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Ms Anna Collyer
Chair
Australian Energy Market Commission
Sydney NSW 2000

By online submission: ERC0346

Dear Ms Collyer

Directions Paper: Unlocking CER benefits through flexible trading

AEMO welcomes the opportunity to provide a submission to the Australian Energy Market Commission's (AEMC's) directions paper on *Unlocking CER benefits through flexible trading*, which progress its consideration of AEMO's *Flexible trading arrangements and metering of minor energy flows in the NEM* rule change proposal.

This submission (Attachment 1) provides AEMO's views on the following topics from the directions paper:

- Consideration of the links between this rule change and the consultation for the *Integrating price responsive resources into the NEM* (Scheduled Lite) rule change;
- Concerns with separating the concepts of connection point, National Metering Identifier (NMI) and the point at which settlement applies (e.g. the 'settlement point');
- A summary of known issues with the current arrangements for embedded networks that make it an unsuitable framework for separation of a customer's consumer energy resources (CER) in wholesale settlement;
- A further use case for minor energy flow metering (in addition to those raised in the original AEMO high level design (HLD) and previous submission), highlighting the potential benefits of the proposed arrangements; and
- Clarification on matters identified as 'market functionality' in the directions paper.

AEMO looks forward to continuing to work collaboratively with the AEMC and industry on this rule change process. Should you wish to discuss any of the matters raised in this submission, please contact Kevin Ly, Group Manager - Reform Development and Insights at kevin.ly@aemo.com.au.

Yours sincerely,

Violette Mouchaileh
Executive Group Manager – Reform Delivery

Attachment 1: Detailed Response

Attachment 1 – Detailed Response

Interactions with Scheduled Lite

Response to question 2: KEY CONSIDERATIONS FOR SEPARATELY IDENTIFYING AND MANAGING FLEXIBLE CER

Acknowledging the link between this rule change and the consultation for the *Integrating price responsive resources into the NEM (*Scheduled Lite) rule change, there are important considerations for separate identification of CER, and formalising roles and responsibilities in relation to it; including in circumstances where a single retailer is operating the entirety of the customer's connection. AEMO contends that should the AEMC determine not to enable the appointment of more than a single FRMP at a small customer connection point, there are material benefits to be gained from enabling the financially responsible Market Participant (FRMP) to separate the measurement of CER for the purpose of wholesale settlement, using the AEMO proposed FTM2 model.

Establishing a separate NMI (as the FTM2 model requires) enables the assignment of transparent roles and responsibilities in market systems and provides all relevant parties with confidence in the accuracy of the data relating to CER, even where there is a single FRMP at the site. Existing mechanisms for retrospective data interrogation and verification are extended to FTM2's secondary NMIs, providing confidence in the market outcomes. AEMO's minor energy flow metering (MEFM) proposals seek to provide for simpler, less costly metering that does not compromise on market standards for accuracy, data quality, formatting, etc. Whilst other forms of measurement might provide information that could be of interest to a customer (such as a non-MEFM measurement facility within, say, a pool-pump or hot water system), and might be a feature of a customer's online retail account portal, it would not provide a framework that could reasonably support wholesale settlement, and as a consequence, Scheduled Lite proposals.

The links between the two rule changes are explored further in AEMO's submission to the Scheduled Lite consultation.

Separation of NMI, connection point and settlement point

Response to question 3: ENABLING A SECOND SETTLEMENT POINT AT A SINGLE CONNECTION POINT

AEMO considers that the directions paper's separation of the concepts of connection point, settlement point and NMI is problematic and unnecessary. Market and participant systems have been built on a singularity in relationship between these concepts. Leveraging this further, the rules establish a direct, singular relationship with financial responsibility, metering installation, role appointment and associated responsibilities.

As considered in the NER Chapter 10 definition of *connection point,* it can denote the physical point of electrical connection, but it also encompasses the 'agreed point of supply' between participants and includes transmission, distribution and embedded network connections.

