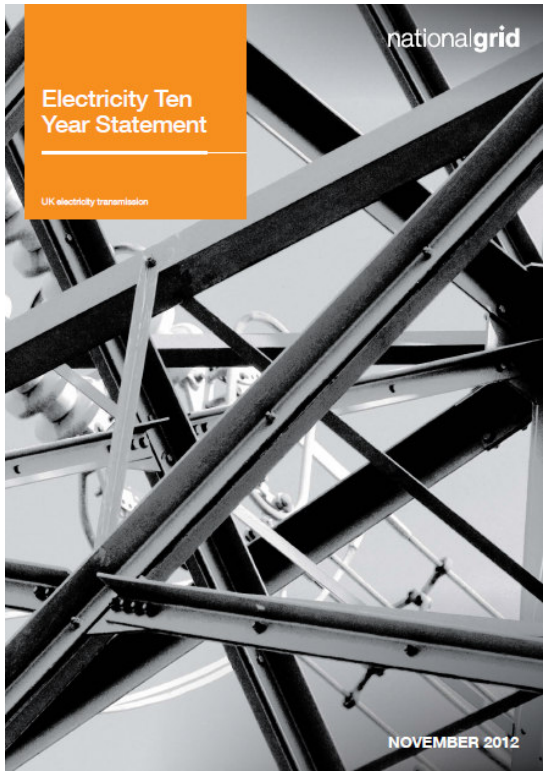
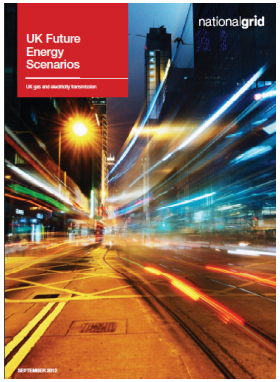
# Electricity Ten Year Statement

- Electricity Ten Year Statement (ETYS) covers:
  - Impact of energy scenarios on the development & operation of the electricity transmission network
  - Network Development Policy (NDP) for England & Wales - defines how we assess the need to progress wider system reinforcements



# Electricity Ten Year Statement

- The Electricity Ten Year Statement covers:

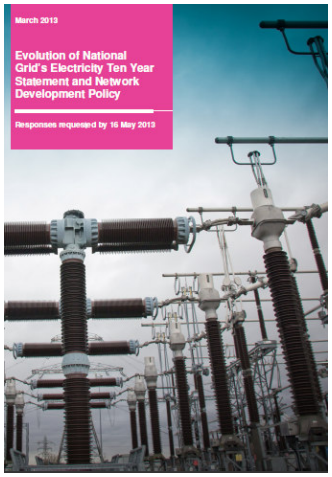



**Summary of UK Future Energy Scenarios**

**Development of the Electricity Transmission System**

**System Operation**

**Developing the ETYS**



# Development of the Electricity Transmission System

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- Policies used in developing the Electricity Transmission System
  - How to connect
  - Design criteria for the system
  - Network Development Policy
  - Technologies available

**What information do you use?**

**What would you like to see here?**

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# Network Development Policy (NDP)

- The NDP considers the timing of wider system reinforcements against the risks including

| If too early | If too late |
|---|---|
| •Higher financing costs<br>•Increased stranding risks<br>•Higher securities costs | •Higher BSUoS costs<br>•Network access issues |

- NDP approach aims to deliver a transparent dynamic process to promote timely investment for aggregate demand and generation patterns.
- NDP should allow stakeholders to understand why decisions to build, and not to build, have been taken.

