

UK Interconnector Development

Lazarus Investor Lunch

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Agenda

1 – Introductions

2 – Opportunities

3 – Projects

4 – Investment Decision

5 – Regulatory Framework

National Grid has made a commercial success from electricity interconnectors – and has an opportunity to build more

Significant electricity interconnector experience

We currently own two interconnectors, linking GB to France and Holland:

	IFA		BritNed
What:	2GW, 70km	What:	1GW, 260km
Partner:	French TSO, RTE	Partner:	Dutch TSO, TenneT
Operational:	1985	Operational:	2011

Additionally we built and subsequently disposed of Basslink (Australia-Tasmania Link)

Increasing momentum in EU for more interconnection

- New Commission's proposal to create an "Energy Union" – details to be published Q1 2015
- EU objectives of interconnection capacity equivalent to 10% of installed generation capacity by 2020, and 15% by 2030
- Ambition to complete the European Internal Energy Market (IEM) by end-2015 to realise consumer benefits of competitive markets
- List of pan-EU "Projects of Common Interest" (PCI) to be updated Oct 2015
- Interconnection enables increased integration of renewable energy

Electricity interconnectors deliver many benefits

- Allow electricity to flow from lowest to highest priced country, generating revenue for owner, based on power price difference and capacity of cable.
- Significant socio-economic benefits
 - Lower prices for consumers
 - Increased security of supply
 - Helps intermittency issues posed by renewables
- Revenues in the form of capacity rents, from users - the greater the price difference, the greater the capacity rents

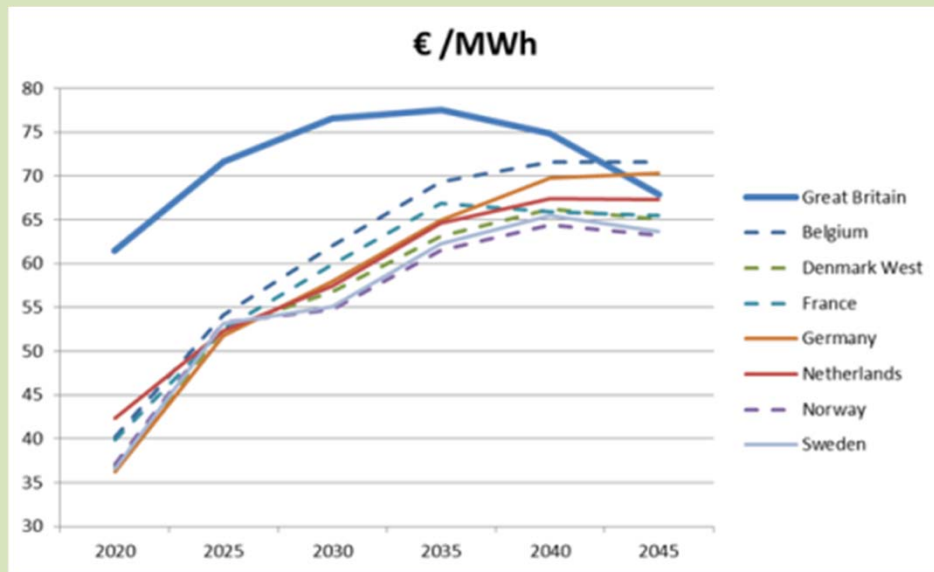
Separate and incremental to UK regulated operations

- Additional growth opportunity to existing RIIO businesses
- Separate business development team within National Grid with strict business separation
- New regulatory deal offers an improved fit with National Grid risk profile
- Returns available (and expected) above regulated UK returns
- Leverages our strong competitive position, operational expertise and experience in a competitive marketplace

Expectations for continued system variability and generation intermittency underpin confidence in future interconnector value

European power price differentials:

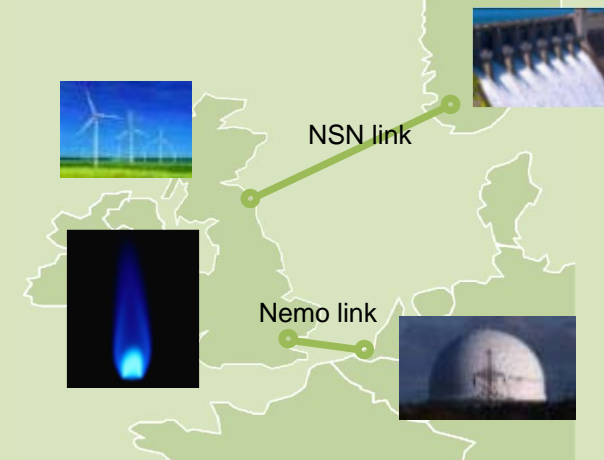
It is expected that future GB power prices will remain greater than European markets over the next 30 years to sustain the structural value of our planned interconnectors:



Source: Baringa modelling – reference case

Structural value:

'Structural' value of interconnectors is derived from fundamental differences in generating mixes and marginal price setting

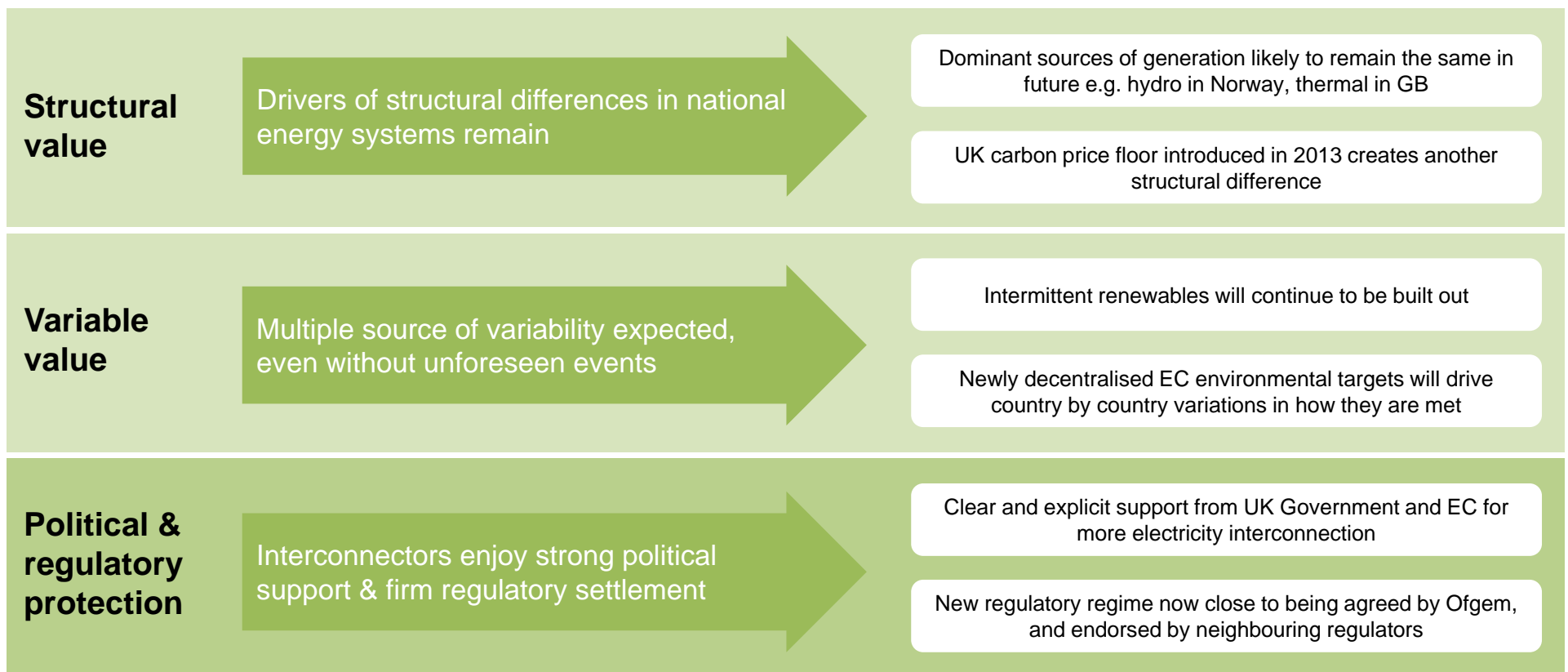


Variable value:

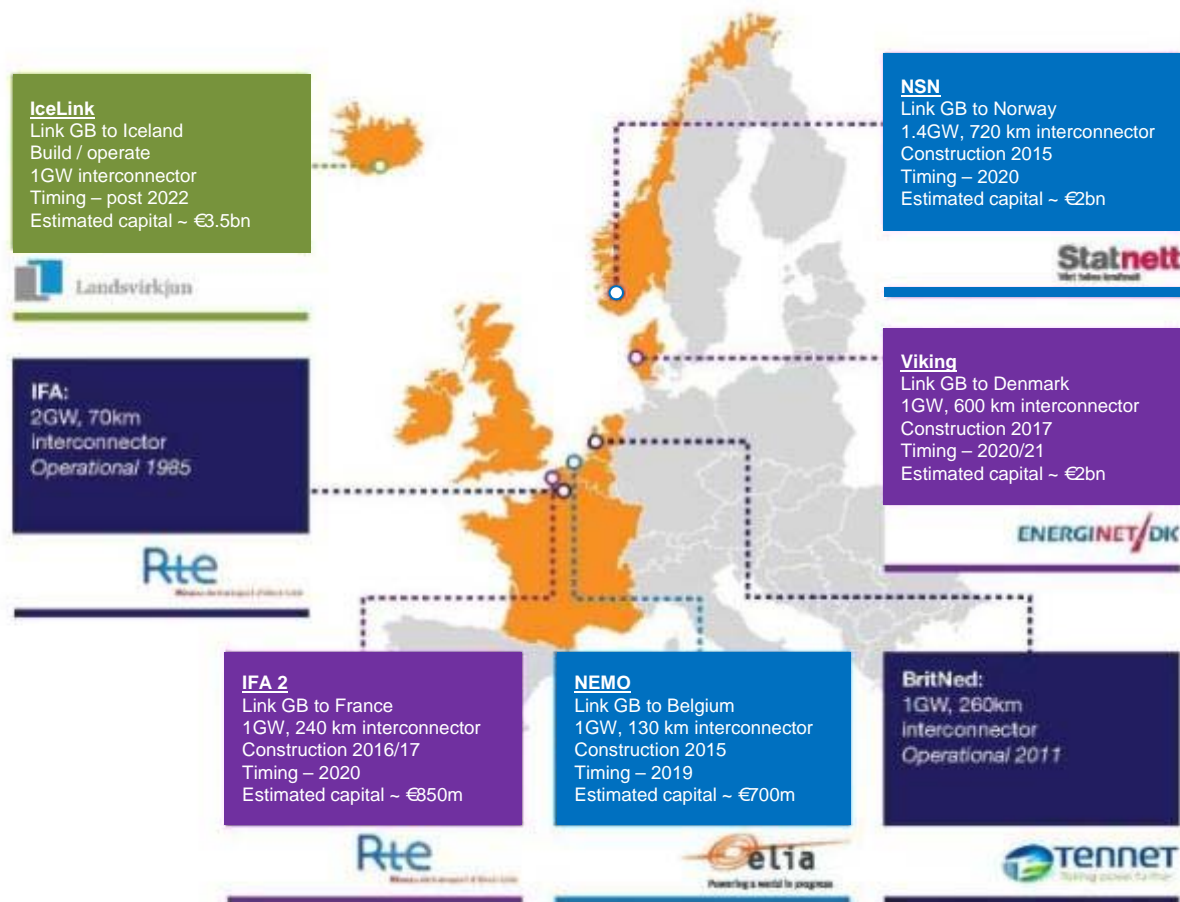
'Variable' value of interconnectors is derived from volatility which can be created by:

- Natural variability in weather conditions, influencing electricity demand and renewable production
- Key events, such as station outages or transmission failures
- Demand side management

The political and regulatory environment adds to expectations that financial performance of interconnectors can remain strong, or become stronger



Our current interconnector portfolio and partners



- Operational interconnector
- Investment decision expected 2015
- Investment decision expected 2016
- Investment decision expected 2017+

Depending on our partner, we may create each project either as an incorporated or unincorporated joint venture

The interconnector investment decision

Key characteristics and value drivers

- Strong TSO partnership arrangements and financing
- Strong political support
- Regulatory certainty
- Procurement and technical design capabilities
- Planning consents knowledge

Cost of getting to investment decision

Typically c. £20m

- Development of the optimised solution
 - Socio-economic study
 - System benefits and implications
 - Technical studies
 - Planning approvals
- Seabed survey
- Procurement events and Risk Management
- Regulatory approvals

