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To Senéad Mangan

Subject: Proposed Revisions to the Western Power Network Access Arrangement – AA4

My comments to Issue 13 of the Issues Paper is attached to this submission.

The objective of my comments is to minimize the cost of electricity to the large and small consumers, regardless where these cost savings fall. My focus is on elements of the proposed AA4 design, the changes of which would in my opinion, lead to the quickest reduction of the price of electricity to WA consumers and a fairer allocation of costs to causers, decision makers and beneficiaries of these decisions.

The executive summary is as follows.

The service standards benchmarks Western Power proposed for AA4 are set too low for the amount of money customers have been paying for. In other words, customers should not be receiving substandard service when they paid for the standard service. Under the Australian regime of consumer protection consumers may be entitled to refund and compensation. Here is why.

The service standard benchmark for distribution system should measure how well it performs its function according to its design. The design requirements are stipulated in the Technical Rules.

The service standard benchmarks for distribution reference services proposed by Western Power contradict the purpose of benchmark standards for the distribution system.

The service standard for transmission system should measure how well it performs its function according to its design. The design requirements are stipulated in the Technical Rules.

The service standards for transmission reference services proposed by Western Power contradict the purpose of benchmark standards for the transmission system.

Namely, the purpose of the transmission system is to provide power injection points into the distribution system. The injection points are zone substations. The distribution system emanates from the perimeter fence of zone substations.

The distribution system does not and should not include zone substation equipment, and, certainly not equipment designed to withstand transmission voltages during normal operation, for example zone substation power transformers.

A transmission circuit should encompass all primary (high current) equipment that injects power into the distribution system, including the zone substation transformer.

Yours faithfully,

Continued on Attachment

Attachment: Stephen Davidson's Comments on Issue 13

Issue 13
Submissions are invited from interested parties on Western Power's proposed revisions to the service standard benchmarks, including:

- Whether the proposed measures are reasonable and sufficiently detailed and complete to enable users or applicants to determine the value represented by the reference service at the reference tariff.
- Whether the system minutes interrupted measure should be removed.
- The reasonableness of the methods used to establish the data series on which the service standard benchmarks are based including using:
- the five-year average of actual performance for all measures, rather than three years for SAIDI and SAIFI and five years for all other measures.
- a Box-Cox transformation to determine the probability of a major event day, rather than a normal distribution.
- using distribution unplanned daily SAIDI rather than daily SAIDI including all interruptions when calculating the major event day threshold.
- Setting the benchmarks using the average of the 99th percentile (or 1st percentile for circuit availability and call centre performance) of the distributions of best fit rather than the 97.5th (or 2.5th) percentile approved for AA3.
- Applying the current (AA3) service standard benchmarks during 2017/18.
- Whether the supporting information provided by Western Power is sufficiently detailed to enable users or applicants to determine the value represented by the reference service at the reference tariff.

Submission on Service Standard Benchmarks for Transmission and Distribution Systems

4.2 Service standard benchmarks for distribution system
The service standard benchmark for distribution system should measure how well it performs its function according to its design. The design requirements are stipulated in the Technical Rules.

The purpose of the distribution system is to distribute electricity to end users of electricity (consumers); from either zone substations (transmission system power injection points into the distribution system) or from within the distribution system itself (embedded generation and small scale solar PV generation. Mass proliferation of the latter has resulted in Western Power now offering bi-directional services, for the first time in AA4. These consumers are consumers and/or producers of electricity; during some periods of time they may:

a) draw electricity (kW) from the distribution system;
b) inject electricity (kW) in the distribution system, and;
c) draw reactive power (kVAr) and inject active power (kW) into the distribution system. This operation, if not properly managed (as per the Technical Rules requirements) may lead to, otherwise, avoidable voltage problems resulting in, unnecessary, investments in the distribution network.

The distribution system physically emanates (high voltage distribution) from the perimeter fence of zone substations. Zone substations are the principal source of electricity from which the distribution system is supplied (from the transmission system).
Nowadays, power is also increasingly injected into the distributed system from the distributed generation sources directly connected to the distribution system (typically, low voltage generators).

4.2 *Service standard benchmarks for distribution reference services*
4.2.3 *SAIDI Application*

The system average interruption duration index (SAIDI) service standard for distribution reference services proposed by Western Power contradicts the purpose of benchmark standards for the distribution system.

Table 5, row definitions, considers only interruptions greater than one minute: "*each sustained (greater than 1 minute)"*, which is inadequate and unacceptable, as interruptions of shorter durations are not included in the benchmark and biased against the customers.

The definition of the service standard benchmark should be amended to include all interruptions, regardless of their duration (not just those "*greater than 1 minute*"). This is explained next.

