ISLES Project Update

Dick Lewis, SONI

Strategic Energy Framework

- 40% of electricity consumption from renewables by 2020

Offshore SEA completed

- Finalising the draft offshore Renewable Energy Strategic Action Plan
- Crown Estate launching offshore renewable leasing round in N Ireland later this year
- Offshore Renewable Energy Forum to advise Department established

Development of Onshore Strategic Action Plan

- Onshore SEA underway
- Project Steering Group established

ISLES Project

- Jim Gannon, RPS

Irish-Scottish Links on Energy Study

creative people making a difference

Jim Gannon, RPS

EirGrid Workshop

27th January 2011

European Union
European Regional Development Fund
Investing in your future

ISLES (Irish-Scottish Links on Energy Study)

Project supported by EU's INTERREG IVA Programme managed by SEUPB (£1.6M total budget)

Strategic collaboration between governments of Ireland, Northern Ireland and Scotland to development of offshore renewables across jurisdictions. ISLES is now a formal part of the North Seas Countries Offshore Grid Initiative (NSCOGI)

www.islesproject.eu

Northern Ireland Executive

The Scottish Government
Riaghaltas na h-Alba

Project Brief

To examine the feasibility of developing an offshore interconnected transmission network - via a subsea electricity grid - linking potential renewable energy sites, off Western Scotland, Northern Ireland & Ireland

Present a robust business case to the partner governments by summer of 2011



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Underpinning Objectives

- To provide an exemplar study as to how integrated offshore networks can be developed in a cross jurisdictional environment.
- Generate a coherent study which identifies the necessary Development Pathways and informs government bodies of the necessary changes to regulation and legislation that may be needed to enable an effective integrated solution.
- The study should be built on a firm technical, engineering and costing base to provide confidence in feasibility and viability assessments
- Contribute significantly to the broader North Seas and European Grid studies and provide a blueprint for future integrated developments.
- Study needs to reflect on and evaluate near term opportunity and identify longer term potential.



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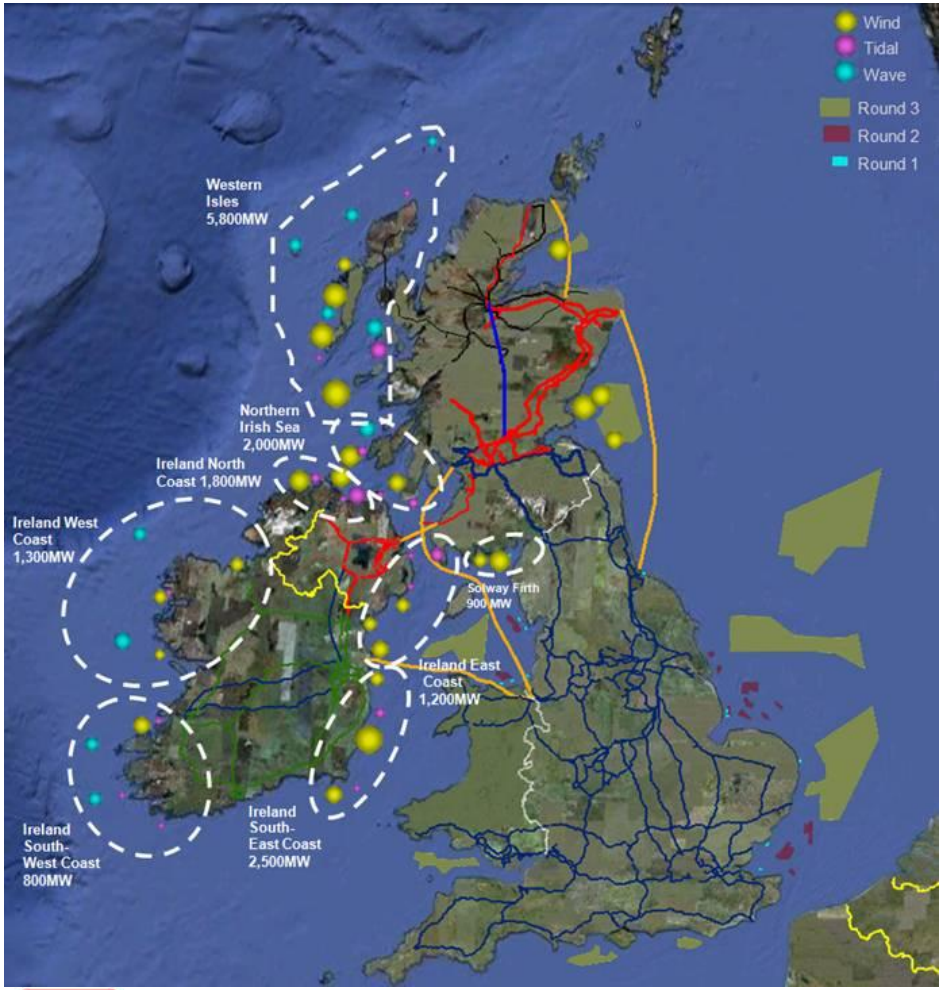
ISLES Resource Assessment