Expected income streams

Potential sources of income

- Market arbitrage
 - 2015 – 2030 (primarily structural value)
 - 2030 – 2045 (increasing variable value)
 - Reacting to patterns of intermittent generation
- Capacity market payments
- Ancillary services – market expected to grow significantly
 - Frequency Response, Black Start
 - Existing suppliers shutting by 2020

Near-term investment decisions

Nemo

- GB and Belgian generation mixes share some similarities so structural value potentially lower than for other links
- Short link, so costs and technical challenges more manageable

NSN

- Very high structural value as generation mixes in GB versus Norway are very different
- Connection distance is long, presenting greater technical risks

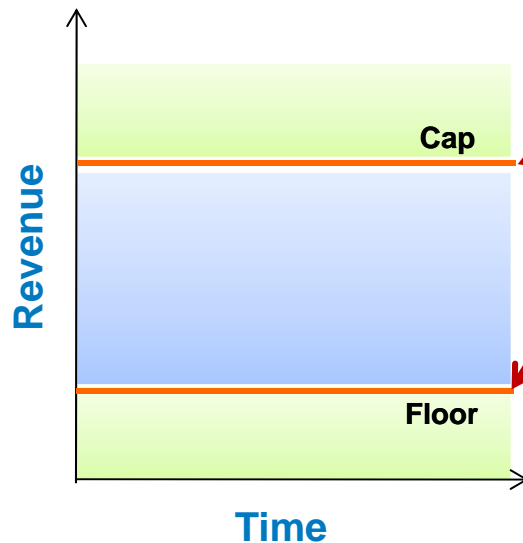
Cap and floor: The new regulatory regime for UK interconnection

UK is alone in requiring a developer-led model for interconnection compared to other EU countries, where it is the responsibility of the National TSO

In summer 2014 Ofgem launched a new, alternative regulatory regime to facilitate investment in UK interconnection, where it agrees the link is in consumers' interests

The new regime is open to any prospective developer and does not form part of the RIIO regime

Regulated Cap & Floor Model



- **Principle:** A single annual maximum (cap) and minimum (floor) level of revenue is set in real terms to apply for 25 years. Annual revenue allowance adjusted for (RPI) inflation: Interconnector revenues are assessed against the cap and floor levels every five years
 - If total revenues exceed the **cap**, NG returns additional profits to customers
 - If total revenues fall below the **floor**, NG can recuperate balance from GB customers through the electricity transmission system operator
- Cap & Floor revenue levels set based on efficient costs, which are assessed by Ofgem
 - Cap is set with reference to the cost of capital of a generator (e.g. 7.34% & 8.1% real post-tax allowed return for NEMO & NSN respectively)
 - Floor is set with reference to the cost of debt (e.g. 0.93% & 1.25% real post-tax allowed return for NEMO & NSN respectively)
- Cap delivers RoE materially higher than UK regulated returns

Capacity Mechanism:

Interconnectors were unable to participate in the first capacity auction held in December 2014 but will be able to participate from 2015 onwards

DECC has consulted on proposals for how best to amend the Capacity Market rules for subsequent auctions (for capacity delivered in Winter 2019/20):

- Due to publish the results from this consultation in mid-January
- Detailed views from DECC on the technical issues related to interconnector participation are also due in February

Rationale for inclusion within Capacity Markets from 2015

- Capacity markets could dampen wholesale electricity prices
 - Generators can be compensated for this loss through steady capacity payments
 - Including interconnectors in the Capacity Market levels the playing field
- Positive contribution made by interconnectors to security of supply
- EC challenge on the lack of participation by interconnectors within the market design

Technical issues

- Calculation of de-rating factors: interconnectors expected to be individually de-rated based on technical reliability and their contribution to GB security of supply
- Contract lengths: new build and existing
- Caps on penalty payments: penalties may be based only on unused import capacity, or also on export capacity (implying a double penalty)

Summary

1. Electricity interconnectors provide National Grid with a significant opportunity for incremental, value adding growth
2. Electricity interconnectors currently benefit from considerable political and regulatory support
3. National Grid is taking a leading role by developing a pipeline of projects
4. Multiple considerations in bringing any project to an investment decision – our experience and expertise provide a competitive advantage
5. Potential for both Nemo and NSN investment decision in Q1 2015