

RfG – Fast Fault Current Injection: GB context of case study

nationalgrid



Ben Marshall

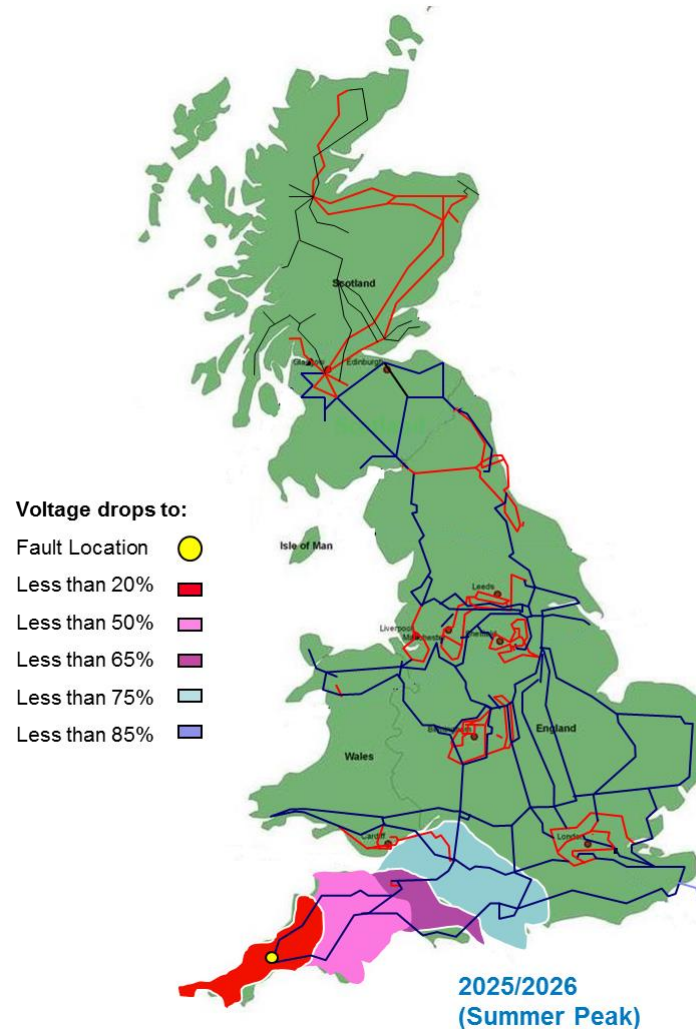
National Grid – System Performance (SO)

April 2017

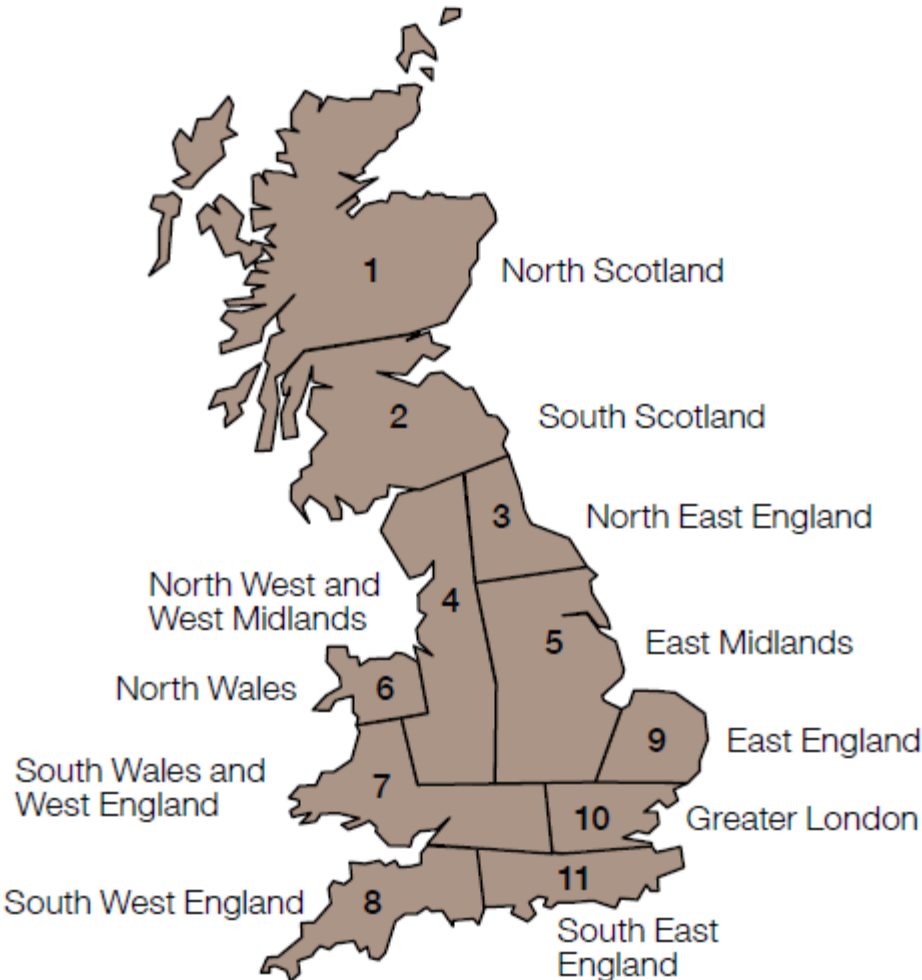
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- Voltage dip propagation contour across SW area.
 - How SW compares to other GB regions
 - How SCL changes over time in these regions (assuming Tx sources only supporting).
 - Conclusions