- Resource Assessment based on interpretation of best available data (existing and ongoing studies)
- Considers West Coast Scotland and All Island.
- Combination of existing development and potential development



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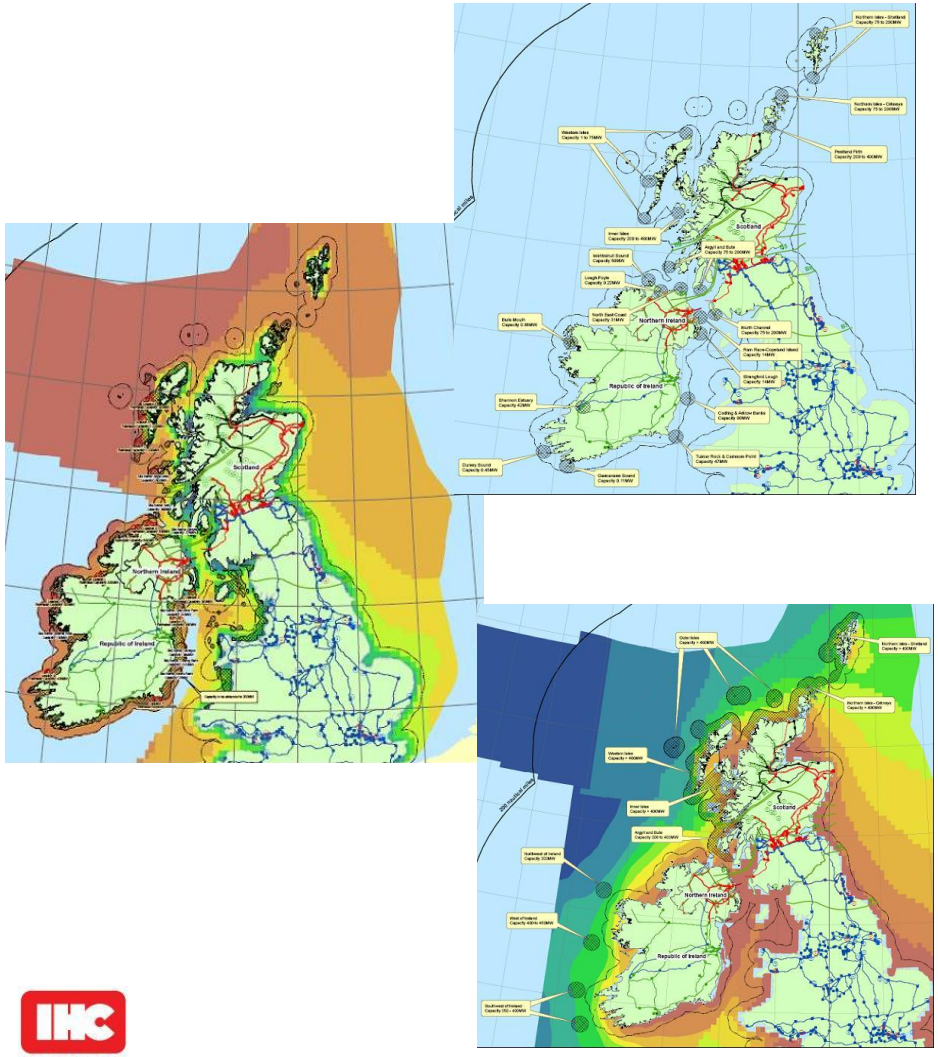
ISLES Resource Assessment

- Approximately 16GW considered within 'notional' ISLES Development Zone and ISLES Timeline
- Considers Wind, Wave and Tidal
- Short to medium-term focus on offshore wind



