Tropical Cyclone Marcus

Natural Event Report:
Electricity Industry Performance Code

June 2018

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Introduction

On Saturday 17 March 2018, Cyclone Marcus impacted Darwin and has now been officially named as the most damaging storm since Cyclone Tracy devastated the city in 1974. Heavy rainfall, damaging winds in excess of 130km per hour and fallen trees caused major damage to Darwin's electricity network infrastructure. TC Marcus was rated as a category two cyclone.

Just over 28,500 electricity customers lost power, or 33 per cent of customers and more than 500 line spans went down. Around 11,000 customer were restored by Power and Water Corporation (PWC) within 24 hours, with 200 customers without power 11 days after the event.

The system load dropped from 170 MW to 100 MW over a period of one and a half hours. The majority of the power outages resulted from damage to the network caused by large falling trees. No generation assets were tripped offline during the cyclone, despite large fluctuations on the network.

The Northern Territory of Australia, Electricity Industry Performance Code (Standards of Service and Guaranteed Service Levels) (EIP) provides that where network providers (i.e. PWC) do not meet minimum performance standards they are to make Guaranteed Service Level (GSL) payments to impacted customers. The EIP Code also sets out annual reporting requirements for network providers.

Additionally, the EIP Code sets out certain exclusions from normal reporting and GSL payments, including natural events as classified by the US Institute of Electrical and Electronic Engineers' (IEEE) 2.5 Beta method. The Beta method is a statistical method to quantify events that are outside normal operational boundaries, and thus should be considered separately from normal (underlying) performance reporting.

That is, major events should be assessed separately, as including it in normal reporting will hide the underlying performance of the network and possibly result in poor operational and investment decisions.

This report sets out that TC Marcus meets the 2.5 Beta method criteria and therefore PWC is excluded from making GSL payments to impacted customers.

The Northern Territory Government made available a $250 and $400 Immediate Relief Payment for households that were without mains power for more than 72 hours.

About the Utilities Commission of the Northern Territory

The commission is an independent statutory authority responsible for the economic regulation of the electricity supply industry, which is governed by the *Utilities Commission Act*, the *Electricity Reform Act*, the *Water Supply and Sewerage Services Act*, the *Ports Management Act* and associated regulations.

Under the *Utilities Commission Act*, the commission has the power to make codes and rules if authorised to do so under a relevant industry Act or regulation. On 25 October 2017 the commission approved the EIP Code.

The EIP Code is available on the commission's website at:
http://www.utilicom.nt.gov.au/Publications/Pages/Codes-and-Guidelines.aspx

Discussion

EIP Code Requirements

Clause 5.4.1 of the EIP Code sets out that natural events are to be identified as a statistical outliner using the IEEE 2.5 Beta method. Clause 7.2 provides a list of exclusions from network reporting and GSL payments. Specifically, clause 7.2.3(f) allows natural events, as identified by the IEEE 2.5 Beta method to be excluded from normal network reporting and GSL payment schemes.

Clause 5.4.1 also requires the network provider to notify the commission of the potential for a natural event within 14 business days. PWC wrote to the commission on 29 March 2018, which is within this time frame.

Clause 5.4.2 requires the network provider to report to the commission within 30 business days. PWC provided a report to the commission on 30 May 2018 (see Attachment 1), which taking into account gazetted public holidays was within the timeframe.

Clause 5.4.3 requires the report to include:

- the relevant event identified under clause 7.2.3(f)
- information and documentation on the circumstances surrounding the event
- the impact of the event on the network entity's ability to meet the guaranteed service levels
- the extent of the exclusion from the adjusted category
- the proposed extent of the exclusion
- reasons why the commission should consider the event as an exclusion.

Clause 5.5 also requires that on receipt of a report submitted under this clause 5, the commission:

- must publish an assessment of the report within a reasonable time
- may make the report publicly available
- must ensure any information made publicly available by the commission complies with section 26 of the *Utilities Commission Act* (i.e. obligation to preserve confidentiality).

This report meets the requirements of clause 5.5.

