Quality Performance Measures

Overarching quality performance requirements

By close of business on 14 February 2010, Transpower must for each quality measure:

a) Provide:

   i. A description of the measure; and

   ii. Key definitions; and

b) Identify:

   i. All relevant documents that were taken into account in preparing the target, cap and collar;

   ii. All relevant assumptions; and

   iii. Any material change and the effect on the forecast performance; and

c) Explain:

   i. All material departures from the policies included as relevant documents;

   ii. The methodology used to generate the parameters including but not limited to details regarding:

      1. Any relevant performance benchmarking undertaken by or for Transpower;

      2. Internal historical performance trends relied upon;

      3. Any material changes from historical performance in any performance component included in the parameters and its effect on the performance forecast

      4. Any contingency factors provided for within the quality performance parameter forecast, including how they were calculated and what uncertainties they allow for.

   iii. For each key assumption identified explain how the assumption has been applied and its effect on the performance parameters.

Draft Response to Proposed Specification

Transpower performance is to be monitored against 4 quality measures during RCP1.

1. Total extent of interruptions – total system minutes
2. Loss of supply event frequency – number of events > 0.05 system minutes
3. Loss of supply event frequency – number of events > 1 system minute
4. HVAC circuit unavailability (unplanned) %

HVDC bipole unavailability (unplanned) % will be included in later revenue control periods.

Weighting will also be proposed for each individual measure. These weightings will determine the percentage of the revenue at risk which is governed by each measure.

At the end of each financial year Transpower will prepare a summary of performance for that year. This will be accompanied by a comparison to the target, cap and collar for the measure and an explanation of any events that contributed to a significant variation from the target performance in that year.

Total extent of interruptions – total system minutes

Description of Measure

System minutes is a normalised measure of the impact on end consumers of interruptions to the supply of electricity. This measure of total system minutes includes both planned (24 hours or more notice) and unplanned (less than 24 hours or no notice) interruptions.

System Minutes are calculated as the best estimate of the MW-minutes of supply that would have been provided if the interruption had not occurred divided by the system peak load in MW for the reporting year during which the event occurred. Dividing by the system peak load means that this measure has been normalised to account for system growth.

Key Definitions

Primary definitions used for this reporting are as set out in Transpower policy TP.GG 10.08 "Interruption to connection performance reporting policy". An overall summary of definitions has been included in Appendix A to this document.

In summary, this measure includes:

- All unplanned and planned Interruption to Supply Events originating in the Transpower system of one minute or longer duration including:
    - Those involving outages or incorrect operation of Transpower equipment
        - including unplanned interruptions originating in the Transpower system but as a result of an outside party, i.e. the "general public" or their equipment, acting on, or interfering with, the Transpower system
        - except if the event involved only the wholly correct operation of boundary equipment for faults in the Transpower Customer system this is not considered to be an Interruption
    - Any Transpower caused contribution to Interruptions originating in a Transpower Customer system
    - Automatic Under-frequency Load-shedding (AUFLS) and Automatic Under-voltage Load-shedding (AUVLS) for Transpower caused events
    - Load restrictions resulting from unplanned events on the Transpower system where the energy cannot be made up later
- Force majeure events

In summary, this measure will exclude:

- All Interruptions to Connection to generator customers
- Any momentary Interruptions to Connection, i.e. those with a duration of less than one minute

- Any Interruptions to Connection originating on another party's system and where Transpower's system operated correctly

Relevant Documentation

Transpower will collect and process information on interruptions as set out in Transpower policy TP.GG 10.08 "Interruption to connection performance reporting policy".

Assumptions and Impact on Forecast Performance

Changes made to Transpower's manual reclose policy following the February 2009 Auckland conductor drop incident have resulted in longer interruption duration times in a number of circumstances because of the need to inspect transmission lines before returning circuits to service after a tripping. This has resulted in an increase in system minutes of interruption for these events.

The increase in equipment outages required to accommodate system upgrades and new build has increased the risk and also the consequences of interruptions because of:

- an increase in the number of human error events
- trippings that would normally have no impact on system performance resulting in interruptions because of reduced security while other plant is out of service

As a consequence, performance in the historical data used to set the parameters is not an completely adequate model for expected future performance.

Departures from relevant policies

All data has been prepared as set out in the relevant policy.

Methodology

Transpower will calculate the target for this measure as the average performance over the 5 financial year period immediately preceding the date for submission of parameters for the next regulatory control period. (For years 2 to 4 of RCP1 this will be the 5 years 2005/06 to 2009/10.)

