

Distribution Network Planning

A real options approach to support decisions on reinforcement versus post-fault demand-side-response

A prototype 'real options' model has been created which provides cost and risk metrics to compare strategies to provide network capacity at Electricity North West, a distribution network operator (DNO). Traditional investments in network capacity are relatively inflexible – large investments providing a fixed amount of capacity – yet based on uncertain future demand.

A tool was required to compare traditional interventions, large and small, as an alternative or in combination with providing capacity via more flexibly contracting for post-fault demand-side-response (DSR). Working in Excel to facilitate practical use by a DNO, analysis by the University of Manchester proposed a hierarchical spreadsheet approach to flexible network investment under uncertainty, which has since been developed by Electricity North West.

The model benefits from the receding horizon approach successively deployed in the engineering applications of optimal control theory, by using the annual update of the DNO's peak demand scenarios. Short-term Monte Carlo simulations reflect uncertainty around those scenarios.

Strategies are defined as a series of up to three interventions with trigger points. The current prototype has been used to support signing one DSR contract as an alternative to traditional reinforcement, and ongoing work is developing the decision-support tool to reflect regulatory and business perspectives.

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