Namely, distribution systems are designed (as stipulated in the Technical Rules) to prevent duration of outages to less than one minute, so their performance should be benchmarked against those design features.
For example, the distribution system in the Perth CBD area is designed to withstand outages of transmission and distribution components by automatic isolation of the faulted component and immediate supply to unaffected customers via alternative supply routes, and without human intervention.
Distribution system automation (for example, auto-reclosing and fault passage indication), SCADA and remote control throughout the distribution system allows prompt restoration of voltages (due to momentary voltage disruptions below 90% of the rated voltage, caused by faults)(to within the tolerable voltage range for steady state operation of +/- 10% of the nominal voltage)(with or without intervention of operators), in times less than one minute.

Finally, from the customer's perspective, momentary interruptions (of very short durations, of few seconds) are very disruptive, due to many household electronic devices, computers, electronic cashiers, security gates, etc. and the need to re-start/re-boot these devices following the interruption of their supply, regardless of its duration. This results in the waste of time, resources, loss of productivity and inconvenience to all.

Table 5, row exclusions, should be amended, by deleting four exclusions (1st, 2nd, 3rd and 4th) as follows.

The 1st bullet point exclusion item "long-winded" should be removed from Table 5 for six reasons. One, planned interruptions are removed from the measure. Their removal provides disincentive to Western Power to quickly restore supply to customers (instead Western Power could wait "until Monday" to send a crew") and/or to engage backup generators ", without "any consequences" or evidence of its consequences. Two, IEEE methodology (deleted in the AA4 proposal) is balanced overall and fair to customers. The intended application of the Box-Cox transformation is not qualified; hence there is nothing to preclude Western Power to selectively apply it only when it gives "better performance" than the IEEE methodology (as the degree of non-linearity of the input data, which is a prerequisite for the application of Box-Cox transformation is not stated). Three, exclusion

of "*events which are more than 2.5 standard deviations greater than …*" is unfair to customers, as it excludes the most severe customer interruption events. Four, the body that recommended the Box-Cox transformation protects the interests of networkers, not their customers (namely, the customers do not care if the "*logarithms of the data set are or are not normally distributed*", they need electricity supply). Five, customers do not care about "better approximation of the normal distribution". Customers need all outages to be recorded as these occurred and not as these were "approximated or transformed" by Western Power. Six, no technical justification is given on why the well-established and balanced IEEE methodology is not suitable any more to Western Power.

The 2nd bullet point exclusion (interruptions shown to be caused by a fault or other event on the transmission system), should be removed. It provides disincentive to Western Power to cost-effectively design switchyards and busbars, to provide design and operational flexibility, in order to minimize supply interruptions to distribution system customers. Western Power has been and still is both transmission and distribution system owner and operator, and should have planned both transmission and distribution system in coordination (with each other) and in order to minimize all distribution system outages planned and unplanned. On the other hand, removal of this exclusion will provide incentive to Western Power to cost-efficiently design and operate the (transmission and distribution) network in order to minimize customer outages (their frequency and durations).

Similarly, the 3rd bullet point exclusion item "*Interruptions affecting the distribution system shown to be caused by a fault or other event on a third party system (…)*" should be also removed from Table 5 for design reasons. Namely, the "*third party system*" should have own graded and backed-up protection systems and own switching apparatus (see clause 2.9 Transmission and Distribution System Protection and clause 3.2.2 Main switch of the Technical Rules).

If third party system connections are compliant with the Technical Rules, there would be no adverse effects on this service standard benchmark (as sufficient design redundancy is embedded in the Technical Rules). Hence this exclusion is not needed and its removal would not adversely affect this measure of performance.

If, however, Western Power failed to enforce Technical Rules compliance of the third party system connections, then we would need a performance measure to capture its impact (not to conceal it, as an exclusion).
Removal of this exclusion would improve this performance measure, by making it more sensitive and capable of clearly and reasonably measuring the impact of any regulatory compliance failure with respect to the Technical Rules on this benchmark.

For decades, customers in WA have been paying Western Power to build cost-effective SWIN distribution system and should have an adequate performance measure that demonstrates how efficiently their money was spent.

This exclusion provides disincentive for Western Power to complete works efficiently and to maintain the existing level of service.

On the other hand, removal of this exclusion would provide incentive for Western Power to efficiently conduct own works and demonstrate the degree of its efficiency, as well as efficiency of the past investments. In order words, customers should not be receiving substandard service is they subscribed for the standard service. Under the Australian regime for consumer protection consumers may be entitled to refund and compensation.

