

19 May 2017

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Electronic Lodgement – ERC0201

Dear Dr Funston,

RE: Directions Paper – Five Minute Settlement Rule

AusNet Services appreciates the opportunity to make a submission to the Australian Energy Market Commission's (AEMC) Five Minute Settlement Directions Paper.

Sun Metals requested a Rule change designed to align dispatch and settlement periods, to provide stronger price signals for more rapidly dispatched generation and demand response. The proposal allowed for small and large customers to adopt five minute settlements on an optional basis. AEMC have proposed an alternative that will see all customers on interval metering transition to five minute settlement after a three to five year transition period.

AusNet Services submission identifies substantial metering and billing system costs involved in implementing the AEMC's proposal in Victoria that are not included in the analysis of the Discussion Paper. These costs of adopting five minute settlement accrue to all customers and should be weighed against the incremental benefits of the AEMC's proposal, to identify the best option for the long term interests of customers.

We consider the case for mandating five minute metering data for all interval metering, in preference to the Sun Metals' proposed principle of optionality, requires further assessment in light of other potential options.

The cost implications of retrofitting new five minute metering capability to the Victorian AMI meter fleet are substantial. The proposed Rule requires all Victorian customers to adopt five minute metering within three to five years, whereas other jurisdictions that have not mandated smart meters are able to progressively deploy new interval metering compatible with five minute settlement.

We welcome the opportunity to participate further in this Rule change development, and we would like to meet with the AEMC staff and together with other distribution businesses to discuss the issues identified in this submission.

AusNet Services has contributed to and supports the submission of Energy Networks Australia.

Should you have any queries in relation to this response please do not hesitate to contact Justin Betlehem on 03 9695 6288.

Yours sincerely,



Kelvin Gebert
Manager Regulatory Frameworks

Five Minute Settlement

Response to Directions Paper

Submission to the AEMC on Five Minute Settlement Rule Change Directions Paper

1 Overview

The proposed Rule change concerns implications for the wholesale market, including the mix of technologies providing electricity in the NEM. We do not address these aspects in this submission. Rather, AusNet Services submission is focused on the system costs in both electricity distribution and transmission networks associated with the AEMC's preferred option and consideration of variations to the implementation approach.

The network costs associated with implementing the five minute settlements would vary significantly depending on the implementation approach. There are large electricity distribution and transmission network costs (in metering and billing systems) associated with the AEMC's preferred option. The quantum of these costs do not appear to have been anticipated in the Discussion paper. There may be alternative options that would have these lesser costs. We recommend that the AEMC updates its assessment of the five minute settlement proposal in light of the costs to determine which option best meets the long term interest of customers.

2 Cost of implementing the five minute settlement rule change

AusNet Services expects that a fuller estimation of NSP costs will need to be included in the assessment of the change to five minute settlement, and these cost considerations would inform the market design and implementation timetable. We consider the rule change as proposed in the Direction Paper would result in significant costs to customers from network charges, especially system change costs. The Directions Paper recognises the need to change existing transmission and sub-transmission interconnector metering, but there are also significant system costs to DNSPs that have been overlooked. On the flip side, it appears to not consider any benefits that DNSPs could derive from receiving better-quality metering data for network analytical purposes.

For AusNet Services systems, a cost assessment would need to account for:

- The physical replacement of most of our transmission interconnector meters of which we have more than 500, and 44 sub-transmission interconnector meters on the distribution network;
- Preservation of data at initialisation, for those meters that can be re-configured, as the process of reconfiguring the meter erases all currently stored metering data;
- In our distribution network, changing or replacing our Network Billing system to handle the five minute metering for over 5,000 large customers with Type 4 metering (this would also impact DNSPs in other jurisdictions);
- Compatibility of older AMI meters (our first 50,000 deployed) and older Type 4 interval meters, which could not be configured to handle five minute interval metering data in a manner consistent with revenue metering even with remote software reconfiguration;
- The significant costs of changing existing AMI metering data management systems to collect, validate, substitute, and deliver five minute interval metering to retailers and AEMO by 6:00 am (AEMO's system, MSATS, does not even identify the trading interval length);
- The move to five minute settlements would require changes to the Metrology procedural framework to efficiently deal with validating six times the volume of trading intervals and substituting even greater volumes of erroneous data;
- Only our newest of AMI meters have the capability to store the required 200 days of metering data as required for Type 5 metering; and
- Changes to head end systems (e.g. SilverSprings UIQ system and PolicyNet), for remotely updating the entire AMI metering fleet to handle five minute interval metering data as revenue metering data, necessary for compliance with all National Measurement Act, National Electricity Rules and AEMO Procedure requirements.