The FTM2 model is founded on that singularity, minimising the degree to which rules, procedures, systems, and processes are required to change, as well as providing the most flexible and simple model of adoption by customers. It is based on the creation of a connection point (identified in the HLD as a Private Metering

Arrangement (PMA) connection point) which is allocated a NMI, with its own, independent set of required role-holders with associated responsibilities and is treated independently in market settlement.

In an earlier submission to the AEMC's consultation paper (dated 15 February 2023)[1], AEMO has provided analysis on a range of material issues that would require consideration if the parallel or multi-element metering arrangements, referred to in that consultation paper and in the directions paper, were to be progressed. In summary, AEMO concludes that neither model offers a viable solution. If either were to be progressed, AEMO considers substantial change would be required to the metering and settlement frameworks, including to AEMO and participant systems and processes, procedures, accreditations, and matters related to competition and consumer protections. AEMO encourages the AEMC to consider the information and analysis provided in AEMO's previous submission before progressing with either model beyond this stage of consultation.

It is important to note the difference between a metering installation that might have more than one data stream (that might have been sourced from more than one metering device) and the parallel and multi-element models presented by the AEMC in the directions paper. Under current market arrangements, a single metering installation might be comprised of:

- a single meter device with one associated datastream;
- a single meter device with two or more associated datastreams; or
- two or more meter devices with two or more associated datastreams.

The example referenced in the directions paper of a metering installation with a controlled hot water measurement, separate from the customer's other electrical usage, is a good example of a metering installation that has more than one datastream at a single NMI. Such an arrangement at a legacy type 6 metering installation would typically comprise two metering devices, each with a single meter reading (which becomes a datastream). Importantly, these datastreams are associated with the one metering installation, at the one NMI, with one set of participants at the one connection point. At a modern type 4 small customer metering installation, this arrangement might be provided with a single meter with two measuring elements, each with an associated datastream.

The separate measurement and resulting datastreams in this example enable the allocation of different network charges and retail tariffs for the controlled and uncontrolled components of the customer's energy use. This might feature within a customer bill in the form of 'Peak usage' and 'Controlled hot water usage' line items with start and end readings for both. In other circumstances, this datastream separation could enable the separate identification in customer bills of, for example, 'Off-peak usage' and 'Solar exports'.

These current arrangements are not proposed to be altered within this consultation, or the Scheduled Lite process. However, the separate datastreams are irrelevant in the context of market settlement, which applies to energy flows at the NMI (i.e. the connection point, which is the settlement point). In the context of the Scheduled Lite consultation, this datastream separation does not provide a practical or sufficiently robust arrangement to support separate identification of CER, for reasons including:

[1] Rule Change Submission - ERC0346 - AEMO - 20230215 (1).PDF (aemc.gov.au)
https://www.aemc.gov.au/sites/default/files/2023-03/Rule%20Change%20Submission%20-%20ERC0346%20-%20AEMO%20-%2020230215%20%281%29.PDF

- It is not a viable solution to support a multiple FRMP model (as explained in AEMO's earlier submission), therefore both an arrangement for FTM2 and a separate model for datastream separation would need to be established;
- It will not be practical to apply in many circumstances, requiring electrical wiring back to the metering position with associated physical space constraints for ever-expanding metering at the Local Network Service Provider (LNSP) connection point;
- Separation of some resources might not align with jurisdictional requirements for connection arrangements, e.g. the measurement of net energy injections for solar feed-in-tariff payments, and the VIC AMI specifications in Victoria;
- It is unlikely that the Scheduled Lite Dispatch model would be able to work at a datastream level rather than connection point (NMI) level, without breaking the connection point-NMI-settlement point linkage with implications for wholesale settlement as previously discussed; and
- It is unclear what measures might be practicable to provide participants with confidence that the datastream is related only to the CER it is purported to be measuring.

The FTM2 model avoids the complexity associated with the parallel and multi-element models, is based on functionality already established in market systems, and leverages current market processes, avoiding material cost. Further, as AEMO has raised previously, a version of it is in operation currently by way of parties applying the embedded networks framework in ways that AEMO considers are inconsistent with its purpose and intent.

