Grid Integration



Martin Moran – Electricity Customer Service Manager

Thursday 5 June 2014

Overview

- Who are National Grid
- GB energy landscape
- Key challenges
- GB offshore wind
- Future scenario - 2020
- Offshore integration and co-ordination

National Grid

- We play a vital role in delivering gas and electricity to millions of people in a safe, efficient and reliable manner.
- International electricity and gas company based;
  - UK
  - North East United States
- One of the largest investor-owned utilities in the world.
  - Significant income derived from Regulated Businesses
    - 65% Operating Profit derived from UK Regulated Business
    - 35% Operating Profit derived from US Regulated Business
  - Almost 15 million customers
  - Circa - 26,000 -plus employees

National Grid

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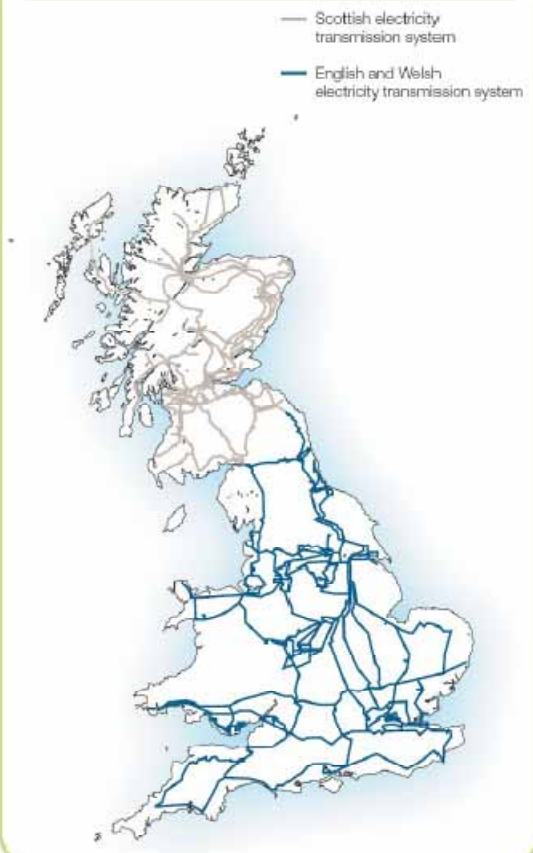
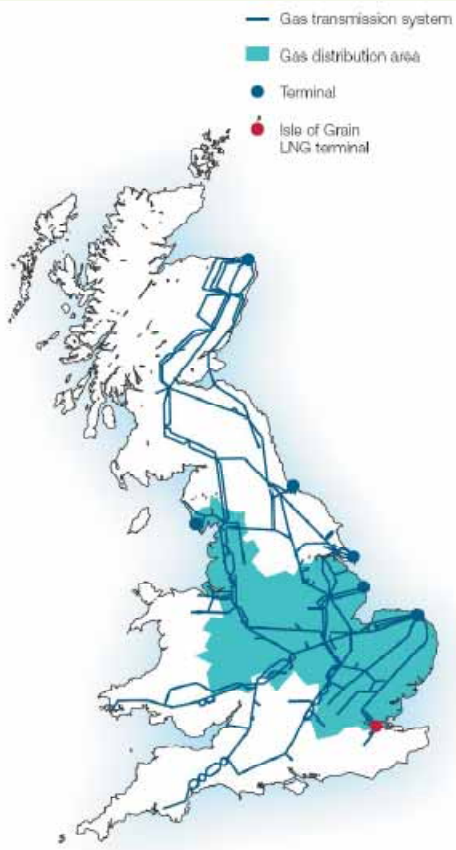
Electricity – UK