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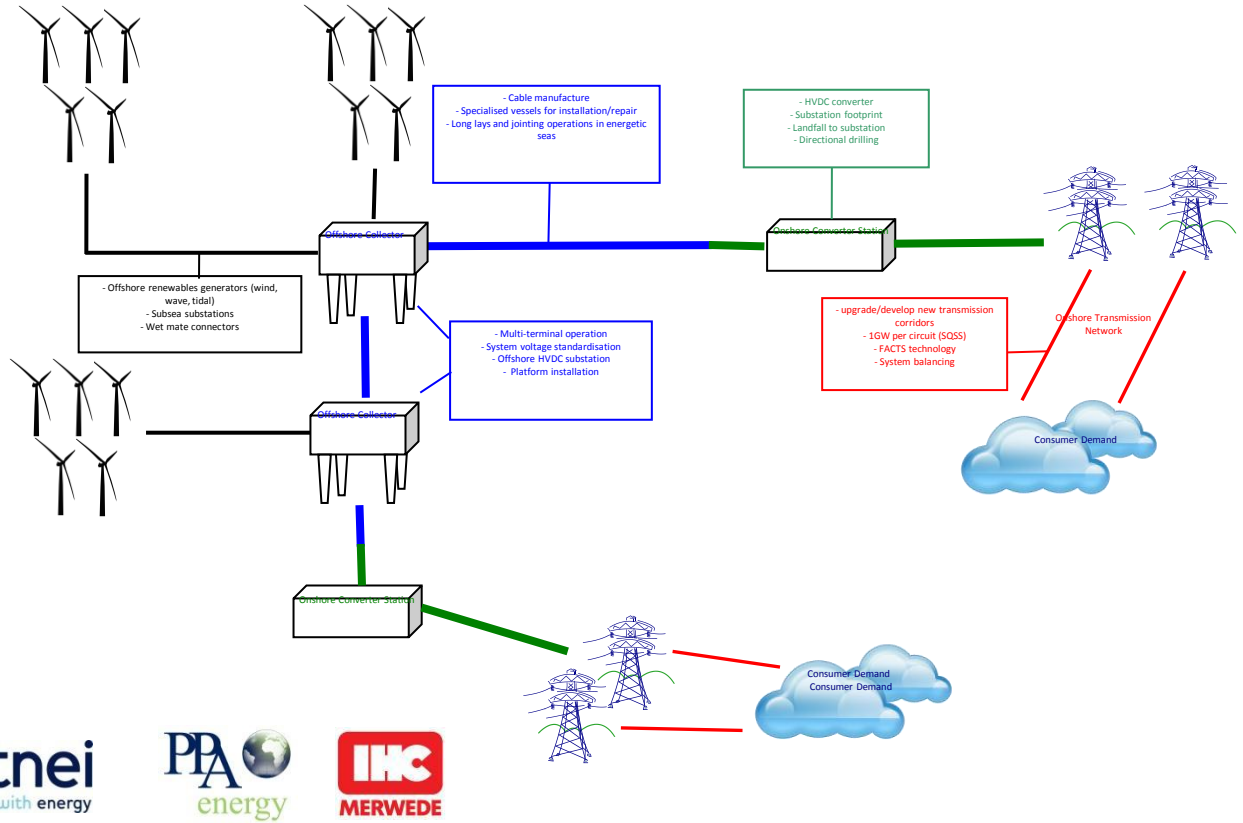
Key ISLES Technology Areas

- Identification of requirements;
  - Development of a technology road map to identify where any potential restrictions may exist either on the supply chain or technical capability
- Offshore Transmission
- Offshore Substations
- Subsea Cabling
- Onshore Connection