Caps and collars will be set symmetrically at 2 standard deviations from this target, unless this results in unrealistic outcome, e.g. a cap of zero system minutes. In this case the caps and collars will be set at 1 standard deviation from the target. If this still results in an unrealistic outcome the underlying data may be capped at an agreed value or a period of historical data longer than 5 years used.

In future as performance improves asymmetric caps and collars may be proposed.

Proposed targets, caps and collars may be modified if the historical period is not a good representation of expected future performance, e.g. changes in legislation (such as environmental or health and safety) or rules (such as operational requirements under Part C of the Electricity Governance Rules), aging assets (requiring additional maintenance and/or displaying increasing failures), system growth, increasing planned outages and risk of unplanned outages as a result in increases in capital (replacement and new build) work, or other changes in equipment or operating practices.

Proposed targets, caps and collars for years 2 to 4 of RCP1 have been modified to take account of the 2 factors included in the assumptions set out above.

Actual performance will be calculated as set out in Transpower policy TP.GG 10.08 "Interruption to connection performance reporting policy" and the methodology set out here..

Application of Key Assumptions

To be developed

Loss of supply event frequency – number of events > 0.05 system minutes
Loss of supply event frequency – number of events > 1 system minute

Description of Measure

These are measures of the number / frequency of unplanned interruption events which are greater than 2 pre-set system minute thresholds. They are intended to capture the number of:

a) small to medium system minute events
b) high system minute events

originating in the Transpower system and affecting off-take customers. Related individual interruptions are summed to determine the total system minute impact of the event.

The system minute thresholds have been selected based on historical performance.

System minutes is a normalised measure of the impact on end consumers of interruptions to the supply of electricity. This measure of total system minutes includes both planned (24 hours or more notice) and unplanned (less than 24 hours or no notice) interruptions.

System Minutes are calculated as the best estimate of the MW-minutes of supply that would have been provided if the interruption had not occurred divided by the system peak load in MW for the reporting year during which the event occurred. Dividing by the system peak load means that this measure has been normalised to account for system growth.

Key Definitions

Primary definitions used for this reporting are as set out in Transpower policy TP.GG 10.08 "Interruption to connection performance reporting policy". An overall summary of definitions has been included in Appendix A to this document.

In summary, these measures include:

- All unplanned Interruption to Supply Events originating in the Transpower system of one minute or longer duration including:
    - Those involving outages or incorrect operation of Transpower equipment
        - including unplanned interruptions originating in the Transpower system but as a result of an outside party, i.e. the "general public" or their equipment, acting on, or interfering with, the Transpower system
        - except if the event involved only the wholly correct operation of boundary equipment for faults in the Transpower Customer system this is not considered to be an Interruption
    - Any Transpower caused contribution to Interruptions originating in a Transpower Customer system
    - Automatic Under-frequency Load-shedding (AUFLS) and Automatic Under-voltage Load-shedding (AUVLS) for Transpower caused events
    - Load restrictions resulting from unplanned events on the Transpower system where the energy cannot be made up later

- Force majeure events

For the purposes of this measure, individual interruptions will be grouped into interruption events using the criteria summarised in the Definitions section above and set out in detail in the Interruptions coding manual.

Also, events included in the count of events that exceed the upper system minute threshold are also included in the count of events that exceed the lower system minute threshold.

In summary, this measure will exclude:

- All planned Interruptions to Connection
- All Interruptions to Connection to generator customers
- Any momentary Interruptions to Connection, i.e. those with a duration of less than one minute
- Any Interruptions to Connection originating on another party's system and where Transpower's system operated correctly

Relevant Documentation

Transpower will collect and process information on interruptions as set out in Transpower policy TP.GG 10.08 "Interruption to connection performance reporting policy".

Assumptions and Impact on Forecast Performance

Changes made to Transpower's manual reclose policy following the February 2009 Auckland conductor drop incident have resulted in longer interruption duration times in a number of circumstances because of the need to inspect transmission lines before returning circuits to service after a tripping. This has resulted in a number of events which previously would have been under the 0.05 system minute (and potentially the 1 system minute) threshold now breaching this threshold.

The increase in equipment outages required to accommodate system upgrades and new build has increased the risk and also the consequences of interruptions because of:

- an increase in the number of human error events
- trippings that would normally have no impact on system performance resulting in interruptions because of reduced security while other plant is out of service

As a consequence, performance in the historical data used to set the parameters is not an completely adequate model for expected future performance.