Natural event

Qualification

The Beta method uses a statistical technique involving natural logarithms where beta is the standard deviation of the logarithms. This method allows abnormal performance to be measured, which is designed to identify (and exclude) events that are outside the normal risks that networks are design for, such as cyclones.

These events are referred to as major event days (MED). Specifically, a MED is a day in which daily System Average Interruption Duration Index (SAIDI) exceeds a threshold value (Tmed).

PWC has calculated Tmed and SAIDI for the Darwin-Katherine System as set out in the table below. The table demonstrates that the threshold has been significantly exceeded and therefore as TC Marcus meets the Beta method criteria, it could be classified as a natural event (i.e. it is a statistical outlier).

System	Date	(TMED)	Actual outcome - SAIDI
Darwin-Katherine	17-03-2018	42	1950

In comparison, the following table sets out the SAIDI performance for the regulated systems across the last five years. Clearly, the SAIDI outcome relating to TC Marcus is extremely different to normal SAIDI performance.

Location	2012-13	2013-14	2014-15	2015-16	2016-17	5 year Average
Darwin	167	398	144	166	159	207
Katherine	326	346	314	296	89	274
Alice Springs	48	20	201	142	214	125
Tennant Creek	435	123	207	43	246	211

Event Identification and Summary

On Saturday 17 March 2018, Cyclone Marcus impacted Darwin and has now been officially named as the most damaging storm since Cyclone Tracy devastated the city in 1974. Heavy rainfall, damaging winds in excess of 130km per hour and fallen trees caused major damage to PWC's electricity network infrastructure, leading to just over 28,500 customers (33 per cent of PWC's customer base) without power and bringing down more than 500 line spans.

Impact on Guaranteed Service Levels and Reliability Performance

PWC has stated that the scale of the event in terms of reliability and GSL far exceeds any event that has occurred in PWC's recent history. The SAIDI calculated for the Darwin-Katherine system is 1,950 minutes. This is 12.7 times higher than 2016-17 annual adjusted Darwin-Katherine SAIDI, and 145 times higher than the highest daily adjusted SAIDI during 2016-17.

In addition, PWC has claimed its ability to carry out re-connections in a timely manner was not able to be met during the cyclone response period. Crews normally allocated to this planned task were allocated to emergency restoration activities associated with the cyclone. A large number of customers were ready to be re-connected within the first few days of the event. However, resources were either

unavailable, or the network in the area was still affected by damage which prevented the customer supply to be restored. Also, switching operations that were conducted as part of fault finding and supply restoration activities resulted in some customers experiencing forced outages of short duration for which no notification was provided.

PWC has stated that no planned maintenance work was conducted and no appointments were attended during the cyclone recovery period. New connections to customer premises were also deferred. This was due to resourcing constraints which resulted in scheduled work being deferred in order to enable PWC personnel to conduct or support emergency work being carried out as part of response to cyclone.

Extent of Exclusions

PWC states that due to the scale of TC Marcus, all events initiating on 17 March 2018 in the Darwin-Katherine system should be excluded. A further three GSL categories should be excluded that are associated with appointments, connections and planned interruptions for the period of the cyclone response activities, from 17 to 29 March 2018.

Justification for Exclusion of the Event

PWC has stated that TC Marcus meets the following requirements:

(a) a natural event identified as a statistical outlier using the IEEE 2.5 beta method
(b) outside of the control of PWC
(c) the network outages and damage were of significant scale that the response is greatly different to the management and response to underlying network reliability.

PWC's report (see Attachment 1) sets out the impact of the event on GSL performance. If the event was not excluded, the financial implications of the GSL obligations as defined in the Code have been calculated by PWC to be $7.1 million.

Assessment by the Utilities Commission

The commission agrees that the impact of TC Marcus was clearly a natural event, outside the control of PWC and outside normal operational boundaries, and consistent with clause 7.2.3(f) of the EIP Code, it should be excluded from the GSL payment scheme and reporting requirements under the Code.

The commission believes that PWC has meet the reporting requirements under the EIP Code.