AusNet Services estimates the costs associated with updating existing AMI meters to five minute settlements (e.g. in excess of \$100 million) are an order of magnitude greater than the combined cost of changing transmission meters and DNSP network billing systems (e.g. in excess of \$10 million).

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These costs would be lower if the scope of the five minute settlement rule change were limited to new metering installed for small customers. This is particularly the case for Victorian customers that already have remotely read interval meters installed as part of the AMI meter roll out and would all be subject to five minute settlements at the conclusion of the proposed five year transition period. While customers in other jurisdictions would have the choice whether to install new metering and hence transition to five minute settlements over a 15 year period (or when their meter fails and needs to be replaced). Furthermore, there are similarities to the Directions Paper assessment that existing manually read interval meters in NSW may need an exemption from this rule.

Distribution businesses expect to be the exclusive provider of smart metering until at least 31 December 2020 in Victoria, and if not extended meter replacements and retailer initiated meter churn will decrease the size of our smart meter fleets. Investing in new functionality for five minute settlements in the last phase of our AMI meter fleet's life would be difficult to justify and would adversely impact the costs paid by small customers that remain on AMI meters. AusNet Services do not see this as economically efficient for all Victorian consumers with AMI meters, although we would be willing work with the Victorian government to potentially develop approaches and mechanisms to efficiently deliver desired policy outcomes.

3 Other Considerations

3.1 Network use of five minute Power Quality data

AusNet Services currently uses five minute time synchronised Power Quality (PQ) data recorded by our deployed AMI meter to deliver a variety of network benefits. However, this information is based on instantaneous (time synchronised) power, voltage, and current measurements taken every five minutes. It is not energy measurements over five minute periods, and it is not subject to metering regulatory obligations from the National Measurement Act, National Electricity Rules and AEMO Procedure requirements. The five minute PQ data is stored in the meter for no longer than 24 hours and collected throughout the day. If it is not collected, there is no attempt to retrieve it from the meter or even substitute it. There is no attempt to validate it to remove high or low data anomalies. Our business only uses this five minute data for non-revenue purposes that are not sensitive to such irregularities. This five minute data could not be used for five minute settlement for the same reasons that SCADA could not be used to shape the settlement data from interconnector and wholesale metering.

AusNet Services is constantly assessing opportunities for improving our metering and network service offering by innovating and modernising our operations. The provision of being able to receive and use five minute metering data is an opportunity that DNSPs would seek to leverage. Our business does not yet have five minute metering data for Type 4 (large) customers. Although large customers represent a very small proportion of connection points, they represent a significant proportion of electricity consumption on our network. Access to five minute data for large customers would enable DNSPs to better monitor and analyse parts of the network that are dedicated to supplying industrial and commercial customers.

