

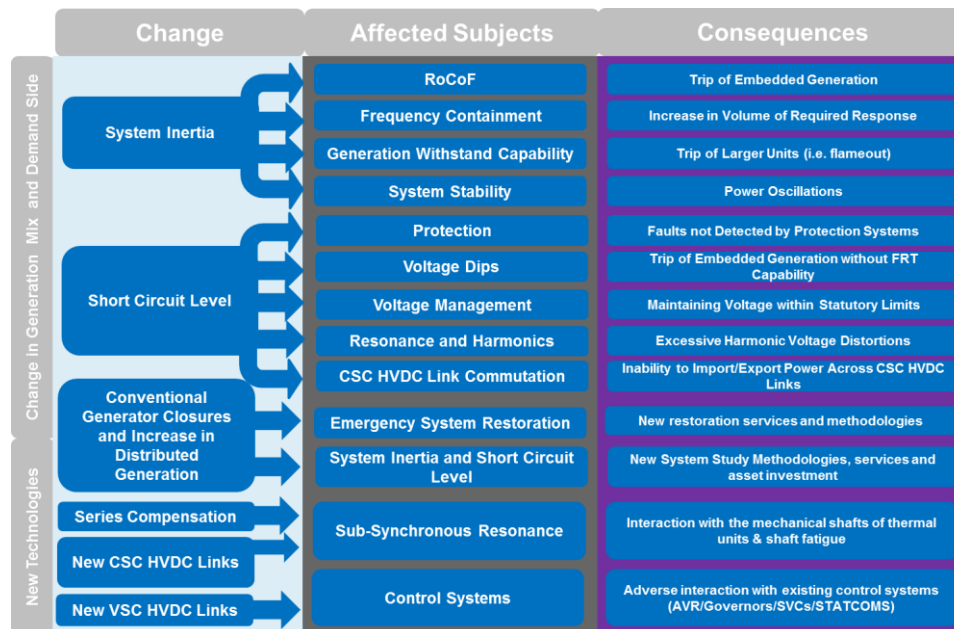
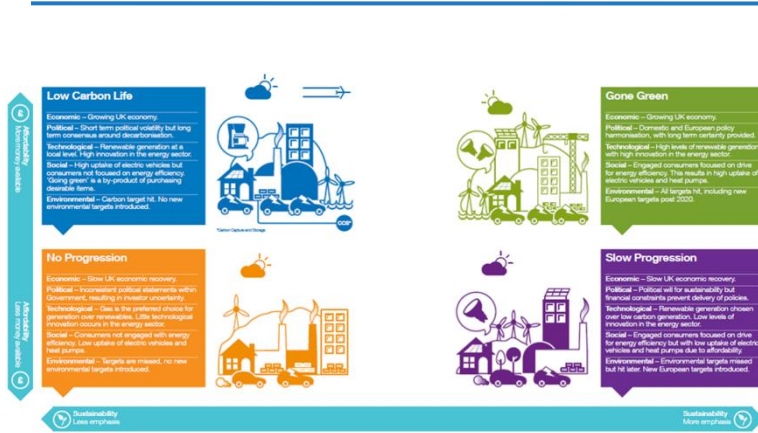
System Operability Framework (SOF)