The commission excludes, the following GSL categories and reporting requirements for events initiating on 17 March 2018:

- Duration of a single interruption (GSL)
- Frequency of interruptions (GSL)
- Cumulative duration of interruptions (GSL)
- System Average Interruption Duration Index (SAIDI) reporting
- System Average Interruption Frequency Index (SAIFI) reporting
- Poorly performing feeders reporting.

The commission also excludes, the following GSL categories and reporting requirements for events from 17 to 29 March 2018:

- Time for establishing a connection (GSL)
- Time for giving notice of planed interruptions (GSL)
- Keeping appointments (GSL).

Attachment 1: Power and Water letter dated 2 May 2018

PowerWater

Phone 1800 245 092
Web powerwater.com.au

Record No: D2018/194265
Container No: PM2017/2/14

Dr Patrick Walsh
Utilities Commissioner
Utilities Commission
GPO Box 915
DARWIN NT 0800

Dear Commissioner,

Quantification of the Major Event Day – 17th March 2018 (Tropical Cyclone Marcus)

We refer to our letter dated 29 March 2018 regarding 'Major Event Day Notification' following Tropical Cyclone Marcus that affected the Darwin-Katherine System.

Power and Water Corporation ("PWC") has quantified the impact of Tropical Cyclone Marcus on the network reliability. The event meets the criteria defined in the Electricity Industry Performance Code (the Code), specifically Clause 7.2.3 (f), a natural event identified as a statistical outlier using the IEEE 2.5 beta method.

The daily calculated major event day threshold (T_{MED}) and the System Average Interruption Duration Index (SAIDI) values for the Darwin-Katherine System are provided in the table below, demonstrating the threshold has been significantly exceeded and is a statistical outlier.

System	Date	T_{MED}	SAIDI
Darwin-Katherine	17/03/2018	42.05	1949.54

PWC have excluded events commencing on 17 March 2018 within the Darwin-Katherine system from:

- Adjusted categories; and
- Guaranteed Service Levels.

An attachment to this letter has been provided to address the requirements under Clause 5.4.2 of the Code allowing the Commission to verify that this event was outside the control of PWC. In addition, an independent review of Power and Water's response to Cyclone Marcus has commenced and is expected to be completed by June 2018.

Should you require anything further in relation to this correspondence, please do not hesitate to contact **Jim McKay**, Chief Engineer by email at Jim.McKay@powerwater.com.au or by telephone on 08 8924 5204.

Yours sincerely

Michael Thomson
Chief Executive

02 May 2018

PowerWater

Phone 1800 245 092
Web powerwater.com.au

Attachment – Summary of Compliance Section 5.4 of the Electricity Industry Performance Code

Introduction

Section 5.4 of the Electricity Industry Performance Code (the Code) requires the network entity to submit a report including the following information.

(a) the relevant event identified under clause 7.2.3(f);

(b) information and documentation on the circumstances surrounding the event;

(c) the impact of the event on the ***network entity's*** ability to meet the ***guaranteed service levels***;

(d) the extent of the exclusion from the ***adjusted*** category;

(e) the proposed extent of the exclusion; and

(f) reasons why the ***Commission*** should consider the event as an exclusion.

This attachment provides a high level report of the events associated with Cyclone Marcus in the context required by the code. A more complete and independent report is in progress and expected to be able to be provided in June 2018. This report will assess in much more detail the event itself, an assessment of how Power and Water responded to the event, as well as recommendations to improve Power and Water's response to this event.

Event Summary

On Saturday 17 March 2018, Cyclone Marcus impacted Darwin and has now been officially named as the most damaging storm since Cyclone Tracy devastated the city in 1974. Heavy rainfall, damaging winds in excess of 130km per hour and fallen trees caused major damage to Power and Water's power network infrastructure, leading to 28,584 customers (33% of our customer base) without power and bringing down more than 500 line spans.

Refer to the event summary information attached to the letter dated 29 March 2018 for further information about the event and Power and Water's response approach.

