

Mopping up the floods – four businesses discuss the key lessons for Australian electricity networks

The flooding in Queensland and Victoria between December 2010 and January 2011 presented electricity networks and their customers with an unprecedented one-in-200-year risk management scenario. Late this year, State Commission inquiries in Queensland and Victoria will report on their examinations of the events leading to the floods, the response, and recommendations going forward.

Electricity distributors have been reviewing their own responses to the floods and reassessing their asset management strategies. Senior managers from **ENERGEX** (Ron Watson), **Ergon Energy** (Paul Jordon), **SP AusNet** (Sebastian Gallo) and **Powercor** (Chris Annett) talked to Marchment Hill Consulting about their learnings.

Impact of the floods

To get a sense of the scale of the challenges faced by distributors, you only have to turn to South East Queensland. Ron Watson commented: “Torrential rain, flash flooding and the rise of the Brisbane River knocked out 25 zone substations, delivered \$35 million of damage to the ENERGEX network and interrupted the electricity of over 300,000 customers, including the entire Brisbane CBD.” Electricity was restored to 80 per cent of these customers after a week and virtually all services were restored within a fortnight.



Further north, Ergon Energy’s network performed surprisingly well despite also receiving a battering from the weather. “Three substations were partially flooded but didn’t trip despite the water flowing through them, and underground assets emerged unscathed, albeit a bit dirty,” stated Paul Jordon. Ergon Energy’s pole assets did not fare so well, with those located near waterways destroyed by debris carried by the flood water.

In Victoria, it was atypical rainfall patterns saturating the soil over multiple months (rather than freak storms) that led to flooding – as a result, the impact was smaller than in Queensland because overhead assets were not at risk of damage from strong winds or airborne materials. SP AusNet’s terminal station assets were threatened but quick action was taken and the assets largely escaped unscathed; however, Powercor’s network faced greater challenges – particularly with its zone substation at Charlton. It tripped after being hit by waist-high flood waters and customers were without power for between two to five days. More positively, the performance of Powercor’s kiosk substations in rural areas were impressive as Chris Annett notes: “They switched out when flood waters rose but once the waters lowered, the transformers just dry out and can be re-energised without issue.”

The scale and scope of the challenges faced by the four utilities were varied but, clearly, there were some common threads in how each addressed the challenges, and some common constraints – particularly with regard to communication, predicting flood paths and asset protection.

Opening up communications

“Initial information was sporadic and sometimes contradictory, making it very difficult to determine the expected water levels and respond to all risks promptly – Sebastian Gallo, Station Manager, SP AusNet”

All utilities initially relied on data from previous floods and advanced flood warnings from the Weather Bureau and SES to help them execute their risk management plans early and minimise the impact on their networks. They relied on effective corporate communication to prepare communities for the flood and to secure SES and public assistance where required. Later, utilities also needed to inform flood-affected customers on the status of restoration work and advise them on how to get reconnected.

With information being distributed from a number of different (and at times unreliable) sources, it was sometimes difficult to cut through the noise. ENERGEX clearly had the largest challenge: with 300,000 customers affected, the utility worked hard to get their messages out. This included 1,661 radio interviews, 270 twitter messages and three newspaper advertisements. Staff were also briefed on a “Message of the day” to ensure information consistency. This had the dual benefit of focusing the community on relevant safety and power supply restoral messaging, and positioning the brand as a reliable centre of information and expertise.

Predicting flood-water paths

“We didn’t know whether it was a one-in-100-year flood or worse. Information indicated the levels could be worse but we couldn’t be sure” - Sebastian Gallo, Station Manager, SP AusNet”

Forecasting where and when the water would flow was key to allowing the networks to focus their risk mitigation plans. Data from previous floods and documentation of installation heights for critical assets was useful for this, but without reliable forecasts, networks had to make a judgement call on the levels to which the waters would rise.

Powercor worked with the SES to plot the likely direction of flood water as it headed north. “Risk assessments were done on the probabilistic pathway of the flood and sandbagging began ahead of when the water hit town three days later,” revealed Chris Annett.

SP AusNet believes an “operational crisis” was avoided through their tracking of flood waters as it allowed them to dispatch crews on site as soon as a threat was identified.

Protecting assets

“We could have saved more gear with earlier warnings – Ron Watson, Group Manager Corporate Communications, ENERGEX”

Identifying flood paths allowed each of the networks to pin-point and save critical assets from water damage. This not only saved money in replacing equipment but, more significantly, services could be restored quickly and easily once the waters receded – teams simply went back to each site and reinstalled the equipment and no clean-up was necessary.