Gas – UK



Electricity – US

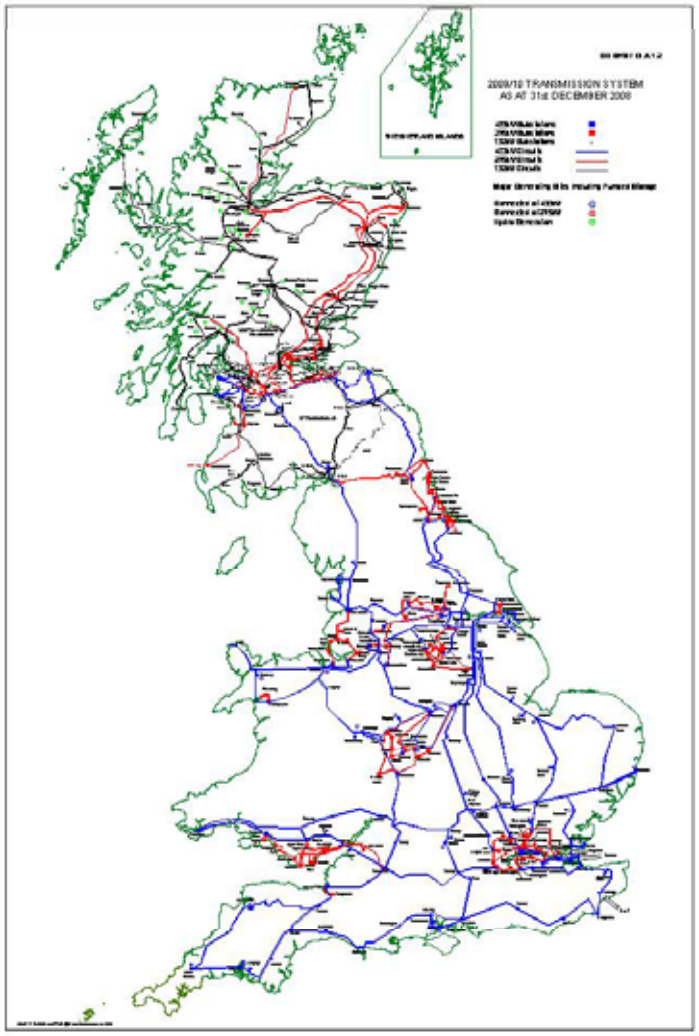
Gas – US

UK and US

Electricity and Gas

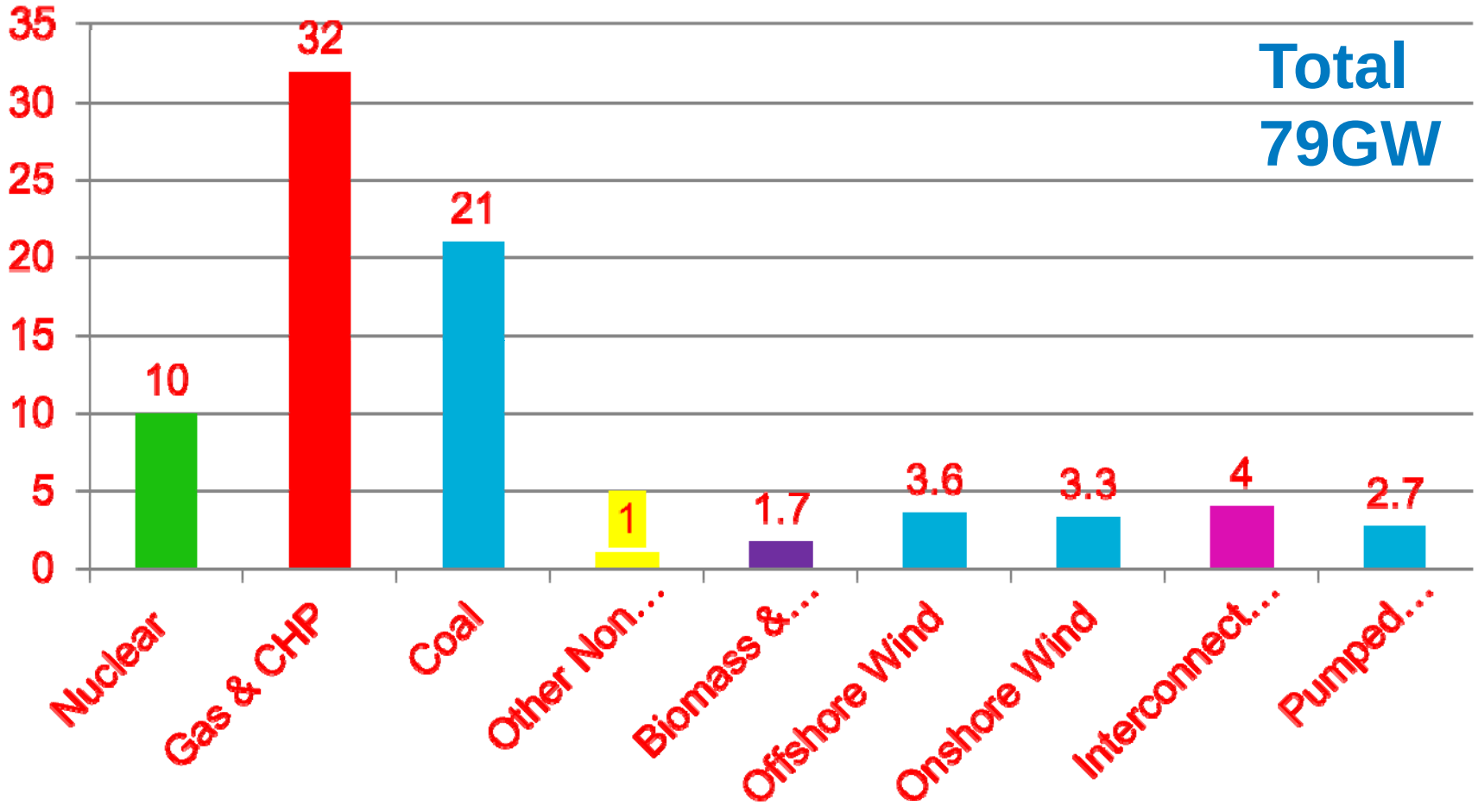
Transmission & Distribution

The GB Electricity Transmission System