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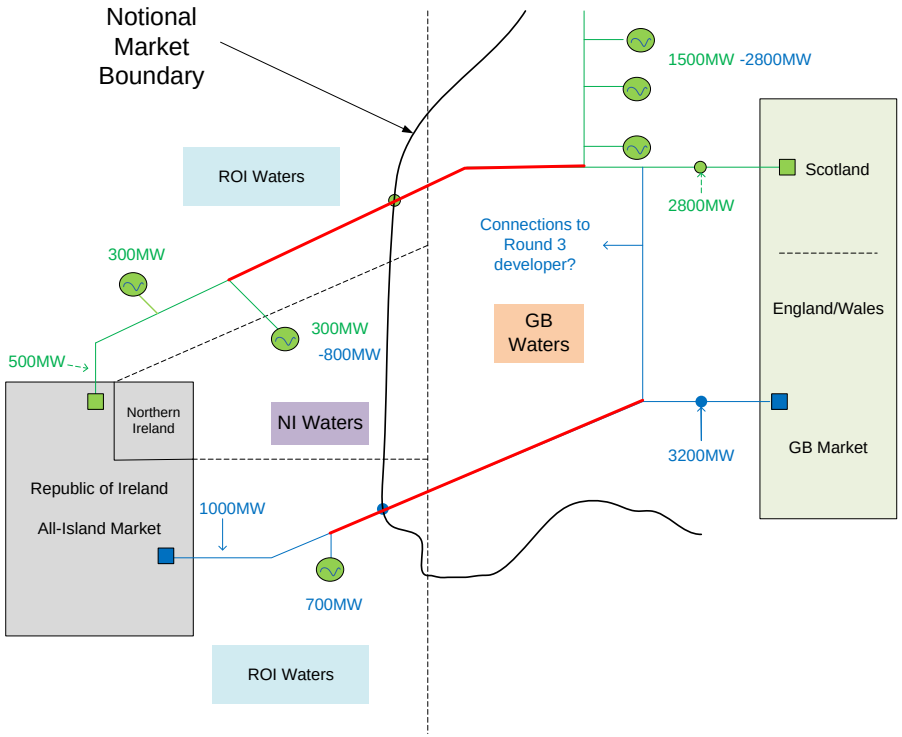
Cross Jurisdictional Regulatory and Market Review

- Legislative Context
  - EU wide level
  - National Level
- Key Issues and Gaps
  - Regulatory Framework
  - Onshore Connection Applications
  - Connection Charges
  - Use of System Charges
  - Market Operations
  - Renewable Energy Subsidies





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Key Market and Regulatory Issues

- The need to define a regulatory and legal framework acceptable to all the jurisdictions affected;
- The legal and regulatory status of interconnectors, and how a network which combines the characteristics of generator connection and interconnection would be treated by each jurisdiction;
- Subsidy models, and how subsidies could be aligned and/or modified to drive market behaviours to meet the needs of each jurisdiction;
- The mechanisms for funding and remunerating strategic network build with incremental development of assets over a period of time. A subset of this is the development of network charging models and agreement over how costs are socialised into the host markets;
- The evolving impact of EU legislation, given current uncertainties about how certain elements might be interpreted, particularly in the GB context.