Embedded network model – issues and misapplication

Response to question 8: MULTIPLE FRMPS: EMBEDDED NETWORKS MODEL

AEMO is aware of a range of issues in the application and operation of the embedded networks framework that are currently materially impacting participants in the wholesale market. In the HLD associated with the original rule change request, AEMO presented information on how the embedded networks framework is being used to create flexible trading within a single customer's electrical installation and why the framework is unsuitable for such a purpose.

In addition to those matters, two specific issues in the application of embedded networks are expanded on below, to provide the AEMC further insight into why the embedded networks framework is not suitable for the matters being considered in this rule change process:

- Retrospective NMI activation and deactivation affecting the integrity of wholesale market settlement.
- Back-up supply settlement anomaly in embedded networks.

Note that all references to Small Generation Aggregators (SGAs) in this section will apply in the same manner to IRP Small Resource Aggregators, which is the participant category that SGAs are being transitioned to under the *Integrating energy storage systems into the NEM* (IESS) rule change[2].

[2] On 2 December 2021, the AEMC published the final rule and determination for Integrating Energy Storage Systems into the NEM (IESS). Amongst other matters, the IESS Rule introduced a new "universal" participant category, the Integrated Resource Provider (IRP),

Retrospective NMI activation and deactivation affecting the integrity of wholesale market settlement

AEMO has identified the opportunity for an SGA connection within an embedded network to be used to gain value from what AEMO considers to be an unintended application of retrospective NMI activation and deactivation in the settlements process. This can occur sometime after the "trading week", once prices and energy flow volumes are known, utilising processes designed to support error corrections. This is at odds with all other persons' participation in the 'live' spot market. In simple terms, market participants associated with SGA connections within embedded networks are able to decide whether to sell their energy "gross" into the spot market, or use it to offset the customer's load after spot prices have been observed and energy volumes are known, including up to the second revision in the settlement process (i.e. up to 30 weeks following the settlement week).

AEMO has recently become aware that this opportunity is being used by some market participants in a manner that AEMO considers is inconsistent with the intended operation of the embedded networks framework and which may adversely affect the integrity of the wholesale market settlements process. AEMO is able to provide further information to demonstrate the same to the AEMC as necessary.

The remainder of this section outlines the mechanisms that support settlement and how they can be used to enable this activity.

NMIs, including child connection point NMIs, can be activated and deactivated in retail market systems by participants in authorised roles. This is a standard feature in AEMO's Market Settlement and Transfer Solution (MSATS) system for the management of NMIs for the purpose of accurate settlement, and the rules around the use of this capability are established in AEMO's MSATS Consumer Administration and Transfer Solution (CATS) procedure and Service Level Procedures. This action can be applied prospectively or retrospectively, to reflect the actual day that the action occurred. If, for example, a NMI was livened by a technician working on behalf of a LNSP on 1 December, but systems were not updated until 6 December, the ability to activate the NMI retrospectively enables the LNSP to ensure that MSATS reflects the fact that the NMI was activated on 1 December, even though that date has now passed. Retrospective updates and error corrections are then picked up in the settlement process and energy is settled and revised to account for new, improved information over the settlement 'window'.

Connection points within embedded networks are more complex than connection points that are directly connected to the transmission and distribution networks. A connection point within an embedded network that has the capability of being a child connection point (and therefore being treated directly in energy market settlements) must have a NEM compliant metering installation. As a result, this metering installation is always recording flows of energy, regardless of whether that energy is:

- being provided for market settlement (with the connection point NMI treated as being on-market); or
- being ignored for market settlement (as the connection point NMI is off-market).

This is true for both load connection points and SGA connection points in embedded networks.

