

Renewable Energy in Scotland



Context

Significant renewable energy opportunities across Europe

- Unique potential – particularly in and around Scotland and Ireland
 - Strategic will & development – in Scotland, UK and EU
 - Renewables: driver of economic growth and recovery
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- **Scotland:**
 - Enormous renewables potential;
 - Already doing it - realising that potential and planning more;
 - Skills harnessed – R&D capacity;
 - Strong energy sector capability;
 - Clear political and regulatory will;
 - Strong support from our enterprise agencies
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- **And the determination to work in partnership with UK, EU and North Sea partners**

The window of opportunity

- **The EU policy landscape:**
 - Strategic Energy Review – North Sea Grid as a priority;
 - Renewable Energy Directive –and National Action Plans to 2020 targets;
 - EU third liberalisation package – facilitating competition and liberalisation of energy markets and removing barriers
 - Identifying and removing barriers to trade in green energy and energy targets (such as extreme locational charging costs)
- **UK policy landscape:**
 - UK Climate Change Act 2008,
 - Transmission Access Review – and now DECC intervention for access for new generation,
 - Links with Ofgem and National Grid,
 - Crown Estate leasing of offshore renewable generation sites.
- **Scottish policy landscape:**
 - Responsive and stable regulatory regime – e.g. Marine Bill,
 - Climate Change Bill
 - National Planning Framework 2 – national infrastructure projects,
 - Streamlined consenting for renewables projects – onshore and offshore;
 - Proactive support for the energy sector from Government and its enterprise agencies
- **Current financial climate:**
 - Renewable energy as a driver of economic growth and recovery.

Government Targets can drive change

European Target: 20% of primary energy supply from renewable energy by 2020

Kyoto target: 60% emission reduction by 2050

UK Target

- 10% of energy from Renewables by 2010
- 30-35% by 2020
- Currently at 5%
- Climate Change Act 2008
- 80% cut in greenhouse gas emissions by 2050;
- a reduction in emissions of at least 34% by 2020

Scottish Target

- 31% by 2011;
- 50% by 2020;
- Currently at 20%;
- Climate Change Bill:
- 80% emission reduction target by 2050
- Interim target of 42% by 2020

Available Energy in Scotland

Scotland has around 25% of Europe's wind energy resource, with some of the best potential wind, wave and tidal sites

11% of Scotland's current demand for electricity is generated through hydro-power installations (85% of UK resource)

Scotland estimated to have 10% of Europe's wave resource and 25% of its tidal resource