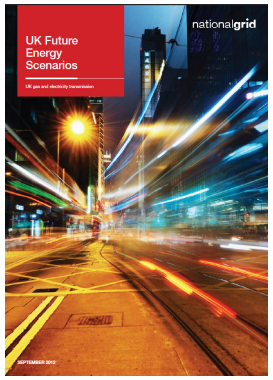
**What are your views on our NDP approach?**

**Does the NDP represent the appropriate balance between investment and alternative options?**

# Proposed Network Development Policy

## Input

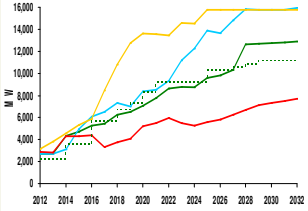
Stakeholder engagement process




UK Generation and demand Scenarios

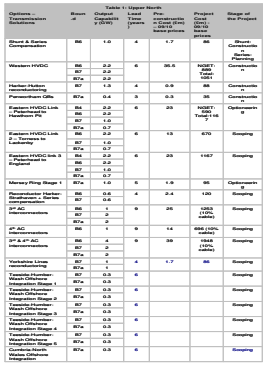
## Requirements

Identify future transmission capability requirements

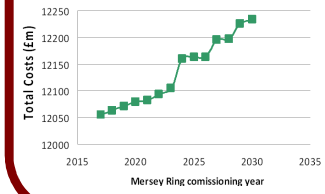



## Solutions

Identify future transmission solutions

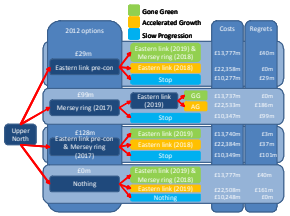


Calculate operational costs for transmission solutions

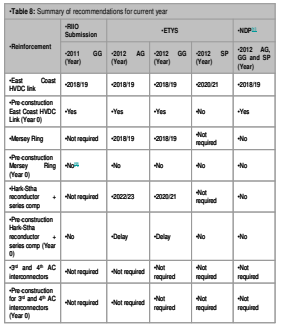



## Select

Development of Options




Selection of preferred option



•Table 8: Summary of recommendations for current year

| •Reinforcement | •RIIO Submission | •ETYS | | | | •NDP[1] |
|---|---|---|---|---|---|---|
| | •2011 (Year) GG | •2012 (Year) AG | •2012 (Year) GG | •2012 (Year) SP | | •2012 AG, GG and SP (Year) |
| •East Coast HVDC link | •2018/19 | •2018/19 | •2018/19 | •2020/21 | | •2018/19 |
| •Pre-construction East Coast HVDC Link (Year 0) | •Yes | •Yes | •Yes | •No | | •Yes |
| •Mersey Ring | •Not required | •2018/19 | •2018/19 | •Not required | | •No |
| •Pre-construction Mersey Ring (Year 0) | •No[2] | •No | •No | •No | | •No |
| •Hark-Stha reconductor + series comp | •Not required | •2022/23 | •2020/21 | •Not required | | •No |
| •Pre-construction Hark-Stha reconductor + series comp (Year 0) | •No | •Delay | •Delay | •No | | •No |
| •3rd and 4th AC interconnectors | •Not required | •Not required | •Not required | •Not required | | •Not required |
| •Pre-construction for 3rd and 4th AC interconnectors (Year 0) | •Not required | •Not required | •Not required | •Not required | | •Not required |

## Output

ETYS


Capital Plan

# Development of the Electricity Transmission System

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- Impact of demand and generation scenarios on the development of the Electricity Transmission System
  - Connection Opportunities
  - Potential reinforcements across system boundaries
  - Regional Strategies
  - European interconnection

**How would you like to see potential connection opportunities highlighted?**

**What would you like to see explained for each region?**

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# Example Boundary Section from 2012 (1)

## 3.7.7 Boundary B7

Figure B7.1:
**Geographical representation of boundary B7**


Boundary B7 bisects England south of Teesside. It is characterised by three 400kV double circuits, two in the east and one in the west. The area between B6 and B7 is traditionally an exporting area, and constrained by the power flowing through the region from Scotland towards the South with the generation surplus from this area added.

### Generation Background

In all scenarios there is an increase in generation output over the period considered, as the boundary is influenced by everything north of Teesside. In addition to that identified in the B6 section there is a further 4 GW of offshore wind, 3 GW of new nuclear and 1.4 GW of new interconnector capacity contracted to connect.