Post consultation activities

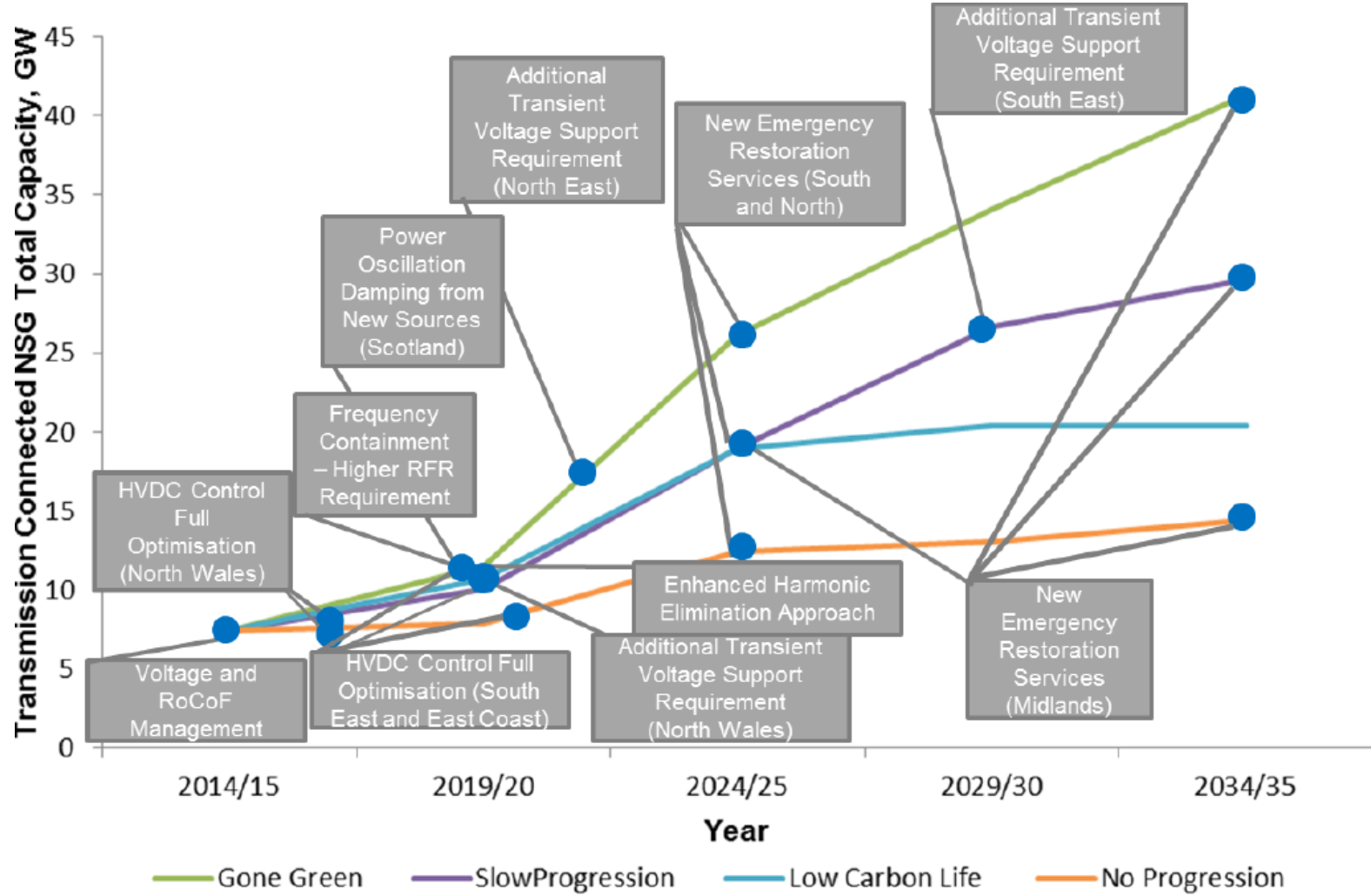


Vandad Hamidi
Transmission Network Services

What was SOF? Recap



Challenges and Opportunities



Key areas

	Change	Affected Subjects	Consequences	Activities	By when?
Change in Generation Mix and Demand Side	System Inertia	RoCoF	Trip of Embedded Generation	Joint Grid Code/Distribution Code Working Group	2015-2017
		Frequency Containment	Increase in Volume of Required Response	NIC – EFCC / Frequency Containment Review	2017-2018
		Generation Withstand Capability	Trip of Larger Units (i.e. flameout)	SOF Review – Compliance Team	Continuous review
		System Stability	Power Oscillations	SOF Review - System Regional NSG Integration Studies	May 2015
	Short Circuit Level	Protection	Faults not Detected by Protection Systems	SOF Review – Liaise with TOs	May 2015
		Voltage Dips	Trip of Embedded Generation without FRT Capability	SOF Review – ENTSO-E RfG / Grid Code	2015-2016
		Voltage Management	Maintaining Voltage within Statutory Limits	SOF Review – NESOS –System Regional NSG Integration Studies	May 2015
		Resonance and Harmonics	Excessive Harmonic Voltage Distortions	Grid Code – G55 development	Summer 2015
	Conventional Generator Closures and Increase in Distributed Generation	CSC HVDC Link Commutation	Inability to Import/Export Power Across CSC HVDC Links	SOF Review – SESG - Liaising with TOs/ Manufacturer	Continuous review
		Emergency System Restoration	New restoration services and methodologies	SOF Review – Black Start Improvement Project	2016
New Technologies	System Inertia and Short Circuit Level	New System Study Methodologies, services and asset investment	SOF Review – System Regional NSG Integration Studies	Continuous review	
	Series Compensation	Sub-Synchronous Resonance	Interaction with the mechanical shafts of thermal units & shaft fatigue	SOF Review – Development of Study Capability	Continuous review
	New CSC HVDC Links	Control Systems	Adverse interaction with existing control systems (AVR/Governors/SVCs/STATCOMS)	SOF Review - Development of Study Capability	Continuous review
	New VSC HVDC Links				