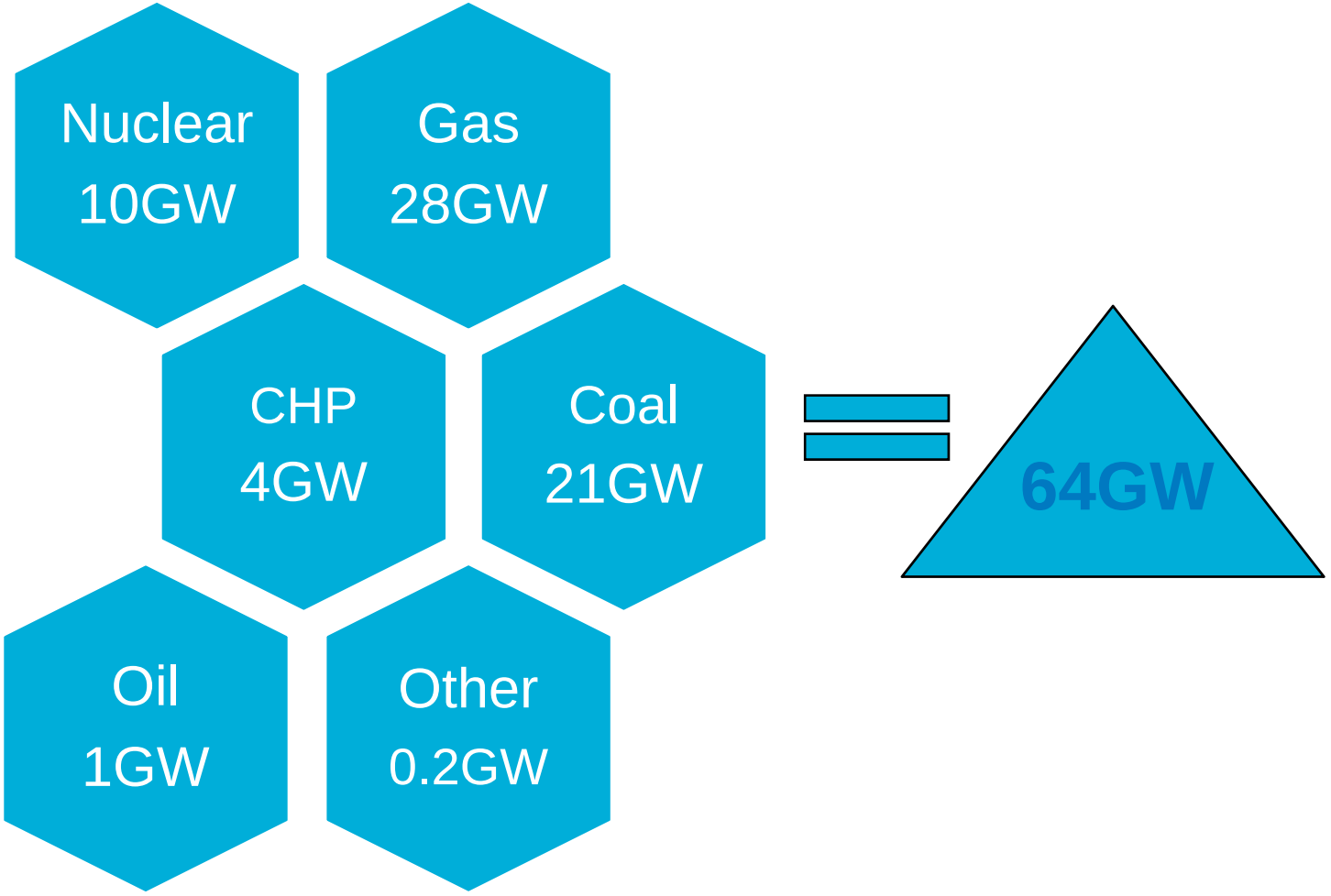


- 1 x System Operator (SO)
  - National Grid
- 3 x Transmission Owners
  - National Grid
  - SSE
  - Scottish Power
- Peak Demand ~ 58 GW
- Minimum Demand ~ 20 GW