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and a series of service or unit classifications including for large and small storage devices. The SGA participant category is subsumed into the IRP under the new label 'Small Resource Aggregator'

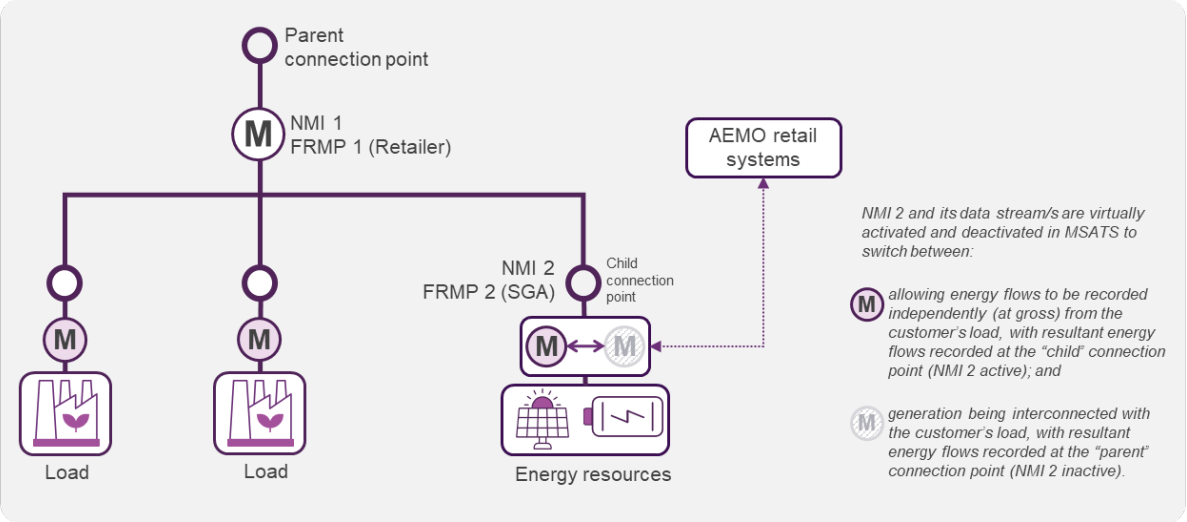
AEMC, 2021. *Rule determination: National Electricity Amendment (Integrating Energy Storage Systems into the NEM) Rule 2021*. Available at https://www.aemc.gov.au/sites/default/files/2021-12/1._final_determination_-_integrating_energy_storage_systems_into_the_nem.pdf

For an SGA connection within an embedded network, NMI activation capability can be used to 'virtually switch' the generation energy flows associated with the 'child' connection point between being:

- recorded independent of the customer's load and sold at gross in the NEM via the SGA/child connection point; and
- used to offset the customer's load with net energy flows recorded at the 'parent' connection point.

This is illustrated in Figure 1.

Figure 1 Virtual activation and deactivation of NMIs for an SGA in an embedded network



This 'virtual switching' capability, does not appear to be problematic when operated prospectively. For example, reacting to the real-time spot market, an SGA might decide to become active and have their sent-out generation identified in the settlement process; the prospective activation of the NMI 'virtually' enables this. For the period that the NMI is active, the SGA will obtain the market price for any sent-out generation, consistent with the SGA concept. However, when applied retrospectively, this 'virtual switching' capability enables the SGA's generation to be treated on-market (i.e. at a child connection point in the embedded network) on specific days across the settlement window, once the spot price value has been determined and all associated energy flow volumes over any given day are known. This could be performed up to the end of the second settlement revision. This can enable associated market participants to determine the days in which it would have been advantageous to have had energy flows recorded on-market (or off-market) across any given trading week once the spot price is known and associated value is guaranteed, and to make changes in MSATS to reflect that outcome.

Within an embedded network setting, this retrospective allocation of generated energy results in an equal and opposite retrospective increase in the volume of withdrawn energy (i.e. load) to the FRMP at the parent connection point NMI for the embedded network.

Noting that this retrospective reallocation could happen at any stage in the settlement window, AEMO considers that use of the embedded networks framework to facilitate flexible trading is problematic for reasons including:

- The SGA is not operating on a level playing field with like-market participants as decisions to inject energy and have it recognised in the market can occur once market prices are known with no risk relating to real-time market interactions.
- The settlement window is being used for market advantage rather than for error corrections and provision of better-quality data.
- Reallocations that result in additional charges to FRMPs at embedded network parent connection points might be material in volume and could occur late in the settlement process, which might affect a FRMP's cash flow position, and might require customer and network rebilling if occurring after customer bills have been issued by those parties, and network invoices settled.

