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Response to Ofgem Consultation

Connecting the Islands of Scotland

on behalf of

Siemens Transmission and Distribution Ltd

Ofgem Ref: Connecting the Islands of Scotland
Letter to interested parties 5th June 2007

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Siemens in energy

Siemens has been established in the UK since 1843 and has been working in the energy and water industries ever since. Today, it serves every aspect of the energy sector, from building and maintaining power stations through to customer data collection. Individually, Siemens' products and services are designed to deliver premium performance. They create resilience, security of supply and safety, as well as timely, high quality data, all of which underpin the infrastructure of the energy sector. Siemens has created energy infrastructures in some of the world's most demanding environments and its experience in the UK has provided a deep and detailed understanding of the way the market is developing.

Siemens Transmission and Distribution Ltd

Siemens Transmission and Distribution Ltd (STDL) is the UK's largest transmission substation contractor, employing around 700 employees in the UK. Headquartered in Manchester, STDL also has principal sites and offices in Hebburn (Tyneside) and Garforth (Leeds) as well as a number of other locations around the UK.

STDL designs and constructs AC and DC substations for UK generation, transmission and distribution companies and industrial customers. In addition it provides services covering all stages of transmission and distribution asset lifecycles including power network studies, operation and maintenance and decommissioning. Siemens also offers a full range of substation equipment including switchgear, transformers and protection for all network voltages.

STDL designed, built and continues to service the converter substations for the Scotland-Ireland HVDC link, and has recently been awarded the contract to design and build the converter stations for the Brit-Ned HVDC link.

Siemens is also committed to supporting the renewables industry in the UK and has built or provided equipment to several onshore and offshore wind farm connections. The business is currently working on design and build contracts for three offshore wind farm connections.

Further information

If you wish to discuss or clarify any part of the following response, or to receive further information on Siemens involvement with the energy sector please contact:

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This response

The format of this response is to make some general points under the following headings:

- Objectives of Regulation
- Cost drivers for Island connections
- Competition and Tendering
- Regulatory comparisons
- Wider issues

We then discuss the three options proposed in the consultation document and draw some conclusions.

Objectives of Regulation

Plans for large scale renewable generation on Scottish Islands have resulted in connection applications to the Great Britain System Operator (GBSO). This has triggered plans for Scottish Hydro electric Transmission Ltd (SHETL), the Transmission Owner (TO), to install new cables to send electricity to the main interconnected transmission system (MITS), for onward transmission to customers throughout Great Britain.

These connections are progressing under existing British Electricity Trading and Transmission Arrangements (BETTA) , but the high cost and the likelihood that at least two of them will operate at High Voltage Direct Current (HVDC) has prompted Ofgem to consult on potential regulatory arrangements specifically for Scottish Island connections.

Three new Scottish Island connections to the mainland are envisaged. Those for the Western Isles and Orkney would represent a major reinforcement of the existing SHETL network. The proposal for Shetland would for the first time link it to the MITS.

Siemens does not believe new regulation is essential to make these Island connections. If the connections raise any unique issues between price reviews it would be possible for Ofgem to treat them as “one off “cases, as was done for RETS. Specific new regulation may, however, be beneficial.

Ofgem’s letter describes regulation as ‘second best’ so before any addition to the existing regulatory burden or complexity is added we believe Ofgem should ensure that it:

1 .Sets out clearly its objectives

2. Demonstrates that the benefits significantly outweigh the disadvantages.

3. Does not unduly delay Island connections

Valid objectives would include:

- Protection of customers
- Faster, more flexible generation connections that support the connection of renewables
- Support for beneficial innovation, optimisation or cost reduction

- More efficient or effective operation of the sector
- Safety

The following should not be accepted as valid objectives for a regulatory change:

- Introducing apparent (but ineffective) competition for its own sake.
- Otherwise unnecessary regulation whose bi-product is a 'subsidy' to some parties – e.g. 'socialisation' of costs.
- 'correcting' the consequences of other regulation.

