Major Energy Users Inc.

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Australian Energy Market Operator
GPO Box 2008
Melbourne Vic 3001

Sent by email: ISP@aemo.com.au

ISP Transmission Costs
Draft Transmission Cost Report

The Major Energy Users is pleased to respond to the AEMO request for a submission to its draft Transmission cost report – a key part of the ISP process.

About the MEU

The MEU was established by very large energy using firms to represent their interests in the energy markets. With regard to all of the energy supplies they need to continue their operations and so supply to their customers, MEU members are vitally interested in four key aspects – the cost of the energy supplies, the reliability of delivery for those supplies, the quality of the delivered supplies and the long-term security for the continuation of those supplies.

Many of the MEU members, being regionally based, are heavily dependent on local staff, suppliers of hardware and services, and have an obligation to represent the views of these local suppliers. With this in mind, the members of the MEU require their views to not only represent the views of large energy users, but also those interests of smaller power and gas users, and even at the residences used by their workforces that live in the regions where the members operate.

It is on this basis the MEU and its regional affiliates have been advocating in the interests of energy consumers for over 20 years and it has a high recognition as providing informed comment on energy issues from a consumer viewpoint with various regulators (ACCC, AEMO, AEMC, AER and regional regulators) and with governments.

As noted in its response to the Issues Paper on the draft ISP methodology, the MEU recognises that AEMO has committed considerable effort into the preparation of the ISP IASR, the ISP methodology and now the draft transmission cost report. The MEU is pleased to note that AEMO has actively sought to address many of the suggestions

and concerns raised by stakeholders in their responses to the many aspects of developing the 2022 ISP. AEMO staff are to be congratulated on developing a suite of documents in such detail in what is a key part of the ISP development. In particular, for the cost estimation, the MEU sees the transmission cost workbook is a major improvement and AEMO should be congratulated for developing it and ensuring that it is regularly updated with more information as that comes to hand, whether from actual project cost data or from other sources.

A core aspect of the ISP process is that any proposed network augmentation must be clearly identified as the best solution to suit the needs of the market[1], but to also be cognisant of the benefits that accrue to those paying for the network augmentation – the consumers – as it is consumers that pay the bulk of all transmission costs. Further, the market is currently undergoing, and will continue to undergo, massive changes. These changes are occurring at a rapid pace and so decisions now that might appear to be sensible and apparently efficient, could be demonstrably inefficient in just a few years' time. Network assets have a life of >50-60 years yet the assets being added to the generation fleet have expected lives well short of this time frame. This imposes a responsibility on AEMO to ensure that network augmentations being made now will not be under-utilised, or even stranded, in the future. This means that there not only has to be sufficiently clear identifiable benefits, but that the costs proposed for the augmentations are not significantly underestimated.

An example of this concern is the costing of the Project EnergyConnect where the decision to proceed with the project was made on the basis of a capital cost that was 60% of the cost proposed at the final investment decision (FID) stage. The MEU is concerned that the costs of PEC (but other actionable ISP projects too) do not exceed the forecasts on which the FID was based. The MEU does not want to see future consumers having to pay for what becomes a "white elephant".

Whilst recognising the amount of work put into the transmission cost report which, the MEU has a number of concerns about the report.

The presentation of the report

The MEU recognises that the report provides a wealth of information about the approach to costing the transmission network options but also it provides a short summary of proposed augmentations that the ISP has identified. While appreciative of the provision of the information, the MEU questions whether this additional data is a little premature when considering that the 2022 ISP has still to be developed. It also raises concerns as to whether stakeholders are expected to respond to each of the individual augmentations that the report incorporates.

The MEU has assumed that the addition of this information on each potential project is provided to allow stakeholders to assess the implications of the costing approach

[1] Noting that the RIT-T assessment is a market benefits test.

outlined in the first two sections of the report, with particular attention to the assessments of risk that need to be accommodated in the costing process.

The MEU has not assessed any of the projects outlined[2] but has used these to exemplify the concerns it has on a wider basis.

The transmission forecast cost accuracy

There is an underlying assumption that the process used to develop the costs for an actionable ISP project is adequate for the task, yet table 6 in the draft report identifies a significant risk for those parties (most commonly consumers) having to take the cost risk for the projects identified. Table 6 outlines the classes of cost accuracy for each stage of an "actionable ISP project" yet refers to a class of accuracy while not showing the accuracy expected of each class. The following table from the Association for the Advancement of Cost Engineering (AACE) "Cost Estimate Classification System" highlights how the estimates can vary considerably in expected accuracy:

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges at an 80% confidence interval
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Table 1 – Cost Estimate Classification Matrix for Process Industries

What is notable about the expected accuracy range in the AACE process is that the expected accuracy is not symmetrical between under- and over-estimates. For example, for a class 5 estimate, the forecast price can range between -50% and +100%.

