NERA
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Smart Meter Data Access Framework Options – Final (Advice)

Australian Energy Market Commission

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Project Team

George Anstey
Will Taylor
Soren Christian

NERA Economic Consulting
One International Towers
100 Barangaroo Avenue
Sydney NSW, Australia 2000
+61 2 8864 6535
www.nera.com

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1. Introduction and Summary

On 1 December 2017, the rule made by the Australian Energy Market Commission (AEMC) that introduced competition into the provision of metering services in all states of the National Electricity Market (NEM) excluding Victoria (ACT, New South Wales, Queensland, South Australia, and Tasmania) commenced operation. Historically, traditional electricity meters (e.g. accumulation meters) have been owned and operated by Distribution Network Service Providers (DNSPs). Under the new regulatory framework, if a meter requires replacement (e.g. if a "smart meter" is being installed), then the new metering services will be provided by a metering coordinator (MC). The MC is appointed by the retailer and this is a contestable activity, though the retailer can also serve as the MC.

When developing the rule, the AEMC recommended that it be reviewed after three years of implementation. Additionally, the AEMC observed several challenges in the implementation of the new rule, such as a relatively limited uptake of smart meters.

For these reasons, on 3 December 2020, the AEMC launched its three-year review, to determine whether further changes are needed to the regulatory framework to enhance its efficacy and efficiency.[1]

One such challenge that the AEMC has identified is in respect to smart meter data access.[2] The AEMC and industry stakeholders alike have observed that smart meters can provide significant value to the system by providing near real-time technical data to DNSPs and other interested third parties. In the case of DNSPs, this could allow for more efficient management and maintenance of their grids. However, access to this data from MCs (or the Metering Data Provider (MDP) they appoint) to DNSPs has to be negotiated on commercial terms, and to date, very little access has been provided.[3]

In July 2021, the AEMC commissioned NERA to develop an Options Paper, setting out a range of potential new data access frameworks to allow for greater access to smart meter data by DNSPs and other participants.[4] We developed four potential access frameworks (which generally are not mutually exclusive), concerning models used in data access elsewhere or other industries:

- The creation of a **"Data Communications Company" (DCC)**, a price-controlled company that would be responsible for collecting, managing and distributing smart meter data. This system is in place in the UK.
- A **Minimum Contents Requirement**, where MCs would be required to make available a certain standard of data, but could commercially negotiate further data streams. This

1 Australian Energy Market Commission (3 December 2020), Review of the Regulatory Framework for Metering Services – Consultation Paper.

2 Note that we are not referring to access by consumers to their consumption data, which is covered by the Consumer Data Right (CDR) framework in Australia.

3 Unless otherwise specified, we refer to MCs to generically include the MDP they appoint.

4 NERA (13 August 2021), Smart Meter Data Access Framework Options, link: https://www.aemc.gov.au/sites/default/files/documents/nera_smart_meter_data_access_framework_options_-_metering_review.pdf

framework has been proposed by industry participants in Australia, for instance, South Australia Power Networks.

- An **Exchange Architecture**, where infrastructure and formats are provided to allow standardised data transfers, but no single exchange is mandated. This system is in place in New Zealand.
- A **Negotiate-Arbitrate framework**, where general principles of negotiation are set out, with a direct path towards arbitration if needed. A negotiate-arbitrate framework exists in the market for gas pipeline access in Australia.

That paper was released alongside the AEMC's 16 September Directions paper, which opened a consultation phase for industry participants to provide feedback on the options given.[5] The AEMC stopped collecting submissions on 28 October.

Following feedback to its Directions paper and our Options paper, the AEMC commissioned NERA to build on our earlier work and further develop a single framework that could ultimately be implemented in Australia.

Our recommendation is an access framework that is a hybrid of the minimum contents Requirement and an Exchange Architecture. The objective of this framework is to: (a) reduce coordination and transaction costs; and (b) ensure that the incentives to exchange data reflect the public value that data access can provide.

Specifically, in this report we set out an access framework with the following high level features:

- Data streams are categorised into three tiers, based on the extent of wider benefits their access would enable, beyond their private value to the entity procuring them.
  - Tier 1 data streams are likely to have wide benefits to the system, either immediately or through enabling future benefits. Thus, we propose that Tier 1 data streams be shared by default.
  - Tier 2 data streams may have some external benefits, but they may be somewhat speculative. We propose that Tier 2 data streams be shared upon request, and rely upon pro forma data templates where possible to minimise transaction costs.
  - Tier 3 data streams do not have clear external benefits beyond the value they could provide to the party procuring them. Thus, we propose that Tier 3 data streams be left to commercial negotiations, which should yield an efficient outcome (i.e. if the purchasing party values the data stream more than the costs incurred to share it, then both parties should be able to agree on a price).
- Where possible, exchange should take place over existing infrastructure, to minimise the marginal costs of transaction. We understand the B2B e-Hub has recently been upgraded and hence may be able to be used for this purpose. However, it is beyond the scope of this report to give IT-related advice.