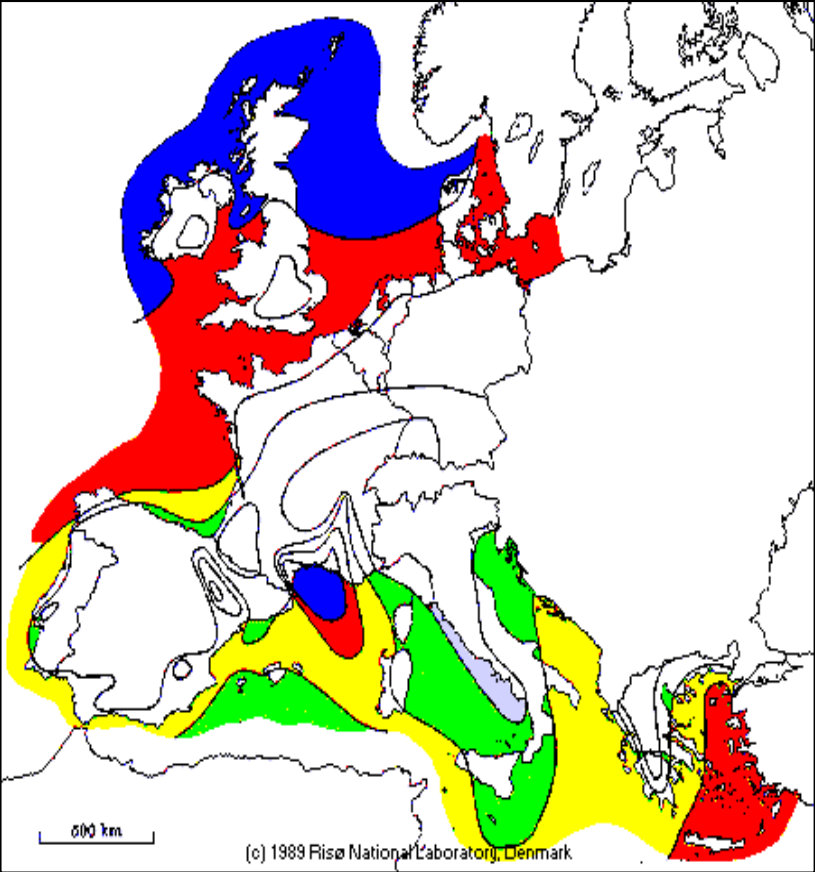
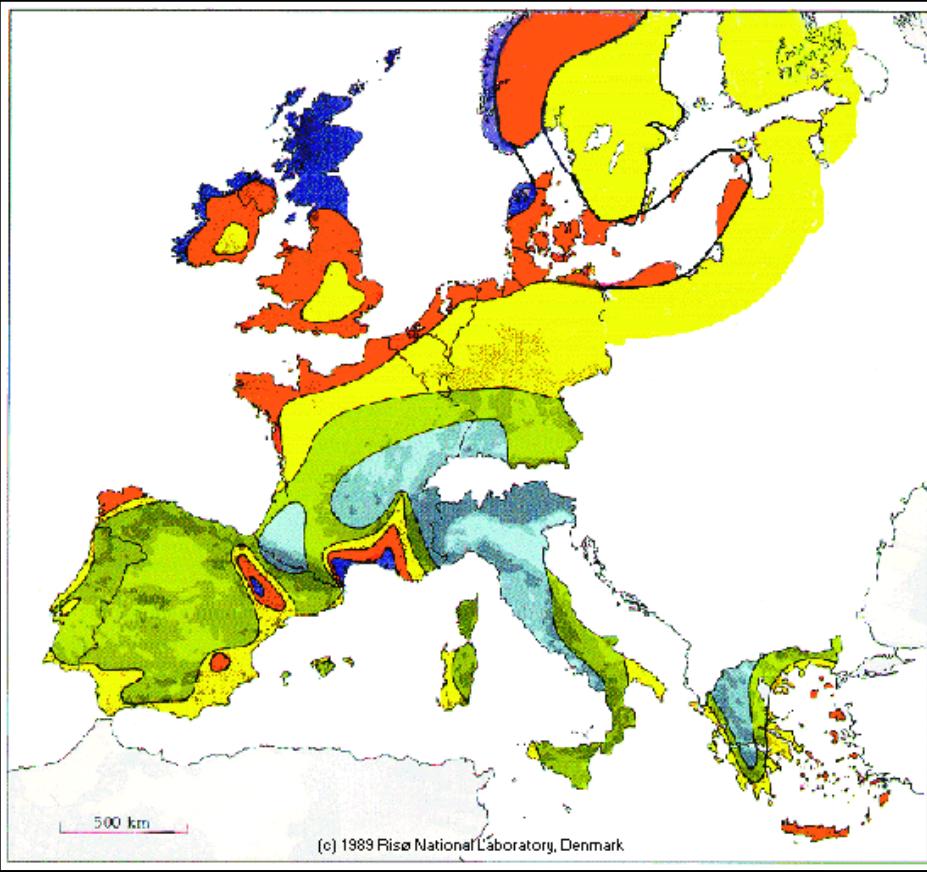
Source	Available Energy (Estimated)
Onshore Wind	11.5 GW
Offshore Wind	25 GW
Tidal	10 GW
Wave	14 GW