The 4th bullet point exclusion item ("*planned interruptions caused by scheduled works*") should be removed from Table 5. It provides disincentive to Western Power to quickly restore supply to customers (instead Western Power could wait "until the end of the festive season" to send a crew and/or (not) to engage backup generators while repairs are done, without any "consequences" and evidence of its consequences. This exclusion is unfair to customers.
Removal of this exclusion, on the other hand, would provide incentive for Western Power to engage professional engineers' expertise on how to optimize its allocation of capital and resources

4.2.4 *SAIDI Benchmark Measure - Table 6*

The targets set in the first column apply to the current financial year (ending 30 June 2018) and seem unchanged from the previous AA3 period. This is acceptable, although surprising. It is surprising because the power supply to Ravensthorpe via a few hundred km long distribution line is intrinsically unreliable. I understand, that Western Power spent a lot of money during the AA3 period on the Ravensthorpe diesel power station backup / load shaving project. What were the outcomes of that project? Did it result in any improvement in the reliability of supply to customers in Ravensthorpe? If yes, why it is not shown in the reduced performance benchmark? One would expect the performance benchmark for long rural feeders to go down in AA4 (from 724.8 hours in AA3), and not to go up (to 902.9 hours in AA4), as is shown in Table 6 for each year after 30 June 2018?

It is further confusing that Western Power pursues now (and in AA4) another reliability improvement project for customers in the Ravensthorpe area. If the first project was successful, then why the second project now? A clarification from Western Power and the Authority would be appreciated, as well as the adjustment of the regulated revenue. Western Power, as corporation, is allowed to conduct own "research and experimentation" outside of the regulated income stream.

4.2.5 *SAIFI Application*

The system average interruption frequency index (SAIFI) service standard for distribution reference services proposed by Western Power contradicts the purpose of benchmark standards for the distribution system.

Table 7, row definitions, considers only interruptions greater than one minute: "*each sustained (greater than 1 minute)"*, which is inadequate and unacceptable, as interruptions of shorter durations are not included in the benchmark and biased against the customers.

The definition of the service standard benchmark should be amended to include all interruptions, regardless of their duration (not just those "*greater than 1 minute*"), for the same reasons explained in section *4.2.3 SAIDI Application* here.

Table 7, row exclusions, should be amended, by deleting five exclusions (1st, 2nd, 3rd, 4th, and 5th), for the same reasons explained in section *4.2.3 SAIDI Application* here. It should be noted that the text of the 1st bullet point in Table 5 is split into the first two bullet points (1st and 2nd) in Table 7.

4.2.5 *SAIFI Benchmark Measure - Table 8*

The proposed performance target for "*Rural Long*" feeders is lowered for the part of the AA4 period after 30 June 2018. This is not acceptable, for the same reasons explained in section 4.2.4 *SAIDI Benchmark Measure - Table 6* here.

4.3 Service standard benchmarks for transmission system

The service standard for transmission system should measure how well it performs its function according to its design. The design requirements are stipulated in the Technical Rules.

The purpose of the transmission system is to provide power injection points into the distribution system. The injection points are zone substations. The distribution system emanates from the perimeter fence of zone substations.

The distribution system does not and should not include zone substation equipment, and, certainly not equipment designed to withstand transmission voltages during normal operation, for example zone substation power transformers.

A transmission circuit should encompass all primary (high current) equipment that injects power into the distribution system, including the zone substation transformer.

4.3 Service standard benchmarks for transmission reference services

4.3.2 Circuit availability application

The circuit availability service standard for transmission reference services proposed by Western Power contradicts the purpose of benchmark standards for the transmission system.

Table 11, row exclusions, should be amended, by deleting three exclusions (1st, 2nd and 4th) as follows.

The 1st bullet point exclusion item "*Zone substation power transformers*" should be removed from Table 11, as explained above.

Similarly, the 2nd bullet point exclusion item "*Interruptions affecting the transmission system shown to be caused by a fault or other event on a third party system (…)*" should be also removed from Table 11 for design reasons. Namely, the "*third party system*" should have own graded and duplicated protection systems and own switching apparatus (see clause 2.9 Transmission and Distribution System Protection and clause 3.2.2 Main switch of the Technical Rules). This reasoning also applies to unregulated transmission assets.

If third party system connections were compliant with the Technical Rules, there would be no adverse effects on the circuit availability service standard benchmark (as sufficient design redundancy is embedded in the TR). Hence this exclusion is not needed and its removal would not adversely affect this measure of performance.
If, however, Western Power failed to enforce Technical Rules compliance of the third party system connections, then we would need a performance measure to capture its impact (not to conceal it, as an exclusion).
Removal of this exclusion would improve this performance measure, by making it more sensitive and capable of clearly and reasonably measuring the impact of any regulatory compliance failure with respect to the Technical Rules on this benchmark.