[5] AEMC (16 September 2021), Review of the Regulatory Framework for Metering Services – Directions Paper. Link: https://www.aemc.gov.au/sites/default/files/2021-09/EMO0040%20Metering%20Review%20Directions%20paper%20FINAL.pdf

- The usefulness of each data stream may evolve over time, and so the tier definitions should remain under review. Specifically, the NER could be amended to empower an entity to update the tier definitions from time to time. That entity should have both the technical understanding of power quality data and the regulatory background in order to implement a change that would affect the obligations of NEM participants.
- Tier 1 and Tier 2 data should be priced according to a set of pricing principles that relate to marginal cost of providing access, with other fixed costs being spread through NEM participant fees where possible. These pricing principles will likely require some means of enforcement, but we do not include advice on how that could be established.
- DNSPs that procure power quality data may incur costs and/or realise cost reductions from access. These two effects could either be explicitly recognised through the price reset process, or implicitly through observed efficiency improvements.

This report proceeds as follows:

- In Chapter 2, we set out the background to our review, focusing especially on our Options paper and the feedback received to date;
- In Chapter 3, we set out a single proposed framework based on a hybrid of a Minimum Contents Requirement and an Exchange Architecture, and discuss the outstanding practical challenges which must be resolved before implementation; and
- In Chapter 4, we conclude.

2. Background

In this chapter, we provide a brief background to this paper, focusing especially on the options that we developed in our August 2021 report and the feedback received on it. While we summarise the key findings of that report in this chapter, we emphasise that this paper is intended to be read in conjunction with our August 2021 report. We accordingly provide only an executive summary level of detail of that paper below.

2.1. Summary of NERA's Options Paper

Our Options paper focused on (a) identifying the market failures which lead to a lack of data exchange; (b) reviewing data access (and other types of access) elsewhere; and (c) developing them into a range of options for consultation. We discuss these three areas below.

2.1.1. Market failures lead to a lack of access

Despite data access and use being one of the primary drivers of value to the system of smart meter roll-out, there has been very little exchange of data between MCs and DNSPs (or any other parties). At its core, this problem is a result of a challenge with transaction costs and a challenge with coordination. Any new regulatory framework must therefore address either or both of these challenges.

Regarding transaction costs, each time a DNSP or other third party wishes to obtain power quality (PQ) data[6] from an MC, they must incur some fixed costs in doing so, concerning negotiating access and processing the data. The MC must do the same. If MCs are fragmented (and therefore the costs are incurred multiple times), or if the scope of the data request is narrow, then the value that the data provides to the DNSP may be less than the cost required to obtain it. If the process can be consolidated and rationalised across MCs, or at least across a large swathe of data held by an MC, the value that it provides is more likely to exceed the cost of procuring it.

Additionally, because the MC landscape is fragmented among several MCs, MCs may be averse to moving first. The value that one MC's data can provide to a DNSP, and hence the price it can ask for it, increases once the DNSP has obtained access from all other MCs relevant to the request. With all MCs facing the same incentive, none of them act first and therefore data access is not provided. The economics literature refers to this as a "hold-up" problem.

2.1.2. We reviewed a range of case studies of access arrangements

To inform the Options, we reviewed a set of case studies for how access is managed in other jurisdictions.

Victoria

In Victoria, DNSPs are responsible for installing and maintaining smart meters, and also have direct access to all of the technical data that they collect. While Victoria is of course part of the NEM, it is outside of the scope of the AEMC's current review given the different

[6] Power Quality data refers to the technical characteristics of power flowing through the grid, beyond the volume itself. This includes characteristics such as voltage and power factor.

arrangements that apply for smart meters. However, it serves as a useful benchmark for what an effective access arrangement could achieve. In discussions with a group of DNSPs in Victoria, they told us that they collect PQ data from their meters every 15 minutes, with each transmission containing the three most recent five-minute periods. Around 99 per cent of residential and small commercial customers are equipped with a smart meter.

Victorian DNSPs collect data frequently enough (every 15 minutes) that they can manage their networks on a near real-time basis. This frequency may be necessary for some use cases, e.g. responding to outages without waiting for them to be reported.

The Victoria case study demonstrates the value of reaching a high degree of rollout, as a wide range of use cases become available which can deliver significant value to customers. Many of these use cases are not yet available in the rest of the NEM, such as phase allocation and other real-time operational uses. These potential uses may be possible in several years if the rest of the NEM reaches near 100 per cent roll-out of smart meters, but the present uses of smart meter data outside of Victoria are limited to those that rely more on the dispersion of smart meters across a wide area rather than a complete picture of every megawatt that is being distributed across the network.

Great Britain

In Great Britain, similar to the NEM, retailers are responsible for installing and maintaining smart meters, but each smart meter includes a specialised piece of communications equipment owned by the Smart DCC, a price-controlled monopoly entity. Retailers are required to supply data on a real-time basis to the DCC, which stores data from all smart meters in Great Britain.

Provided they file a Data Privacy Plan with the energy regulator Ofgem (and all have), DNSPs can access data stored by the DCC at no charge (the costs of the DCC are ultimately recovered through retail tariffs). The Data Privacy Plans must set out their intended purpose in accessing the data. All DNSPs collect half-hourly consumption data on a monthly interval, to use it to help plan network reinforcement on a highly localised basis. To our knowledge, no DNSP has accessed real-time or PQ data from the DCC.

