are set out in Table 5.2. These options were developed by AEMO for the purpose of consultation.

54 Electricity Pricing Order, see The South Australian Government Gazette, 5 December 2002, p. 4458.

55 National Electricity (South Australia) Act 1996, section 18(5)(a).

56 National Electricity (South Australia) Act 1996, section 18(5)(c).

Table 5.2 Potential options for the treatment of virtual transmissions nodes under global settlement

Option	Effects
1. Retain VTNs and: • maintain settlement at the TNI level • ignore energy associated with VTN NMIs	• No change to VTN policy arrangements. • Allows a UFE to be calculated and allocated for each TNI. • Results in a distortion to the UFE proportional to the metered energy assigned to VTNs. This means the metered energy for VTN NMIs would be part of UFE and the UFE would be apportioned across the non-VTN NMIs. This distortion means customer prices will not be cost-reflective.
2. Remove VTNs and: • maintain settlement at the TNI level • require the physical TNI to be used instead of the VTN	• Policy arrangements for VTNs are separate to the objectives of Global Settlement. Jurisdictions may wish to retain these arrangements. • The proposed UFE methodology could be retained, with the UFE being calculated and allocated for each TNI. • DNSPs would need to attribute each VTN NMI to a physical TNI (once-off cost).
3. Retain VTNs and: • maintain settlement at the TNI level • enable this option by updating AEMO's systems: — decouple the application of MLFs from the TNI designation in MSATS. This involves splitting the TNI field into two so that one field is the physical TNI (location) and the other is the MLF (or VTN MLF).	• No change to VTN policy arrangements. • The proposed UFE methodology could be retained, with the UFE being calculated for each TNI. • AEMO's retail and wholesale systems would need changing to allow a separate MLF code to be stored and used. • DNSPs would need to attribute each VTN NMI to a physical TNI (once-off cost).
4. Retain VTNs and: • maintain settlement at the TNI level • enable this option by updating AEMO's systems: — create additional VTN codes in MSATS for each combination of VTN and TNI. Does not require an additional field.	• No change to VTN policy arrangements. • The proposed UFE methodology could be retained, with the UFE being calculated for each TNI. • Requires AEMO to create additional “dummy” VTNs and link them to physical TNIs using a look-up table. Would involve a significant update of MSATS standing data. • DNSPs would need to update MSATS.
5. Retain VTNs and: • perform settlement at the local area level	• No change to VTN policy arrangements. • UFE would be calculated and allocated for each local area • Requires lesser changes to AEMO's and DNSPs' systems than other options. • This option provides a more level playing field than settlement by differencing, however it is less cost reflective than options 2, 3, and 4 where settlement occurs at the TNI level. This is because UFE will be allocated across the local area rather than being targeted to customers associated with particular TNIs.

Issue 5 Treatment of virtual transmission nodes under global settlement

1. **Are VTNs still an appropriate mechanism for the NEM?**
2. **Which classes of customers would be affected if VTNs were removed?**
3. **What price effects would occur if VTNs were removed?**
4. **What are the possible options for treatment of VTNs should the proposed rule be made? Describe any other suitable options (or variations of the options presented).**
5. **Depending on how VTNs are treated under global settlement, DNSPs may incur a once-off cost associated with mapping existing VTN customer meters to a physical TNI. What costs, effort, benefits or synergies would be associated with this activity?**

5.3 Global settlement coverage

AEMO's global settlement design only extends to the retailer side of the wholesale market. This means that the existing provisions for settlement of generators supplying the market are retained and there would be no change to arrangements for inter- and intra- regional settlement residues.[57]

AEMO propose that embedded networks continue to be settled by difference. It states that 'global settlement cannot be applied to embedded networks as only the parent connection point and the on-market child connection points are recognised by the NER and, therefore, are the only connection points where metering data is available for use in settlement.'[58]

AEMO proposes that it will retain the capability to operate settlement by differencing. It notes that this 'provides the capability for appropriate bodies, such as jurisdictional regulators, to utilise this simplistic approach in jurisdictions or regions where there is limited, or no retail competition. Similarly, it may be used for a new region to the NEM and where there is a desire to limit market data flows for the commencement of retail competition.'[59]

Issue 6 Global settlement coverage

1. **Do you agree with AEMO's proposed coverage of global settlement? Are there other situations, perhaps legacy arrangements or future scenarios, where settlement by differencing should be maintained or used?**

57 AEMO, High level design, p. 11.

58 Ibid

59 Ibid

5.4 Implementation

5.4.1 Implementation timing

AEMO proposes that the IT system capability for global settlement should be developed in alignment with the design and build activities already underway for the introduction of five minute settlement on 1 July 2021. It notes that the process and system changes required to support global settlement are similar to those required for five minute settlement.[60] Implementation activities, transition and market readiness for both projects would follow the same structure and format.[61] AEMO has not suggested a start date for global settlement.