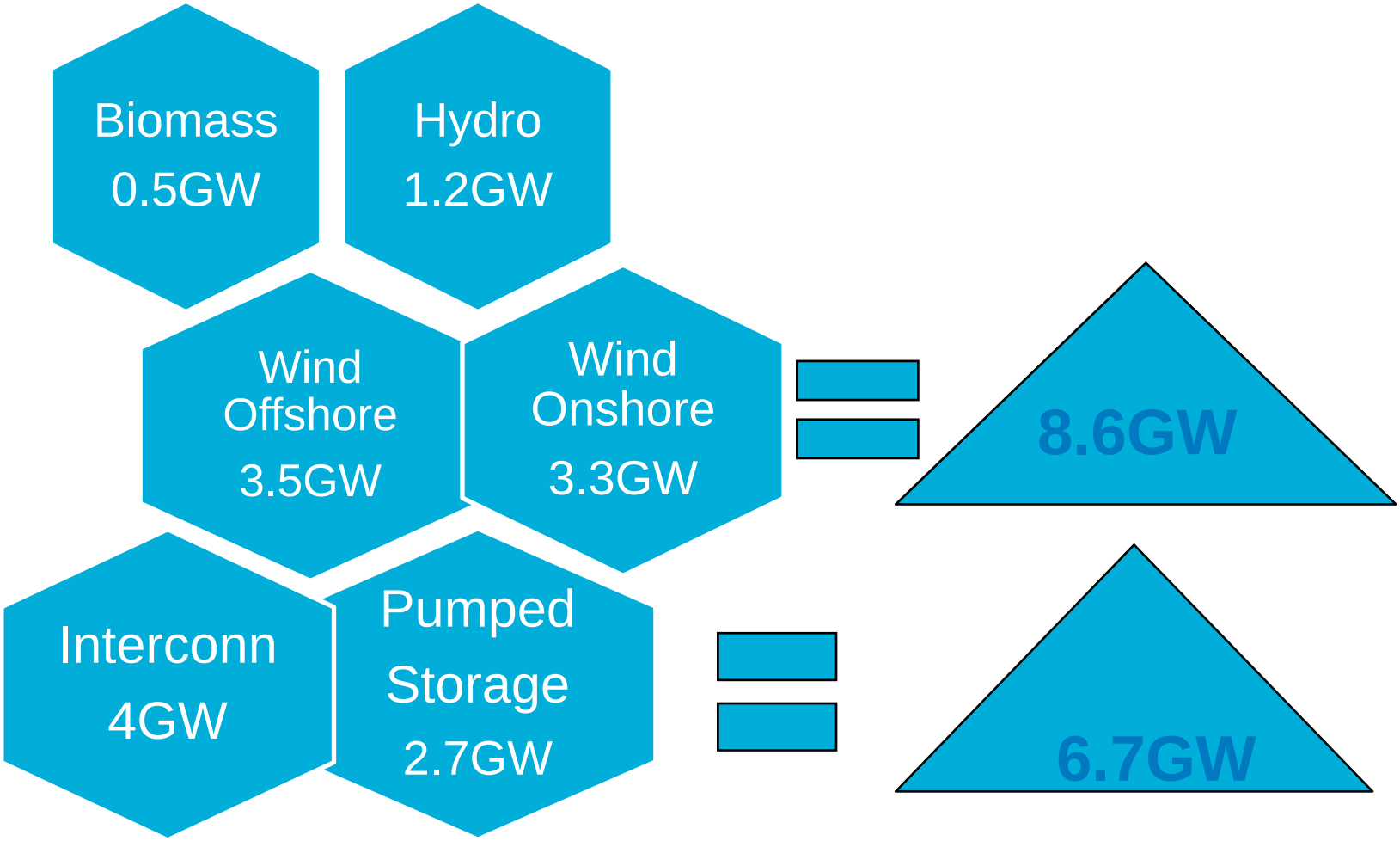
GB contracted generation



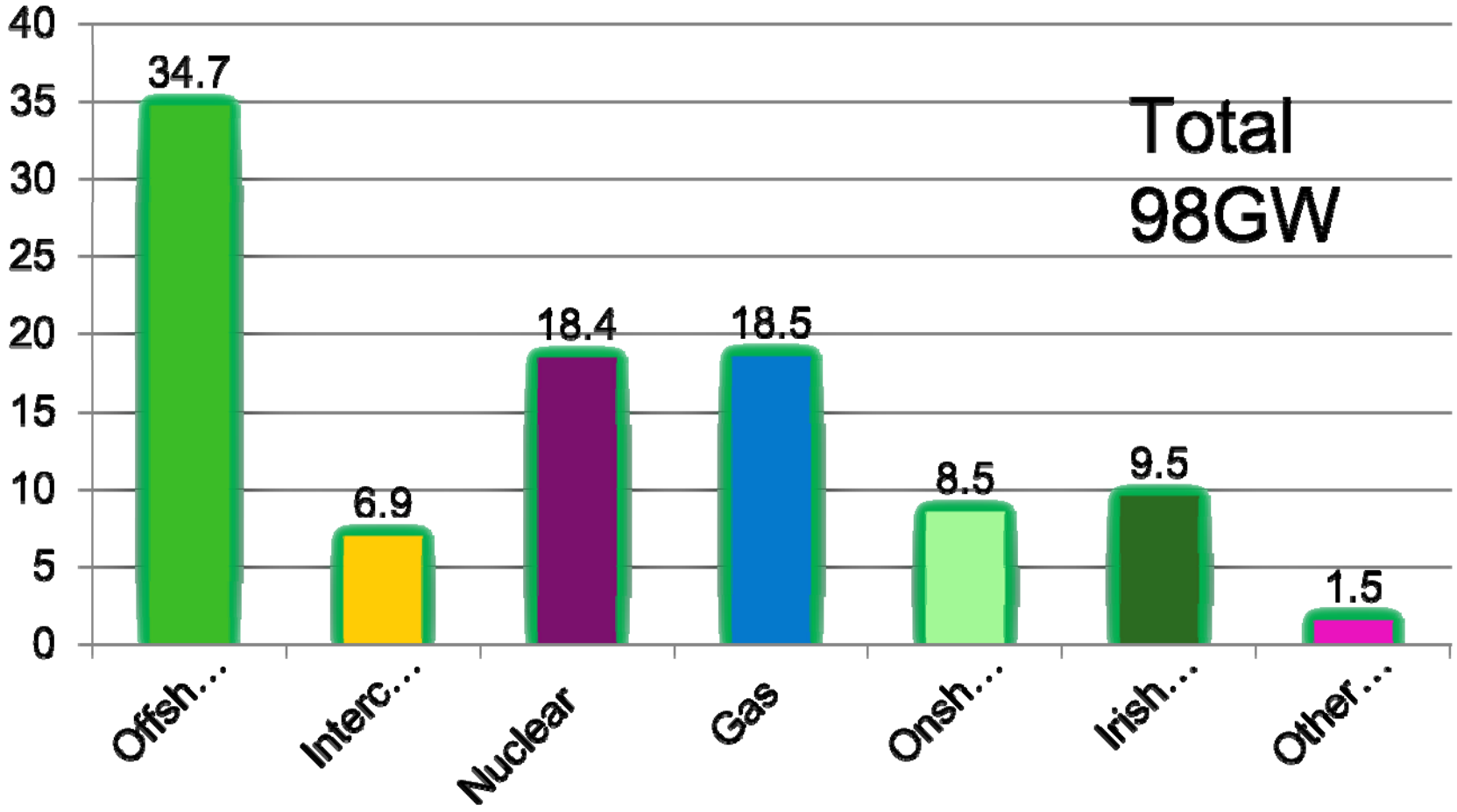
GB Connected non renewable



GB Connected renewable & other



GB contracted generation - 2026

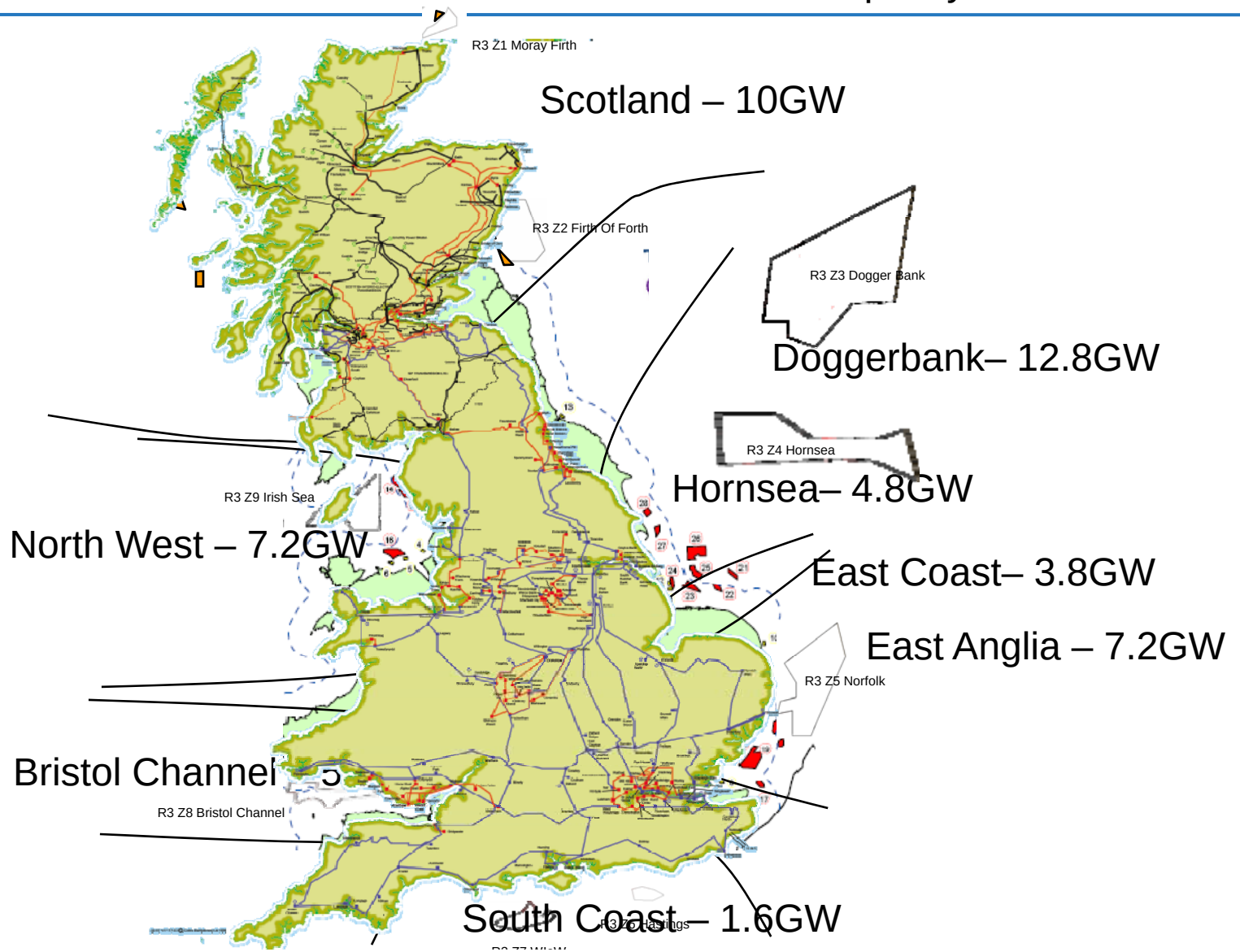


GB – key challenges

- World recession
- Developer uncertainty
- Funding / Revenue streams for Developers (EMR)
- Transmission v Developer lead time to build
- Closure of existing plant v delay in new build
- Managing a constraint network
  - Wind constraint payments
  - Facilitating a potential 180GW network