The British model does not require any commercial negotiation between DNSPs and any other party but instead requires DNSPs to apply for approval to Ofgem, who assess the applications primarily based on data privacy and security.

While the ownership of smart meters is decentralised, the process of data management is centralised. The DCC bears the costs of managing a single communications network and putting data into a consistent format, but these costs are not replicated across many different retailers. Additionally, DNSPs only interact with Ofgem (in applying for access) and the DCC (in receiving the data). Therefore, unlike the present situation in the NEM, DNSPs do not need to hold many, simultaneous negotiations across a disparate set of MCs.

New Zealand

In New Zealand, retailers are required to provide consumption data to DNSPs in a pre-set format if requested, with DNSPs obligated to pay the reasonable costs that retailers incur in doing so. Retailers and DNSPs can agree to provide PQ data beyond this, but there is no defined framework for doing so.

The obligation to provide data is imposed through an appendix to the Default Distributor Agreement (DDA), which is the template use of system agreement on which DNSPs and retailers must base their agreements, but may negotiate alternative terms. Under the DDA, retailers must comply with any request for data from DNSPs, so long as it is for a permitted purpose. Ultimately, however, DNSPs are limited in their use of data to only the purpose expressly agreed to in the request. Additionally, required data transfers are limited in scope, relating only to the data that must be provided to bill retailers for their use of distribution networks.

DNSPs do not currently have widespread access to this consumption data due to a clause in the DDA which prohibits combining the consumption data with another data source without the consent of the retailer. Given the large number of retailers operating in a given network area, this imposes transaction and coordination costs to obtaining a complete dataset if the DNSP wants to combine it with other datasets (such as GIS data).

For additional types of data that could be used for the use cases seen in Victoria, and to a lesser extent Great Britain, the Electricity Authority sets out only the format of the data template (for some transactions) and transfer system but does not regulate any of the terms of access. Indeed, for PQ data there are no regulatory access obligations, templates or pricing principles. Access to this data must therefore be commercially negotiated. To obtain consumption data, DNSPs deal with the retailer, but for PQ data they negotiate directly with the metering equipment provider (MEP). There are far fewer MEPs than retailers, which may reduce the transaction costs and coordination issues with obtaining this data.

Australian gas transportation access

In Australia, shippers of natural gas who require third-party access to gas transportation infrastructure are entitled to access under certain circumstances under a negotiate-arbitrate framework. Depending on the type of asset in question, access may be subject to greater or lesser regulatory control. For example, under a proposed change to the current access arrangements, some pipelines will be subject to "stronger regulation", where any disputes will be resolved by the Australian Energy Regulator (AER) based on pre-defined reference prices. Other pipelines will be subject to "lighter regulation", where disputes are resolved by an arbitrator based on pricing *principles* (e.g. cost-based) but not based on any pre-defined reference price.

The lighter negotiate-arbitrate framework seen in the context of gas network access represents a relatively light-touch and non-prescriptive form of regulation, which gives both parties considerable leeway in determining the terms of access. While the arbitrator must follow pre-defined principles in the event of a dispute, they also have considerable leeway in determining how to apply those principles for recovery of fixed investment costs and allocating joint costs.

2.1.3. We developed options and assessed them against criteria

Based on our review of the case studies, we developed a range of potential access options that could apply for smart meter data access in the NEM.

- Implement a **DCC-type organisation** and mandate the types of data that must be provided through it.

- Set **minimum standards for bilateral engagement** between retailers and DNSPs but allow for additional commercial engagements beyond the minimum standard. This is similar to the system in New Zealand and also as proposed by South Australia Power Networks.
- Establish an **exchange architecture** with defined roles and partially written contracts but allow parties to participate freely within it.
- A **negotiate-arbitrate framework**, where arbitrators (potentially including the AER) are subject to guiding principles when making a determination.

We compared these options against the following criteria, informed both by the theoretical challenges and the case studies:

- **Provision of data access:** Will the framework overcome key obstacles and ensure that DNSPs and third parties are able to gain access? All of the options have been selected because they are likely to achieve the fundamental goal of providing access.
- **Cost and ease of implementation**: Can the new framework be implemented without undue burdens to the industry, both in terms of financial cost and the time and complexity of compliance?
- **Ongoing costs of framework**: What are the costs of providing data access on an ongoing basis? Do industry participants have to incur unnecessary costs that do not deliver value? Are there high ongoing costs required to enforce compliance?
- **Ease of price formation**: Is it clear how prices for data are set, and how the additional value created is split between DNSPs and MCs?
- **Flexibility to new use cases**: If a new type of data is deemed to be useful, or to have value in a new use case, can the regulatory framework easily adapt to incorporate the new use case?

Additionally, we commented on whether each option could be combined with any other option, or whether it could be partially implemented. We summarise our findings in Table 2.1 below.