Internal Activities

Joint activities / working groups

Engagement Forums

SOF Engagement

Generation

Operational Forum - Grid Code Review Panel - Compliance Meetings

- New services
- New generation technologies
- Generation withstand capability
- Modelling issues
- Installations worldwide
- Compliance issues
- Grid services to the generators
- Joint innovation projects

Transmission

SQSS - STC – JPC- Grid Code Review Panel - Liaison Meetings

- Investment optimisation for design and operation
- New transmission technologies
- Operability and regional strategies
- SQSS and Code development
- Modelling issues and data exchange
- Joint innovation projects

Distribution

ENA Grid Code & Distribution Code Review Panel – T&D Liaison

- Investment optimisation for design and operation
- New demand side technologies (i.e. heat pumps, DSR, storage)
- Operability and regional strategies
- SQSS, Grid Code and Distribution Code development
- Modelling issues and data exchange
- Joint innovation projects

Supply Side

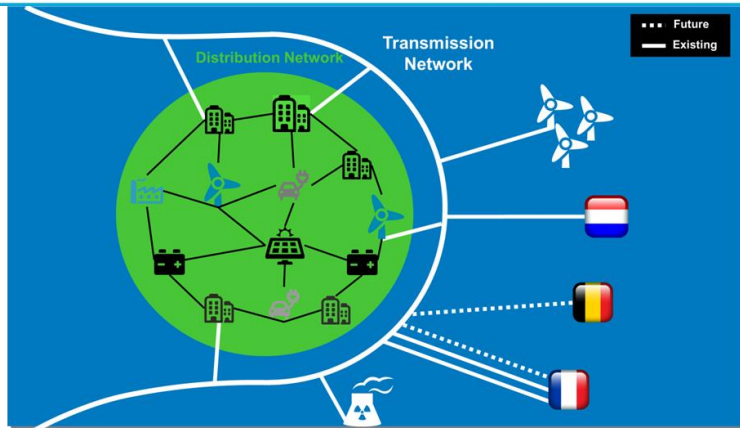
Operational Forum - Liaison Meetings

- Demand Side Services
- Code development
- Operability of new technologies
- Modelling techniques (i.e. modelling DSR effects)
- Joint innovation projects

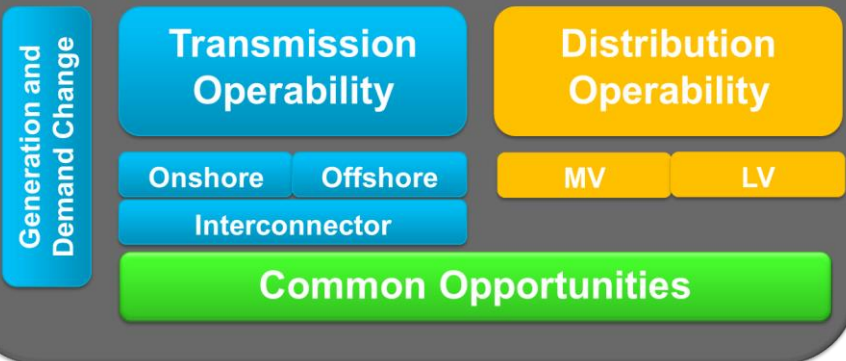
Example – South East Smart Grid

Investigating a joint T&D approach in coordinating the resources across the networks to benefit the consumer; whilst making sure the effects on both networks are well understood.

Transmission and Distribution working together



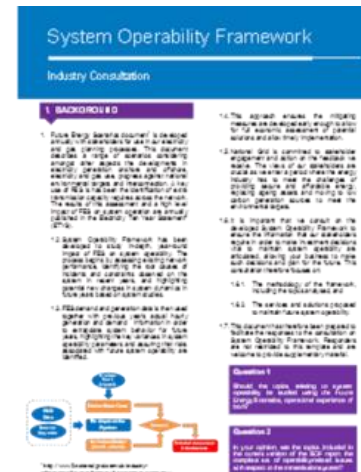
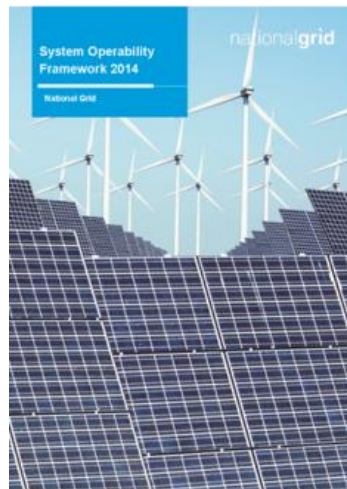
GB Power System Operability



a theme for future SOF?