Should the AEMC provide for an FTM2 design in the Rules, mitigations against similar issues arising from retrospective reallocation would need to be considered explicitly in the design. AEMO is currently considering whether this matter, as it relates to embedded networks, can be addressed in AEMO procedures or whether it needs to be considered by the AEMC outside of this rule change process.

Back-up supply settlement anomaly in embedded networks

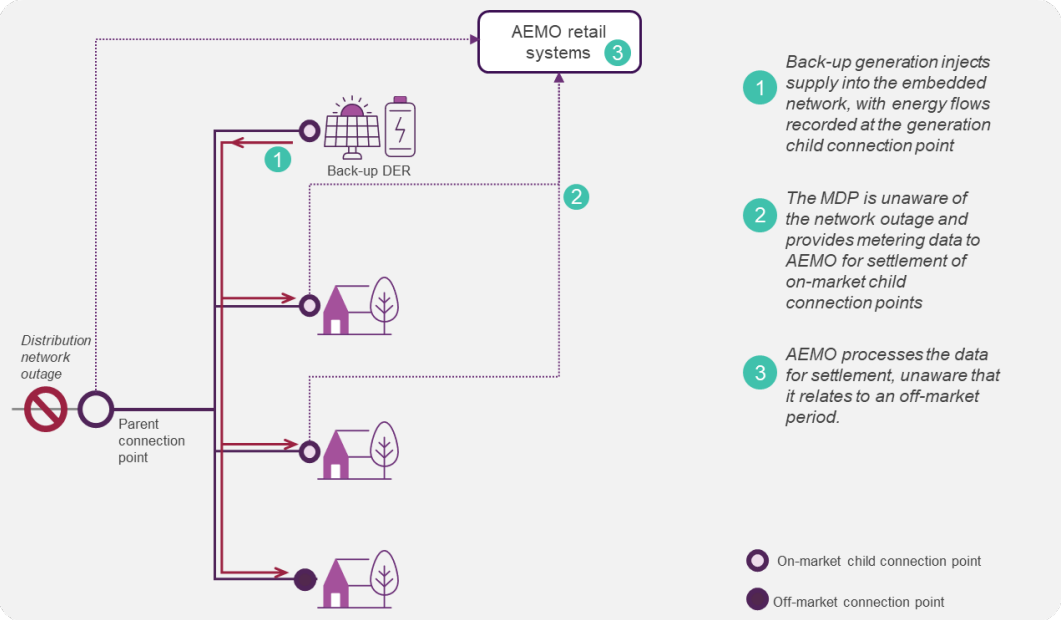
The issue explored in this section is relevant to any embedded network where generation with the capability of providing back-up supply is established, whether that generation is at a child connection point, including SGA connections, or is otherwise within an embedded network where other on-market child NMIs are active.

Back-up generation connected within embedded networks has the potential to create an anomaly in energy settlement as follows:

1. The supply of electricity to the embedded network from the distribution network fails. Generation and storage resources within the embedded network inject energy into the embedded network to act as back-up supply. For the duration of the distribution outage, these energy flows are neither part of the interconnected system nor described or otherwise considered within the National Electricity Rules (NER).
2. Metering Data Providers (MDPs) at all on-market child connection points within the embedded network are, in practical terms, oblivious to the outage and will record the flows of energy assuming they are market flows. As this scenario has not been considered within the NER, no rules or procedures have been established that would require them to act otherwise. This metering data will be provided as 'actual metering data' for processing in NEM settlements, despite it not being explicitly related to the market (as defined in the NER), or the interconnected national electricity system (as defined in the National Electricity Law).
3. MDPs provide the metering data to AEMO for use in settlement – AEMO is unaware that the data provided relates to an off-market period and processes it for settlement. Energy is settled, with AEMO applying market prices and associated factors for the energy flows at each connection point, crediting some FRMPs and charging others. Money changes hands; some FRMPs will be charged, and others will receive funds, for energy settled and related charges such as loss allocation and non-energy cost recovery.