Finally, the 4th bullet point exclusion item "*Hours exceeding 14 days for planned interruptions for major construction work*" should also be removed from the list of exclusions, as is unreasonable, unqualified and unjustified.

For decades, customers in WA have been paying Western Power to build meshed SWIN transmission system and should have an adequate performance measure that demonstrates how efficiently their money was spent.

This exclusion provides disincentive for Western Power to complete works efficiently and to maintain the existing level of service.

On the other hand, removal of this exclusion would provide incentive for Western Power to efficiently conduct own works and demonstrate the degree of its efficiency, as well as efficiency of the past investments. In order words, customers should not be receiving substandard service is they subscribed for the standard service. Under the Australian regime for consumer protection consumers may be entitled to refund and compensation.

4.3.3 *Circuit availability benchmark measure – Table 12*

It is proposed to lower the performance target part of the AA4 period after 30 June 2018. This is not acceptable, for the same reasons explained in section *4.3.2 Circuit availability application* here.

4.3.4 System minutes interrupted application (erroneously titled as "Loss of supply event frequency")

I strongly object effective removal of the Loss of Supply Event Frequency from the list of service standards for transmission reference services. It exists only in the name in the amended AA4 proposal and not in substance. The frequency is not measured minutes, as it is stated in the row "Definition", 2nd column, of Table 14 ("*system minutes interrupted*"). I find this unacceptable inconsistency in the AA4 proposal to be, at best, the unprofessional conduct and further justification for IEAust CPENG NER certification of Western Power's submissions to the public and Authority.

The proposed amendment of system minutes interrupted service standard for transmission reference services proposed by Western Power contradicts the purpose of this benchmark standard:

1. it removes from the measure outages of short durations (<0.1minute)
2. it removes from the measure outages of long durations (<1minute)
3. the target measure of performance is left unchanged (for year 30/6/2018) and insufficiently lowered for the reminder of the AA4 period.
4. the newly proposed formula ("load integration method") gives "better performance" for the same outage than the old formula. It is therefore biased against the customers.
5. It does so by reducing the nominator (via the load integration method, which reflects the shape of the daily load diagram), while retaining the same, artificially high denominator – the annual System Peak MW (which do not reflect the shape of the daily load diagram).
6. It excludes planned outages (by introducing qualifier "Unplanned customer outages"). This is unnecessary, because transmission systems are meshed.
7. The newly proposed load integration method is not transparent, in contrast to the old method, and cannot be independently calculated from the outage data publicly available.
8. The 1st bullet point exclusion item (planned interruptions) is unreasonable, because transmission systems are meshed. Its retention will remove incentive for Western Power to complete works efficiently. This exclusion provides disincentive for Western Power to efficiently conduct own works.
9. The 2nd bullet point exclusion item (interruptions of less than one minute duration) is unreasonable and should be removed.

10. The 2nd bullet point exclusion item in the body of the Table 13 is also inconsistent with the heading of Table 13, which reads “interruptions of less than 0.1 minute duration”. This difference has enormous cost implications, in my opinion, if one designs the power system for different target performance measures.
11. Removal of these exclusions, in the body of the Table 13 and in the heading of Table 13, will provide incentive for Western Power to efficiently conduct own works and demonstrate the degree of its efficiency, as well as efficiency of the past investments.
12. The 3rd bullet point exclusion item (unregulated transmission assets) is unreasonable. It removes incentive to Western Power to complete works efficiently and not to interrupt supply to transmission customers. Removal of this exclusion will provide incentive for Western Power to efficiently conduct own business.

If adopted, Western Power’s proposal would considerably lower the service standard without any reduction of the cost of electricity to consumers. In order words, customers should not be receiving substandard service if they subscribed for the standard service.

I support Western Power’s intention is to better describe the impact of the particular outage upon the power system and propose the following better alternative, that overcomes deficiencies of the proposal discussed here.

I, therefore, propose the denominator to be the “System MW Load at the Time of the Interruption”.

My rationale is that the same (MW curtailed) interruption will have greater (relative) impact on the power system if it occurs during the periods of low or medium loads than if it occurs during the periods of the peak load.
It can be calculated from the outage data available at the time of interruption, hence it overcomes the transparency concern No. 7 here.
In addition, it does not require, often time consuming, search through the historical load data base, and is therefore a more efficient procedure than the Western Power proposed formula for the “load integration method”.

Given that the transmission system interruptions are of relatively short durations, during which the system load is stable, the marginal potential benefit the load integration method (over the old formula used in AA3) provides is negligible and does not justify the loss of transparency.