- Managing large scale offshore integration

Offshore wind in GB

Total Capacity to 2032 ~ 51GW



Offshore wind in GB

- Contracted capacity of 34.7GW (33.5GW)
- Q1 2014 – 5GW Terminated
  - Consents
  - Finance
  - Joint venture – non agreement
- Significant connections from 2017
- Challenges in keeping up with new technology

New Technology and Innovation

Requires developing and understanding

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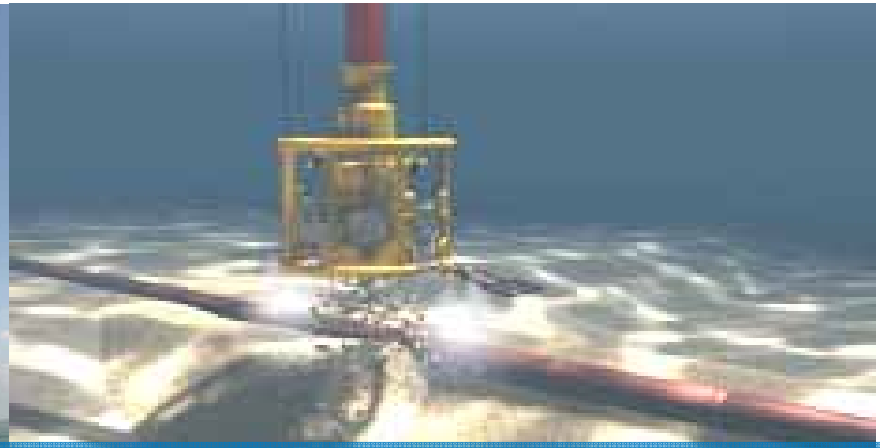
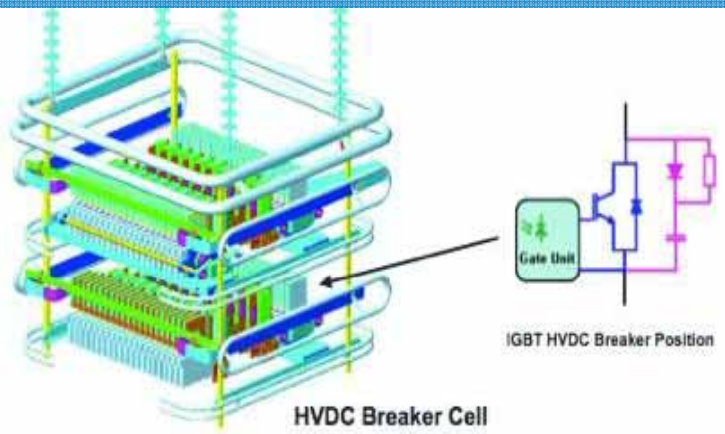
Platforms



Subsea Cables

HVDC Converters



What Next?