Table 2.1: Appraisal of Options Against Criteria

Criteria	DCC-Style Organisation	Minimum Contents Requirement	Exchange Architecture	Negotiate-Arbitrate
Provision of data access	Highly likely to achieve core objective.	Highly likely to achieve core objective if minimum obligation includes desired data.	Should achieve core objective, but it is not mandated so perverse outcomes are possible.	Likely if "strong regulation" principles are instilled for basic data access, but otherwise unclear.
Cost/ease of implementation	Expensive to implement as new organisation and remuneration structure required.	Relatively low, as can rely on existing entities.	Some costs to implement architecture (e.g. IT costs, pro forma contracts).	Relatively easy. Framework exists in other industries.
Ongoing costs	Expensive if irrelevant data is collected.	Expensive if irrelevant data is collected and not standardised across retailers.	Relatively low as data is only collected when needed.	Low. Though arbitration is expensive.
Ease of price formation	Data provided to DCC free of charge, DCC recovers costs separately.	Unclear how minimum required data must be remunerated.	Price formation for data access relatively easy, but unclear who bears the cost of the architecture.	Unclear, still relies on negotiation as in status quo.
Flexibility to new use cases	Limited. New policies may need to be written.	Flexible, as it allows negotiation beyond the minimum requirement.	High.	High.
Potential to combine with other options	Limited. Already prescriptive roles and responsibilities.	High. Could introduce an exchange architecture to facilitate access.	High. Could underpin a minimum contents requirement.	Could underpin an exchange architecture.
Possibility of partial implementation	Yes, role of DCC could be limited.	Yes, scope of minimum requirement is flexible.	No. Architecture either exists or it does not.	No.

2.2. Feedback to AEMC's Directions Paper

The AEMC made our Options Paper available as an attachment to its Directions Paper, and collected extensive feedback on the four options we proposed. The AEMC received feedback from (i) metering parties; (ii) distributers; (iii) retailers; and (iv) technology parties.

We summarise the feedback to each option below, and our reactions to the feedback received:

Access Option	Stakeholder views	NERA comment
Option 1: DCC	Respondents were largely opposed to Option 1 (DCC), because the costs of doing so are not proportionate to the scale of the benefits which could be realised. Several respondents noted the running costs of the regime could exceed the total expenditure on metering as it stands, while distributors highlighted that many of the new costs would duplicate costs already incurred.	We agree with the bulk of the concerns raised for Option 1. The incremental complexity and cost required to establish this option compared to both the status quo and the alternative options are likely not justified given the level of benefits that could be achieved through this option in comparison to other options. Additionally, this option could be cumbersome to adapt to future data requirements.
Option 2: Minimum contents	Across the four categories of respondents, most were broadly supportive of Option 2 (minimum contents), because it would be relatively low cost to design and establish. Several respondents questioned how it would be implemented in practice, how costs would be allocated, and how the framework would adjust to account for new use cases.	We agree that, if implemented well, this option could unlock benefits from PQ data without imposing excessive costs to achieving them.
Option 3: Exchange Architecture	Respondents generally supported aligning on a single exchange architecture (Option 3) because it would reduce ongoing transaction costs. Some respondents were concerned with the costs involved in establishing a new exchange architecture and instead supported using the existing B2B solution, managed by AEMO. On the other hand, one technology provider was concerned that B2B integration costs are expensive and could provide an advantage to incumbents who have already incurred that cost. Respondents generally did not agree on how prescriptive the use of the common architecture should be. Some preferred the flexibility to use other options to not burden smaller players with integration costs; others supported mandatory usage of the exchange architecture due to the whole industry cost minimisation which comes from standardisation.	We agree that the use of the existing B2B architecture provides the benefits of coordination without the imposition of substantial new IT costs. The trade-off between barriers to entry (by mandating the use of B2B) versus cost reduction is nuanced and requires careful consideration.
Option 4: Negotiate Arbitrate	Most respondents were opposed to a prescriptive form of Option 4 (Negotiate-Arbitrate), particularly if it tends towards price regulation of data access and is costly to implement. Other respondents supported its use as a backstop to other options.	We agree that excessive price regulation is unnecessarily restrictive and cumbersome and that any negotiate-arbitrate framework should be left outside the core streams of data. However, the pricing and access principles that underpin the negotiate-arbitrate scheme are applicable to the present context.

Outside of responses to the four options we presented, respondents also provided more general feedback around the premise of the work.

Most notably, two metering providers (Intellihub and Vector) questioned the existence of market power held by metering providers. Both parties argue that the landscape of MDPs is sufficiently fragmented across the NEM that MDPs are not able to exert meaningful market power. By contrast, they argue, any market power that does exist sits with DNSPs, as the sole credible buyer of data in most cases. Intellihub, supported by Farrierswier, argues that the problem is one of coordination and exchange costs and that any solution should seek to minimise those.[7] Farrierswier also concludes that the cost of a new scheme should not exceed the value that can be derived from it.