If Ofgem chooses to create a specific and enduring regulatory regime just for Scottish island connections, the benefits need to be clearly identified and outweigh the costs of creating and operating that regime in perpetuity.

We would want to see timeliness of connections recognised at least as highly as the lowest cost. Timely connections have the following benefits:

- Earlier connection of renewables – meeting CO_2 reduction targets.
- Ability of generation developers to proceed (connection offer fits project programme allowing financial close).
- Earlier benefit from access to supply market.

A lengthy competitive processes and regulatory uncertainty, would impact negatively on supply chain and investor confidence, adding cost.

Cost drivers for Island connections

Regulation can affect what gets built, how and when, in direct and indirect ways. It impacts on the whole supply chain, not just the regulated entity. The main cost drivers for an island connection are the underlying costs of building and managing the asset, not the internal efficiency of its owner (the regulated entity).

The cost drivers are listed and discussed in decreasing order of significance:

- Point of connection
- Route
- Financing and risk allocation
- Contractual innovation
- Technology

Point of connection

The overall aim is to take power derived from a generation source on a Scottish Island and deliver it to demand further South. One end of the interconnector has to be at the island, but the other end could be anywhere on the MITS, with consequent additional reinforcement costs between that point and the demand.

The choice of whether the connection runs from A to B, or A to C will fundamentally set the cost. The optimum choice of point of connection to the MITS is likely to save more cost to customers than any possible saving through better regulation. Ofgem should therefore focus on how its proposals will affect this decision and who takes it.

For example a large generator on the Western Isles could consider connections to each of the three TO networks. The shortest being to SHETL at Ullapool, but this might involve a long delay for the consenting and construction of the Beauley-Denny and other lines to release transmission capacity. Scottish Power might offer a longer

cable to Hunterston, but still require additional capacity to be created on the Scotland-England interconnector. NGET might offer an even longer cable connecting to Heysham with fewer constraints.

Regulation can skew the economics of the decision of which option to take. If the sub sea cable were built on a merchant basis the generator would pay the full cost of the cable, but under BETTA only 27% of the cost of the onshore reinforcement.

The existing grid queue in Scotland also has consequences for the timing of connection of proposed generation on Scottish Islands.

The combined regulatory arrangements result in different parties bearing differing shares of the costs of alternative options, and causing significant differences in the timing of when they would be built. This is driving developers and TOs towards investment decisions that would not be justified if an overall cost/benefit analysis were considered.

Route

Having set points A and B, the route between them is the next biggest cost driver. The shortest route may involve more significant environmental issues, leading to delays in consenting. Apparently small issues like choice of land fall can significantly change cable costs. e.g. crossing under a sea defence at depth in a duct increases thermal resistivity compared to a shallower direct buried route. The de-rating of the cable could lead to using a larger cross section for the whole cable length to avoid an expensive sub sea joint.

Local sea bed conditions and water depth will dictate which vessels can be used and cable installation method, ploughing, jetting or cutting, with widely varying costs.

Finding the optimum route requires understanding of all the cost drivers. There are many trade offs between cable length, installation method, cable size, compensation equipment etc. Many only become known once detailed surveys and studies are done. Balancing these costs requires involvement of expertise from the full supply chain. The regulatory approach may support or inhibit such involvement.

Financing and risk allocation

Merchant or price regulated arrangements result in different risk allocation.

A price regulated TO earns a relatively low rate of return and therefore cannot take risk on behalf of the connecting generator.

Their charges are paid for by all connectees, so they cannot agree a more expensive solution that would benefit one party, for example using an alternative technology to make an earlier connection.

A connection exposed to merchant risk will require a higher RoR than for a regulated income and has a wider choice of financing arrangements.

There is a trade off between early cost certainty and cost minimisation. If a Contractor has to fix a price before full details are known he must factor in the risks. The timing of any competitive process will determine this trade off.