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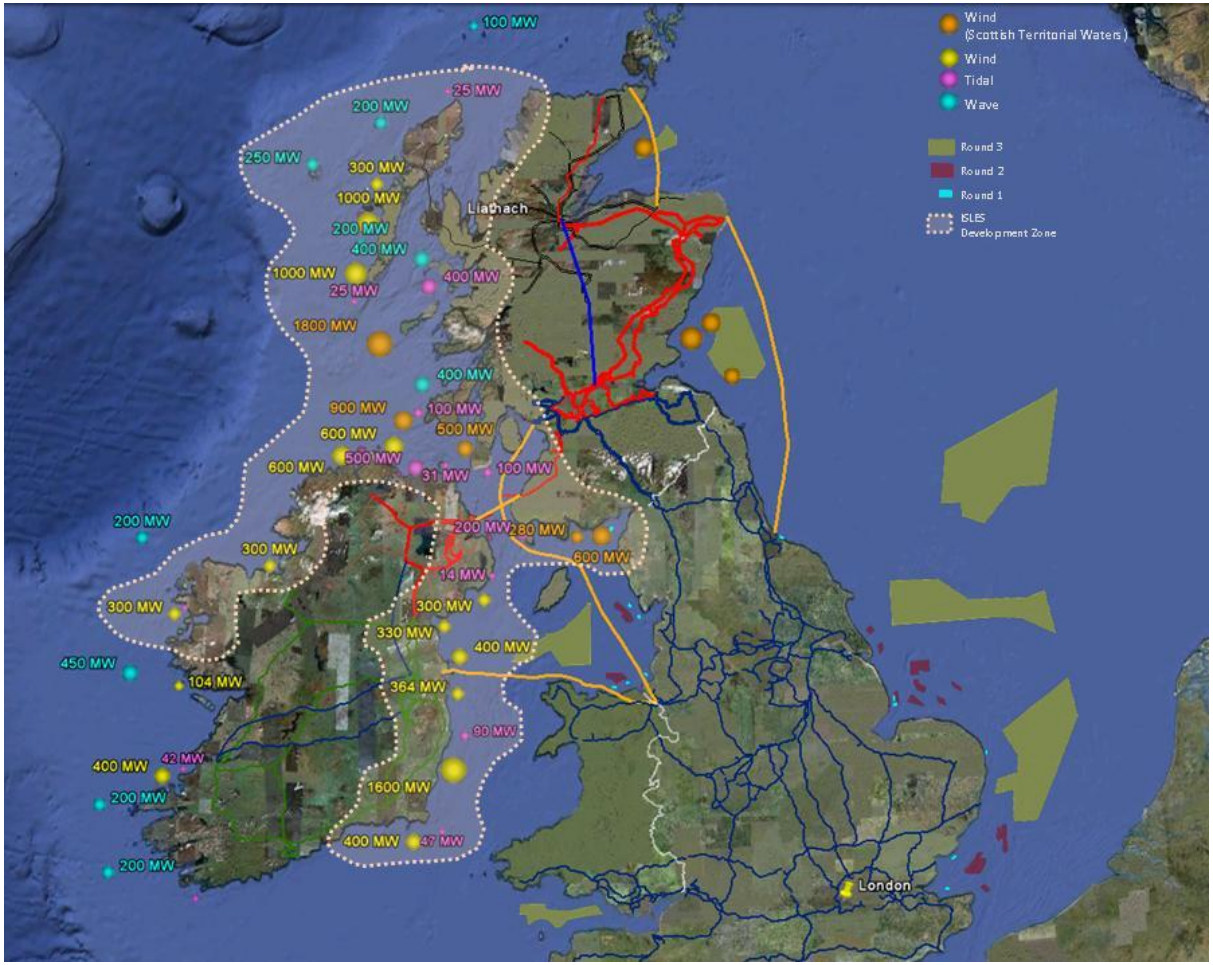
ISLES Concept Selection - Objectives

- Demonstrate technical feasibility and economic viability under a range of energy policy, regulatory and infrastructure scenarios;
- Generate credible concepts within limitations of study;
- Test the fundamental premise of an integrated offshore system connecting multiple offshore resources to the onshore network(s);
- Consider in the context of the potential generation & infrastructure landscape at different points in the future;
- Focus on cross jurisdictional Regulatory and Legislative implications;



Potential ISLES Development Zone

- ISLES Development Zone is extensive
- Circa 16GW 'potential' resource within 'notional' ISLES development zone and initial development timeframe





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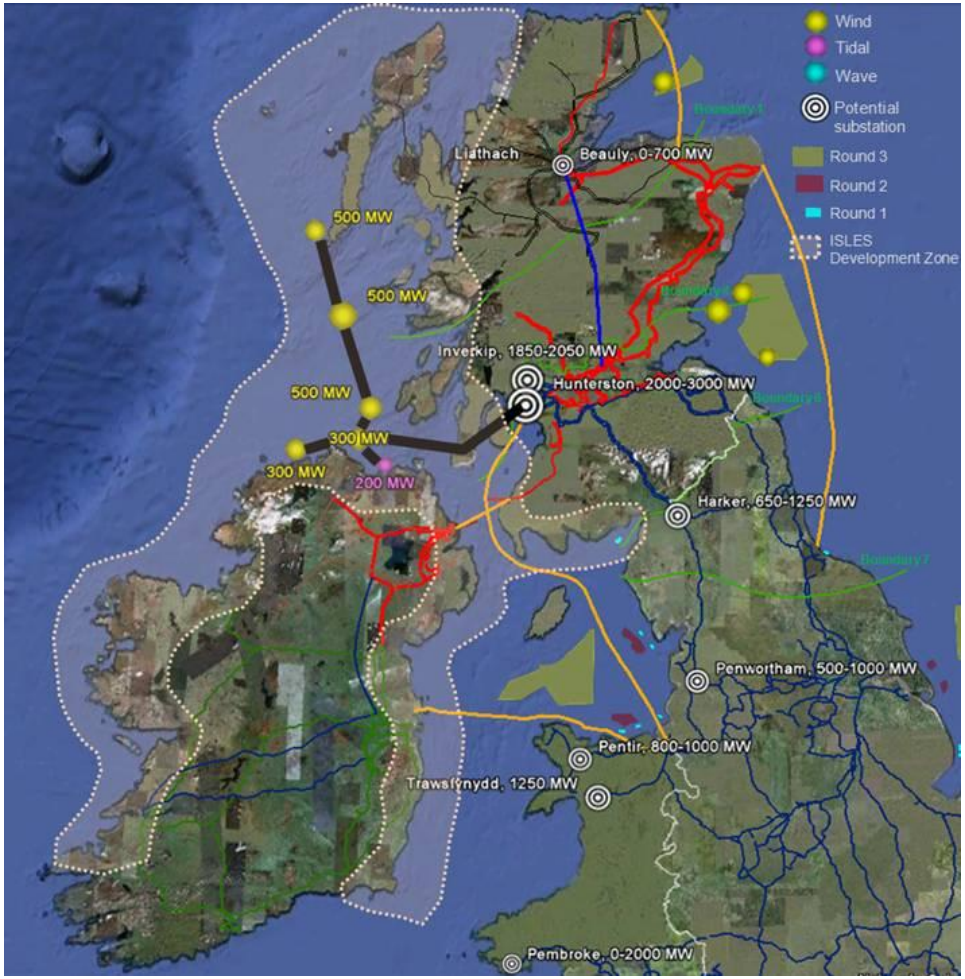
Proposed ISLES North Concept