We respond to these points as follows:

- Market power can still exist locally, even if metering providers do not hold a monopoly over a wide area. This could occur either through (a) a very local market and product definition, where the metering provider holds data that is *uniquely* valuable to the DNSP in its location; or (b) certain coverage thresholds must be met to achieve any value, which cannot be achieved by only one or two metering providers. Regarding a localised definition of the market, an analogy exists in telecommunications. Most jurisdictions, including Australia, regulate the "mobile termination access services" (MTAS), even in circumstances where the mobile market, in general, is considered to be competitive. When a call is made, the caller's network must pay a "termination fee" to the mobile provider whose network serves the recipient of a telephone call. This fee is regulated based on a view by regulators that the recipient's provider is the only party that can terminate the call[8] and therefore has a localised bottleneck, and hence market power, with respect to setting the termination fee. The market for mobile termination can thus be characterised as the sum of many (miniscule) monopolies. In the present case, similar dynamics may be at play whereby there is competition to install the meter (analogous to competition at the stage where a consumer chooses which network to subscribe to), but once the meter is installed, the MC/MDP has localised market power over access to that individual customer's data. Whether that market power is meaningful in the context of the overall market depends on how uniquely valuable that individual customer's data is.
- The exercise of market power is only one potential market failure that the introduction of an access arrangement could solve. High transaction costs driven by a lack of coordination is another market failure that justifies the implementation of an access arrangement.
- Over the full life of smart meter rollout, we agree that the costs of implementation should not exceed the value that power quality data can provide. However, the value that can be provided by power quality data includes the potential for significant changes in the

[7] Farrierswier (28 October 2021), Review of AEMC data access proposals – A review and alternative option development for Intellihub, p.15.

[8] I.e. if the caller is on the Optus network and the receiver is on the Telstra network, to terminate the call it must go via the Telstra network. Optus could not instead terminate calls to Telstra customers using its own network or that that of VHA/TPG. The advent of over the top (OTT) messaging services is however changing this dynamic, as they provide a means of bypassing the mobile networks. Indeed, increased usage of OTT messaging apps (e.g. WhatsApp and Facebook messenger) have led the ACCC to no longer regulate MTAS for text messages. Source: ACCC (28 June 2019), Domestic Mobile Terminating Access Service Declaration Inquiry – Final report, p.22.

investment and operation of DNSPs if sufficient coverage is achieved. In other words, the long-term benefits may be considerably larger than the short-term value, and may only become possible in the long-term if shorter-term costs are incurred. Farrierswier aptly identifies this as a "'chicken and egg' problem", particularly for DNSPs' financial incentives to use PQ data.[9]

[9] Farrierswier (28 October 2021), Review of AEMC data access proposals – A review and alternative option development for Intellihub, p.9.

3. Proposed Framework for Further Development

3.1. Summary of Proposed Framework

Following on our review of the feedback provided by the industry in response to the AEMC's Directions paper, we conclude that a hybrid model of Option 2 (Minimum Contents) and Option 3 (Exchange Architecture) is most proportionate to resolve the access problems observed. Option 1 (DCC) was universally regarded to be excessively costly and burdensome and may provide little flexibility to updating use cases. Option 4 (Negotiate-Arbitrate) is also costly to meaningfully implement and could tend too closely to price regulation, but we can still incorporate some of the underlying principles into our proposed framework.

We set out the broad principles of our approach below, with more details and areas for further consideration set out throughout this chapter:

- A Minimum Contents requirement would set out a list of data streams that MCs would be obligated to collect and make available to DNSPs and other users. Other known data streams would be categorised separately and made available through commercial negotiations. The framework would be flexible to updating use cases and changes between data tiers.
- An existing piece of exchange architecture, such as the AEMO B2B portal, could be leveraged as the primary medium through which data is transmitted, with some provision for alternative means if needed. Pre-set templates will be used for transmitting the minimum contents, while the portal will be used more flexibly for non-mandatory data streams.
- We do not propose any defined pricing rules, but a set of pricing principles should underpin negotiations.

We could think about this as a three-tiered arrangement as follows:

- Tier 1 products are required to be collected and made available by MCs through the exchange architecture. When requested, MCs would transfer the data to the relevant party.
- Tier 2 products would be defined in advance, and hence the templates for exchange could be built into the exchange architecture. However, MCs would not be obligated to collect and provide this until requested. It remains to be determined whether MCs *would* be obligated to provide tier 2 products upon request, or whether the only difference between tiers 2 and 3 relates to the extent to which the exchange architecture is already set up to accommodate it.
- Tier 3 products capture all the remaining products which are currently unknown (and may not even exist at present). It would thus be impossible to build a data template within the exchange architecture, although components of the exchange architecture may be agnostic to the particular data stream (e.g. any hardware, or partially-written contracts).

3.2. Detailed Design Questions

We have set out the overall structure of the new framework above, but many design questions must be resolved before the framework can be implemented. We set out some of the considerations that the AEMC should have regard to in answering these, recognising that these detailed design issues would be more formally addressed in a subsequent rule change process.

3.2.1. Tier definition

The three tiers of data access are generally categorised on a spectrum based on their likely usefulness and their cost of provision. Tier 1 data streams are likely to have widespread usefulness and relatively common and consistent requirements by requesting parties (at least eventually) while being less burdensome to collect. By contrast, Tier 3 data streams may arise on a case-by-case basis when a potential buyer sees the use for them, and it may be burdensome for the meter provider to collect and provide the data if there is not a private value that exceeds the cost of collection.

The definition of a data stream can be thought of along several dimensions:

- What the actual metric being transmitted is, e.g. reactive power, voltage, etc;
- The geographic precision of the data, e.g. every single house (with an associated location) vs anonymised and/or aggregated across a neighbourhood;
- The time interval over which it is collected by the smart meter (i.e. the sampling rate), e.g. every 30 minutes, every 5 minutes, every 30 seconds, etc.;
- The frequency and delay with which it is transmitted to the B2B system, e.g. every six hours covering the previous six hours of data, every hour covering the previous hour of data, every five minutes, live, etc.