Source "Scotland's Renewable Resource" 2001

Up to 60GW of potential energy supply

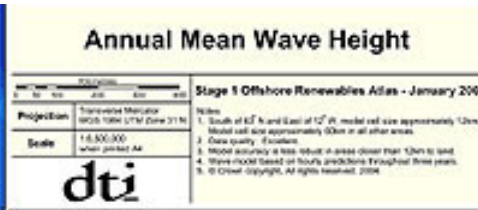
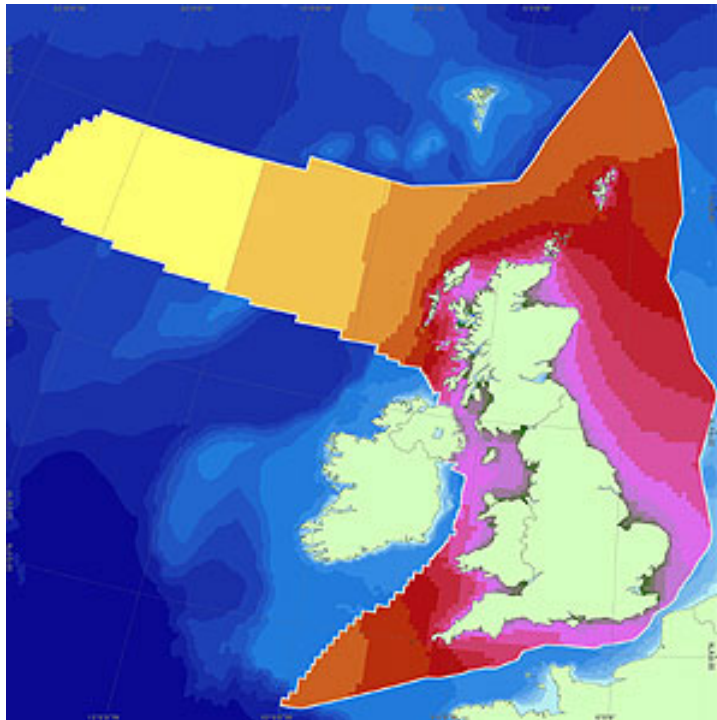
Scottish demand is about 6GW

25% of Europe's wind energy potential

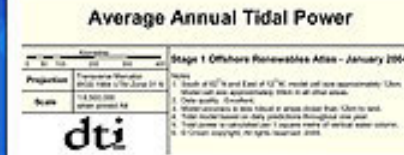
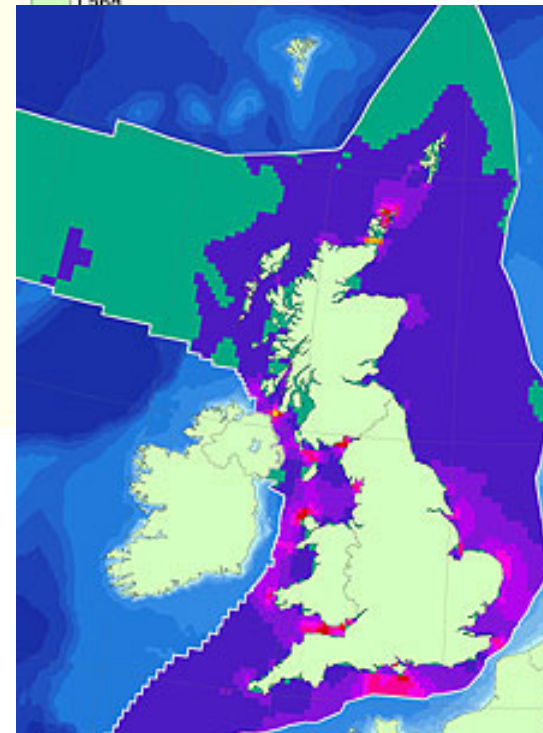
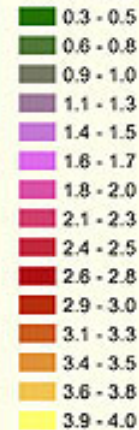


Scotland's Wave and Tidal Resource

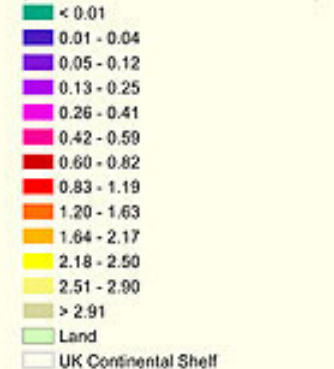
Scotland's position at the end of a long Atlantic Ocean fetch produces tremendously energetic waves



Wave Height (m)



Average Tidal Power (kW / m² of vertical water column)



Scotland has over 70% of the UK's tidal power which has been estimated at 13 billion Kilowatt hours per annum