ENERGEX proactively switched-off power to 100,000 homes and businesses, including Brisbane’s CBD, to prevent risk to life and unnecessary damage to equipment. Its crews removed critical equipment from the CBD before the floods hit but recognise that they could have done more if earlier warnings had allowed more response time.

SP AusNet’s focus was the protection of the Kerang Terminal Station control room which was sandbagged to protect critical equipment, in particular protection assets, switchboards’ DC circuits, and backup batteries which were required for a planned shut-down should water levels deem it necessary. A contingency plan was also put in place and excavating equipment called in to produce “a make-shift levy around the station”. Crews and volunteers then worked side-by-side when the waters arrived to maintain the levy walls and prevent them from being eroded. Seb Gallo reflected on the coordinated effort across SP AusNet contract managers, the SES, the local community and maintenance service providers, Powercor; “half the town came out to help”, and “Powercor were fantastic, working around the clock”.

Powercor also used sandbagging on their own assets as well as helicopters to access HV lines and restore substation and 66kv lines out of Charlton. As the waters rose, there were instances of “linesman responding to faults in boats,” explained Chris Annett.

Re-energisation

“In Charlton, crews had to go street-by-street to isolate each connection point, check if the house had been inundated by floodwaters and then re-energise – Chris Annett, Powercor”

In Victoria, once flood waters subsided, the challenge was to restore supply as quickly as possible; however, many people went without power at their residences for days or weeks. “Powercor is required to restore supply to the connection point but is restricted from energising if the house may be unsafe,” explained Chris. Hence, the onus is on the customer to commission a registered electrician to check the premises and certify it as safe to restore power. In the aftermath of the floods, it was difficult to access services from these electricians. Large numbers of electricians would be

required to mobilise at flood affected locations in order to expedite re-energisation.

Where to from here?

“We must recognise the rarity of this incident and the fact that most assets came through unscathed – Paul Jordon, Ergon Energy”

The key question utilities must answer is whether the 2011 floods were a one-in-200-year event as historic records suggest, or whether they were characteristic of new weather patterns that may become more common in the future.

Ergon Energy has categorised the flood as a one-in-100-year event. Paul Jordon believes their assets held up “surprisingly well” so Ergon Energy will not be “over-reacting” or making sweeping changes which would incur widespread costs.

ENERGEX is recalibrating its network standards to reflect 2011 flood levels (rather than 1974 levels) and is reviewing how it can flood-proof its substations by using levies, bunding and physical elevation as well as mobile generators to maintain services to isolated communities. It hopes to work with the Reconstruction Authority to help facilitate the work required. Towns like Grantham are rebuilding on higher ground as a result of these floods, which means Energex and other infrastructure providers will need to move their assets accordingly to accommodate a new town centre in a safer location.



Powercor has also assumed 2011 to be a one-in-100-year flood event and has identified 10 of their zone substations with a significant flood risk potential. They have requested height data from the Department of Sustainability and Environment to provide an accurate topography and reference as to the levels water could reach across their network. Powercor is investigating mitigation practices including inflatable bunding, permanent levies and land management to divert water when necessary, as well as physically raising assets at the Charlton zone substation. Reactive solutions (such as temporary bunding) may not be applicable for the type of flood Powercor endured as the water levels rose so quickly, that the business would have had no time to deploy these measures, even if such solutions were available during the recent floods.

Powercor also noted that in large-scale crisis situations – where affected buildings are potentially rendered unsafe for re-energisation – there should be a coordinated effort to bring sufficient numbers of registered electricians to the region in order to expedite the required safety checks to re-energise customers’ homes in a timely manner.

SP AusNet's network was less impacted and they have categorised the event as a one-in-200-year flood and are now assessing whether they need to invest significant capital into mitigating such events. The business has kept the levy around Horsham Station and is now looking into temporary bunding options (including inflatables and portables) which may be more relevant to them than Powercor, due to sufficient warning time for deployment and their fewer numbers of at-risk assets.

All utilities impacted by these floods have incurred considerable operational costs and will also likely incur capital costs either for rebuilding or in relation to changes in standards and available risk data that may result in the need to relocate, elevate or otherwise protect critical assets.

In conclusion

Australian electricity network businesses have proved over the years that when faced with a crisis, whether corporatised, privatised, decentralised or disaggregated, they can pull together to achieve remarkable response and restoration efforts. Marchment Hill applauds the resilience and determination displayed by our Queensland and Victorian network utilities during these devastating flood events and encourage all Australian utilities to share the experiences and learnings from these events. We would also like to thank Ron Watson, Paul Jordon, Sebastian Gallo and Chris Annett for sharing their experiences.

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