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Project Transmit – response from Greenspace Research, Lews Castle College UHI, Isle of Lewis, HS2 0XR Tel: 01851 770322 Email: neil.finlayson@lews.uhi.ac.uk

Greenspace Research is a low carbon and renewable energy research group at Lews Castle College UHI Millennium Institute. We are involved in a major European FP7 project called SusPlan (http://www.susplan.eu/) which is developing decentralized renewable energy scenarios for Europe in the 2030-2050 time frame. Our evidence to Project Transmit encapsulates the findings in our SUSPLAN Western Isles Regional Case Study report.

Locational Pricing

Grid capacity and transmission charging mechanisms which disadvantage those looking to develop in rural locations away from the central grid network, are proving to be a serious barrier to ensuring sufficient future network capacity. The current regime of locational pricing is designed for high load factor, base load generators, but it is also being levied on low load factor, intermittent generators. It has been questioned whether the model and inputs reflect the network and power flows, and whether the short term year-on-year approach to charging properly reflect economic decisions in an industry with long-life assets.

The UK's system of transmission charging results in higher and less predictable charges for Scottish based generators and is a particular disadvantage to those developing renewable energy projects in those areas with the best resource.

As is probably well known by now – a report for ScottishPower has shown that under the pricing regime, energy producers in Devon and Cornwall receive almost £9 per kW, those in London receive £5 and those in south Wales and Gloucester receive £3. In Scotland, they are charged almost £14 and those in the north of Scotland pay £22. The operator of a 50 MW wind farm would pay a locational charge of about £1.1m per year, while one in southern England would receive subsidies of about £450,000. The additional locational costs for generators in the north amount to 15% of their total costs and appear to run contrary to Government energy and climate change policy, by making it harder to finance projects in optimal, but peripheral locations. This too is a barrier to the geographical dispersal of projects to counter variability.

It has to be recognised that under present economic circumstances, renewable energy companies are experiencing serious difficulties in financing projects. When growth takes off again, this will also pose problems. Global demand for turbines will drive up the cost of projects and squeeze the margin of financial return, which will mean that locational pricing will increasingly become a barrier to renewable development in peripheral areas. It will also disincentivise investment in extending the life of and constructing new thermal plants to back up the variable power supply from renewables. Alternatively, under current proposals a

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system whereby generators using the UK transmission network would be levied at a uniform rate for each unit of energy that enters the system, irrespective of its location. Locational signals could be provided in other ways under consideration by the industry, such as charging for network losses associated with generators output. This approach would support integration of the European energy market.

Transmission costs currently make up 3% of customers bills. Therefore, if these changes were implemented, consumers would not be affected. The total revenue recovered from the generators would not be altered either. The charging would, rather, be more evenly and fairly distributed.

The lack of a formal charging method and the resultant uncertainty/potential volatility is the biggest barrier to renewable energy projects being developed on Scotland's islands. The Viking wind farm project will create a new industry on Shetland, which will compensate for the rundown in the oil and gas industry. An average of 230 local jobs will be created during each year of the construction phase and more than 50 local jobs created during the anticipated 25-year life of the wind farm. Through a unique community-private sector partnership, it will return an estimated £25m to £30m to the Shetland economy every year, including £18m profits on average to Shetland Charitable Trust. Electricity demand on the island peaks at 60 MW and a large project (540 MW) is needed to justify the estimated £250m capital cost of the cable connection. The indications are that transmission charging could be over 100 times greater than in London and even 20 times higher than in Aberdeen. This would be a greater cost on an annual basis than all the other costs put together and could make it commercially unviable. But Viking Energy is still awaiting finalised figures and the project is proceeding into planning blind of its single biggest cost after project finance.

The European Commission's Renewables Directive of 2001 stated that 'Member states shall ensure that the charging of transmission and distribution fees does not discriminate against electricity from renewable energy sources produced in peripheral regions, such as island regions and regions of low population density'.

It is clear that capping of transmission charges from the islands, would be a step towards integration with the wider European market, and based on what is a strongly disputed report, the UK Government appears to have rejected such a positive step. The effect on UK consumers of any special measures to adjust transmission charges for the islands would be virtually nothing. On the other hand, the socio-economic value of renewable energy developments to the islands would be transformational.

Summary in Relation to Transmission Costs

Scotland's peripheral areas have sparse populations but more than their fair share of wind, waves and tides. That ought to make them a potential power house of renewable energy, and

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many areas in the Highlands and Islands have already been identified as ideal locations for wind farms.

