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Bulk Electricity Reliability

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The situation in North America

At the beginning of the 1960's a number of regional bulk electricity grids existed in North America, and these were being interconnected. An informal, voluntary organisation was formed to help coordination of the new interconnected grid.

Through the early 1960's, criteria for reliable operations were developed, and reliability planning guides began to be published.

On 9 November, 1965, an extensive blackout occurred, resulting in 30 million people losing power for up to 13 hours. Toronto and New York were the main cities affected, but the whole north-east of North America felt the effects. Bulk electricity system reliability was studied both by the industry and by the US federal government. On 1st June 1968, the National Electric Reliability Council (NERC) was established by the industry as a response to the 1965 blackout. NERC introduced a more robust system of guides and criteria.

On 13 July 1977, there was a blackout of New York City, in which 2.5 million customers lost supply for up to 24 hours. Unlike in the 1965 blackout, a feature of this 1977 blackout was an outbreak of looting, fire-raising and civil disturbance. The US federal government proposed that there should be limited reliability powers backed by legislation, but these were not implemented at this time.

During the 1980's and 1990's the industry-backed mandatory powers of NERC were increased, and the scope of their interests was expanded to address physical security issues like terrorism and sabotage, and also cyber attacks against the Bulk Power System. Further blackouts occurred, and the industry introduced fines for organisations who did not follow the established criteria. By 1997 there was a realisation that the voluntary arrangements had to be backed by US federal legislation.

In 2002 the NERC operating policies and planning standards became mandatory in Ontario, Canada.

On 14th August 2003, there was a further massive blackout in north-eastern and mid-western United States and in Ontario. 50 million people lost power. The main recommendation of the Outage Task Force, which reported in April 2004, was that the US federal government should make reliability standards mandatory and enforceable. In 2006 NERC was appointed “electric reliability organisation” in the United States and filed 102 reliability standards with the Federal Energy Regulatory Commission (FERC). On 18 June 2007, 83 of the NERC standards became legally enforceable. The remainder were to be followed voluntarily as representing “good utility practice”.

Efforts continue to extend NERC’s mandatory powers. Issues covered now include not only technical issues like operating procedures and planning criteria, but also reliability and adequacy assessments, events analysis, bulk power system real time oversight, infrastructure security, benchmarking to ensure NERC’s own effectiveness, education, registration of organisations, certification of organisations, and certification of system operators.

Despite this powerful reliability regime, extensive blackouts can still occur. Measures continue to be taken to prevent these events happening in the future, or at least mitigating their effects.

The mission of NERC, now known as the North American Electric Reliability Corporation, described thus:

The North American Electric Reliability Corporation’s (NERC) mission is to ensure the reliability of the North American bulk power system. NERC is the electric reliability organization (ERO) certified by the Federal Energy Regulatory Commission to establish and enforce reliability standards for the bulk power system. NERC develops and enforces reliability standards; assesses adequacy annually via a 10-year forecast, and summer and winter forecasts; monitors the bulk power system; and educates, trains and certifies industry personnel. ERO activities in Canada related to the reliability of the bulk power system are recognized and overseen by the appropriate governmental authorities in that country.

The Situation In Britain

Britain does have some enforceable reliability measures, but is a long way behind North America in putting a comprehensive set in place.

There is a statutory requirement that electricity supply voltage and frequency are within defined standards. Generators, grid system operators, distribution network operators and suppliers are licensed, and are required by their licenses to adhere to the Grid Code or other codes appropriate to the part of the system they are connected to. However, much that is covered by legislation in North America is left to the operation of “market forces” in Britain. The market here is skewed by subsidies, subsidy-like measures such as renewables obligations, and politically influenced planning systems, so their full effect is diminished.

IMck 13.09.14