[2] The MEU questions as to why AEMO has divided the proposed projects into two discrete parts (flow paths and REZs) as there is significant cross over between the two which effectively clouds the purpose of the augmentation. For example, for VNI West (a flow path example) one of the reasons for not augmenting the existing VNI in favour of VNI West, is that VNI West would be able to serve a number of REZs depending on the actual route. So VNI West is an augmentation that is both a flow path project and to serve REZs.

So, for a class 5 estimate[3], if AEMO forecasts a cost for an ISP project as $1 Bn then the ultimate cost is expected to be between $500 m and $2 Bn. This range is quite concerning as Project EnergyConnect (PEC) demonstrated where the AEMO forecast in the 2018 ISP for the project was $1.27 Bn yet the final approved cost for the project is $2.28 Bn (an increase of ~80%). Further, the National Electricity Rules (the rules) could allow the final cost for consumers to pay an even higher amount if the NSP can prove to the regulator that the over-run was efficient.

While the costs developed by AEMO for the SA to NSW interconnector (what eventually became PEC) still fell within a class 5 estimate, it is very uncertain whether the likely benefits assessed for PEC in the 2018 ISP would have supported such a massive forecast cost over-run.

While the MEU accepts that estimating to a higher accuracy for all projects than class 5 in the initial stages of the ISP is possible, the MEU considers that the process needs to reflect the reality that costs are more likely to exceed the initial estimate than under-run it. This could be achieved in one of two ways:

- AEMO carries out more detailed assessment of the costs by increasing the amount of design work to provide a more accurate forecast of costs, or
- AEMO adjusts the forecast costs to sit above the mid-point of the range of possible outcomes.

Of the two options for the development of the ISP, the MEU considers that the second is a more realistic approach. To implement this option, the MEU considers that the forecast cost needs to be adjusted up by a premium of 40%.

For example, if the forecast cost was $1000 m, the range of possible cost outcomes for the class 5 estimate is $500 m to $2000 m, with an arithmetic mid-point between the two values being $1250 m, a potential 25% increase in the forecast cost. Further, the AACE classification states that the ranges included in its table 1 are based on an 80% confidence level. This implies that the range could be even wider than the -50%+100% noted for a class five estimate. Adjusting for the confidence level, this would potentially deliver a range from $400 m to $2400 m, with a mid-point of $1400 m, a potential 40% overall increase in forecast cost.

While this adjustment would not have accommodated the massive rise seen in the cost for PEC, the ISP forecast would have been much closer to the final approved cost.

AEMO implies in table 6 that “actionable ISP projects” would be developed to a class 4 or 3 estimate and the MEU supports that this is appropriate. If AEMO considers that its estimate for an actionable ISP project is class 4, then using the same approach above (noting that the range lies between -30% +50% at an 80% confidence level,

[3] Which AEMO proposes for the first stage of the ISP

then AEMO would add a premium of 20%[4] to the assessed cost of the actionable ISP project. For "actionable ISP projects", this accuracy is appropriate for the project specification consultation report (PSCR) stage, noting that PSCR stage is replaced by AEMO assessments for "actionable ISP projects".

In table 6, AEMO observes that the accuracy of project assessment draft report (PADR) and project assessment conclusions report (PACR) stages should be class 4 or 3, and class 3 for the contingent project application (CPA) stage but at the forum on 10 June 2021, AEMO commented that they cannot impose this estimation accuracy as it is the work of the relevant TNSP(s).

While the MEU recognises the cost accuracies for the PADR, PACR and CPA stages are controlled by the TNSP(s), it considers that for a PADR (which is the last time stakeholders get to comment in detail on a project and the options for delivering against the identified need), a class 3 estimate is appropriate for the options being considered and from which the TNSP(s) develop a PACR. The MEU considers that the PACR needs to be a class 2 estimate as it is the basis from which the AER is required to assess the costs against the likely benefits under the RIT-T process. For a commitment to be included in the Regulatory Asset Base as an ex-ante cost, the costing needs to be at class 1 level.

The MEU notes there are different accuracies for each stage implicit in commentary in the draft report and by AEMO consultant GHD[5]. There needs to be consistency across the documentation with regard to accuracy of forecasts, and the classes should be based on the AACE approach.