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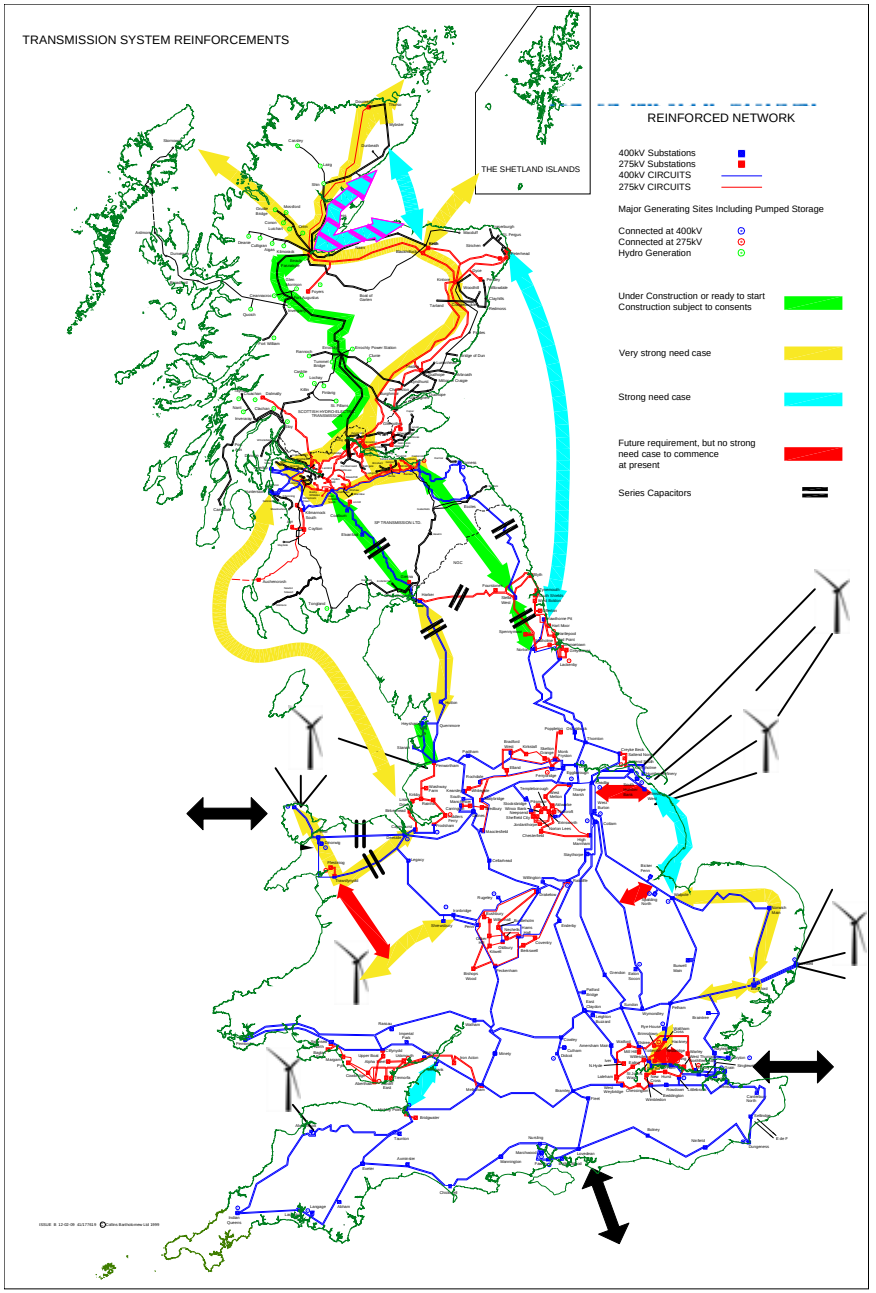
An NGET Future Scenario

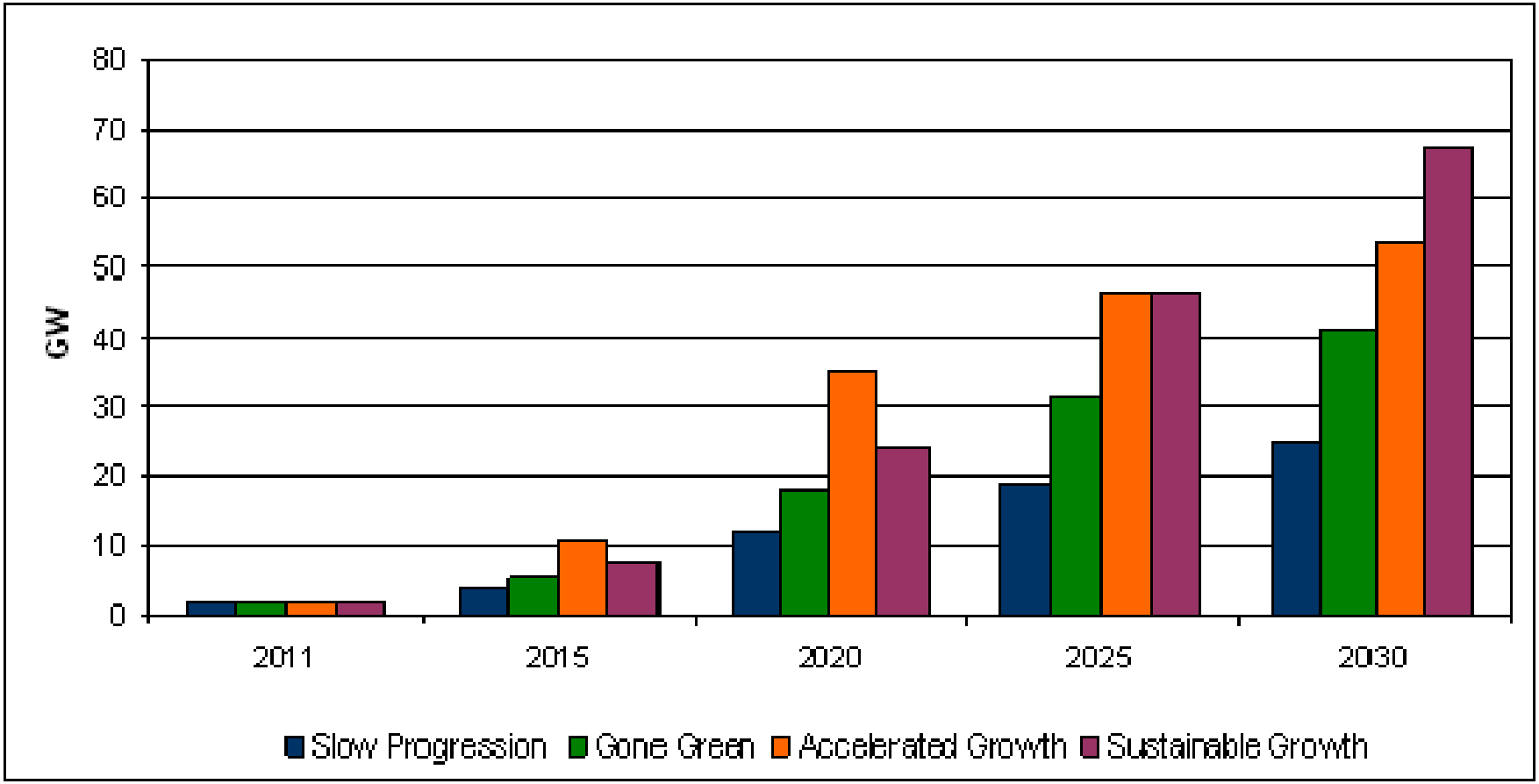
‘Gone Green 2020’