Impact on Guaranteed Service Levels and Reliability Performance

Analysis of information gathered during and after the cyclone has been collated and analysed to understand the impact of the event in terms of both GSL and general reliability performance.

The scale of the event in terms of reliability and GSL far exceeds any event that has occurred in Power and Water's recent history. The SAIDI calculated for the Darwin-Katherine system is 1949.5 minutes. This is 12.7 times higher than 2016-17 annual adjusted Darwin-Katherine SAIDI, and 145 times higher than the highest daily adjusted SAIDI during 2016-17.

The table below summarises the service impact of the event. If the event was not excluded, the financial implications of the GSL obligations as defined in the Code have also been calculated for information.

Duration of a single *interruption*:	**Number of Customers**	**Calculated Payments**
More than 12 *hours* and less than 20 *hours*	9	$720
More than 20 *hours*	28,421	$3,552,625
Frequency of *interruptions*:		
More than 12 *interruptions* in a *financial year**	37	$2,960

Duration of a single *interruption*:	Number of Customers	Calculated Payments
Cumulative duration of *interruptions*:		
More than 20 *hours* of *interruptions* in a *financial year**	28,421.00	$3,552,625.00
Total		**$7,108,930.00**

*Calculated as of April 2018, however this could increase depending on outages that occur up to and including June 2018.

In addition, Power and Water's ability to carry out re-connections in a timely manner was not able to be met during the cyclone response period. Crews normally allocated to this planned task were allocated to emergency restoration activities associated with the cyclone. A large number of customers were ready to be re-connected within the first few days of the event. However, resources were either unavailable, or the network in the area was still affected by damage which prevented the customer supply to be restored. Also, switching operations that were conducted as part of fault finding and supply restoration activities resulted in some customers experiencing forced outages of short duration for which no notification was provided.

No planned maintenance work was conducted and no appointments were attended during the cyclone recovery period. New connections to customer premises were also deferred. This was due to resourcing constraints which resulted in scheduled work being deferred in order to enable PWC personnel to conduct or support emergency work being carried out as part of response to cyclone.

Extent of Exclusions

Due to the scale of the event, all events in the Darwin-Katherine system on the 17th March 2018 have been excluded from the GSL and adjusted categories shown in the table below. GSL categories associated appointments, connections and planned interruptions have been excluded for the period of cyclone response activities, from the 17th to 29th of March 2018.

Guaranteed Service Level Categories	Exemption
Duration of a single *interruption*:	
More than 12 *hours* and less than 20 *hours*	Yes
More than 20 *hours*	Yes
Frequency of *interruptions*:	
More than 12 *interruptions* in a *financial year*	Yes
Cumulative duration of *interruptions*:	
More than 20 *hours* of *interruptions* in a *financial year*	Yes
Time for establishing a *connection*:	
Re-connection of an existing *premises* – within 24 *hours* of receipt by the *network entity* of a valid request for re-*connection* from the *small customer*	Yes
New connection of a *customer's premises* (excluding *connections* requiring network extension or augmentation) – within 5 *business days* of receipt by the *network entity* of a valid electrical certificate of compliance from the *small customer*, or as otherwise agreed with the *customer*	Yes

Time for giving notice of *planned interruptions*:	
At least 2 business *days'* notice prior to the commencement of the *day* upon which the *planned interruption* will occur	Yes
Keeping appointments:	
Within 30 minutes of the time agreed with the *small customer*	Yes

Reliability Performance Indicator	**Exemption**
System Average Interruption Duration Index (SAIDI) adjusted	Yes
System Average Interruption Frequency Index (SAIFI) adjusted	Yes
Poorly performing feeders	Yes

Justification for Exclusion of the Event

The impact of Cyclone Marcus has been demonstrated to meet the requirements for treatment as a Major Event Day to be excluded from unplanned network interruption as per the Code. The event meets the following requirements:

(a) a natural event identified as a statistical outlier using the IEEE 2.5 beta method;

(b) outside of the control of the Power and Water; and

(c) the network outages and damage were of significant scale that the response is greatly different to the management and response to underlying network reliability.