- Circa 7.8 GW of potential marine resources
- 2.5 – 3.0 GW presents ambitious scale for North Concept with 'available' connection capacity
- Incorporates 500 MW of potential Interconnection capacity to test market benefit
- Technology requirements at this level are non-trivial
- Satisfies all key objectives



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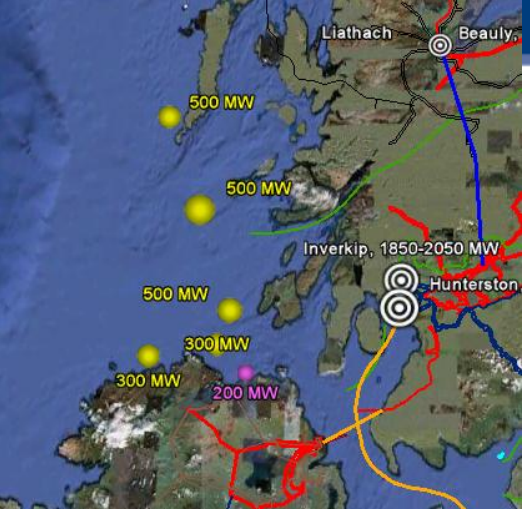

500MW VSC station

HVDC Platform HUB

Offshore Windfarm

1000MW VSC station

AC cable

500MW HVDC cable

1000MW HVDC cable

Location C OWF

Argyll OWF

Argyll HUB

Islay OWF

Location K OWF

Location J OWF

Hunterston

Coastal HUB

Coleraine Tidal Farm

Coleraine

Colkeragh?

Questions to be Evaluated under North Concept

- Regulatory barriers and how do key regulatory changes impact on the economic viability of ISLES?
- What is the minimum scale for ISLES to be viable?
- How much interconnected generation (from All Island into the wider GB market) could be considered as part of ISLES and how important is this in supporting ISLES viability?
- How is ISLES affected by the acceleration or delay of other West Coast infrastructure projects, either STW or interconnection?
- How competitive is ISLES compared to other offshore projects, existing conventional generation, or new-build clean coal?
- Is ISLES technically feasible and what, if any, technology driven constraints are imposed by ISLES compared to other offshore renewable projects?

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Key Considerations in Shaping ISLES South Concept

- South Concept tests the robustness and sensitivity of Concept 1;
- ISLES South Concept provides an export path for identified wind generation; opportunities for interconnection between NI and RoI networks and between Irish and GB markets; and opportunities to reinforce existing onshore transmission networks;
- South Concept is consistent with ISLES objectives; focus's on cross jurisdictional implications, testing the ISLES proposition and refining Development Pathways.
- Scale of development and timeframe similar to North Concept;
- Multiple onshore connection points in NI, RoI and Wales / England;
- Keep 'simple'; do not consider implications of integration to Irish Sea Round 3 developments or the Isle of Man.
- East Coast Ireland represents best alternative ISLES development