Departures from relevant policies

All data has been prepared as set out in the relevant policy.

Methodology

Transpower will calculate the target for this measure as the average performance over the 5 financial year period immediately preceding the date for submission of parameters for the next regulatory control period. (For years 2 to 4 of RCP1 this will be the 5 years 2005/06 to 2009/10.)

Caps and collars will be set at 2 standard deviations from this target, unless this results in unrealistic outcome, e.g. a cap of zero system minutes. In this case the caps and collars will be set at 1 standard deviation from the target.

In future as performance improves:

- the 0.05 and 1 system minute thresholds may be revised
- asymmetric caps and collars may be proposed

After calculating all 3 parameters, the target, cap and collar will be set at the nearest whole number.

Proposed targets, caps and collars may be modified if the historical period is not a good representation of expected future performance, e.g. changes in legislation (such as environmental or health and safety) or rules (such as operational requirements under Part C of the Electricity Governance Rules), aging assets (requiring additional maintenance and/or displaying increasing failures), system growth, increasing planned outages and risk of unplanned outages as a result in increases in capital (replacement and new build) work, or other changes in equipment or operating practices.

Proposed targets, caps and collars for years 2 to 4 of RCP1 have been modified to take account of the 2 factors included in the assumptions set out above.

Actual performance against the 0.05 and 1 system minute thresholds will be based on system minutes calculated as set out in Transpower policy TP.GG 10.08 “Interruption to connection performance reporting policy” and the methodology set out here.

Application of Key Assumptions

To be developed

HVAC circuit unavailability (unplanned) %

Description of Measure

HVAC Transmission Circuit unplanned unavailability is the percentage of time that, averaged over all transmission circuits, these circuits were unavailable as a result on unplanned outages. An unplanned outage is were equipment is out of service as a result of that equipment being automatically or urgently removed from service with less than 24 hours notice or no notice at all.

Unavailability is normalised by the numbers of circuits on the system, however it does not take into account circuit length which can have an impact on numbers and durations of outages.

Key Definitions

Primary definitions used for this reporting are as set out in Transpower policy TP.GG 10.09 "Availability and unavailability recording and reporting policy". An overall summary of definitions has been included in Appendix A to this document.

In summary the HVAC Circuit Unavailability (Unplanned);

- Is based on duration of unplanned outages of transmission circuits
- Includes all unplanned circuit outages originating on the Transpower system
    - Unplanned outage defined as fault trippings and forced outages within 24 hours of discovering the problem requiring the outage
- Caps unplanned outage durations at 7 days to avoid very long duration outages skewing the results
    - These outages are removed from historical data used to calculate the target, cap and collar also.
    - This actually results in a lower target and a narrower cap/collar band
- For outages spanning 2 financial years, splits the durations over these 2 years and counts in year in which they occur
- Will be expressed as a percentage taking into account:
    - The possible available duration for the year
    - The number of circuits at start of reporting year
- Includes:
    - Force Majeure
    - Forced Outages caused by third parties such as general public
- Excludes
    - Momentary outages (<1 minute duration)
    - Outages at request of, or caused by, customer
    - All planned outages
    - Correct operation of boundary equipment
    - HVDC outages

Relevant Documentation

Transpower will collect and process information on interruptions as set out in Transpower policy TP.GG 10.09 "Availability and unavailability recording and reporting policy".

Assumptions and Impact on Forecast Performance

Changes made to Transpower's manual reclose policy following the February 2009 Auckland conductor drop incident have resulted in longer outage duration times in many cases because of the need to inspect transmission lines before returning circuits to service after a tripping. This has resulted in an increase in unplanned unavailability as a consequence of these events.

The increase in equipment outages required to accommodate system upgrades and new build has increased the risk of unplanned outages because of an expected increase in the number of human error events

As a consequence, performance in the historical data used to set the parameters is not a completely adequate model for expected future performance.

Departures from relevant policies

All data has been prepared as set out in the relevant policy. However as allowed for in the policy for this particular measure reporting:

- is based on unplanned outages only
- has a limit of 7 days on the duration of outages included in the calculation
- excludes outages required by the System Operator to meet their obligations under Part C of the Electricity Governance Rules

Methodology

Transpower will calculate the target for this measure as the average performance over the 5 financial year period immediately preceding the date for submission of parameters for the next regulatory control period. (For years 2 to 4 of RCP1 this will be the 5 years 2005/06 to 2009/10.)