Contractual innovation

Since each connection is unique it is likely that better solutions will be found faster if a design team comprises expertise from the whole supply chain. Under the 'status quo' option the TO would be constrained to operate traditional competitive bidding procurement to demonstrate it had chosen the lowest cost contractor. This option would limit the potential to involve contractor expertise at the design stage.

Technology

The high level technical choices that drive outturn cost include:

- HVDC vs AC or mixed solutions.
- If HVDC whether Current or Voltage source conversion is used.
- The operating voltage and design of cable systems.

The expertise in each of these areas lies mainly with cable and converter station contractors, again suggesting their early involvement.

Regulation and licensing have two main influences over technical innovation

- Technical codes and standards that must be adhered to – e.g. Grid Code
- Constraints over the procurement process adopted by a TO and whether consortia involving the supply chain could come forward.

Competition and Tendering

Effective Competition

Ofgem's primary duty is to protect customers, where possible by encouraging *effective* competition. Any competitive process needs to be carefully designed to ensure that it sends the right messages to competitors and is therefore beneficial rather than for its own sake.

In particular the timing of any competition can be critical. If competition is too early there will be significant unknowns and risks. The bidders must factor these in, resulting in a high or variable price. If competition comes at a later stage key decisions that drive costs will have been made there is no opportunity to offer innovative solutions.

The competitive process may dictate who competes. There could be competition at the highest level - for the right to build and own the connection. This would allow bids from TO companies or consortia that might include construction contractors. If a monopoly TO is in place, there could be competition one level down the supply chain amongst design-build contractors.

Competition in the supply chain

Over 150 HVDC interconnector projects are proposed around the world, some may not be built for decades or ever, but many are as likely to happen as the 3 Scottish Island connections. Competition to construct interconnectors takes place on an international basis, as does the provision of investment funds for the projects.

There are three converter station manufacturers competing in the European market – ABB, Areva and Siemens. There are three higher voltage sub-sea cable manufacturers – ABB, Nexans and Prysmian. These companies compete on an international basis and each has a full design and construction capability for interconnectors.

There are limited resources available globally, for which UK projects must also compete. Asian and Latin American industrialisation has led to a world shortage of cable and transformer manufacturing capacity, resulting in lengthening lead times and raw material price rises.

There is increasing activity in the sub sea cable installer and vessels sector from oil and gas and offshore wind projects. There is potential for vessels to be built or converted to meet the increasing demand, so at present this is not a driving constraint on projects.

There is a limited role for consultants on interconnector projects as there is the necessary expertise is in the cable and converter station companies and network owners.

There is sufficient investor interest in interconnectors, much of it based in London, that this should not constrain UK projects. However the perception of country risk including the regulatory regime will drive the required rate of return.

In summary, competition exists one tier down the supply chain from the monopoly TO, so regulation does not need to extend to this level. The impact of regulation on perception of risks and rewards in doing UK business will affect the availability of resource and the returns expected.

Regulatory comparisons

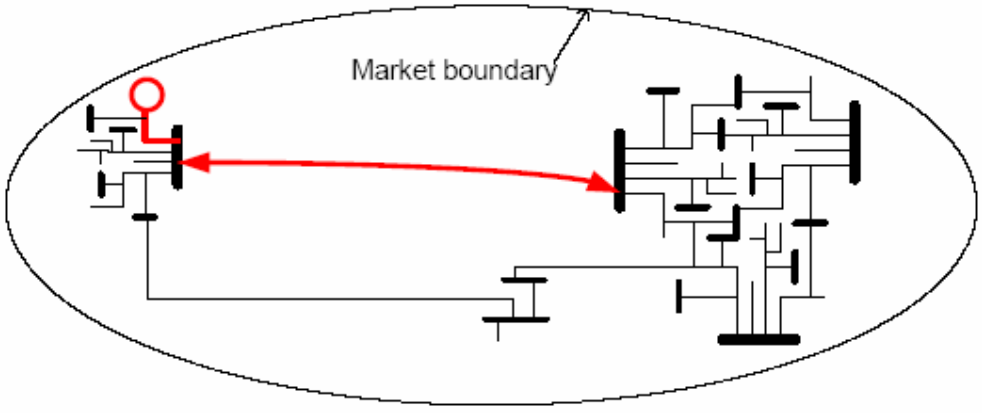
Comparisons may be made with the regulation of other parts of the electricity industry, where apparently similar situations and technology are involved:

- Onshore transmission
- Offshore transmission
- International Interconnectors

Onshore transmission

There are no essential differences between Scottish island connections and the connection of new renewable generation close to remote onshore communities. They only differ in the relative cost of making the connection and the technology used.