Yet remoteness from the major centres of population is working against the development of green energy in the North of Scotland. Generators of renewable energy in the Highlands pay around £22/kWh to use the transmission system to the National Grid and Island based generators have been quoted up to £96/kWh. This is in stark contrast to those in the South of England which are subsidized at up to £7/kWh. It now seems the high charges are having a serious impact on the business case for some major investments in renewable generation in more remote areas.

As background to this the following is relevant:

- The UK's transmission system costs around £1.7bn a year to run. This cost has to be met by generators, suppliers and customers, who use the system.
- Generators which are located far away from the main centres of demand for electricity pay higher transmission charges as their output has to be transported long distances to reach their customers.
- The aim is to encourage generators to site new plants in the most cost-effective location, which cuts costs to customers. This would also reduce the electricity which is lost as heat (ohmic losses associated with the electrical resistance of the conductors) as it is transported through the transmission network. These costs amount to somewhere in the region of £174m a year.

This pricing regime is over-seen by the regulator, Ofgem, which allows the discrepancy because it reflects the cost of transmitting the energy to the areas of greatest demand.

This policy will have longer consequences. If renewables companies find transmission charges make their business unsustainable, they could move elsewhere, removing a vital source of new jobs from areas where employment opportunities will always be limited, but where the potential for renewable energy production is excellent.

The underlying problem is that the network was designed to join a much smaller number of producers of large amounts of power and is having to adapt quickly to transmitting energy from the sudden proliferation of wind farms.

Nevertheless, it is essential for Scotland that green energy provides an increasing proportion of the overall mix if we are to meet carbon reduction targets.

National Grid has begun development work on a subsea cable which would run down the West coast, linking into the network and boosting capacity. Such a scheme holds out the prospect of making it much easier to connect power generated close to the coast and on Islands. If, in the meantime, renewables companies were forced to abandon such areas to

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build wind farms closer to major centres of population it would be a significant lost opportunity.

Ofgem's remit is to approve the system of charging, not the level of charges. Nevertheless, the two are linked. Since the new European renewables directive (Directive 2001/77/EC) requires any transmission charge system not to discriminate against peripheral or thinly-populated areas, the European Commission's move in seeking an explanation from the UK Government (Department of Energy and Climate Change, DECC) is welcome. Clarification is urgently required. This is the first step in what could be a full-scale commission enquiry into how the UK charges electricity producers in different parts of the country. However, the locational transmission charging regime has been challenged previously by Scottish Power in 2005. The European Court of Justice dismissed Scottish Power's representation and upheld Ofgem's decision to approve the formula for charging (but not the level of charging).

SUSPLAN Executive Summary

Key policy recommendations to emerge from the study have been grouped under four action headings, namely:

Governmental Issues:

- The low carbon economy is inevitable and strategic foresight and action is required if Island communities such as the Western Isles are to take part and benefit from this transformation.
- Forward momentum on the Island needs to be speeded up to address the key issues of fuel poverty, sustainability and economic growth.
- That a Hebridean ESCO be set up with the local authority as shareholder as a first pragmatic step to building momentum – its main focus being to expedite onshore and offshore wind projects and lay the early foundations for marine renewables.
- Take a lead in assisting companies/organisations already based on the island to diversify (Quinetic), and extend and deepen the capabilities of others (Arnish).
- A key factor to emerge from this report is the recognition that the Scottish and UK Governments must adopt the Scottish Islands renewable grid infrastructure as strategic priorities, and address the barrier presented by locational pricing.
- On a National geographic basis, Scottish Ministers should adopt a unilateral, unconditional approach to their moral obligation to act on climate change and ensure that the benefits are spread throughout the country and its Islands.

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- One of the major priorities of the Scottish Government should be to encourage marine and wind developers to deploy in Scottish island waters where there is the greatest abundance of resource – in the secure knowledge that problems associated with the grid can be resolved.

Business Development Issues Related to the Western Isles:

- A key requirement is to have high quality detailed resource and infrastructure information available, such as wind and wave resource assessments, e.g. bathymetric data, local constraints, grid infrastructure and integration, accurate wind data, and land ownership details.
- Recognise that there is strong industry demand for knowledge exchange projects with UHI Lews Castle College to provide this information in the Hebrides.
- Recognise that renewable energy development in the Hebrides is one of the most demanding Scottish challenges of the 21st century, with major strategic implications for the UK electricity industry and the emergent renewable energy sector.
- The wave power resource to the West of the Outer Hebrides is widely acknowledged to be one of the best in Europe. Locational Guidance produced by Marine Scotland ranks the Outer Hebridean wave resource as the best in Scotland – at 43kW/m compared to 31.8kW/m in Shetland and 27.9kW/m north of Tiree.
- However, beyond the high-level assessments done to date, prospective developers lack detailed accurate data and analysis of the true commercial potential of this resource.
- Marine energy projects located in high resource areas produce more power at levels of investment which result in a lower cost per unit of energy output. This means there is a clear economic imperative for project developers to target these areas. The Scottish Government and its enterprise agency's need to be more proactive in enabling this to happen.
- The excellent resource West of the Hebrides has already attracted several of the world's leading technology developers. Voith Hydro Wavegen, in partnership with RWE nPower, have consented and secured full funding for a 4MW shoreline wave project at Siadar – a global first. Aquamarine Power, Pelamis Wave Power, and Statoil are all actively scoping sites in the region. However, Enterprise funding to enable and un-lock the necessary financial investment is lacking.

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- It is imperative to examine grid integration issues and related technical barriers to commercial schemes; which will deliver design recommendations for industry which in turn will inform device power take off design and manufacture.

Benefiting From the Marine Resource:

- With initial test and small-scale demonstration projects well underway elsewhere in Scotland, the time has come for the renewables industry to actively seek high-energy sites suitable for utility-scale and pre-commercial deployments in the Outer Hebrides. There now needs to be a direct response to developer demand for resource assessment and technical analysis of grid integration issues - to enable initial site selection; and help them make the investment case for marine energy projects in the Outer Hebrides in order to meet 2020 targets and beyond (2030-2050).
- LCC UHI has identified a strong marine developer demand for a standard and independently verifiable resource assessment and geotechnical analysis capability, to reliably characterise potential marine energy sites and identify areas appropriate for large-scale development projects.
- In order to guide siting decisions project developers to date have either developed a range of proprietary resource modelling techniques or relied on low-resolution and non-standardised third party models available in the public domain. While this is acceptable for early-stage projects, it will not be sufficient for the development of a large-scale industry. In order to develop large projects and unleash the economic opportunity, large financial commitments (in the order of £100m and larger) will be required from major renewables investors such as utilities and investment banks.
- Investors in these projects will require accurate, independent, third-party-verified resource assessment data and energy yield projections before releasing investment funds to a project.
- Taking action now will create the foundations for future collaborative ventures involving industry, academia and the local community which will bring further sustainable jobs to the region and drive the development of an advanced knowledge base which will be transferable to marine sites worldwide.

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The Outer Hebrides Key Enabling Role:

- Knowledge exchange between UHI and Industry partners - structured training programmes and 3-month industry placements for post-graduates at UHI; industry partners will provide technical parameters for grid and resource studies.
- UHI can provide energy and environmental research expertise to industry partners on hydrodynamic, meteorological, oceanographic and informatics issues.
- There is a requirement to develop and agree a core methodology, to be used to generate a detailed and accurate assessment of the size of the resource (deepwater wave, near-shore wave, onshore wave and tidal power), quantifying the market in terms of the potential energy yield available from each source in order to optimise geographic deployment of the technology.
- Development of further industry funded research work, training of students, and further KE and research projects;
- Support longer term development of the Outer Hebrides economy, providing on-going research, test/evaluation, and support to the deployment of wind, wave and tidal technologies;
- These actions will contribute to the achievement of national energy policy objectives and maintaining the UK lead in the commercialisation of wave/marine energy technologies for export markets.

Summary

We envisage that this report will play an important and continuing role in helping to inform the development of RES in the Western Isles and to deliver a future energy network to meet the Scottish Government, UK and EU challenging renewable and climate change targets. We also hope the document will allow the Scottish Government, the energy industry and other stakeholders to understand better the issues that these targets raise for the future development of energy supplies for island communities and to debate longer term network issues.

Meeting Government renewable and climate change targets will have profound implications for electricity networks in Great Britain as these networks are being asked to rise to new challenges. These challenges mark a radical departure from the way in which networks have been managed during the 20th century when our electricity was primarily delivered by conventional, large-scale thermal and nuclear generation technologies.

Against this backdrop, stakeholders need a consistent and coherent perspective of the way in which the networks could plausibly evolve. This has been the aim of this Regional Case

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Study. The investigation has sought to develop a range of plausible RES development scenarios for the Outer Hebrides in the time frame 2030 – 2050, around which industry participants, Scottish Government, National Grid, Ofgem – (Office of Gas and Electricity Markets), and other stakeholders can discuss longer term RE issues and try to ensure that the regulatory framework will allow companies to make investments with a view to meeting future challenges.

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