Outages included in this measure will be limited to a maximum of 7 days to avoid infrequent but exceedingly long outages skewing the data.

Caps and collars will be set at 2 standard deviations from this target, unless this results in unrealistic outcome, e.g. a cap of greater than 100%. In this case the caps and collars will be set at 1 standard deviation from the target.

In future as performance improves asymmetric caps and collars may be proposed.

Proposed targets, caps and collars may be modified if the historical period is not a good representation of expected future performance, e.g. changes in legislation (such as environmental or health and safety) or rules (such as operational requirements under Part C of the Electricity Governance Rules), aging assets (requiring additional maintenance and/or displaying increasing failures), system growth, increasing planned outages and risk of unplanned outages as a result in increases in capital (replacement and new build) work, or other changes in equipment or operating practices.

Proposed targets, caps and collars for years 2 to 4 of RCP1 have been modified to take account of the assumptions set out above.

Actual performance will be calculated as set out in Transpower policy TP.GG 10.09 "Availability and unavailability recording and reporting policy" and the methodology set out here.

Application of Key Assumptions

To be developed

Appendix A Defined Terms for Quality Performance Measures

Target – The level of performance that results in Transpower receiving neither a financial penalty nor a financial reward for any year in the regulatory period.

Cap – The level of performance that results in Transpower receiving the maximum financial reward for the performance measure in question.

Collar – The level of performance that results in Transpower receiving the maximum financial penalty for the performance measure in question.

Weightings – The proportion of the financial incentive under the Quality Measure Scheme allocated to each of the performance measures applying to Transpower as part of this scheme.

Year – The period from 1 July of a given calendar year to 30 June of the following calendar year.

Duration Limit – A value which is substituted for the actual value in the data to avoid outlying data skewing results when calculating actual performance as well as setting targets, caps and collars.

Availability – Means the percentage of time that an asset (or group of assets) is In-Service during a chosen period, usually a year. It is calculated as

100% - Unavailability %

Note: for these calculations In-Service is used as a proxy for "available for service", refer to definition of In-Service.

Unavailability – Means the percentage of time that an asset (or group of assets) was Out-of-Service during a chosen period, usually a (financial) year.

For example, for HVAC Circuit Unavailability this is calculated as:

$$\frac{\text{Total number of minutes (or hours) any Circuits were Out-of-Service in period} * 100}{\text{(Total number of minutes (or hours) in period * Total number of Circuits at start of year)}}$$

Note: for these calculations Out-of-Service is used as a proxy for "unavailable for service", refer to definition of Out-of-Service.

Planned Outage* - Means equipment is Out-of-Service as a result of the equipment being deliberately Removed-from-Service at a selected time with at least 24 hours notice. This may be scheduled for maintenance purposes or for other planned work or an outage arranged to start more than 24 hours after a defect or failure was found . Planned Outages may also be referred to as "Scheduled Outages".

Unplanned Outage* - Means equipment is Out-of-Service as a result of an item of equipment being automatically or urgently Removed-from-Service with less than 24 hours notice or no notice at all. This may be the result of the operation of protection devices to immediately remove an item from service or when manually switching operations are performed, and includes outages caused by improper operation or human error . Unplanned Outages may also be referred to as Forced Outage.

Note: The definitions of "Planned Outage" and "Unplanned Outage" in the Electricity Governance Rules 2003, Part A, Interpretation, is, for the purposes of Part F, respectively:

a) an outage carried out in accordance with the planning requirements set out in the Outage Protocol.
b) an outage not planned in accordance with the planning requirements set out in the Outage Protocol.

However Section 10.2.1 of the Outage Protocol specifies that, for the purposes of service levels and reporting under the Benchmark Agreement and the Electricity Governance Rules 2003, Transpower will still use the 24 hours notification rule to determine whether outages are planned or unplanned.

Momentary Outage – Means equipment is Out-of-Service for a period of less than 1 minute.

