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Grid Connection of Geothermal Generation

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Overview

- Introduction
- Generation in the National Electricity Market (NEM)
- NEM transmission open access regime and its implications
- Choice of connection point affects cost and access to market
- Releasing network capacity
- Optimising network augmentations
- Summary

Generation's place in the NEM

- The NEM objective is to ensure efficient and secure supply of electricity.
- Facilitation of new, innovative or cleaner generation is not an objective *per se*.
- A successful business case for new generation requires identifying capability of the existing network, or cost effective augmentation, to allow transport of the additional generation.

Identifying network capacity

- Network capability is multi-dimensional
 - Thermal rating of equipment: ability of transmission lines and transformers to transport power is limited by safe operating temperatures
 - Fault current tolerance: circuit breakers can only interrupt so much power under fault conditions
 - Voltage control and stability
 - Transient stability limits
 - Small-signal stability limits

The open access regime

- NSPs have an obligation to connect any generator that meets NER obligations and technical requirements.
- A Connection Agreement in the NEM carries *no guarantee* that the network will accept the specified production at all times.
- Onus is on generators to assess and manage production risks from network capability limits

Choosing a connection point

- The optimal connection point is not always the closest one!
- Corollary: the power line running across your site may not be the best connection.
- Need to analyse in detail what the network can support, at a variety of connection points

Releasing network capacity

- Historically, estimates of network capacity tend to be on the conservative side, due to NSPs' focus on maintaining firm supply to load
- Successful examples of 'tuning up' networks:
 - Dynamic rating
 - 'Non firm' operation with runback schemes
 - Semi-dispatch to address bottlenecks

Optimising network augmentations

- There is substantial potential to drive down cost of long transmission lines with optimal line design and routing
 - Optimise route selection / pole design to minimise civil works cost
 - Minimise upfront Capex with compact ‘fit for purpose’ poles
- Crucial to identify/estimate augmentations at planning stage, to allow room to move

Summary

- New generation projects stand or fall on assessment of existing network capacity
- Spare capacity is being “used up” quickly.
- A successful project will optimise:
 - Capex
 - Network losses
 - Utilisation of available network
 - Vulnerability to grid congestion over the life of the project