Two of the three islands already have links to the mainland grid. The additional connections are reinforcement of an existing network to accommodate new generation, within an existing market involving generation and demand customers.



Island connection reinforces within an existing network and market

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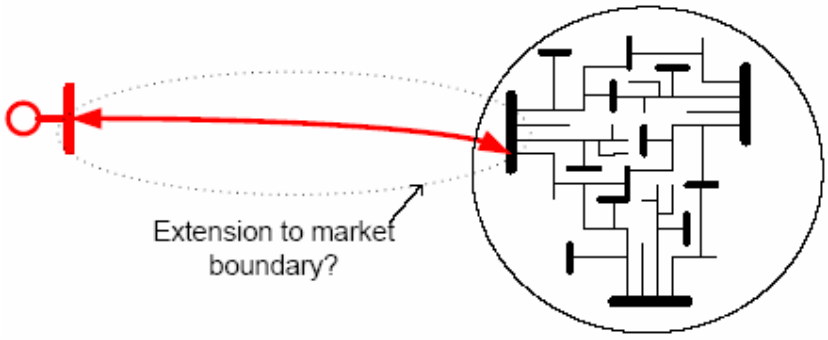
Offshore transmission

Ofgem is developing the regulatory regime for offshore renewable connections, 'offshore transmission'. Initial thoughts were set out in a scoping document in March 2007 and Ofgem's latest proposals will be published in July 2007, as this consultation closes.

Under these proposals it has been decided that the radial connections from offshore generation to the onshore MITS will be regarded as part of the transmission system.



Offshore transmission connects a remote generator to an onshore network and market

In the Ofgem letter of 5th June on Scottish Island Connections, "many similarities" are suggested with offshore transmission. Whilst there are some similarities, there are three fundamental differences, given below which mean that offshore renewable regulation should not be used as a precedent for island connections.

- There are no customers other than the generators on offshore transmission connections. Scottish islands are inhabited by existing demand customers whose interests need to be protected by regulation.
- The design lifetime of offshore transmission assets is driven by the economics of the connected generation. The islands are likely to remain populated in perpetuity, so their connections will need to be renewed at intervals indefinitely.
- Offshore transmission licensing is based on the assumption that connections linking one or more generators to the mainland will be radial in nature. (see assumptions list in offshore GBSQSS and Grid Code reports.) It benefits generators that these radial circuits can be operated more flexibly than interconnected systems, e.g. by setting higher voltage ranges on a wind farm 33kV cable array to reduce I^2R losses and maximise power exports. Whereas Island connections must continue to be operated in line with existing standards for the benefit of all connectees.

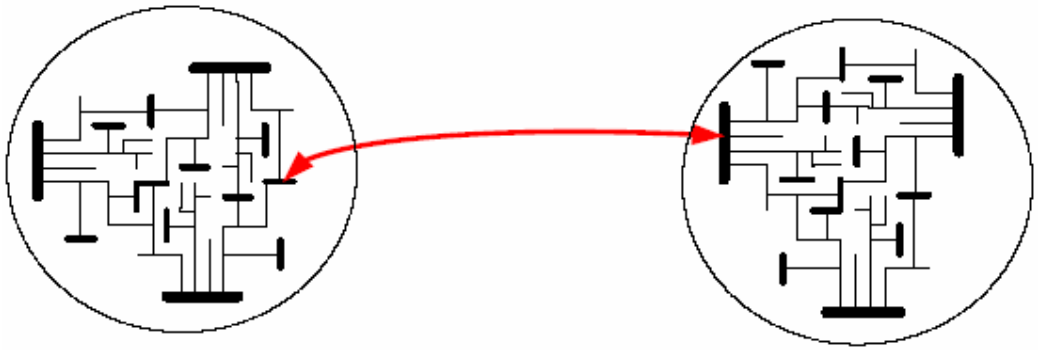
The decision to adopt price regulation for offshore transmission was driven by the desire of the renewables industry and the DTI for socialisation of offshore renewable connection costs, rather than the underlying technical or regulatory issues.