Outage – When interconnection assets or connection assets are temporarily not provided in accordance with the requirements of a transmission agreement or the requirements of section VI. Without limiting the above, and the outage includes a situation where:
(a) Transpower removes assets from service temporarily;
(b) Assets are not able to be provided due to grid emergencies, in order to deal with health and safety issues, or due to circumstances beyond Transpower's reasonable control;
(c) Transpower reduces the capacity of branches below the capacity required by a transmission agreement or rule 3 of section VI;
(d) Transpower changes the configuration of the grid. (TP.OG 45.03)

Circuit (transmission) - A set of conductors (normally three) plus associated hardware and insulation on a Transmission Line, which together form a single electrical connection between two or more stations and which when faulted is removed automatically from the system (by circuit-breakers) as a single entity. (Transpower Glossary)

In-Service – The formal definition used in the coding manuals is "Describes the state of an item when it is performing its required function; for example a Transformer or Transmission Circuit that is connected at each end."

In practice, In-Service is used as a proxy for "available for service" and it is assumed that if an item of plant, with the exception of reactive compensation plant , is not connected at each end it is unavailable – i.e. it is not performing its function of conducting power. In line with this practice, if a circuit is switched out for operational reasons it is treated as no longer In-Service, i.e. as Out-of-Service.

In general most items of transmission system plant are always in service unless removed because of a fault or for planned work. Any delays in returning plant to service for operational reasons, e.g. periods of time when the plant could have been put into service but was not because the System Operator did not require it, are considered to be of sufficiently short duration to be immaterial in comparison to outages for planned work and faults.

Out-of-Service - The formal definition used in the coding manuals is "Describes the state of an item when it is not performing its required function; for example a Transformer or Transmission Circuit not connected at each end."

In practice, Out-of-Service is used as a proxy for "unavailable for service" and it is assumed that an item of plant, with the exception of reactive compensation plant3, is unavailable if it is not connected at each end – i.e. it is not performing its function of conducting power. In line

with this practice, Circuits switched out for operational reasons are also considered to be Out-of-Service.

Removed-from-Service – equipment isolated to the extent that it ceases to perform its designated function. (TP.OG 45.03) Refer Out-of-Service as defined in this document also.

Reclose Block (RCB) - An A statement made by the RCB issuer to a recipient that equipment which livens specified equipment/ transmission circuit under live access will not be operated either automatically or manually. (TP.OG 45.03)

Removed-from-Service – equipment isolated to the extent that it ceases to perform its designated function. (TP.OG 45.03) Refer Out-of-Service as defined in this document also.

Interruption: In relation to the supply of electricity to an electricity consumer by means of a prescribed voltage electric line, means the cessation of supply of electricity to that electricity consumer for a period of 1 minute or longer, other than by reason of disconnection of that electricity consumer for breach of the contract under which the electricity is supplied.

(Commerce Commission Electricity Information Disclosure Requirements issued 31 March 2004 (Consolidating all amendments to 1 April 2007)).

> *Note: Transpower includes unserved energy as a result of the operation of automatic under frequency or automatic under voltage load shedding, even if initiated by relays installed in a Transpower customer's system, as part of System Minutes of Interruptions to confirm to historical practices, although the above definition could be interpreted to exclude such occurrences.*
>
> *Note: The definition of "Interruption" in the Electricity Governance Rules 2003, Part A, Interpretation, does not contain any reference to the duration of the Interruption. However, Transpower records both "Interruptions" and "Momentary Interruptions". Also, reporting under the Benchmark Agreement and the Electricity Governance Rules 2003 requires separate reporting for Interruptions to Connection of one minute or greater and Interruptions to Connection of less than one minute. Therefore, continued use of the historical definitions of "Interruption" and "Momentary Interruption" does not create any conflict with the reporting now required under the Electricity Governance Rules 2003, Part A which uses an alternative definition for "Interruption".*

Interruption Duration: For reporting purposes only, this is the duration in minutes from the start of the Interruption to Connection to a Transpower Customer until:

- for a Supply Customer the first restoration of load or the backfeed of the first block of load or until an offer of restoration is made and rejected as described in clause 5.3.1 (b),

- for a Generator Customer connection is restored or offered, i.e. the Transpower system can again accept power being injected.

Note: This is not necessarily the duration used for calculating Unserved Energy or System Minutes as portions of load may be restored over a, sometimes considerable, period of time so a number of "Interruption Durations" may be applicable for that calculation.

Planned Interruption*: Means any Interruption in respect of which not less than 24 hours notice was given, either to the public or to all electricity consumers affected by the Interruption.

(Commerce Commission Electricity Information Disclosure Requirements issued 31 March 2004 (Consolidating all amendments to 1 April 2007)).

