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Dr Peter J Boxall AO, Chair
Electricity Transmission Reliability Compliance
Independent Pricing and Regulatory Tribunal
PO Box K35
Haymarket Post Shop NSW 1240

Submitted by online form

Dear Dr Boxall,

TransGrid welcomes the opportunity to respond to the Electricity Transmission Reliability Compliance Draft Report – August 2017 (the report) published by the Independent Pricing and Regulatory Tribunal (IPART) as part of its consultation process in assessing compliance to the Electricity Transmission Reliability and Performance Standard (the standard), adopted by the Minister for Industry, Resources and Energy on 1 June 2017.

TransGrid is the operator and manager of the high voltage transmission network connecting electricity generators, distributors and major end users in New South Wales and the Australian Capital Territory. TransGrid's network is also interconnected to Queensland and Victoria, and is central to interstate energy trading.

Proposed compliance methodology

TransGrid seeks to clarify the methodology, including required actions to be completed, that will be used to assess compliance of individual bulk supply points (BSPs) to the standard.

BSPs forecast to not meet the expected unserved energy allowance prior to 1 July 2018

TransGrid generally supports the flexibility in planning for the level of expected unserved energy identified in the standard[1]. TransGrid recommends the following detailed process be adopted to manage BSPs that are forecast to not meet the expected unserved energy (EUE) allowance prior to 1 July 2018. Further, this process is to be successfully completed well in advance of 1 July 2018, to assure TransGrid that it will be compliant to the standard at commencement.

- TransGrid will submit to IPART a plan Requesting Flexibility in Planning for the Level of Expected Unserved Energy for each BSP forecast to not meet the EUE allowance prior to 1 July 2018, in accordance with the standard, clause 6(a). This plan will include:

[1] NSW Electricity Transmission Reliability and Performance Standard 2017, clause 6.

- The calculated EUE.
- A cost-benefit analysis detailing the RIT-T [2] requirements comprising an identified need, credible options, costs, and methodology and evaluation to determine the preferred option. Standard TransGrid business cases will be provided as attachments to underpin this cost-benefit analysis.

- The Tribunal, upon satisfaction of the above plan, will advise TransGrid in writing of its satisfaction and compliance to the standard.

BSPs forecast to not meet the level of redundancy and/or expected unserved energy allowance on or after 1 July 2018

TransGrid recommends the same approach be adopted to manage BSPs forecast to not meet the level of redundancy and/or EUE allowance on or after 1 July 2018, as that used for BSPs forecast to not meet the EUE allowance prior to 1 July 2018.

Similarly, timely completion of the process is essential to assure TransGrid that it remains compliant to the standard.

Requirement to provide information to the Tribunal

TransGrid supports the requirement to inform IPART of any new BSPs intended to form part of the transmission system. TransGrid recommends the standard, clause 7(d), 'at least 90 days before entering into any contract for the construction of a new bulk supply point', specifically refer to 90 days before entering into any contract for the civil and electrical construction works of the new BSP. Clause 7(d) should explicitly not refer to entering into any contracts for long lead time items, such as high voltage electrical plant.

Expected unserved energy calculation methodology and input metrics

TransGrid supports the broad calculation methodology and input metrics, for determining EUE. TransGrid recommends the following clarifications to the EUE calculation methodology equations be included within the Reporting Manual, but not be published on IPART's website. TransGrid recommends that calculation of EUE will be determined using these equations, where:

- Li is the forecast load at any point in time based on historical loads, scaled to the ratio of forecast peak demand / historical peak demand.
- Ci is the supply capacity of the BSP at any point in time, under each asset failure scenario.
- T is the demand sampling duration of 0.5 hours. This corresponds to the 0.5 hour sampling duration from AEMO's Operations and Planning Data Management System (OPDMS).
- N is the number of demand values sampled during 1 year.
- FR is the failure rate, the expected average number of failures per year per transformer (non-catastrophic only) or line.
- TTR is the mean time to restore the electricity service following an asset failure.