Connecting renewable developments

- Onshore and offshore constraints issues – we know what they are;
- Reinforcing the interconnectors between Scotland and England;
- Getting our planning approaches right – NPF 2;
- Working with DECC, Ofgem and National Grid to:
 - Plan the grid for 2020 to connect and export up to 11.4GW;
 - Sub-sea links to the Scottish islands and off the West Coast;
 - Sub sea link from Hunterston to Liverpool Bay;
 - Sub sea link from Peterhead to Humber Bay;
- Working to address access and charging issues;
- Working to ensure GB energy regulatory approaches are EU compliant

Work in hand

- Existing grid studies – North Sea and Irish Sea
- Proven industry capacity and capability – on and off shore
- Strong on innovation R&D – and the Saltire Prize
- 1st class test and demonstration facilities:
 - Beatrice Offshore Wind Demonstrator and EMEC.
- Working closely with industry and academia on developing technology
- 6GW renewables capacity installed, consented and under construction – more than our 2011 target of 31% of electricity demand from renewables.
- Our National Planning Framework identifies priorities for energy, encourages development of renewables and North Sea offshore grid.
- Developing supply chain opportunities and synergies.
- Increasingly close joint working with, and learning from, UK and Europe.
- Key sector focus on the energy by our enterprise agencies
- Capitalising on – and sharing - the commercial, economic and environmental benefits.

- And working on much more....

Accommodating Increased Volume of Renewables from Scotland

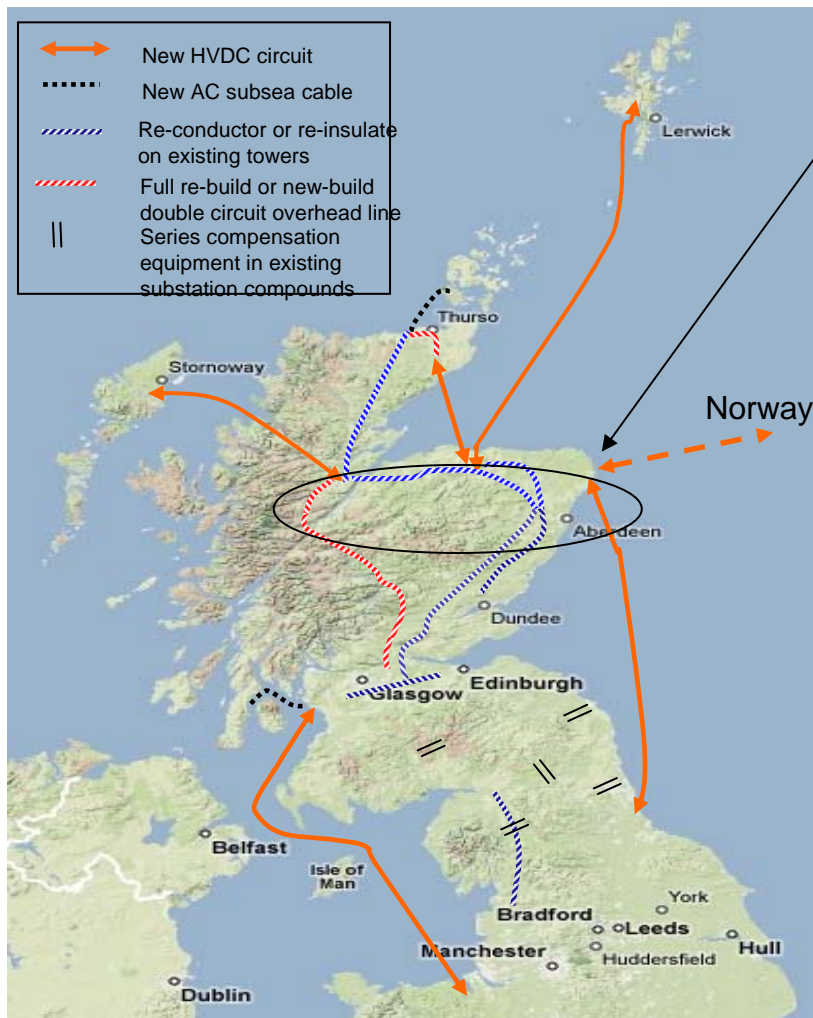
UK and Scottish Government, Ofgem and transmission licensees work to identify transmission reinforcements to deliver of UK renewable energy targets – including onshore and offshore reinforcement in Scotland. Outcomes of this work “Vision 2020” published on 4th March 2009



- HVDC circuit**
 - HVDC cable from Hunterston – Deeside (circ 1.8GW)
 - HVDC cable from Peterhead to Humberside (circ 1.8GW)
- Series compensation**
- Re-conductor or re-insulate existing OHL route**

Accommodates ~11.4GW of renewables in the north of Scotland

Transmission development overview



- Early instance of multiple HVDC terminals will occur in Scotland
- Fundamental power systems planning, operation and control issues associated with a concentration of multiple HVDC terminals
- Understanding and resolution is required for Scotland, but will **also** be key to realisation of any wider vision for North Sea and Irish Sea renewables reliant on HVDC transmission.

