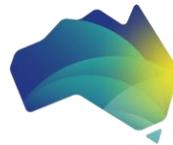


Strengthening energy networks to withstand severe wind and storms



Energy
Networks
Australia

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Motivation



December 2023, SE Qld Severe thunderstorm

>130,000 people without power

~950 **distribution** lines down



February 2024, Victoria Severe thunderstorm

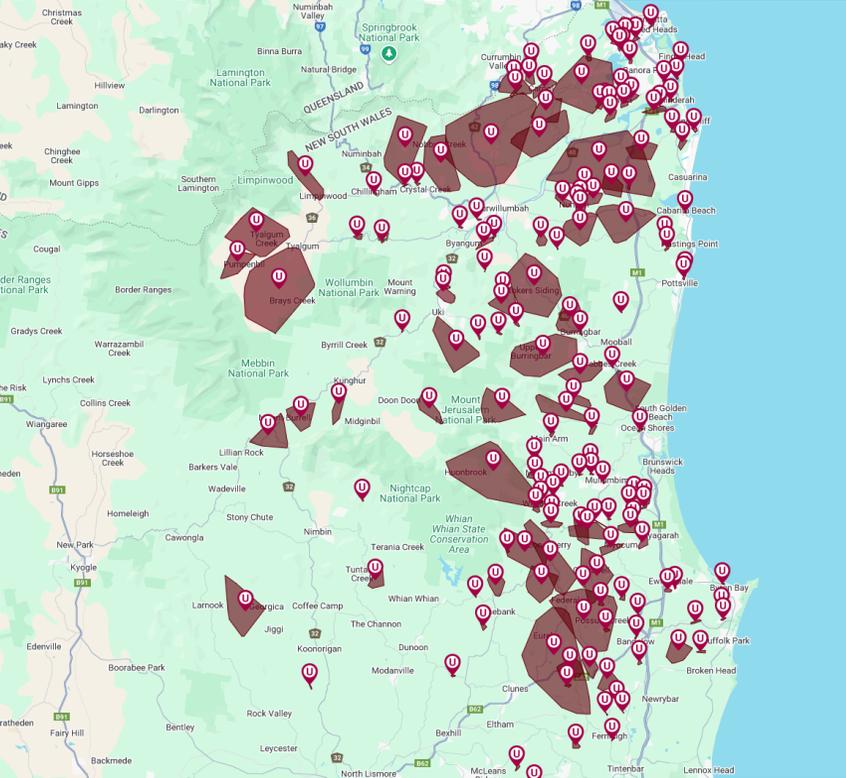
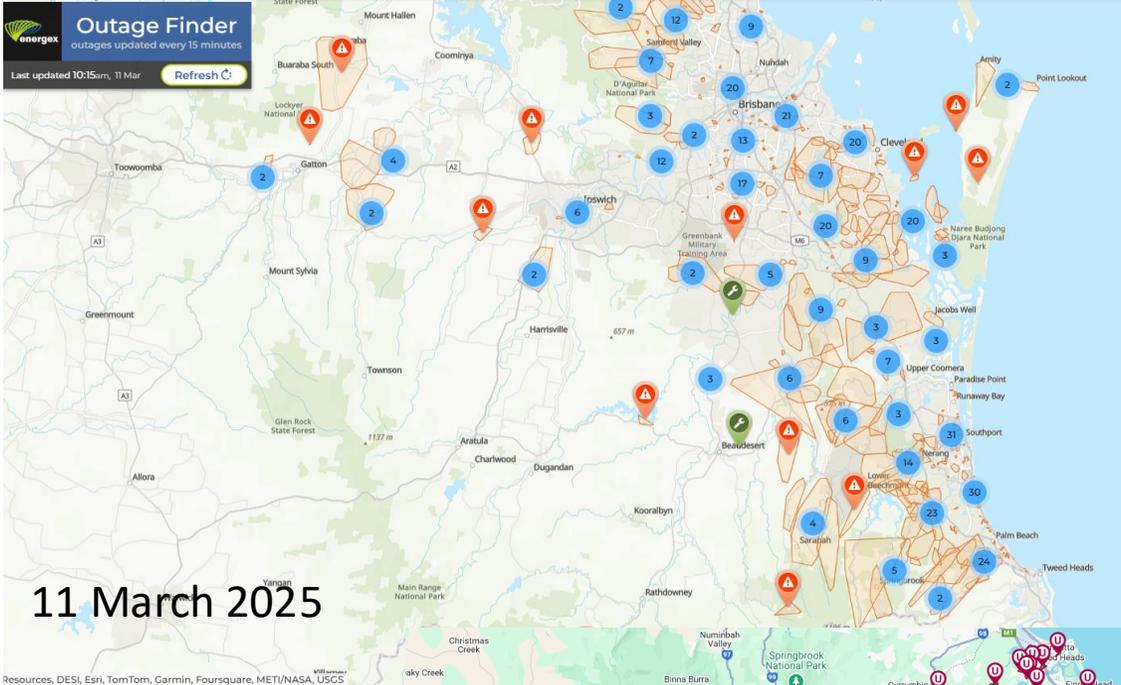
>1 Million people without power

1,100 **distribution** lines impacted

6 **transmission** towers failed



Motivation



March 2025, Tropical Cyclone Alfred
>300,000 people without power due to downed **distribution** lines through Qld and NSW for an event well below design levels



Why the problem?

- Transmission lines/structures
 - Wind + direction
 - Generally, well engineered and managed
 - Older structures may be under-designed by current standards
- Distribution lines/structures
 - Wind + water + vegetation + direction
 - Many more poles/wires than transmission
 - Embedded in urban and vegetated environments



Project aims

1. Determine the types of severe wind and storm events that cause damage to the national electricity transmission and distribution networks and build an understanding of why this damage occurs.
2. Consistently analyse the present climate wind hazard that transmission and distribution networks are exposed to.
3. Analyse how key climatic variables important for assessing wind risk to electricity networks, including frequency, intensity and directionality of extreme winds may change under future climate scenarios.
4. Develop a computational tool that Network Service Providers can use to assess wind (+) risk to their existing and future network under current and future climate scenarios.



Project tasks

1. Research plan co-design
 - Two stage finalisation approach: individual distribution and transmission providers then broad ENA engagement
2. Catalogue historic weather-related impacts to electricity networks
 - Develop a public database of impacts to both the distribution and transmission network and the associated weather event (e.g. cyclone, thunderstorm) that caused the damage
3. Review of wind loading codes and standards relating to electricity infrastructure
 - Produce a report detailing codes and standards used for the design of overhead electricity transmission and distribution infrastructure and assets



Project tasks

4. Analysis of wind hazard data
 - Analyse the frequency, intensity and directionality of different types of wind (e.g. cyclone, thunderstorm) using Australia's AWS network. These data are the basis for Task 6.
5. Analysis of climate projection data
 - Analyse extreme wind gust proxies in reanalysis and projection data mapping how these change with projection scenarios. Correlate proxies with distribution parameters from Task 4 to see how these may change.
6. Energy Network Wind Risk Tool Development
 - Extend an existing wind risk tool developed for transmission line networks into a stand-alone tool for NSPs that also includes distribution networks and is driven by the hazard data from Task 4 and 5.



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