3.2 Potential network implications

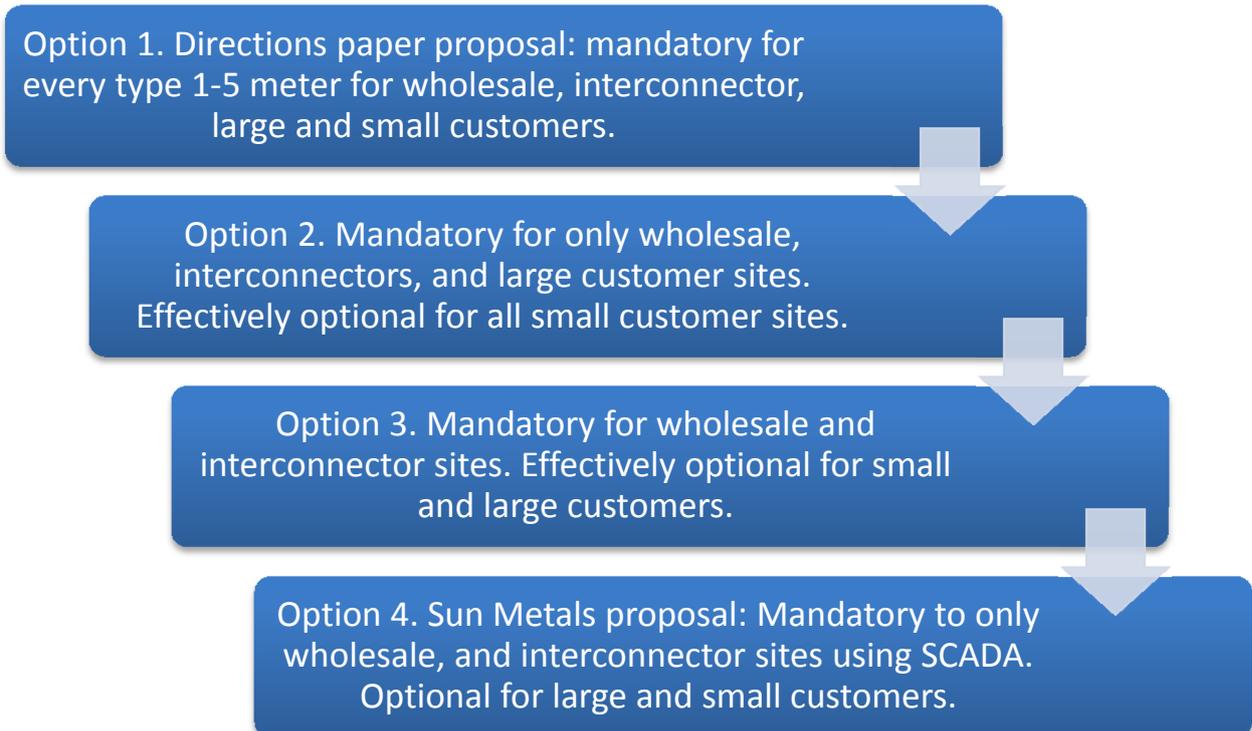
The rule change could create implications for network operations. As highlighted at the recent webcast on the Directions Paper, aggregators of batteries systems would be responding to individual five minute prices. Distribution Network Service Providers (DNSPs) are aware that geographically concentrated, centrally dispatched switching (i.e. simultaneous aggregated dispatch of batteries) may lead to network implications. However, until the penetration of electricity storage technology starts to rival the current penetration of solar micro embedded generation on our network these network implications are likely to be manageable through working with inverter manufacturers to mandate appropriate controls in AS4777 (ramping and randomisation). In the event that technology allows for instantaneous activation of distributed electricity storage resources there may be the need to establish a Load Management and Switching Protocol to avoid adverse network implications, or establish a causer pays approach for managing the impacts of rapid generation changes on distribution networks.

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4 Alternative options

The Directions Paper has shifted the proposal from being optional participation for all non-wholesale and non-interconnector customers, to participation by all customers with interval metering. This is the cause of the significant costs discussed in this paper. There are other options which would result in much lower network associated costs; however these are not adequately presented in the Directions Papers.

Accordingly, we suggest that the reconsideration of the proposed market design to minimise NSP costs and other implementation costs. These alternative market design options are outlined in the following figure.



Source: AusNet Services

Effective optionality of the solution can be provided by only mandating that new and replacement meters installed at the end of the transition period, which is proposed to be three years. If a customer makes a substantial investment and installs a rapid response electricity storage unit, the meter could be replaced at the same time. In assessing optionality, we have established the below table of options, pros and cons. Option 4 is not included because the Directions Paper determined the use of SCADA to profile 15 and 30 minute data is not viable. We consider the imposition of applying revenue metering requirements on SCADA would be more costly than changing the wholesale and interconnector meters.

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Address standard	Pros	Cons
<p><i>Option 1. Directions Paper proposal: Mandatory to every type 1-5 meter for wholesale, interconnector, large and small customers.</i></p>	<p>Directions paper notes it creates improved price signals and allows the use of <i>intra</i>-regional residue settlements. This only applies to Victoria, while in other jurisdictions settlement residues and average profile price signals would persist until the majority of accumulation metering is replaced.</p>	<p>The Directions Paper acknowledges metering and IT system change costs. AusNet Services considers these costs would be substantial (in excess of \$100 million). The benefits may not justify this level of cost for all customers with interval meters.</p>
<p><i>Option 2. Mandatory for only wholesale, interconnectors, and large customer sites. Effectively optional for all small customer sites.</i></p>	<p>AusNet Services considers this option would rapidly introduce improved price signals at the demand side with 10,000s large customers needing to upgrade their contestable metering over the initial transition period. Small customers would gradually take up five minute metering through new and replacement metering changes and when battery storage is added.</p>	<p>This option would cause an increase in metering data volumes that would impact Network Billing systems and require IT system costs. These network costs would likely to be an order of magnitude less than option 1 network costs.</p>
<p><i>Option 3. Mandatory for wholesale and interconnector sites. Effectively optional for small and large customers, similar to the Sun Metals proposal.</i></p>	<p>This option would allow those customers who install rapid response electricity storage systems to benefit from the five minute prices, while minimising new investment in metering and billing systems.</p> <p>We consider this option would cause gradual increases in metering data volumes that would eventually impact Network Billing systems. System change costs could be more readily incorporated into normal asset lifecycle associated expenditure.</p>	<p>The Directions Paper outlines that this approach causes “contract market liquidity and basis risk” and residue settlements issues. We suggest an assessment of this impact. In jurisdictions other than Victoria, demand side optionality is inherent with their new and replacement approach to deploying contestable metering through the Power of Choice program over the next 15 years.</p>