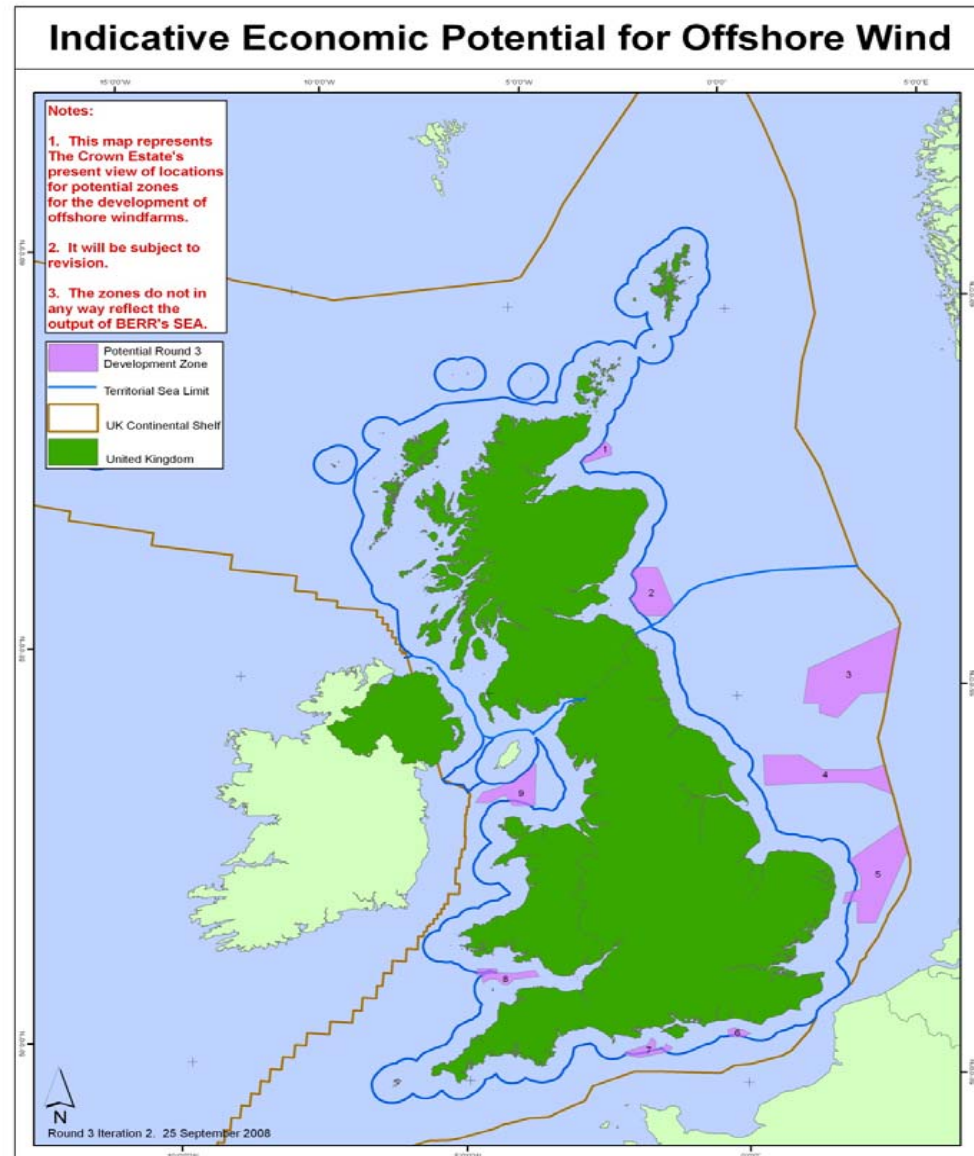
HVDC in Scotland provides an invaluable test case towards a wider pan-European grid