[2] Regulatory investment test for transmission application guidelines, June 2010

Box 2.1 Calculating annual EUE

For the asset failure scenario, where a single line fails:

$$\text{EUE (1 line fails)} = \sum_1^N \max\{0, (Li - Ci)\} * T) * \left(\frac{\text{FR 1st line} * \text{TTR 1st line}}{8760}\right)$$

$$= \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760} * (\text{FR 1st line} * \text{TTR 1st line})$$

= L * FR 1st line * TTR 1st line

This is equivalent to equation (3). Also,

$$L = \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760}$$

$$= \text{Peak Demand (MW)} * \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760 * \text{Peak Demand (MW)}}$$

= peak demand (MW) * F(single line failure)

This is equivalent to equation (7).

For the asset failure scenario, where two lines fail:

$$\text{EUE (2 lines fail)} = (\sum_1^N \max\{0, (Li - Ci)\} * T) * \left(\frac{\text{FR 1st line} * \text{TTR 1st line}}{8760}\right) * \left(\frac{\text{FR 2nd line} * \text{TTR 2nd line}}{8760}\right)$$

$$= \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760} * (\text{FR 1st line} * \text{TTR 1st line}) * \left(\frac{\text{FR 2nd line} * \text{TTR 2nd line}}{8760}\right)$$

= M * FR 1st line * FR 2nd line * TTR 1st line * TTR 2nd line / 8760

This is equivalent to equation (4). Also,

$$M = \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760}$$

$$= \text{Peak Demand (MW)} * \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760 * \text{Peak Demand (MW)}}$$

= peak demand (MW) * F(double line failure)

This is equivalent to equation (8).

For the asset failure scenario, where a single transformer fails:

$$\text{EUE (1 tx fails)} = \sum_1^N \max\{0, (Li - Ci)\} * T) * \left(\frac{\text{FR 1st tx} * \text{TTR 1st tx}}{8760}\right)$$

$$= \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760} * (\text{FR 1st tx} * \text{TTR 1st tx})$$

= N * FR 1st tx * TTR 1st tx

This is equivalent to equation (5). Also,

$$N = \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760}$$

$$= \text{Peak Demand (MW)} * \frac{(\sum_1^N \max\{0,(Li-Ci)\}*T)}{8760 * \text{Peak Demand (MW)}}$$

= peak demand (MW) * F(single tx failure)

This is equivalent to equation (9).

For the asset failure scenario, where two transformers fail:

$$\text{EUE (2 tx fail)} = \left(\sum_1^N \max\{0, (Li - Ci)\} * T\right) * \left(\frac{\text{FR 1st tx} * \text{TTR 1st tx}}{8760}\right) * \left(\frac{\text{FR 2nd tx} * \text{TTR 2nd tx}}{8760}\right)$$

$$= \frac{\left(\sum_1^N \max\{0,(Li-Ci)\}*T\right)}{8760} * (\text{FR 1st tx} * \text{TTR 1st tx}) * \left(\frac{\text{FR 2nd tx} * \text{TTR 2nd tx}}{8760}\right)$$

= O * FR 1st tx * FR 2nd tx * TTR 1st tx * TTR 2nd tx / 8760

This is equivalent to equation (6). Also,

$$O = \frac{\left(\sum_1^N \max\{0,(Li-Ci)\}*T\right)}{8760}$$

$$= \text{Peak Demand (MW)} * \frac{\left(\sum_1^N \max\{0,(Li-Ci)\}*T\right)}{8760 * \text{Peak Demand (MW)}}$$

= peak demand (MW) * F(double tx failure)

This is equivalent to equation (10).

Peak demand (MW)

TransGrid recommends that the latest maximum demand forecasts published before the start of the financial year being assessed be used as the demand input for each annual compliance report. For example, the 2018 forecasts, published by 30 June 2018, will be used as an input for the 2018/19 annual compliance report, due 31 August 2019.

Use of more granular load duration curves

TransGrid supports IPART's decision to accept the proposal that more granular load duration curves be used for assessing compliance with the allowable EUE, as noted in section 2.1.2 of the report. TransGrid recommends that IPART update the last paragraph in Box 2.1 Calculating annual EUE, to include the use of more granular load duration curves, and remove the reference to a 'look-up to a logistic curve expressing the Load Duration information for the BSP'.