We understand that the AEMC is consulting with the industry on what the contents of any minimum content tier should be (i.e. Tier 1).

An important consideration is what the institutional structure will be for maintaining and updating the tier system, and where these sit between rules, guidelines, and the discretion of different decision-making bodies. What is legally possible/practical is beyond our expertise as economists. However from an economics perspective, the process would ideally have the following two characteristics:

- **Flexibility:** experience with the use of power quality data elsewhere (especially Victoria) shows that the value of data streams can evolve rapidly over time. Given the value of various data streams is currently unknown and is likely to evolve rapidly over time (and indeed the actual data that can be collected will change over time), the process for updating the tier definitions should allow some flexibility so that the definitions can be updated relatively quickly and can evolve over time in line with the demand of data users.
- **Decision maker should have access to technical and policy expertise:** however decisions on the tiers are made, it is important that the decision maker has access to technical expertise to understand the technical characteristics and limitations of each data stream. In addition, because defining a data stream as Tier 1 or Tier 2 would involve

regulatory pricing obligations, movements Tier 1 or Tier 2 should only occur where the benefits exceed the costs. This is a policy question and thus would require policy expertise.

Regarding the flexibility principle, in defining the governance process it will be necessary to strike a balance between flexibility (to ensure that the system keeps up with the needs of its users) and fairness (so that parties are not obligated to incur costs without input). These considerations can be balanced through flexible pricing principles, grandfathering and transition arrangements, and differing transition procedures based on the tiers that a stream moves between:

- As we discuss in Section 3.2.3, flexibility in the application of pricing principles for each of the tiers means that the metering party should never be obligated to provide a data stream at a price below the cost of making it available.
- When a data stream changes tiers, metering providers should be given a transition period to determine how to feasibly begin providing it, and at what cost (insofar as the cost of providing that stream has changed as a result of changing tiers).
- Existing bilateral contracts may exist for the provision of a particular stream of data which may outlast the change of tier definition. Unless a mutually agreeable alternative can be found, the terms of existing contracts should be grandfathered beyond the date that the tier definition changes, to their date of contracted expiry.[10]
- In some cases, a metering point may not be physically capable of transmitting a particular data stream. In these cases, exceptions should be made to any requirement to provide data by default (Tier 1) or by request (Tier 2), and these exceptions should be respected if a data stream changes from one tier to another.
- From a data provider's perspective, there is little immediate difference between Tiers 3 and 2 in terms of the costs that immediately apply (though there could be an obligation to make a data stream available upon a specific request). The most significant difference is in the architecture used to transmit them. It may therefore be appropriate to allow the updating body to move data streams from Tier 3 to Tier 2 with less industry consultation than a move from Tier 2 to Tier 1 (where, after a transition period, they would immediately start uploading the data stream by default). A less intensive process may also be appropriate any time a data stream is *downgraded*.

In terms of ensuring both technical and policy making expertise is brought to bear on decisions to move a data stream to a higher tier, this expertise does not necessarily need to reside in the same body. Our key point is merely that when regulator pricing obligations are imposed (i.e. when a stream is upgraded to Tier 1 or Tier 2), it important that the costs and benefits of the regulatory obligation are considered. This requires policy expertise as well as technical expertise. There are different ways to achieve this, though whether certain options are legally possible is outside the scope of our expertise as economists.

[10] In some sense this is similar to the provisions in the National Gas Rules which allow for bilateral contracts to supersede regulation.

We do however note that the Information Exchange Committee (IEC) already has representatives from most of the relevant stakeholders and thus could be a logical body to update the tier definitions as needed, or provide technical advice to the decision making body.

3.2.2. Use of the exchange architecture

As we note throughout, a key objective of a data exchange framework is to minimise transaction costs and improve coordination between parties, both of which can result in a more fruitful exchange of power quality data. A single, consolidated exchange architecture can reduce transaction costs by ensuring that they are not duplicated unless necessary. For more widely used data streams, these costs can also be spread across the industry (reflecting the wider benefit smart meter data can provide), further minimising the transaction cost borne by any one transacting party. An exchange architecture can also improve coordination by ensuring that all potential parties are already close to alignment before transacting.

We recommend that the exchange architecture be based around existing infrastructure like the B2B e-Hub as much as is possible, in order to avoid duplication of costs. AEMO already uses this system to operate the system in real-time, so the most market participants already have access to it. This will minimise the up-front costs of participation, as a new system does not need to be developed. Additionally, because the B2B e-Hub is funded through NEM participant fees, the system allows for a convenient avenue to spread the costs of data exchange, for data streams where there is a substantial social benefit to exchange (in addition to the potential private benefit). We understand that B2B has recently been upgraded beyond the needs of power quality data exchange, and so there would not be any additional IT costs driven by this process. However, we would defer to IT experts to advise as to whether the B2B e-Hub is capable of being used for this purpose, and whether any updates would be required..