Bidding for – and winning - EU recovery plan funding

Offshore wind

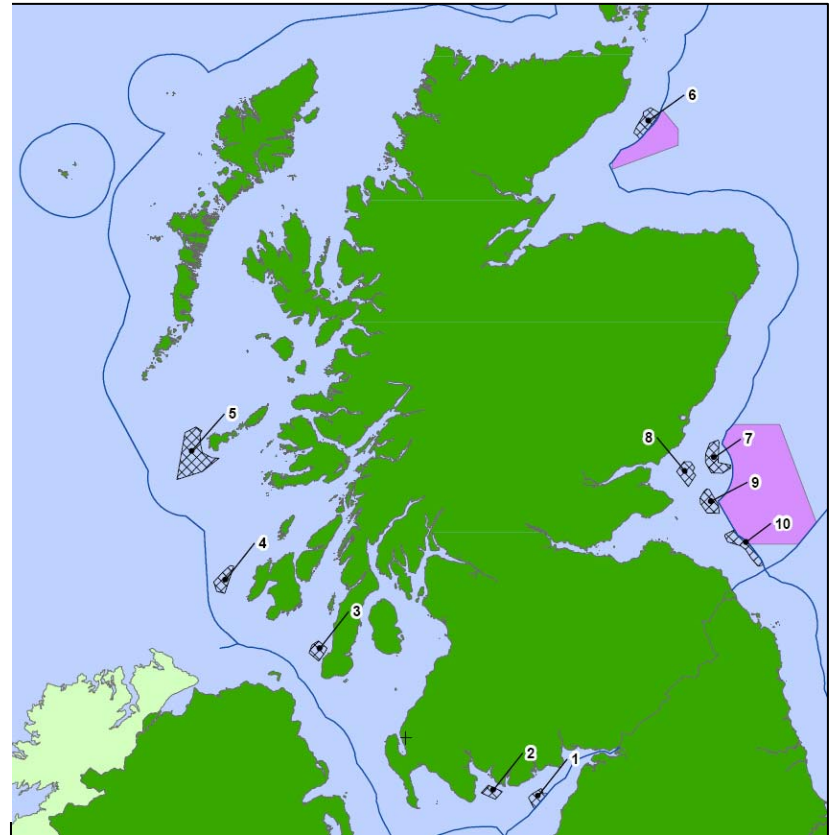
UK Crown Estate – responsible for offshore marine estate - more than 55% of the UK's foreshore and seabed to 12 nautical mile limit.

- ambitious programme to deliver total of 39 GW offshore wind from UK waters;
- offering leases for 9 zones;
- announcement on successful bidders expected at end of year;



Offshore wind - Scottish Territorial Waters Projects

- Licencing of sites for offshore wind development – now in round 3 – up to 25GW;
- In addition 6 GW of exclusivity agreements awarded to developers in Scottish Territorial waters;
- Working with Crown Estate and enterprise agencies to inform developer interest.



Developing sub sea grid in the Irish Sea

The Irish Scottish Links in Electricity Study project



Department of Communications, Energy and Natural Resources
Roinn Cumarsáide, Fuinnimh agus Acmhainní Náúrtha

....and with EU funding support through Special EU
Programmes Body



European Union

European Regional
Development Fund
Investing in your future

Developing North Sea Grid

- Existing grid connections across Europe – between England and France; Scotland and Northern Ireland; Norway and the Netherlands.
- Others planned – between England and the Netherlands; Norway and Germany; Ireland and England.
- To date, evolution in response to demand in particular regions.
- EC Strategic Energy Review late 2008 – develop blueprint for a North Sea Grid to interconnect national electricity in Europe and offshore renewables projects; and work towards a future European Supergrid.
- Interconnections across the EU to help ensure security of supply, maintain future energy flows across the EU and meet renewable energy targets