Further consideration of the above options that incorporate the Sun Metals principle of optionality is recommended. Option 3 has the lowest network cost impact, while still achieving the rule objectives. Option 2 has marginally higher network costs, but it rapidly provides DNSPs with some form of five minute data for large industrial and commercial customers that could be valuable for network monitoring and analytics. These costs should be considered in assessing which option is in the long term interest of electricity customers.

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5 Conclusion

In the interest of a smooth and efficient implementation, we recommend the reconsideration of Sun Metals' proposal of optionality for non-wholesale and non-interconnector sites, as an alternative implementation approach to mandating five minute settlement to all customers with interval meters. The cost implications of applying five minute settlements as proposed to existing Victorian AMI meters and system would be particularly significant with costs in excess of \$100 million. However, the costs would be lower if the scope of the five minute settlement rule change were limited to new and replacement metering for small customers.

It is for this reason, we also recommend a longer transition period for Victoria customers than the AEMC's proposed approach, and if the rapid change is preferred, to at least give consideration of efficient cost recovery and cost minimisation approaches for Victorian customers. The Victorian government should be involved in the consideration of new metering requirements that have the potential to add very significant costs to existing customers, although we may be able to work together to make such a change in a manner that is economically efficient.

6 Responses to selected questions

AusNet Services positions with respect to these aspects of the framework are given in the answers below:

Question 6

- a) How material are the issues identified around demand-side optionality? Are there any material issues or benefits that have not been identified?
- b) If demand-side optionality is adopted as a temporary measure, should the settlement residue be incorporated in *intra*-regional residue? If not, how should it be treated?
- c) How might contract market react if demand-side optionality is adopted on a temporary basis?

Response to question 6

a) AusNet Services considers the issues identified around demand-side optionality are not material in comparison to the substantial costs of replacing network billing systems and the even more significant costs associated with changing all existing 2.8 million AMI meters to be providing five minute interval metering data to the market in accordance with all National Measurement Act, National Electricity Rules and AEMO Procedure requirements.

b) It seems that the *intra*-regional settlement residues does appear to be an appropriate mechanism to pay for any material settlement residue costs associated with a portion of customers trading in the five minute settlement market with other customers being applied with an average profile. However, we do consider that this settlement residue would not become material until a significant proportion of small customers establish rapid response battery storage capabilities. Therefore, it seems the *intra*-regional settlement residue process could allow optionality for small customers, noting that five minute metering would be required for new and replacement metering.

c) We query whether the impacts on are contract market would be material as a result demand-side optionality. The Directions Paper does not quantify this impact. In jurisdictions other than Victoria,

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demand-side optionality is inherent with their new and replacement approach to deploying contestable metering through the Power of Choice program over the next 15 years.

Question 7

- a) Are there any suitable alternatives to collecting five minute data from the transmission network metering installations used to compile the NSLP other than reconfiguring or replacing the existing meters?
- b) What percentage of meters can be remotely reconfigured? What would this process look like and what would the costs be? Conversely, what percentage would be needed to be manually reconfigured or replaced?
- c) The Commission has proposed aligning the transition with the timeframes for the NER test and inspection regime. Would this provide an appropriate amount of time for changes to occur?
- d) For with categories and situations should an exemption from providing five minute data be considered? Why?
- e) Are there any other metering implementation issues relevant to collecting five minute data that should be considered?