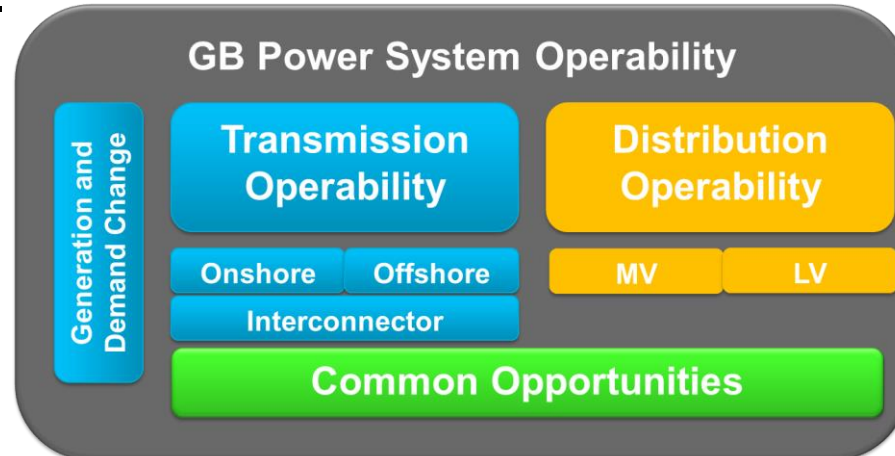
System Operability Framework Consultation Responses

Top 4 Topics



More focus on the Demand Side

- SOF does take into account the impact of change in demand side on the transmission networks.
- Way forward:
- In the next version, with more collaboration with the DNOs, and review of the existing works (i.e. WS7) this will be better addressed.



Review of existing unutilised capabilities within service providers

- Number of technologies already deployed on the system are capable of providing number of services required for operability
 - i.e. Storage, Windfarms, Interconnectors, DSR
- Valuation
 - Single service vs overall capability

Development of Long-term solutions require incentives

- Example – SOF makes reference to synchronous compensator – the next fleet of CCGTs can be designed in such a way to have the capability of operating at low load/no load to provide this capability.
 - Long term contract

Timeline to deliver solutions

- Clear roadmap showing the activities leading to create new opportunities and solutions for whole system operability
 - Innovation
 - Technology development
 - New services

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System Operability Framework

Thank you for your attention

For more information please email:

box.transmission.SOF@nationalgrid.com

The screenshot shows the National Grid website interface. At the top left is the 'nationalgrid' logo. To the right are links for 'Corporate | UK | US | Media'. Below the logo is a search bar with a magnifying glass icon. A navigation menu includes 'Home', 'Our services', 'Our company', 'In your area', 'Industry information' (highlighted in blue), and 'Careers'. Below the navigation is a red banner image. The main content area is titled 'System Operability Framework'. On the left is a sidebar with links: 'Industry information', 'Domestic gas customer satisfaction survey', 'Gas Commercial Frameworks', 'Gas Distribution Shipper information', 'Gas capacity methodologies', 'Gas Transmission operational data', and 'Gas transmission system'. The main text describes the Future Energy Scenarios (FES) document and the System Operability Framework (SOF). It states that the SOF is developed annually with stakeholders and is used for electricity and gas planning. The SOF document describes a range of scenarios considering other aspects of the developments in electricity generation onshore and offshore, electricity and gas use, progress against national environmental targets and interconnection. A key use of FES has been the identification of extra transmission capacity required across the network. The results of this assessment and a high level impact of FES on system operation are annually published in the Electricity Ten Year Statement (ETYS). The SOF has been developed to study in-depth, year-round impact of FES on system operability. The process begins by assessing existing network performance, identifying the root causes of incidents and constraints observed on the system in recent years, and highlighting potential new changes in system dynamics in future years based on system studies. National Grid is committed to stakeholder engagement and action on the feedback we receive. The views of our stakeholders are crucial as we enter a period where the energy industry has to meet the challenges of providing secure and affordable energy, replacing ageing assets and moving to low carbon generation sources to meet the environmental targets. It is important that we consult on the developed System Operability Framework to further develop this framework, and therefore we appreciate if you participate in our question based consultation. The response to the SOF questionnaire should be sent to box.transmission.sof@nationalgrid.com by 10 October 2014. A 'Privacy' link is visible in the bottom right corner.

<http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/System-Operability-Framework/>