Voltage dip Propagation across SW area

- For a fault at Indian Queens voltage dip below 0.3 up to Hinkley Point.
- Broad equivalent impact for loss of large machine in area and simulations as discussed.
- High potential for > maximum infeed loss



SCL regions of GB

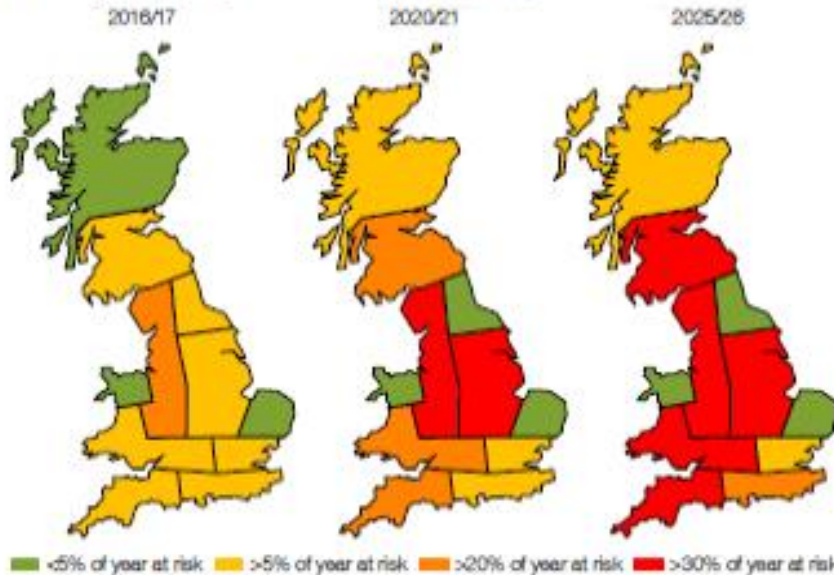


How SW compares to other areas of GB

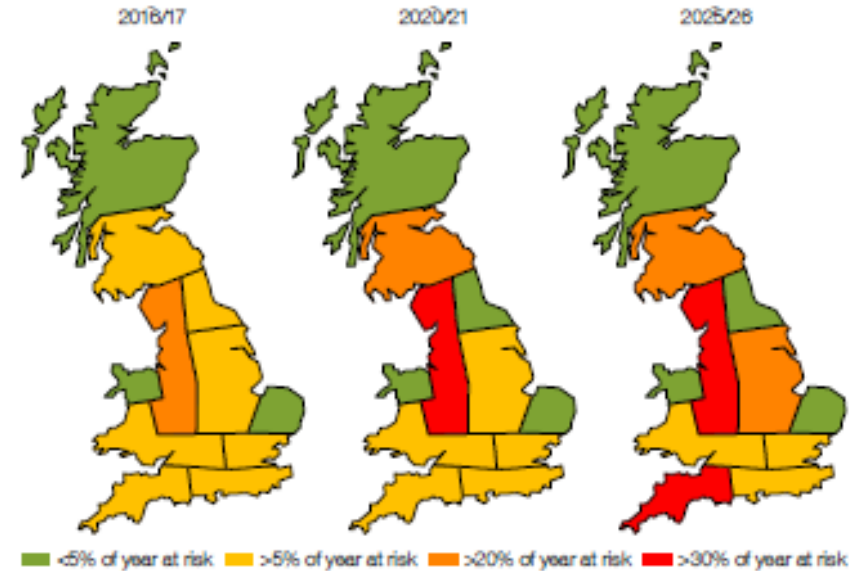
Area		GC048 study			Future Of Energy documents					
		SCL studied 2025 (kA)	DG installed 2025 (MW)	DG studied 2025 (MW)	FES2025 max DG output (MW)	FES2025 min DG output (MW)	SOF regional SCL min (kA)	SOF regional SCL 95% confidence min (kA)	SOF regional SCL 95% confidence max (kA)	SOF regional SCL max (kA)
1	North Scotland	N/A	N/A	N/A	1839.5	1167.6	6.8	11.9	16.5	18.6
2	South Scotland	N/A	N/A	N/A	2941.8	2024.4	9.5	13.1	20	21
3	North East England	N/A	N/A	N/A	1360.6	885.4	10.8	14.4	29.3	34.1
4	North West and West Midlands	N/A	N/A	N/A	3338.1	1990.1	0.7	5.7	21.1	22
5	East Midlands	N/A	N/A	N/A	3540.8	2029.3	2.7	7.1	24.4	28.4
6	North Wales	N/A	N/A	N/A	740.1	594.3	13.3	21.6	36.1	38
7	South Wales and West England	N/A	N/A	N/A	3677.3	2300.5	6.4	9.8	26.2	30.4
8	South West England	16.3	2522.4	2411	3213	1999.7	2.4	7.3	22.1	25.9
9	East England	N/A	N/A	N/A	3934.5	2543.1	9.1	17.4	41.5	45.6
10	Greater London	N/A	N/A	N/A	1716	1104.4	6.2	14.2	32.4	35.7
11	South East England	23.95345696	N/A	N/A	2059	1268.2	7.6	15.1	27.9	31.7