Unplanned Interruption*: Means any Interruption in respect of which less than 24 hours notice, or no notice, was given, either to the public or to all electricity consumers affected by the Interruption.

(Commerce Commission Electricity Information Disclosure Requirements issued 31 March 2004 (Consolidating all amendments to 1 April 2007)).

**Note: The definitions of "Planned Interruption" and "Unplanned Interruption" in the Electricity Governance Rules 2003, Part A, Interpretation, refer to respectively*

a) *a Planned Outage – which, for the purposes of Part F, means an outage carried out in accordance with the planning requirements set out in the Outage Protocol.*
b) *an Unplanned Outage – which, for the purposes of Part F, means an outage not planned in accordance with the planning requirements set out in the Outage Protocol.*

However Section 10.2.1 of the Outage Protocol specifies that, for the purposes of service levels and reporting under the Benchmark Agreement and the Electricity Governance Rules 2003, Transpower will still use the 24 hours notification rule to determine whether outages (and therefore Interruptions to Connection) are planned or unplanned.

Momentary interruption: Means an Interruption for a period of less than 1 minute

Transpower Service Point (TSP): Means each individual combination of "site and customer and voltage" that does not receive supply as a result of an incident causing an interruption or interruptions.

System Minute(s): Means the number calculated in accordance with the following formula:

a/b where:

a is Energy Not Supplied (in megawatt minutes); and
b is System Maximum Demand.

(Commerce Commission Electricity Information Disclosure Requirements issued 31 March 2004 (Consolidating all amendments to 1 April 2007)).

Energy Not Supplied:** In relation to the transmission system, means the amount calculated by subtracting energy supplied from the amount that represents the best estimate of the amount of electricity that would have been supplied to electricity consumers from the system if there had been no Interruptions.

(Commerce Commission Electricity Information Disclosure Requirements issued 31 March 2004 (Consolidating all amendments to 1 April 2007)).

System Maximum Demand: In relation to the transmission system, means the single highest half-hourly input (in megawatts) to that system during a particular financial year.

(Commerce Commission Electricity Information Disclosure Requirements issued 31 March 2004 (Consolidating all amendments to 1 April 2007)).

Unserved Energy:** Transpower's best estimate, in MW-minutes, of the energy that would have been supplied to a Supply Customer if the Interruption to Connection had not occurred. Unserved Energy is calculated from an estimate of the MW not supplied over the duration of the Interruption to Connection and the duration in minutes of the Interruption to Connection. It takes into account changes in load over the duration of the Interruption, any staged restorations of loads, and also any load supplied from alternative sources. (Refer also to definitions for Estimated MW Interrupted and Interruption Duration.)

> *** Note: In this document, Energy Not Supplied and Unserved Energy are for all intents and purposes the same.*

Estimated MW Interrupted: For reporting purposes only, this is Transpower's best estimate of the effective MW that was not supplied during the Interruption.

> *Note: For short, simple Interruptions this is usually the MW at the start of the Interruption. However for longer or more complex Interruptions this number will reflect the overall impact of the Interruption. Further details are contained in the Transpower Interruption to Connection coding manual and supporting documentation.*

supply customer: A Transpower Customer whose Point of Connection to the Transpower Grid is a Transpower Grid Exit Point. A Supply Customer may be either an Electricity Distributor or a Direct Consumer.

generator customer: A Transpower Customer whose Point of Connection to the Transpower Grid is a Grid Injection Point.

Force Majeure: Based on definition in Electricity Governance Rules 2003 , Part F, Section II, Schedule F2 Benchmark Agreement, Part A2, Section 13.1, Force Majeure for the purposes of this policy, means an Interruption to Connection which is caused, or made more severe by:

a) Specific events or circumstances: Any event or circumstance occasioned by, or in consequence of, any act of God (being an event or circumstance (i) due to natural causes, directly or indirectly and exclusively without human intervention, and (ii) which could not reasonably have been foreseen or, if foreseen, could not reasonably have been resisted), strikes, lockouts, other industrial disturbances, acts of public enemy, wars, terrorism, blockades, insurrections, riots, epidemics or civil disturbances.

b) Court orders, etc: The binding order of any court, government, regulatory body or a local authority beyond the reasonable control of Transpower; or

c) Other event or circumstance: Any other event or circumstance beyond the control of Transpower,

and being such that, by taking reasonable precautions in accordance with Good Electricity Industry Practice, Transpower could not have avoided the effect of such an event or circumstance.