This precedent to set regulatory models on the basis of their side effects, rather than direct merits should be resisted by Ofgem.

If a similar option to that chosen for offshore transmission is the most appropriate for islands it should be justified on its own merit and not because of any 'consistency' argument with offshore transmission.

International Interconnectors

Interconnectors between countries allow electricity to be traded in bulk between separate markets. They are built on a competitive, merchant basis. This does not make a good precedent for island connections as the economics and charging models are different, e.g. the same TO and DNO is present at both ends of an Island connection.



Interconnection between separate electricity markets

Wider issues

There are a limited number of Scottish Islands to which any new regime would ever apply. Ofgem should consider the value of focussing on this area of renewable networks against the opportunity cost of other wider industry developments.

A range of bodies including the Scottish Executive, the EU and the Crown Estates are each considering proposals for major sub sea infrastructure for renewables. Some of these would encompass connection to Islands as part of a wider plan. If this were to happen the proposed regulatory regime might be superseded.

Networks with high penetrations of variable output renewables were not envisaged at the time of privatisation when the regulatory concepts were set. The process for agreeing modifications to codes etc. is deliberately incremental and therefore favours incumbents and the status quo. BERR and Ofgem may need to consider more radical changes to the whole GB regulatory regime, rather than focussing on Islands.

There is a wider national and international objective to increase the proportion of renewable generation. If the UK government is to meet its share of the EU target of 20% all energy from renewables by 2020 this would equate to around 35% of electricity. This would require significant enhancement to the GB transmission network to transfer the power from high resource areas like Scottish islands to meet demand further south or in mainland Europe.

The government and regional stakeholders should take a strategic approach to this objective. Adjusting the existing regulatory model will not in our view drive the fundamental change that would be needed to meet the 2020 deadline.

Ofgem's proposed options

The three options outlined by Ofgem are compared below:

a) Status quo

Under the status quo SHETL, the incumbent TO, would procure the construction of the link on a competitive basis from converter station contractors, cable suppliers and installers. Siemens agrees with the list of advantages of this approach stated in the ofgem letter. It would also allow design and planning for the link to start sooner, as there would be no delay to competitively appoint a TO.

In models a) and c) the price regulated nature of the TO would make it risk averse (as only a regulated return is available whatever risk is taken) and therefore potentially unable to offer flexibility of timing to suit the interests of the generator.

If the developer were paying the full cost of the connection there might be a cost benefit trade off involving an alternative route or more under grounding alternatives that would deliver an earlier connection. Under BETTA, developers pay cost reflective charges, but not the whole costs. The TO therefore has a duty to seek the least cost solution in the interests of all customers. This might result in lengthy planning delays associated with overhead lines and taking the shortest sea cable route.

In both price regulated models a) and c) the generator who triggers the construction of the island connection enjoys the benefit of sharing the cost with others, but suffers the inflexibility of not being able to influence route, technology or timing.

Siemens recognises that SHETL retaining a monopoly prevents the exposure of its internal costs to competition, but the main cost driver is the cost of the link itself which is unaffected by competition for the TO license. We see no reason why any other TO would be able to procure the same connection from the same contractor base at a significantly lower cost. Neither would an alternative price regulated TO significantly change the risk of asset stranding. There is no reason to suggest that SHETL should be less efficient at delivering island connections than other parts of its regulated activities.

b) Merchant

Several options for a merchant approach are possible. The one described in the Ofgem letter implies that there would be no interconnection with the existing island network until the point of connection on the mainland. This would make a merchant connection a bilateral issue between the generator and the merchant TO and the merchant TO would in effect, be the party connecting to the SHETL network.

