HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

kersti.berge@ofgem.gov.uk 27/05/2014

Dear Kersti

Highlands and Islands Partnership Response to Consultation on Scottish Hydro Electric Transmission's proposed transmission project between Caithness and Moray in northern Scotland

Highlands and Islands Enterprise (HIE) is the Scottish Government's agency responsible for economic and community development across the North and West of Scotland and the islands.

HIE makes representations to key participants on behalf of industry to influence the way in which grid construction is triggered, underwritten then accessed and charged for in the region.

General Comments

We welcome the opportunity to respond to this consultation and have commissioned research to compare the economic impact of building the subsea proposal in 2018 vs. an onshore option in 2026. The TEC register indicates that there is around 3.1GW of generation dependent on the Caithness Moray grid upgrade. We have compared the economic impact of building that generation by around 2018 vs. waiting until after 2026 when an onshore solution could be delivered. For simplicity we haven't assumed any attrition in either scenario and on the basis that a job today is worth more than a job tomorrow, we can demonstrate significant UK benefits to pursuing an earlier subsea solution rather than postponing to 2026 to allow an onshore option to be developed (without any certainty of delivery).

The evidence is attached and we would welcome its inclusion in consideration of the needs case for the Caithness Moray upgrade.

Responses to Specific Questions

In response to questions 1-3 we agree with the case as outlined by SSE in the needs case submission.

Question 4. What are your views on the potential wider benefits of SHE Transmission's proposed subsea link? How should wider benefits be measured and evaluated in the Needs Case assessment for a proposed transmission project?

There are a number of other potential consequences associated with the timing delay between the two upgrade options. Delaying the availability of a grid connection by eight years could have the following consequences:

- Developers of onshore windfarms either abandon or reduce the scale of their proposed projects as they look to other investment opportunities.

- Delays in offshore windfarms and marine renewables projects delays the development of the relevant supply chains. Potential supply chain companies have faced continuing delays in projects coming to fruition. As a consequence there is less incentive for them to invest in training and capital expenditures in anticipation of potential future work for them in this sector.
- Supply chains in other European countries, especially in relation to offshore windfarms and marine, develop more rapidly than in the UK resulting in loss of potential competitive advantage of Scottish/UK supply chain and potential reduction in the attractiveness of Scottish locations for OEMs and the establishment of a new, indigenous marine industry here in the UK

Question 5. Do you consider we (and our consultants) have identified the relevant issues to the Needs Case assessment for SHE Transmission's proposal? Are there any other factors you think we should examine in order to inform our views on the proposed reinforcement?

According to our analysis, on average, the delay in the onshore and offshore wind farms and the marine renewables projects having access to the grid upgrade results in c32% greater jobs impact under the subsea cable option compared to overland option. ***(Note: this does not mean a difference in the absolute number of jobs but the 'benefit' of these jobs taking into account social time preference where a job is 'worth' more now than in a years time).*** We would welcome this evidence being considered as part of the needs case assessment for the proposed reinforcement.

I hope you find these comments and supporting evidence useful. Please feel free to contact me to discuss any of the points raised – particularly as this is new evidence not previously considered as part of needs case assessments.

Yours sincerely

Gavin MacKay

Gavin MacKay
Senior Development Manager
Highlands and Islands Enterprise

Grid Upgrade
Caithness to Moray Coast
Economic Impact Assessment

Final Report

To

Highlands & Islands Enterprise

May 2014

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1 INTRODUCTION

This is the final report of an assessment of the economic impacts associated with two scenarios for a potential grid upgrade between Caithness and the Moray Coast proposed by Scottish Hydro Electric transmission plc (SHE Transmission). The two options are the development of a subsea High Voltage Direct Current (HDVC) solution with a 2018 completion date, versus an onshore AC solution with an expected completion date in 2026.

This assessment will support the Ofgem consultation response being prepared by HIE and partner agencies.

This research was undertaken on behalf of Highlands & Islands Enterprise (HIE) during May 2014.

1.1 STUDY OBJECTIVES

The objectives of the study were to:

1. Provide a brief overview and description of the two potential grid solutions (subsea HDVC by 2018 and onshore AC by 2026).
2. Provide an overview of windfarm developments that may be developed within the timescales.
3. Calculate the economic impact from building, installing and maintaining these energy devices in terms of estimated direct, indirect and induced employment and income impacts, and wider GVA and turnover.
4. In comparing the two potential grid solutions and their respective implications for windfarm developments, consider: time additionality; business efficiency savings; and wider industry and supply chain impacts.

1.2 STUDY METHOD

The study method included:

1. Review of documents provided by HIE.
2. Consultations with Gavin Mackay (Senior Development Manager-Energy Policy & Strategic Projects, Highlands & Islands Enterprise).

1.3 STRUCTURE OF THE REPORT

Chapter 2: Overview of Proposed Project
Chapter 3: Economic Impact Assessment

2 OVERVIEW OF PROPOSED PROJECT

2.1 GRID UPGRADE OPTIONS

SHE Transmission is aware that there is a growing volume of generation requesting to connect into the network in the north of Scotland and that Ofgem believe that 'there is a need for the reinforcement' recognising that 'existing transmission capacity is highly likely to be exceeded'.

In 2013 SSE submitted a design to Ofgem for a grid upgrade to enable the transmission of power from wind farms in Caithness and future Orkney marine projects to demand centres in the south. The preferred option is for an HVDC subsea cable between Caithness and the Moray Coast (see **Diagrams A** and **B**) which is fully underwritten by real generation projects, fully costed, fully consented and a preferred supplier identified. Effectively, subject to approval by Ofgem, construction could begin and a 2018 completion date be achieved.