### Potential Reinforcements

Potential reinforcements for the period to 2032 are listed in Table B7.1 on page 118. This boundary tends to be limited by thermal constraints, so most of the reinforcements involve either upgrading existing lines or constructing new ones.

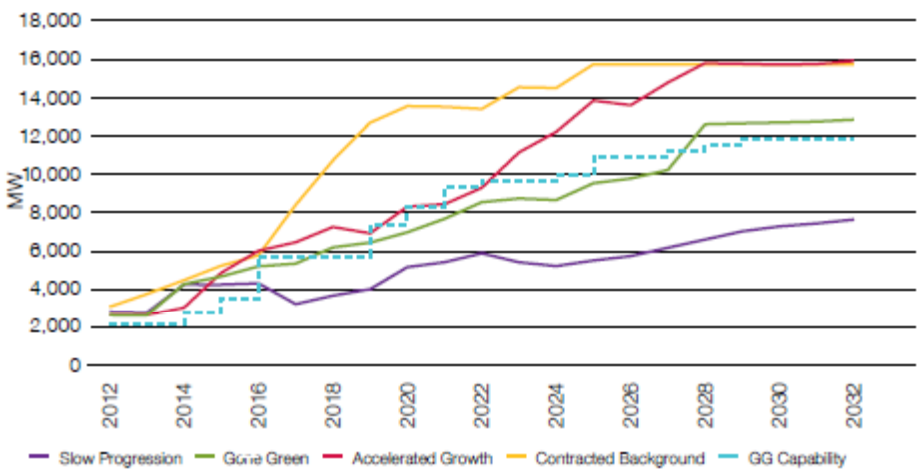
- Map
- Generation Background
- Potential reinforcements

Table B7.1:
**List of potential reinforcement projects in the EC1 boundary**

| Ref | Reinforcement | Works Description |
|---|---|---|
| B6-R01 | Series and Shunt compensation | Series compensation to be installed in Harker–Hutton, Eccles–Stella West and Strathaven–Harker routes. Two 225MVar MSCs are to be installed at Harker, one at Hutton, two at Stella West and one at Cockenzie. Strathaven–Smeaton route uprated to 400kV and cables at Torness uprated |
| B7-R01 | Harker–Hutton reconductoring | Reconductoring of the Harker–Hutton–Quernmore circuits with higher rated conductor |
| B6-R02 | Western HVDC link | A new 2.4 GW (short-term rating) submarine HVDC cable route from Deeside to Hunterston with associated AC network reinforcement works on both ends |
| B7-R02 | Harker–Stella West series compensation | Installation of series compensation in the Harker–Stella West circuits |
| B7a-R03 | Yorkshire Lines reconductoring to 3100MVA | Reconductoring the existing two double circuits crossing B7 in the East, Lackenby–Thornton and Norton–Osbaldwick with higher rated conductor |
| B6-R03 | Eastern HVDC link 1 | A new ~2 GW submarine HVDC cable route from Peterhead to Hawthorn Pit with associated AC network reinforcement works on both ends. Possible Offshore HVDC integration in the Firth of Forth area |
| B6-R05 | Eastern HVDC link 2 | A new ~2 GW submarine HVDC link between Lackenby and Torness with associated AC network reinforcement works on both ends |
| B7-R03 | Eastern HVDC link 3 | ~2 GW of second HVDC link from Peterhead to England with associated AC network reinforcement works on both ends |
| B7-R04 | New Cumbria–Lancashire transmission route | Construction of new transmission route from Cumbria to Lancashire across the B7 and B7a boundaries |
| OS Link-01 | Teesside–Humber Offshore Integration | Offshore integration between Teesside, Dogger Bank offshore project and Humber region |
| OS Link-03 | Teesside–Wash Offshore Integration | Offshore integration between Teesside, Dogger Bank, Hornsea offshore projects and Wash region |

# Example Boundary Section from 2012 (2)

Figure B7.2:
**Required transfer and capability for boundary B7**




**Boundary Discussion and Opportunities**
Figure B7.2 above shows the required transfer capabilities from 2012 to 2032 for the four different scenarios, as well as the optimum reinforcements and their timing for the Gone Green scenario. Beneath, Table B7.2 identifies the reinforcements selected for each scenario.