For new BSPs, TransGrid proposes the use of a load duration curve from another BSP with a similar composition of load types scaled to the forecast maximum demand, in the absence of specific historical information for a new BSP,

Lifecycle average failure rate

TransGrid supports IPART's decision to maintain the use of lifecycle average failure rates for assessing compliance with the EUE requirements of the standard.

For the avoidance of any doubt, TransGrid supports the inclusion of Table 3.1 Asset failure frequency rates, from the Transmission reliability standard compliance Issues Paper – June 2017, as the lifecycle average failure rates to be used in assessing compliance with the EUE requirements of the standard. The exception is Asset type, Underground cables (failures per year per 100km) which should be 0.0595, and not 0.00595.

Exclusion of semi-forced outages

TransGrid supports IPARTs proposal to exclude semi-forced outages from contributing to the calculation of EUE. TransGrid understands that the description 'IPART will continue to consult with relevant stakeholders regarding the impact of semi-forced outages for the purpose of future reviews of allowable EUE', as noted in section 2.1.4 of the report, is associated with potential future revisions to the standard, and not for compliance purposes.

Third party agreements

TransGrid supports the requirement to provide joint planning minutes to underpin compliance assessments where Distribution Network Service Provider (DNSP) assets are used to provide backup supplies to the transmission system. TransGrid recommends that accepted joint planning meeting minutes include:

- For the level of redundancy assessment, confirmation of the continuation, for the foreseeable future, of the network arrangement. For example, at a BSP if there were no proposed changes to the DNSP network, then the level of redundancy would remain the same.
- For the assessment of annual expected unserved energy, confirmation of the DNSP backup supply switching times (which are an input to the EUE calculation).

Reporting obligations

TransGrid supports the publication of Box 2.1 on the IPART website. However the EUE calculation methodology equations and lifecycle average failure rates should be excluded from the IPART website and included in the reporting manual.

TransGrid supports the requirement for an annual compliance report to be submitted to IPART each year. TransGrid recommends that the annual compliance report is a self-assessment, and does not require an independent annual audit[3] prior to submission to IPART. Further, TransGrid recommends that the independent audit is only required where IPART have initiated an audit separate to the annual compliance report process.

Information regarding compliance with clause 4 of the Standard – expected unserved energy

TransGrid does not support the requirement to report the numerical values of all the inputs noted in the report[4]. The majority of these inputs are derived within IPART's optimisation model and the associated numerical values were not sourced from TransGrid. TransGrid recommends the provision of numerical values for the following inputs only:

- Failures per transformer per annum.
- Failures per annum per 100km overhead line.
- Failures per annum per 100km underground cable.
- Mean hours to replace / repair transformer.
- Mean hours to repair overhead line.
- Mean hours to repair cable.
- Relevant network / circuit diagrams.

TransGrid does not support the requirement to annually report on the numerical values of these inputs. The numerical values may be volatile year on year and would provide little benefit as the longer term average view is of importance. TransGrid proposes submission of

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[3] Electricity Transmission Reliability Compliance Draft Report – August 2017, section 4.1, page 12.

[4] Electricity Transmission Reliability Compliance Draft Report – August 2017, Appendix B, draft reporting manual, section 1.1.2, page 2.

this data when IPART revises the standard in advance of each regulatory control period, normally every five years, as noted in TransGrid's consultation response to the Transmission reliability standard compliance Issues Paper – June 2017.

Ongoing engagement with IPART and other stakeholders

TransGrid looks forward to continuing engagement with IPART and other stakeholders to finalise this important review. TransGrid also acknowledges that further detailed engagement with all parties will be particularly important as TransGrid looks to implement the standard as part of its planning, reporting and compliance processes.

If you would like to discuss any matter raised in this submission, please contact Vincent Ong on [redacted]

Yours faithfully

[redacted]

Andrew Kingsmill
Manager / Network Planning