- Plant closures
  - 12GW Coal & oil LCPD
  - 7.5GW nuclear
  - Some gas & additional coal
- Significant new renewable
  - **29 GW wind (2/3 offshore)**
  - Some tidal, wave, biomass & solar PV
  - Renewable share of generation grows from 5% to 36%
- Significant new non renewable build
  - 3GW of new nuclear
  - 3GW of new supercritical coal (some with CCS)
  - 11GW of new gas
- Electricity demand remains flat (approx 60 GW)
  - Reductions from energy efficiency measures
  - Increases from heat pumps & cars

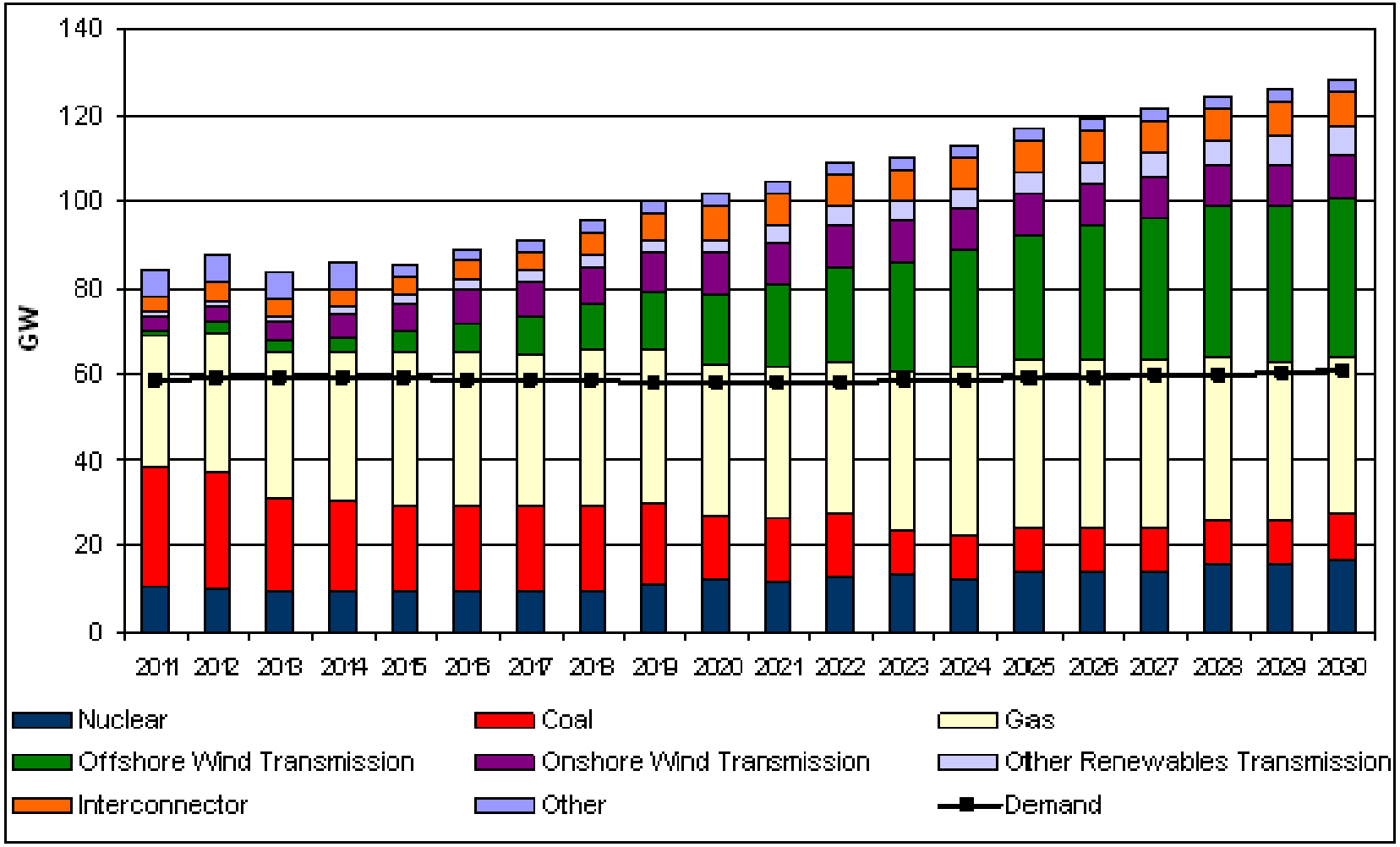
Strategic Reinforcements



Offshore Generation Scenario Capacity Comparison



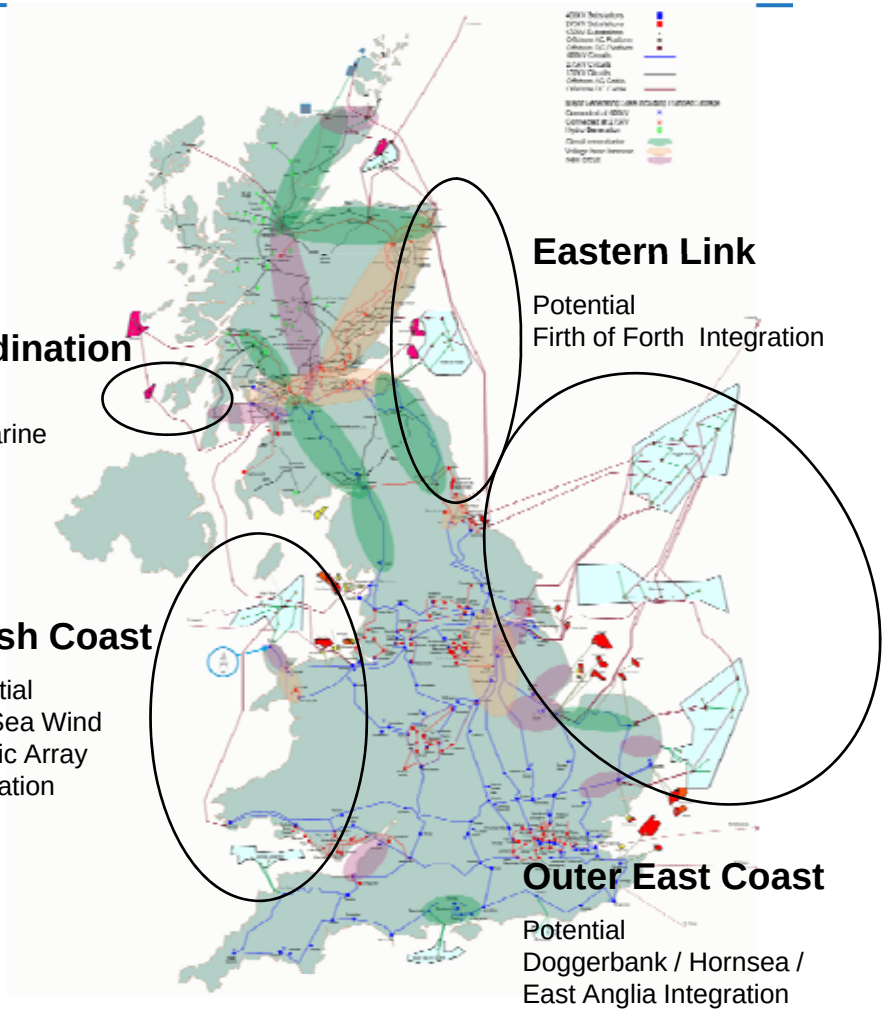
Gone Green Transmission Capacities



Offshore Integration and Coordination

Potential development

- **Integration / Coordination**