An example of this situation is illustrated in Figure 2. In this scenario, the back-up energy flows are recorded at the generation child connection point and the FRMP (which may be an SGA or Market Customer) is paid at the market price, despite the flows being related to an off-market period. A combination of the FRMP at the parent connection point and any FRMPs at on-market child load connection points will be charged for energy flows commensurate with the volume generated.

Figure 2 Example of settlement anomaly created by back-up supply in embedded network



The materiality of this issue (e.g. in terms of the quantity of financial exchanges and regularity) is unknown to AEMO as the volume, length and timing (and ergo the coincident prevailing spot price) of distribution outages to embedded networks of this type is not apparent or otherwise recorded. No technical measures are specified to prevent it from occurring.

AEMO does not consider that NEM settlement processes should be operating in these circumstances.

This issue has been explicitly treated in AEMO's FTM2 HLD and could therefore be mitigated via the implementation process. Whilst similar design mitigations could be applied to the embedded network framework more generally, AEMO considers that this would require targeted changes to NER Chapter 3.

AEMO has also raised this issue with the Australian Energy Regulator (AER) as part of its *Network service provider registration exemption guideline review 2021–22*[3].

Stakeholder impacts

The issues highlighted here regarding the operation and application of the embedded networks framework are not exhaustive. In addition to regulatory uncertainty and general implications for the transparency and integrity of market processes, taken together these issues have direct impacts for customers and market participants. As the body responsible for operating and settling the market, AEMO is impacted by market integrity concerns where these arrangements are allowed to proliferate. Participants' confidence in market processes and outcomes may be impacted if they believe some parties are gaining an unfair advantage by using mechanisms in the market framework that are inconsistent with their intended purpose in ways that are not available to all market participants, and by a lack of transparency of such arrangements.

[3] https://www.aer.gov.au/system/files/Australian%20Energy%20Market%20Operator%20%28AEMO%29%20-%20Submission%20to%20AER%20Network%20Draft%20Guideline%20%28Redacted%29%20-%209%20December%202022.pdf

In contrast, the approach advocated by AEMO in the FTM2 design, enables the fulsome consideration of the various actions and activities that should and should not be allowed and enabled, and provides transparency to all relevant parties at all times.

Minor Energy Flow Metering (MEFM) – opportunities for innovation

Response to question 10: OPPORTUNITIES AND BENEFITS OF IMPROVING EXISTING ARRANGEMENTS

In the original rule change request and HLD, AEMO identified a range of use cases for which MEFM arrangements might be an optimal solution. This included streetlighting, other "street-furniture" such as telecommunications kiosks and street-side electric vehicle charging points, and metering within the FTM2 design (such as a metering installation built within an EV charging unit).

In more recent discussions with market participants, AEMO has identified a further potential scenario where the proposed MEFM arrangements could be deployed: generation connection points within Stand Alone Power Systems (SAPS).

This new scenario presents as an example of the potential for the AEMO MEFM proposal and could provide a practical use case to test how new types of connection arrangements might be considered within the ambit of MEFM in the future. In the absence of MEFM arrangements, the case for metering system adaption to support this use case would have to be presented in a specific rule change request to be raised for the AEMC's consideration.

AEMO considers that there is value in creating a MEFM framework that is sufficiently flexible to enable AEMO's consideration and approval of unconventional metering arrangements, within guidelines set in the NER providing the conditions or boundaries within which flexibility might be applied, and that this could include the SAPS generation connection point scenario identified here.

The remainder of this section outlines the scenario, the case for an alternative approach and the alignment with the MEFM arrangements proposed by AEMO.

Background

The rules that enabled the establishment of SAPS came into effect in May 2023.

A generation system connected to a SAPS requires a connection point, a NMI and a metering installation. The NER requires that the metering installation is a Type 1-4 with remote communications, noting that NER 7.8.4 (that enables manual reading as a type 4A metering installation) does not apply as these connections are not *small customer metering installations*.

Issue

It is typical for the location of SAPS to be in areas that are remote and rural, and typical communications networks such as 3, 4 and 5G access is often restricted or inconsistent.