- Transfer requirements & capabilities
- Timing of reinforcements by scenario

Table B7.2:
**Selection and timing of reinforcements**

| Ref | SP | GG | AG | C |
|---|---|---|---|---|
| B6-R01 | 2015 | 2015 | 2015 | 2015 |
| B7-R01 | 2014 | 2014 | 2014 | 2104 |
| B6-R02 | 2016 | 2016 | 2016 | 2016 |
| B7-R02 | 2029 | 2019 | 2016 | 2016 |
| B7a-R03 | – | 2020 | 2018 | 2018 |
| B6-R03 | 2026 | 2019 | 2019 | 2019 |
| B6-R05 | – | 2021 | 2019 | 2019 |
| B7-R03 | – | 2025 | 2020 | 2020 |
| B7-R04 | – | – | 2025 | 2023 |
| OS Link-01 | 2025<br>2027 | 2022<br>2024<br>2027<br>2028 | 2019<br>2021<br>2024<br>2025<br>2027<br>2029 | 2017<br>2019 |
| OS Link-03 | – | 2029 | 2026<br>2028<br>2030 | – |

The Harker–Hutton (B7-R01) reconductoring and Western HVDC link (B6-R02) works will increase system capability significantly by 2016. In order to realise the full benefit of B7-R01, the series and shunt compensation scheme on B6 (B6-R01) is required.

In the Slow Progression scenario, an Eastern HVDC link in 2020, and the Harker–Stella West series compensation in 2029 is required. As identified in section B6, for Gone Green and Accelerated Growth the reinforcements identified represent a significant challenge if they are to be delivered by the dates specified. The integrated connection of offshore wind generation provides additional capability in later years. The connection of new nuclear generation in the Contracted and Accelerated Growth backgrounds requires an additional transmission route across the boundary (B7-R04) which would increase capability by an estimated 3.5 GW. The Contracted Background still requires further reinforcement from 2023, as does Gone Green from 2028. These could include additional offshore or onshore circuitry, but at this time detailed solutions have not been developed.

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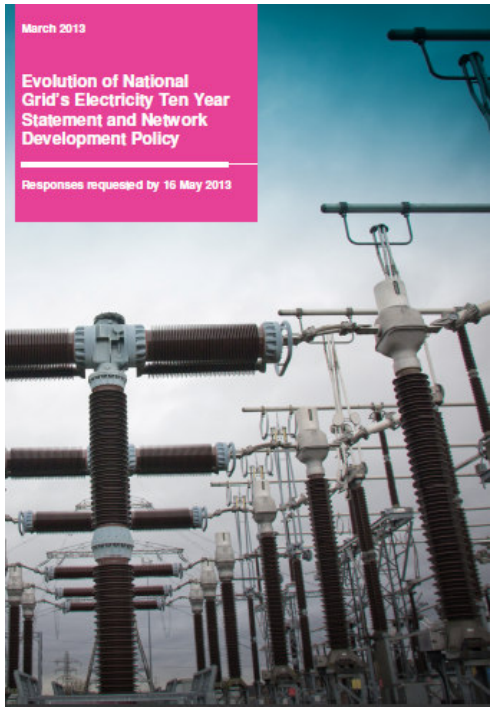
# System Operation in the ETYS

- System Operation chapter includes high level overview of:
  - Impacts of energy scenarios on network operability & dynamics
  - Options to resolve operability challenges including tools, products and technologies for design and operation of the transmission system:
    - E.g. Rapid Response to manage frequency
  - We're co-ordinating this area with Commercial Balancing Services Group

**What information you would like to see on potential solutions to operational challenges?**

# ETYS & NDP Consultation

- Your opportunity to influence:
  - The information we provide to meet your needs & increase transparency
  - How we minimise network operation costs
  - Discussion of all opportunities to innovate
- Please take the time to respond to our consultation by **Thursday 16th May** at




http://www.nationalgrid.com/uk/Electricity/ten-year-statement/consultation/

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