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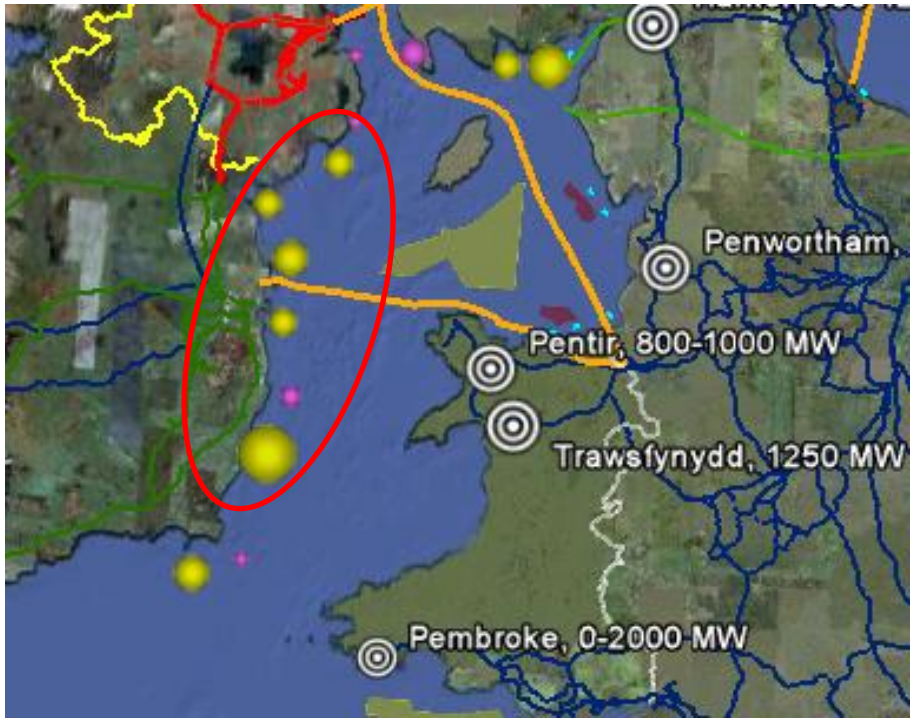
Proposed ISLES South Concept

- Circa 3.4 GW of potential marine resources of East Coast All Ireland - similar scale to North Concept
- Incorporates 3000 MW of potential Interconnection capacity
- Enhanced transfer capacity and reinforcement across all Ireland
- Hybrid Technology solution incorporating DC and AC mix
- 3 x 1000 MW links to Wales
- Final configuration / development route(s) to be explored