This option has advantages for the generator in that it has control over the design of its connection, the level of redundancy and any cost vs. planning-delay trade-offs. It does however require it to meet the full cost of the connection. It also reduces the ability to co-ordinate strategic reinforcements across a region for the benefit of all connectees.

This approach provides no additional benefits to demand customers on the island either from a more robust connection or by exposure to the competitive supply market.

As an alternative a merchant island connection owner could potentially derive its income by providing an island connection asset to SHETL, embedded within the SHETL network. This would allow SHETL to connect both the generator and demand customers on the island. This would be complex from a regulatory viewpoint as SHETL's income would be price regulated with part of its cost incurred from a merchant connection owner. This is analogous to toll roads or with the telecommunications industry, but would be new to electricity regulation.

The merchant options allow the greatest innovation in the supply chain and therefore potential to reduce base cost. Merchant connections could be financed and built by a range of companies or consortia. Contracts could include value engineering, risk and benefit sharing with customers.

A merchant approach works best where only two parties are involved and there are no other customers to consider, as with offshore renewable generation connections. When given a similar choice in the consultation on offshore transmission licensing, developers mostly chose price regulation (and socialisation of the connection costs) rather than the flexibility of the merchant approach

If there is a connection to demand customers on the islands, their interests would need to be safeguarded through regulation. If this regulation is significant option b) would tend towards option c).

Merchant risk would require a higher rate of return than a price regulated regime.

c) Tendering for the right to be the TO / to build and receive revenue

This option appears to combine a degree of flexibility with customer protection, however it would require the most complex form of regulation. We believe that practical considerations would make it unlikely to deliver in full the potential benefits.

The problem is in ensuring that the competitive process would deliver effective competition, rather than just holding a 'beauty contest' for the monopoly TO license. The winner of which would then be in same position as SHETL under option a). In effect, all the contest will have demonstrated is their enthusiasm.

Cost benefit of competition at the TO level needs to be set against its impact on lower levels of the supply chain. The cost to HVDC contractors of multiple bids to prospective TOs is greater than to a single TO. Fewer resources could then be afforded to work on actual technical options.

Conclusions

Island connections are high value one off assets and it is therefore right that Ofgem consult on possible forms of regulation. Siemens is grateful for the opportunity to comment.

Only three island connections are envisaged and it is already possible to deliver them under existing regulatory arrangements.

If Ofgem proposes a specific regulatory regime for Scottish Islands it must clearly state the aims of the new regulation and demonstrate that it would deliver benefits outweighing the costs.

The impact of the regulatory process on timing of renewable connections should be a significant factor in any decision to introduce new regulation.

Siemens does not believe a sufficient case has yet been made to introduce a new regime just for Scottish Island connections.

The options

The three options outlined by ofgem are all potentially workable, each represents a trade off between advantages and disadvantages and c) in particular will require complex regulation.

The merchant approach (option b) as described in the Ofgem letter would create different assets from a) or c) as there would be no connection to the island network.

There may be other forms of merchant connection which would allow existing islanders to benefit from the new connections.

Siemens, as a main contractor for designing and building transmission assets, could work under any of the three options. Our role would differ for each due to the way the connections would be procured.

We would like to see the expertise of the whole supply chain used at early stages of projects to help find the optimum solution. We would consider participation in TO consortia where regulation made this possible.

Any competitive process would need to be very carefully designed to deliver the right messages and objectives to all parties for it to deliver effective competition.

Mixed forms of regulation skew the cost messages received by markets, resulting in overall inefficiencies. Adding further complexity or creating special cases can make this situation worse.

Higher level strategic change to the whole of the UK electricity market may be required if the government's objectives for renewable energy are to be achieved.