- **Offshore Regime**
  - Not fit for purpose
  - Integrated Transmission Planning & Regulation Project (ITPR)
  - Ofgem's "Consultation on a proposed network framework to enable coordination of offshore transmission"
- **Connections and Infrastructure Options Note (CION)**
  - Economic, Efficient and Coordinated with today's knowledge
  - Contracted based generation
- **Integrated Offshore Transmission Project (East) – IOTP (East)**
  - Strategic project development looking towards the future, providing wider system capability
  - Scenario based generation
  - Could influence contractual designs



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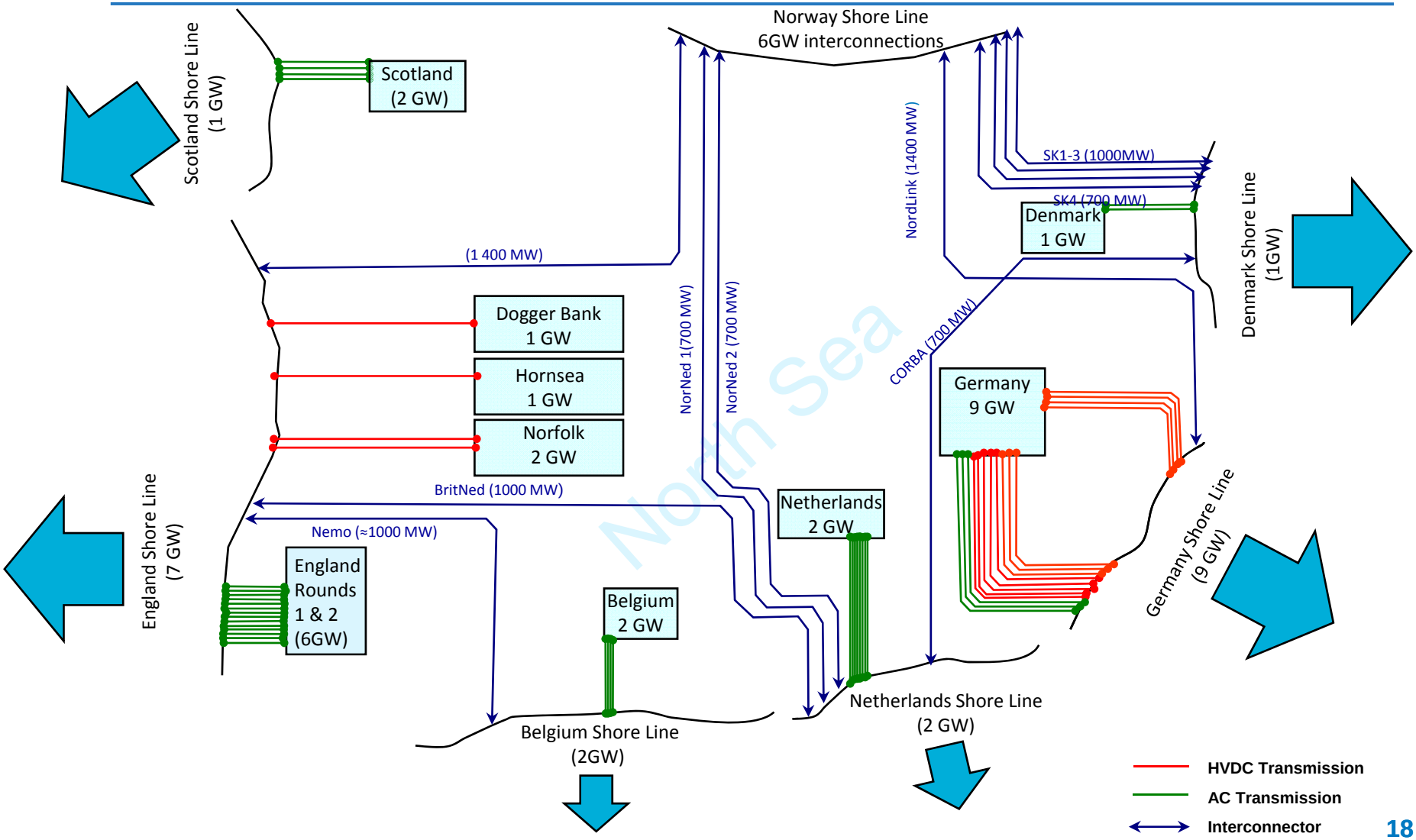
North Sea, 'in flight' and operational large projects up to 2020



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