How SCL changes over time

Areas in need of protection operation review (Gone Green)

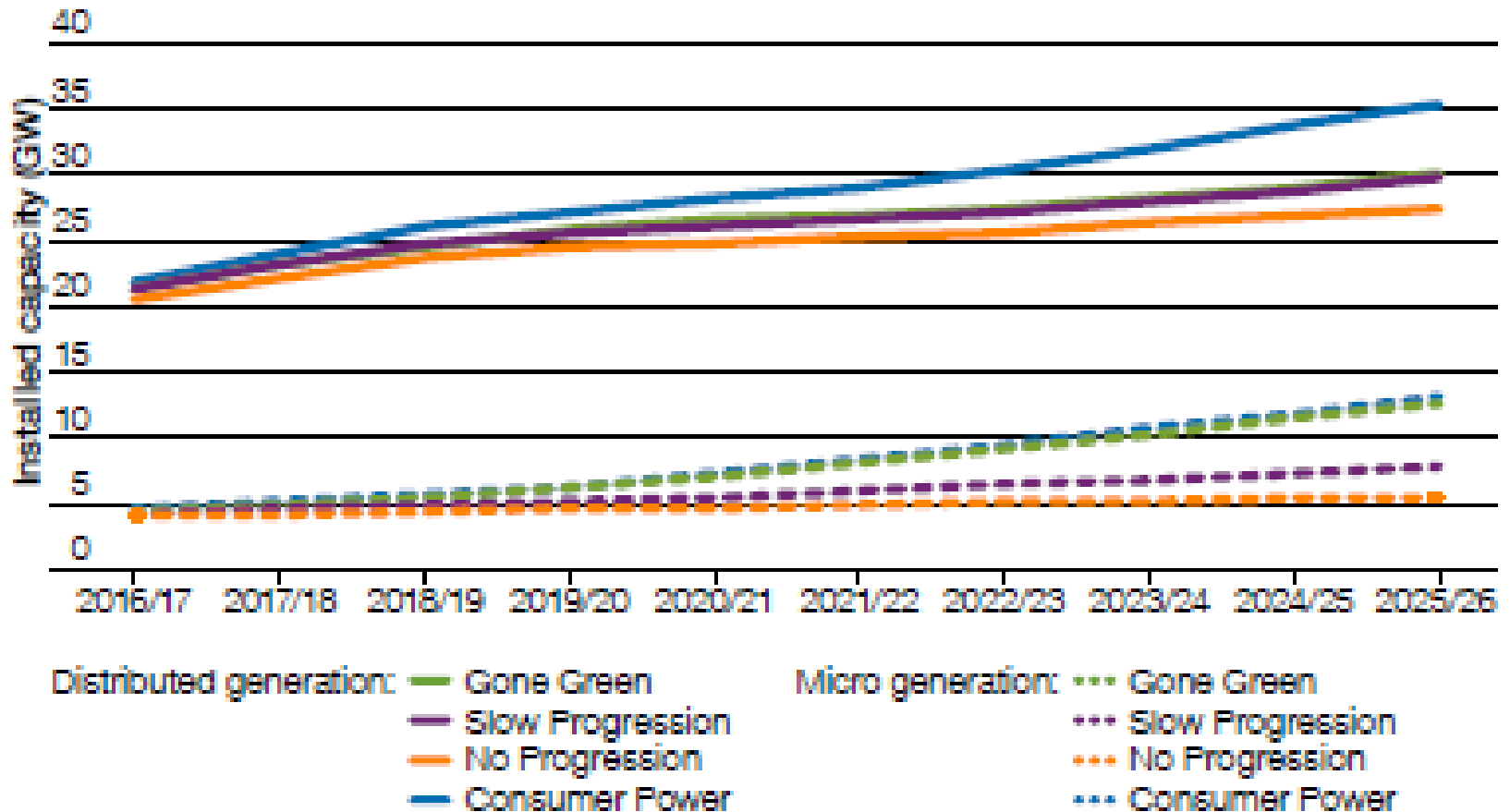


Areas in need of protection operation review (No Progression)



- 2021/2 is a critical juncture as energy environment develops

How DG changes over time



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- The SW case study is a credible illustration of the cascade loss risk of DG with transmission plant.
 - The study sits in the middle of the FES range for DG contribution and optimistically within the range of potential SCL at the time.
 - Across GB, the SW is indicative of most areas of GB other areas except arguably Greater London and North Wales.
 - The rate of change of SCL is such in these areas that a response to arrest the displacement effect of transmission resources and increasing levels of non-synchronous capacity would need to be fully addressed early in the next decade to avoid operability challenge with mitigation occurring ahead of this