Data providers' requirement to use the centralised exchange architecture (whether that is the B2B e-Hub or otherwise) should vary by tier, as should the level of functionality included in the system:

- For Tier 1, given that the contents are pre-determined and the participation is mandatory, the architecture should contain fully-specified data templates for data providers to populate. Data providers should implement systems that automatically populate these data templates and send them through the architecture. By making participation mandatory, data providers will also most likely face smaller *per-unit* costs of data provision, as they will presumably streamline and automate their systems. The benefits from the mandatory minimum contents will most likely be felt across the industry – hence it is appropriate to spread as many of the costs as possible by including as much integrated architecture as possible, and fund them through AEMO participant fees (which already fund the B2B e-Hub).
- For Tier 2, similar pro-forma data templates should exist alongside the IT capability to deliver it, but there will be no obligation to actually populate the templates until requested by a DNSP (or other recipients). While the benefits of Tier 2 data streams are not as widespread as Tier 1 data streams, substantial industry-wide benefits may still exist, supporting the idea of maintaining as much functionality and as many costs as possible within the common architecture (e.g. B2B). Nonetheless, the per-unit costs incurred by data providers will likely be higher, because providers will not have fully automated their

systems and will hence incur one-off costs each time a new party requests a Tier 2 data stream.

- For Tier 3, the architecture should contain pro-forma documents to reduce the transactions and coordination costs, but the participants should separately determine how to best deliver the data stream. A separate API may be more appropriate to ensure that the architecture is not burdened by a very granular data stream used only by one party and that no costs are socialised through participant fees. In the case of Tier 3 data, the benefit of data access is more likely to be held more privately by the user, and so it is more appropriate that the cost be borne directly by the data provider and then paid for by the party that purchases it. The benefit of improving coordination across disparate parties is not as large given the lack of widespread use of the data.

For the remainder of this section, we assume that the selected architecture will be the B2B e-Hub. The costs associated with using B2B are likely relatively small for all of the above uses because the system has recently been upgraded beyond the standard required for this use case. At some point, however, the transmittal of power quality could conceivably trigger the need for a further upgrade, which could be expensive. If this is driven by Tier 1 or Tier 2 data specifically, it will remain appropriate to socialise the costs of an upgrade across the industry, because the benefits are widespread. An upgrade is unlikely to be triggered by Tier 3 data, because, under this framework, B2B will only be used for pro-forma contracts, documents, and templates, but not for the transmittal itself.

Some respondents to the AEMC Directions Paper raised concerns that mandatory participation in the B2B e-Hub could provide an advantage to incumbent parties who have already incurred the integration costs of the B2B e-Hub, adding a new barrier to entry into the market.[11] These concerns can be ameliorated, to an extent, by limiting the requirement for B2B to just Tier 1 data, which is less complex by nature than Tier 2 or 3 data, and hence imposes a smaller integration cost upon potential users which have not already integrated into the system.

The above focuses on the roles and responsibilities of data providers who will upload data onto B2B (or an API for Tier 3 data), but we must also consider the roles and responsibilities of those who access the data.

We understand that the primary, but not exclusive, users of the data will be DNSPs, who already have access to B2B. Further value for PQ data could come from sales to other third parties which do not currently use the B2B system (e.g. DER providers or researchers). There are at least three ways that access could be addressed for such parties:

- Allow access to the B2B system to a wider group of market participants, though this may come with substantial integration costs for relatively small and dispersed parties;
- Require DNSPs to make the data they collect available for certain use cases. For example, DNSPs in Victoria (which are not subject to this ongoing process) make

[11] Gridsight (28 October 2021), Feedback to Directions Paper, p.8.

available their power quality data to third party users (e.g. researchers), generally free of charge;[12] and

- Treat all non-DNSP recipients as "Tier 3" users, even if the data stream they access would otherwise be considered Tier 1 or 2.

In either case, provisions would need to be made around data privacy and consent. DNSPs already access smart meter data to measure consumption and levy distribution charges. Thus, it should not require greater customer consent or raise privacy concerns if that data includes power quality dimensions as well. Non-DNSP users, on the other hand, have generally not had access to smart meter data in the past. The AEMC should consider whether existing customer consent to data access extends to other parties, or whether new consents must be given to enable access to a wider group of parties.

3.2.3. Pricing principles

In order for a data access framework to be successful, the prices that data providers charge for data access should:

- Reflect the marginal cost of providing data (which would ensure that data is sold if the marginal value to the purchaser at least exceeds the marginal cost of providing it);
- Ensure that data providers are able to recover their *average* costs associated with providing a particular stream across all users of it (to account for any fixed costs of making a stream available); and
- Allow for a reasonable level of margin or profit for the data provider, especially where the total benefits of a transaction are expected to be considerably larger than the costs of enabling it.

Because there may be fixed costs in addition to the marginal cost of providing access to a particular stream to an additional user, data providers may wish to develop a two-part charging regime (i.e. a subscription fee plus a small usage fee) or some form of cost-sharing arrangement to cover fixed costs.

Direct price control may not be proportionate to the problem at hand, so it may be preferable to instead introduce a set of pricing principles based on the above which industry participants can refer to when negotiating access.