Response to question 7

- a) AusNet Services understands that the Commission has already considered the option of using SCADA data to profile existing settlement metering data and found it not fit for purpose. We consider the imposition of applying revenue metering requirements on SCADA would be more costly than changing the wholesale and interconnector meters.
- b) All existing late model meters can be remotely reconfigured, but not all the Type 4 meters would have the memory capacity to store 35 days of two-channel interval metering data (Watts and VARs). If storage is inadequate the meter would need to be replaced. The vast majority of metering for interconnector and wholesale sites would need to be replaced to meet this storage requirement. Similarly for majority of AMI meters capable of recording five minute interval metering data would not have enough memory to store the required 200 days of metering data.
- c) The NER test and inspection requirements are now completed on the basis of approved sample testing methodologies and not every five years for every meter. Further the relative cost of an inspection or test is immaterial compared to the cost of coordinating a change out of metering within secure, high voltage stations. Further every newly deployed meter needs to be tested within the first 2 years of service. We consider that aligning the transition with the NER test regime would not materially reduce the costs and operational impacts of the rule change.
- d) We recommend that all existing Type 5 meters be exempt from the requirement to provide five minute metering data to the market.
- e) We wish to advise that every meter remotely upgraded and reprogrammed to support five minute metering data would have all of its stored metering data erased. The process of upgrading meters would need to also include a process of loading all stored metering data from the meter as part of a carefully managed program of remotely firmware and program changes.

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Question 10

- a) What are the costs, synergies and risks involved in updating IT systems to accommodate five minute settlement?
- b) What timeframes are required to upgrade IT systems?

Response to question 10

- a) Accommodating five minute settlements would mean DNSPs receiving, storing and billing metering data for a non-interconnection and non-wholesale meters driving the need to upgrade systems and databases to manage the six times increase in data volumes. Further the impacts on our AMI metering systems would be material with cost estimates exceeding \$100 million.
- b) The timeframe for properly planning, designing, delivering and testing the types of IT systems and metering changes to implement the rule change is likely to be two years. Developing consequential changes to AEMO's market procedures and metrology requirements is also timely and may require six months to complete in addition to the system development timeframe. This reflects our experience in years of AMI metering and system changes and our more recent Power of Choice program implementation.

Question 11

- a) Are there any further categories of costs that would be incurred if five minute settlement was adopted?
- b) How suitable is the proposed two-stage transition period to implement five minute settlement? Do you consider there to be a more preferable approach to a transition period such an alternative timeframe?
- c) What are the detailed benefits, costs and risks of the proposed two-stage transition to five minute settlement on?
 - (i) existing contract arrangements?
 - (ii) metering requirements?
 - (iii) IT system requirements?
- d) Are there any practical aspects of implementing five minute settlement that should be considered?

Response to question 11

- a) AusNet Services notes that the AEMC paper has overlooked the cost of changes to network billing systems to DNSP. Changing our DNSP billing system to accommodate processing five minute metering data would cost over \$10 million.
- b) We consider the phased approach outlined by the AEMC offers a reasonably balanced, practical implementation timetable for any new five-minute settlement regime.
- c) (i) It should be understood that contestable metering providers in supporting five minute settlements would need new or modified metering data collection and processing systems. Existing contractual arrangements may allow these costs to be passed onto to the transmission business or retailer they

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are contracted by. In this case, these additional system change costs would be ultimately passed on to customers.

(ii) In summary of the metering costs above, we consider the rule change would result in the following direct costs about \$4-7 million in costs to replace transmission and sub-transmission metering; and roughly \$10 million in replacing our first 50,000 AMI meters that cannot be reconfigured to provide five minute metering data. All AMI meters would not be able to store the required 200 days of metering data, so this metrology requirement would need to be relaxed. The increase in our AMI metering data communication network volume requirements would result in higher third party telecommunication (mobile data) costs in the order of \$1 million per year.

(iii) In summary of the system costs above, the requirement to perform network billing on five minute metering data as proposed in the Directions Paper would require a replacement of our network billing system. Previous estimates of this system replacement are in excess of \$20 million. The cost of updating AMI metering head end systems (PolicyNet and SilverSpring's UIQ) and replacing metering data systems is risky and difficult to quantify with AusNet Services indicative estimate exceeding \$100 million in costs, although there may be ways to minimise this cost.

d) All regulated DNSPs and contestable metering providers are developing metering and system capabilities to meet the Power of Choice program requirements associated with the metering contestability rule and associated procedure changes effective on 1 December 2017. These systems are unlikely to be end of life by the end of the first implementation phase of five minute settlement rule change. If the arrangements were optional after the first three years at metering providers may be able to transition meters to newer platforms while retaining existing meters on existing systems.