Issue 7 Implementation timing

1. **What are your views on a start date for global settlement?**
2. **What are your views on a staged commencement of global settlement, for example, by jurisdiction or distribution area? How would a staged commencement best be implemented?**
3. **What are your views on aligning the IT system development for global settlement with that of five minute settlement?**
4. **What timeframes would be required for AEMO, retailers, DNSPs and MDPs to upgrade internal processes, procedures and IT systems for global settlement?**

5.4.2 Implementation costs and savings

Implementation costs identified by AEMO are described in section 3.3 and in the high level design.[62] They mainly relate to the changes required to AEMO's, MDPs' and retailers' IT systems. At this early stage, AEMO have estimated that implementing global settlement for its own systems would cost less than $5 million, assuming that it is done as part of the five minute settlement implementation.

Under the proposal, there will be an increase in metering data flows as AEMO would receive all retailers' data, whereas currently it does not always receive metering data relating to local retailers' customers. The supply of this data by MDPs is an ongoing cost.

AEMO notes that it 'has identified potential savings for retailers currently engaged in attempts to reconcile their settlement statement and for Metering Data Providers, who would no longer be required to support and deliver an AEMO settlement-specific data format'.[63] This is because, under global settlement, AEMO would provide

60 AEMO, Rule change proposal, p. 3.

61 AEMO, High level design, p. 15.

62 AEMO, High level design, p. 16.

63 AEMO, Rule change request, p. 9.

reconciliation reporting to each market participant for all relevant trading weeks[64] and AEMO would receive metering data in the same format required for retailers.

Global settlement would necessitate changes in the way that market participants and AEMO interact with each other. Consequently, any contracts between these parties may be affected.

Issue 8 Implementation costs and savings

1. **What are the costs, synergies and risks involved in upgrading IT systems to accommodate global settlement?**
2. **A move to global settlement would increase data handling because MDPs would need to send additional data to AEMO. What would the incremental cost of this activity be?**
3. **What level of savings would there be from MDPs no longer needing to support and deliver an AEMO specific data file?**
4. **What level of savings could be expected by retailers from reduction in settlement statement reconciliation?**
5. **Are there any other costs that market participants may incur if there is a move to global settlement? If so, what are they?**
6. **What contract issues need considering?**

5.4.3 Implementation – consideration of non-market generators

Currently in the NER, a 'non-market generator' is described as 'a *generating unit* whose *sent out generation* is purchased in its entirety by the *Local Retailer* or by a *Customer* located at the same *connection point*'.[65] AEMO's global settlement design would remove the role of the local retailer from the settlements process. It proposes that the arrangement for non-market generators be extended from the local retailer to all market customers so long as the generation will not exceed the sum of its market loads within the local area.'[66]

Issue 9 Implementation – consideration of non-market generators

1. **How should non-market generators be accommodated under a global settlement framework?**

64 AEMO, High level design, p. 14.

65 NER, cl. 2.2.5.

66 AEMO, rule change proposal, p. 12.; AEMO, High level design, p. 12.

6 Lodging a submission

The Commission has published a notice under s. 95 of the NEL for this rule change proposal inviting written submission. Submissions are to be lodged online or by mail by **Thursday, 5 July 2018** in accordance with the following requirements.

Where practicable, submissions should be prepared in accordance with the Commission's Guidelines for making written submissions on rule change requests[67] The Commission publishes all submissions on its website subject to a claim of confidentiality.

All enquiries on this project should be addressed to Ben Davis on (02) 8296 7851.

6.1 Lodging a submission electronically

Electronic submissions must be lodged online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code ERC0240. The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

6.2 Lodging a submission by mail

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated. The submission should be sent by mail to:

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

The envelope must be clearly marked with the project reference code ERC0240.

67 This guideline is available on the Commission's website www.aemc.gov.au

Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Commission	See AEMC
DLF	Distribution loss factor
DNSP	Distribution network service provider
IEA	International Energy Agency
LRET	Large-scale renewable energy target
MDFF	Metering data file format
MDM	Metering data management (file format)
MDP	Metering data provider
MLF	Marginal loss factor
MSATS	Market Settlement and Transfer Solution
NEM	National electricity market
NEO	National electricity objective
NERL	National energy retail law
NMI	National Metering Identifier
SRES	Small-scale renewable energy scheme
TNI	Transmission node identity
TUOS	Transmission use of system
UFE	Unaccounted for energy
VTN	Virtual transmission node