Non- network solutions and clarity of "need"

The MEU notes that, essentially, the options considered by AEMO in its listing of current and future ISP projects are network augmentations. Also, the MEU notes that the summary (provided to express the "need" for action) is not explicit as to what the investment is intended, in hard numbers, to achieve.

For example, on page 28, AEMO identifies there is a need for increased flow capacity in North Queensland:

> "With retirement or reduced generation from Gladstone Power Station and increased generation in North Queensland, the Boyne Island, Calliope River, Larcom Creek and Raglan substations cannot be supplied.
> In the 2020 ISP, AEMO recommended Powerlink complete preparatory activities for reinforcement of Central and North Queensland (CNQ) and Gladstone Grid (GG) section. One network option is proposed to increase the maximum network transfer

[4] While the maths implies a 18% premium, 20% is seen as a convenient approximation.
[5] For example, the accuracy classification used by AEMO is different to that included by GHD, the notes in the specific projects have the accuracy at class 5 (-50%+100%) but then states a +/-30% accuracy.

> capability between CNQ and GG. Powerlink will provide the cost and capability of this option by 30 June 2021."

While the intent is clear, the absence of any quantification makes assessing any non-network solution impossible, for either AEMO, the TNSP or any aspiring non-network service provider.

On page 30, for the northern NSW-Southern Qld proposed augmentation, there is reference to a non-network solution, but the absence of essential quantification for the option 3 (a Virtual Transmission Line option with a 300 MW energy storage system south of Armidale and north of Braemar includes a note that the option needs to be provided by interested parties) makes it impossible for a non-network service provider to price an option, as the quantity of storage required (MWh) is essential, but absent from the detail of the project.

The MEU accepts that the power system engineers developing the ISP probably have a reasonable understanding of the need but to ensure that the most efficient outcome is delivered, greater identification of need must be explicitly stated in the description of the project so that potential providers, other than the TNSP and AEMO, can assess the viability of the options they might be able to provide against a clear statement of need.

For example, the MEU has provided input into the proposed VNI West assessment process. The stated reason for the proposed VNI West project is the expected loss of Yallourn Power station in the next decade, yet the options now excluded from further assessment include the upgrading of the exiting VNI on the basis that there is additional value by connecting new REZs as a part of the benefits that an upgrade of VNI would not be able to deliver. The MEU is concerned that by not identifying the need explicitly, not only are efficient solutions are being discarded without detailed explanation and reasoning, but non-network solutions are not being considered. This is because, in the absence of quantified needs, it is not practicable to develop and cost a non-network option without this essential data. Further, by not quantifying the need, a non-network solution can be excluded without explicit reasoning.

The MEU considers that the same approach to a statement of needs is essential for connection of the new generation within REZs. The network solutions include new powerlines of sufficient capacity to deliver the peak generation from each REZ. However, perhaps a smaller capacity powerline (or even using existing powerlines) could be sufficient if there was a non-network solution provided to address times when there is peak generation occurring. For example, the inclusion of significant storage within a REZ could result in a number of benefits that the network solution cannot deliver (eg smoothing the output from the REZ and so providing diversification of output).

System Strength

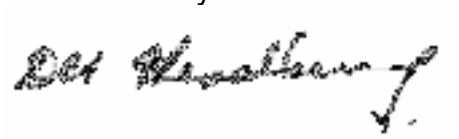
The AEMO costing paper addresses system strength needs as well as augmentations and observes on page 97:

> "System strength remediation is a complex requirement that is dependent on synchronous generation dispatch, network upgrades, and the scale of local inverter-based resources (IBR). As such, any remediation requirements not already built into network upgrade costs are post-processed."

Whilst the MEU accepts that AEMO needs to address the issue of system strength, the clear implication of the statement is that synchronous condensers will be required to address any potential lack of system strength. The MEU points out (as it did to AEMC in regard to the draft rule change on system strength) that this need for system strength can be addressed by VRE generators using grid forming inverters to provide this need. Again, it is the lack of a clear identification of need that leads to an assumption that a network solution will be required. If the ISP clearly details and quantifies the need, non-network solutions can propose solutions (eg VRE generators changing out their grid following inverters for grid forming inverters[6]) making the need for network-based system strength obviated.

The MEU is happy to discuss the issues further with you if needed or if you feel that any expansion on the above comments is necessary. If so, please contact the undersigned at davidheadberry@bigpond.com or 0417 397 056

Yours faithfully



David Headberry
Public Officer

[6] The MEU understand that this conversion can now be achieved by VRE generators using the same inverter hardware and only changing the software.