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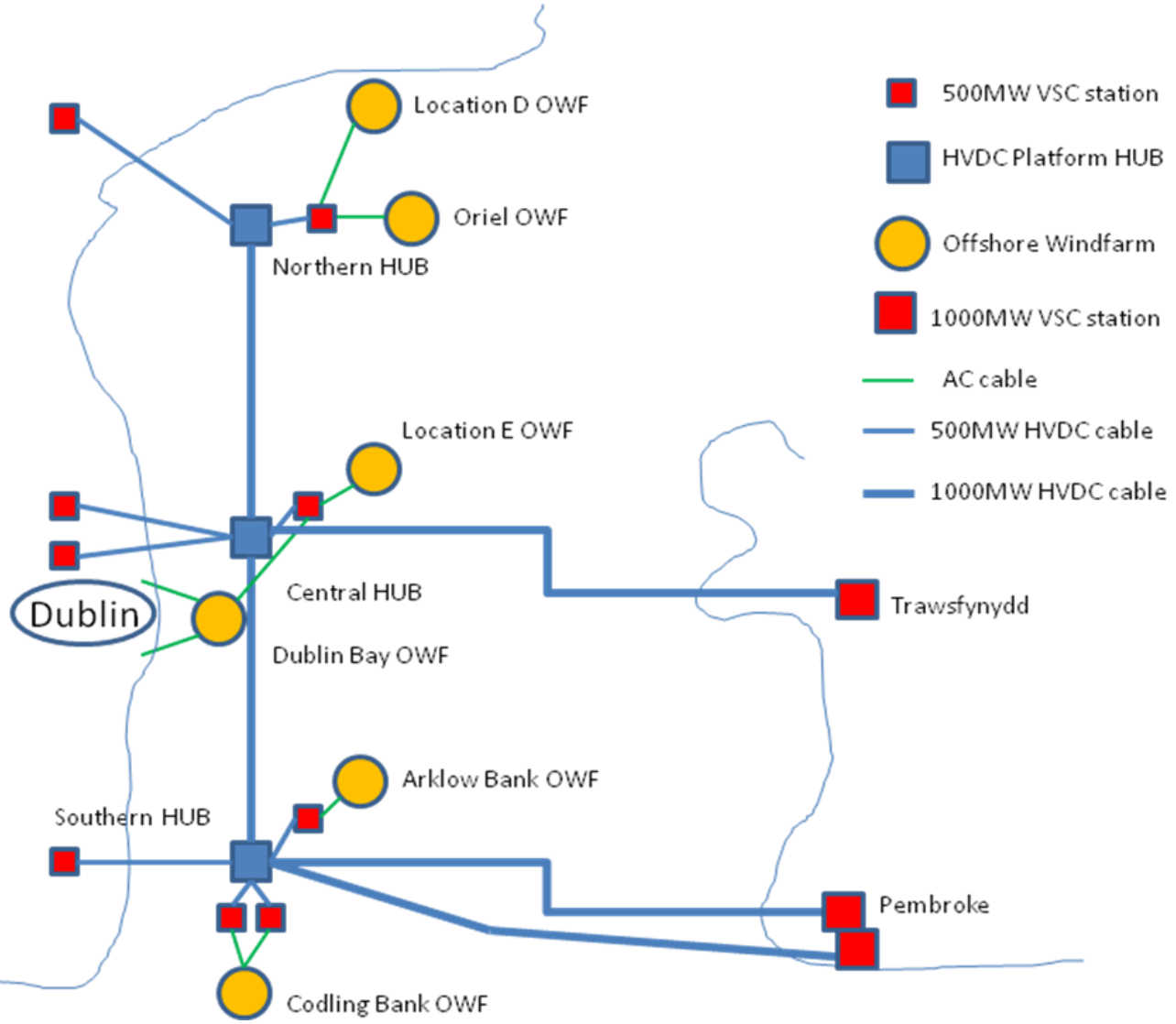

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ISLES – Next Steps

Phase 1
Project Inception

Project Inception

- Formal kick-off
- The Macro Picture
- Resource Assessment
- Industry Track Record
- Infrastructure Status
- P & E Policy Assumptions
- Cross Jurisdictional Review:
  - Regulatory & Legislative
  - Market / Networks
- Outline Concept Appraisal
- Risk Appraisal

Output - Project Inception Report and Workshop

Phase 2
Feasibility Assessment

Technology & Infrastructure
- Assessment of Technology Landscape
- Evaluation of Onshore Grid Constraints
- Identify Tolerable System Risk

Regulatory & Market Considerations
- Alternative Regulatory Models
- Impact of Multi-Jurisdictions
- Cross Boundary Access / Grid Codes?

Environmental & Planning
- Explore all development constraints
- Identify procedures/licenses required
- Policy Implications

Construction & Deployment
- Onshore Connections - No. & Location
- Explore Future Expansion Flexibility
- Offshore Construction Innovation

Phase 3
Viability & Cost Benefit

Economic Viability
- Development Capital Costs
- O&M cost implications
- Network Charging
- System Risk / Redundancy
- Financing Alternatives

Output - Project Economic Models & Risk Assessment

Cost Benefit Analysis Business Justification
- Economic Viability
- Technology / Manufacturing Delivery Capacity
- Economic & Supply Chain Development
- Inward Investment / GVA
- Social-Economic and Environmental Benefits

Assessment of Concept Viability and Economic Potential



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SYNOPSIS & QUESTIONS

OFFSHORE GRID STUDIES

Method and Assumptions
Pure AC & AC/DC
Hourly dispatch modelling
Compensation
Harmonics

Assumptions/ Findings
Topography & Technological /Conclusions

Additional Analysis (Short circuit/ Harmonics/etc)

Issue Report on findings to date

TSO Offshore Policy and Standards

TECHNO-ECONOMIC STUDIES

Cost assumptions for offshore wind / interconnection.

Years to study.

Fuel, carbon price.

Interconnection Report – Update.

Further modelling for ENTSO-E group.

ISLES PROJECT

Disruptive Technology/ Innovation

EU Third Package – Regional Markets

Q2 Consultation

Q3 Publication of Final Study