The objective of pricing principles is to align the internal incentives to transact with the current or potential social costs and benefits. For Tier 1 data, there are substantial external (i.e. social) benefits (known in the economics world as "positive externalities"), and so stricter adherence to pricing principles is needed to ensure that those externalities are realised. For Tier 3 data, there are likely to be fewer positive externalities, and so we would expect the process of commercial negotiation to yield an efficient outcome (that is, if the private benefits that the purchasing party gains from access exceed the cost of provision, there should be a mutually agreeable price for exchange, and little potential for the seller to price gouge to the point that the transaction does not take place).

[12] They are allowed to charge the user for requests that take more than 10 hours to prepare, but in practice they do not usually do so.

The application of these principles will thus vary across the three tiers of data.

For Tier 1 data, the above discussion of design parameters focuses on centralising and socialising as many costs as possible into the B2B system (funded by participant fees). Hence, data providers should incur almost no *marginal* or *incremental* cost from providing access to an existing stream to a new user. Any usage charge should therefore be minimal.

Most of their costs, by contrast, will sit in the set-up costs of automating data uploads. Where possible, data providers should offer transparent and non-discriminatory prices which do not load all fixed costs on the first user. This could be in the form of a subscription fee based on the anticipated number of purchasers (e.g. all of the DNSPs where the data provider has significant coverage) or one that decreases for everyone as more parties subscribe.

For Tier 3 data, by contrast, the marginal cost itself includes substantial fixed set-up costs, because each stream is possibly unique to each user. In this context, the data provider should have more flexibility in incorporating the fixed costs into a usage fee. This would also be consistent with the economic rationale behind the Tier 3 data streams: these streams are costly to provide, and hence should only be made available if the purchasing party values them enough to pay a higher price to receive them. Additionally, given the limited external benefit to exchange, the outcome of a commercial negotiation should reflect the social value of providing access, and the need for pricing principles is lower. Thus, we recommend that Tier 3 pricing be left to commercial negotiation. If there becomes a case that a certain data stream has greater social benefit beyond the private benefit, this would be a reason to move that data stream into a higher tier, rather than to apply pricing principles to Tier 3 data.

For Tier 2 data, we recommend that prices follow the same set of principles as Tier 1, but these principles will apply to a smaller set of data, because Tier 2 data is only exchanged upon request, and thus the burden is not as great as for Tier 1.

There is also practical question of how pricing principles would be enforced, who would enforce and them and the authority for that enforcement. As this is partly a legal matter outside our expertise as economists, we do not provide any comment, but note it is an area the AEMC should explore further. We do however note that the AER already has compliance and enforcement responsibilities in energy markets.

3.2.4. DNSP cost recovery principles

The above pricing principles focus particularly on the costs incurred by data providers, but DNSPs will incur integration costs as well in order to fully make use of the data they have purchased.

In general, these costs should not be a concern if they are not included in the regulatory cost base. If the value that a DNSP can attain from data access (whether through a cost reduction or a revenue increase through an incentive mechanism) exceeds its own set-up costs plus the price of access (itself a function of the data provider's set-up costs), then it will be able to decrease its costs or increase its revenues in net terms and no separate allowance is needed.

If the value it can attain is *lower* than its internal costs plus the price, then perhaps it is inefficient to purchase that data in the present moment (assuming that the incentives included within their regulatory regimes are calibrated to reflect social value). To the extent the

private benefits are likely to occur in the future, DNSP revenue allowances may need to take into account the following:

- Whether DNSP costs with respect to power quality data access *now* appear inefficient but could enable efficiencies in the future. If this is true, the DNSPs could recover these costs through regulated revenue allowances, while ensuring that customers see the benefit of those future savings by passing them through into the revenue requirement.
- Whether DNSPs have the opportunity to *sell* power quality data to further third parties (e.g. researchers and DER providers), under which pricing principles, and how that revenue will be used to offset regulated revenues.

In short, the price reset process could explicitly recognise the costs and benefits of power quality data access (including the resale value to third parties) or it could implicitly recognise them through their effects on DNSPs' costs included in the annual benchmarking exercises.

4. Conclusions

In this report, we have addressed feedback given by industry with respect to the potential options for a data access framework. We have used the feedback alongside economic rationale to develop an overall framework that uses a three-tiered structure and, to varying degrees by tier, the pre-existing B2B platform.

The framework we propose addresses the transaction and coordination cost challenges, while also avoiding the burden, cost, and inflexibility of a more prescriptive solution like a DCC-style organisation.

For Tier 1 data, which is the least complicated and costly to collect while providing potential value to the widest group of users, the proposed framework reduces and centralises the incremental costs of data access so that DNSPs can access it easily at a low cost. The price reset process could be amended to account for the additional costs and benefits of mandatory data access, but this is beyond the scope of this report. This easy access may unlock future, unknown potential cost savings.

For Tier 3 data, which is the most complicated and costly to collect while providing potential value to a narrower group of users, the proposed framework reduces and centralises fewer costs, and hence changes less relative to the status quo (i.e. the absence of a framework). This ensures that the approach to Tier 3 is less speculative: parties will generally only incur the cost of attaining access if there is a clear and present value to doing so.

Our recommendations contained herein are high-level principles only. Further phases of consultation and detailed drafting will be necessary before they can be formally implemented.

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NERA
ECONOMIC CONSULTING

NERA Economic Consulting
One International Towers
100 Barangaroo Avenue
Sydney NSW, Australia 2000
+61 2 8864 6535
www.nera.com