Achieving sufficiently capable network connectivity for a material volume of these connection points is likely to require the use of expensive high-gain antennas (e.g. "whip" or directional "yagi" antennas). Where high-gain antenna use does not achieve connectivity, the MDP would need to utilise other, non-standard, remote

communications networks such as the Starlink satellite network. Installation and operation of communications under these arrangements adds material cost to the provision of the metering installation and the collection of metering data for these connection points (estimated at ~$4,000 for installation including antennas, with an ongoing monthly cost of ~$500 for data and hosting).

This scale of cost alone will have a material impact on the viability of any cost benefit assessment to move a customer, or group of customers, to a SAPS.

The metering data collected by the MDP at the SAPS generation connection point is only actively used by a market participant where there is more than one SAPS generation connection point in the same SAPS. Metering data for generation in a SAPS where there is a single SAPS generator connection point (regardless of how many customers are connected within that SAPS) is not required to be actively used by any person for market purposes, or to perform an obligation under the NER, as SAPS settlements is based on the aggregate of the SAPS customers' metering data. However, AEMO settlement processes do perform automated checks on the activity or inactivity of generation connection points within SAPS, and this includes recognition of the provision of metering data for SAPS generation, regardless of whether there is one or more generating NMI in the SAPS.

Therefore, in the case where a SAPS with a single SAPS generation connection point requires additional installation and operational costs to achieve remote communications, this additional expense might be avoidable providing that metering data can be provided (in one form or another) to AEMO to support the settlement process.

Considerations

The requirement for there to be a metering installation at the connection point is an intrinsic component of the NER. Metering data cannot be provided in any form unless there is a metering installation to which it pertains and should there be a change to the SAPS such as the inclusion of a second SAPS generation NMI, full market metering would be necessary.

SAPS generation NMIs have similar traits to the connection arrangements considered for MEFM in the HLD. For example, the connection point is not a *small customer metering installation*, it is connected within the confines of the LNSP's infrastructure, there is no apparent need for a physical display and metering installation size and cost are key criteria in determining the viability of the arrangement being established (e.g. as is the case with smart street lighting systems).

Applying the MEFM concept to this issue, a proponent might be able to obtain AEMO approval for a metering system which meets the requirements of the market (e.g. the establishment of a metering installation with associated roles and responsibilities, facilitating the accurate operation of settlement) with alternative approaches for the management of metering data delivery and communications, reducing the costs of the provision of the SAPS in the process.

This subject could be raised as a rule change request to the AEMC, with case-specific measures to ameliorate the issue, however the adoption of a MEFM framework might allow more complex regulatory processes to be avoided and be flexible to accommodate arrangements including and beyond those that are currently identified.

Market functionality

Page 40 of the directions paper notes the following:

- *Market functionality: that is, the relationship between the primary and secondary energy service provider and how will that impacts other participants (e.g. metering providers, distributors, etc.). In AEMO's FTM2 the primary FRMP would maintain most of its existing responsibilities with network providers. The rule change request recommended that MDPs at the second connection point have a relationship with both the primary and secondary FRMP to facilitate the reconciliation of settlement. Other market functionality issues were not fully addressed in the rule change request and require further exploration.*

It is important to clarify that AEMO's rule change request does not recommend that MDPs at secondary connection points have a relationship with both the primary and secondary FRMPs, simply that metering data is provided to the FRMP at the primary connection point to enable them to reconcile settlement statements and via standard B2B processes.

Provision of metering data to relevant, authorised, parties is commonplace in the NEM and does not require a relationship to be established between parties. In this respect, AEMO's FTM2 design is no different to how metering data provision works in embedded networks, where child connection point metering data is provided to the FRMP at the parent connection point (without the child MDP having to establish a relationship with the parent FRMP) and is also the same as the provision of metering data to the Local Retailer at all NEM NMIs prior to the commencement of global settlement. The FTM2 design uses the role-relationship model that is well established in MSATS, providing clarity to all parties on how it is to be provided with various types of data and who can access services at a NMI.

More generally, AEMO can confirm that matters in relation to market functionality have been extensively considered in the development of the rule change request and HLD regarding FTM2 and is happy to clarify or expand on any matter that was insufficiently clear or that the AEMC considers to be less clearly developed in that documentation.