

South West Regional Development Strategy

Executive summary

The increase in renewable generation is the biggest change the electricity network has experienced in decades. Little short of a revolution, it is being driven by new technology and changing customer and political opinion. The ultimate prize is reduced costs to customers.

Traditionally, electricity entered the system from a large, usually fossil-fuelled, power station and flowed down the network to customers' homes and businesses. But renewable generation is often smaller-scale and its energy joins the network at a lower voltage. This means that instead of being a passive, one-way only system the electricity network now has to be an active, two-way system. Across the country, the companies involved in enabling smarter, more flexible networks are describing the change as moving from being a network operator to a system operator. Achieving this change involves huge commercial and technical engineering challenges – all of which must be met without impinging on the network reliability customers have come to expect.

The South West Regional Development Strategy is a stage in this process as National Grid and Western Power Distribution have spent a year working together on a programme that has developed a whole system approach to the electricity network in England's South West region.

Aims

The exposed position and strongly maritime climate of South West England means it has become a favoured location for renewable generation. It is also an area where modelling indicates the network's ability to absorb that energy may be an issue after 2020. If the region is to fulfil its potential of meeting future governmental green energy targets the programme needed to:

- analyse the requirements and capabilities of the network
- ensure future capacity requirements can be managed.

The other question that the programme had to answer is what is the most cost-effective way of enabling renewable generation to connect to the whole network? Customers do not expect to see their bills rise from the costs of connecting renewable energy. Conventional means of increasing the network capacity by installing new infrastructure to enable the power to flow may not be most cost-effective solution for renewable energy due to its intermittent nature. As a result, other plans need to be on the table.



Challenges

- The first set of challenges the programme considered were technical. The traditional one-way power flow provided a straightforward handover from the transmission to the distribution network at the point where 400,000 or 275,000 volts was stepped down to 132,000 volts. But the new two-way power flow makes the interaction between the two networks much more complex. Analysis revealed that the logical solution for an issue on one network could create problems on the other. >>>

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- The South West itself presents a unique challenge in that it has large amounts of solar generation on sunny days in spring and summer, which coincide with low customer demand. However, the number of days where this will cause an issue for the network is low, meaning that installing new infrastructure is not a cost-effective approach.
- The increased amount of renewable generation in the South West means that much of the spare transmission capacity has already been allocated. New ways of managing the network are needed to prevent delayed connections.
- How quickly customers in the South West will take up electric vehicles is an unknown factor. The programme used a range of potential outcomes to understand the impact on the networks.



Achievements

The increased understanding of the interaction between the transmission and distribution networks gained via whole system network planning will ultimately enable an increased number of connections at minimal cost to customers and risk to network reliability.

National Grid and Western Power Distribution are working together to provide a single-stage connection process for generators, this should result in quicker, more efficient connections for customers.

The two companies will be sharing their findings with other network companies via the Energy Networks Association's Open Networks project.

Future Opportunities

To help balance the load on the network, customers who can provide extra generation or be flexible with their power demands could be asked to sign up to one of the services available via Western Power Distribution's Flexible Power scheme. Flexible Power, which is being trialled in the Midlands, enables its customers to earn money from their assets by signing up to provide additional flexibility to the network operator. Flexible Power will be rolled out across all four WPD licence areas this summer.



Glossary

Constraints Limitations due to the capability of assets which prevent more power from flowing through the network

Distribution network The part of the network that carries electricity from the transmission grid to customers' homes and businesses. Voltages range from 132,000 to 400/230. Across the country the distribution networks are operated by one of 14 licence holders. Western Power Distribution is the licence holder in four areas.

Network capacity The amount of instantaneous power it is possible to distribute through a network.

Transmission network The 400,000 and 275,000 volt network that carries electricity from power stations to the 132,000 volt networks operated by distribution companies. It is operated by National Grid.

Whole system Viewing the transmission and distribution systems as one network.