My proposal to use the old formula used in AA3 (and probably in AA2 and AA1) and change the denominator to that of the “System Load in MW at the Time of the Interruption” (instead of the annual peak SWIS System Load in MW), if adopted, provides additional information on the relative impact of each interruption at the time of that interruption.

In conclusion:

Table 13, row exclusions, should be amended by deleting four exclusions (1st, 2nd, 3rd and 4th), and
Table 13, row definitions, should be amended as follows:

- Delete two bullet points above the formula.
- Delete the newly proposed formula
- Amend the denominator in the old formula for calculation of the system minutes:

$$\frac{\Sigma\, MW\ of\ Unserved\ Energy}{System\ Peak\ Load\ in\ MW\ at\ the\ Time\ of\ Interruption}\ (in\ minutes)$$

- Delete all four bulet points below the formula.

- Insert one bullet point: “Period of the interruption starts when the loss of supply occurs and ends when Western Power restores supply to the last customer who lost the supply”

4.3.5 System minutes interrupted benchmark measure – Table 14

I suggest to put back the AA3 target performance (Table 13 in AA3, now deleted in AA4 proposal) and delete Table 14 (in AA4 proposal), as follows:

Loss of supply event frequency	For each year ending 30 June
Meshed	12.5
Radial	5.0

for the reasons explained in section *4.3.4 System minutes interrupted application* here.

4.3.5 Loss of supply event frequency

I strongly object effective removal of the Loss of Supply Event Frequency from the list of service standards for transmission reference services. It exists only in the name in the amended AA4 proposal and not in substance. The frequency is not measured minutes, as it is stated in the 1st column of Table 14 (“*system minutes interrupted*”).
I find this unacceptable inconsistency in the AA4 proposal to be, at best, the unprofessional conduct and further justification for a IEAust CPENG NER certification of Western Power’s submissions to the public and Authority (trickery at worst).

The proposed amendment of supply event frequency service standard for transmission reference services proposed by Western Power contradicts the purpose of benchmark standards:

1. It removes from the measure outages of short durations (<0.1minute). This is an unacceptable inconsistency with clause 4.3.4 (see my comment No.2:“*it removes from the measure outages of long durations (<1minute)*”.
2. The newly proposed measure gives “better performance”, for the same outage, than the old (AA3) measure. It is therefore biased against the customers.
3. The target for the financial year ending 30/6/2018 is unrealistically high, for the above reasons.
4. Transmission systems are of the meshed design and allow, by design, uninterrupted supply for credible contingencies. The proposed measure is inadequate for the transmission system.

If adopted, it would lower the service standard without any reduction of the cost of electricity to consumers.

I therefore suggest to delete the body of Table 14 and replace it with two separate measures for meshed and radial parts of the SWIN transmission system (aka Table 13 in AA3, which is deleted in AA4), as shown above.

4.3.6 Average outage duration application

The system average outage duration service standard for transmission reference services proposed by Western Power contradicts the purpose of benchmark standards for the transmission system.

Table 15, row definitions, considers only unplanned outages which is inadequate and unacceptable, as planned outages are not included in the proposed benchmark and biased against the customers.

The definition of the average outage duration service standard benchmark should be amended to include all outages (not only unplanned outages), regardless if these are planned or not, for the same or similar reasons explained in section *4.3.2 Circuit availability application* here.

Table 15, row definition, it is noted that the denominator of the formula is the "Number of events", which includes all events regardless of "*whether or not the loss of supply occurred*". If the loss of supply did not occur, then the outage or interruption has zero duration. I support this definition.

That definition supports my argument in this submission that outages and interruptions of all durations (or regardless of the magnitude of its duration) should be included in the transmission and distribution system benchmarks.

It is unfair to customers that Western Power proposed to inconsistently use the outages of short durations, only when it suits the interests of Western Power.

Table 15, row definition, should be amended by deleting eight exclusions: 1st, 3rd, 4th, 5th, 6th, 7th, 8th and 10th, for the reasons explained in section *4.3.2 Circuit availability application* here.

4.3.7 Average outage duration benchmark measure – Table 16

The proposed performance target is lowered by more than 50% (from 886 minutes to 1,333 minutes!?) for the part of the AA4 period after 30 June 2018. This is not acceptable, for the same reasons explained in section 4.2.3 *SAIDI Application* and in section 4.2.4 *SAIDI Benchmark Measure - Table 6* here.

If adopted, Western Power's proposal would considerably lower the service standard without any reduction of the cost of electricity to consumers. In order words, customers should not be receiving substandard service if they subscribed for the standard service.