Developing North Sea Grid

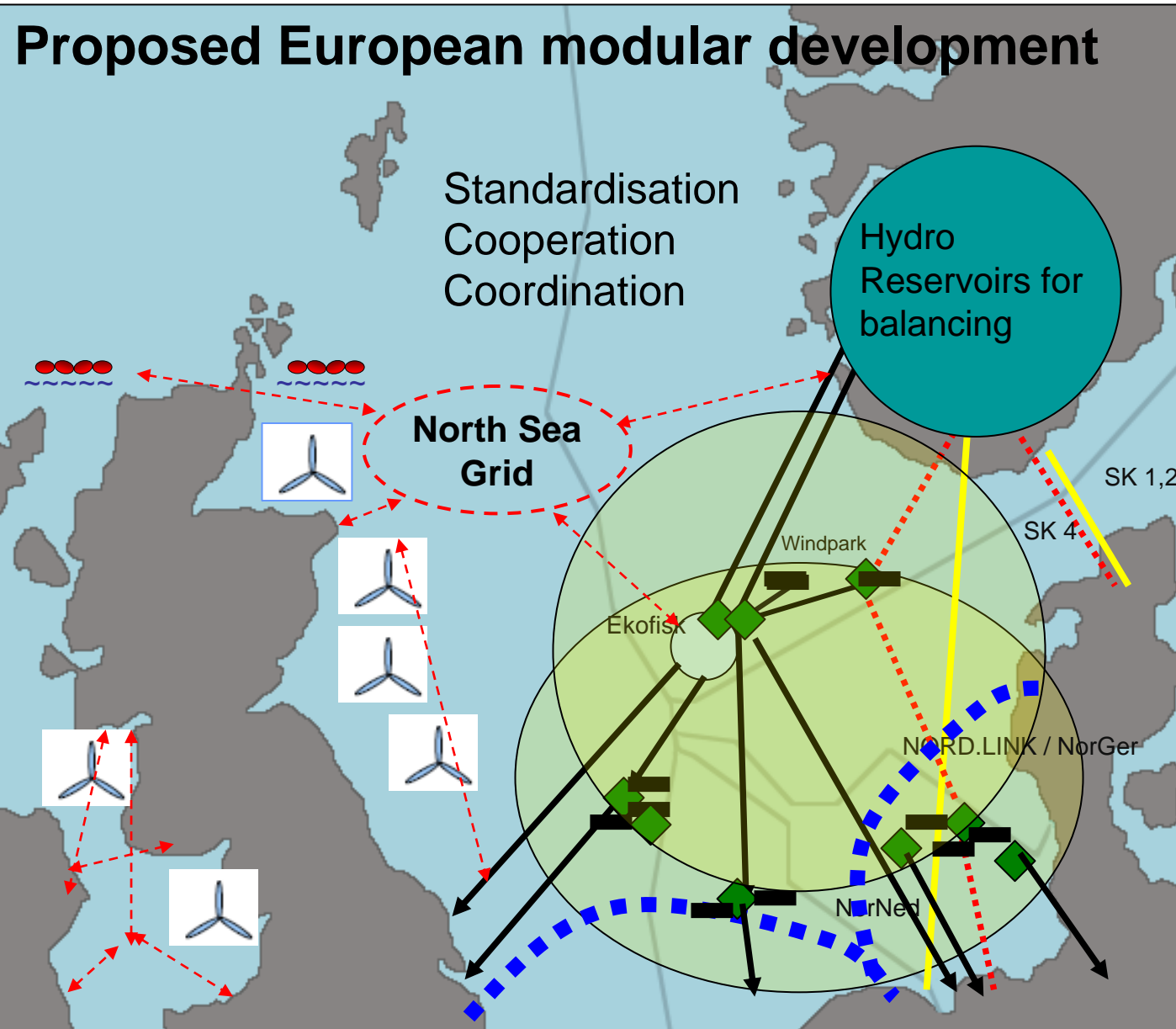
- Delivering a North Sea grid through a more collaborative and strategic approach to a co-ordinated and connected grid network.
- It will also need significant and sustained effort to standardise electricity transmission systems and energy regulation approaches.
- EU Coordinators appointed.
- Scotland is part of the European working Group on North Sea grid connections.
- Working to address some big issues - around interconnection, standardisation of regulatory and legal frameworks, financing development and political will.
- Big ambition – but big opportunity.

Developing – North Sea Grid Post 2020

Through...

- Vision
- Commitment
- Commercialisation
- Investment
- Reward
- Regulation
- Collaboration

Government



Conclusion

- Remarkable renewables potential;
- Commercial and partnership opportunities;
- Political will;
- UK and EU engaged;
- Range of Policy and Practical support



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