The proposed project is estimated to cost £1.3 billion and will be completed by 2018. It comprises:

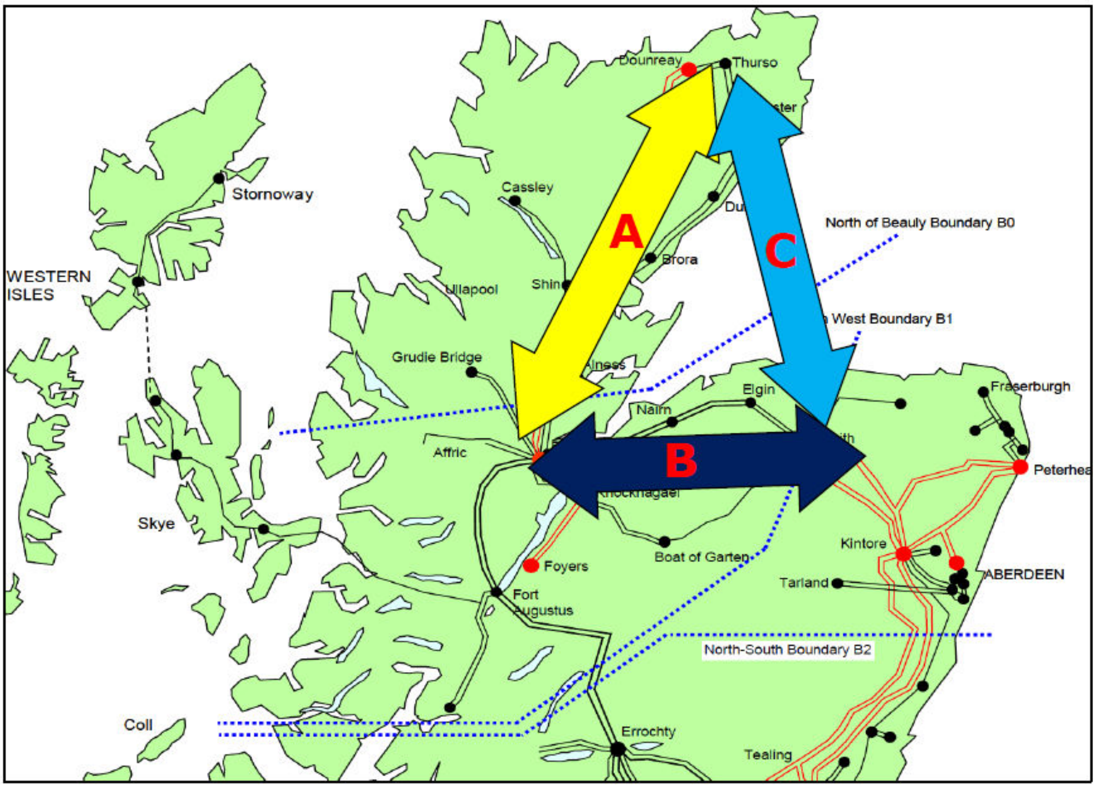
1. A new 275/132kV substation at Spittal, approximately 4km north of Mybster (approximately half way between Latheron and Thurso).
2. Redevelopment of the Blackhillock substation (south of Keith, Morayshire), including a new 400kV busbar.
3. A HVDC cable between Spittal and Blackhillock (160km) comprising a 800MW cable from Spittal to the Caithness coast, then a 1,200MW subsea cable to Blackhillock.
4. A new 275/132kV substation at Loch Buidhe, at the crossing of the Beauly to Dounreay 275kV and Shin to Brora/Mybster 132kV overhead lines.
5. A new 275/132kV substation at Fyrish near the existing Alness 132kV Tee point and moving the existing Alness Grid Supply Point (GSP) to the new substation.
6. Replacing the existing conductors on the 275kV circuit between Beauly and the proposed new substation at Loch Buidhe (62km).
7. Rebuilding the existing Dounreay-Thurso-Spittal 132kV circuits at 275kV (32km) and a new 275/132kV substation at Thurso South close to the existing Thurso GSP.
8. A new 132kV double circuit overhead line between the new substation at Spittal to Mybster (4km).
9. A new 132/33kV collector for new wind generation around Mybster.

The proposed subsea link includes anticipatory investment to accommodate a future cable link from Shetland. The main anticipatory element included in the proposal is additional capacity (400MW) in the cable from the Caithness coast to the Blackhillock substation in Morayshire. The proposal does not include the cable link to Shetland.

Ofgem is applying increased scrutiny to its assessment of the need for grid upgrades and is consulting on the proposed Caithness to Moray link. The alternative option comprises onshore cables between Caithness and Beauly, then on between Beauly and Kintore, near Aberdeen (see **Diagrams A** and **B**).

DIAGRAM A: Caithness Moray HVDC Link and Associated Onshore Works (Option 1)

DIAGRAM B : Route Options (C versus A+B)



2.2 OVERVIEW OF ENERGY DEVELOPMENT

SSE has identified a number of renewable energy projects in the North of Scotland that could be affected if the provision of extra grid capacity is not available by 2018. These comprise a mix of onshore and offshore wind farms and marine renewable projects in the Pentland Firth/Orkney area.

SSE do not identify the specific projects which include:

1. **Transmission**:
   a. Onshore wind-1260.3 MW
   b. Offshore wind-1,000 MW
   c. Wave-119.5 MW
   d. Tidal-392 MW

   e. **Total Transmission**-2,771.8 MW representing 22 projects

2. **Distribution**:
   a. Onshore wind-318 MW
   b. Biomass-5.1 MW
   c. Hydro-7.5 MW

   d. **Total Distribution**-330.6 MW representing 20 projects.

3. **Total** (transmission & distribution):
   a. Onshore windfarms: 1,578 MW
   b. Offshore windfarms: 1,000 MW
   c. Wave: 120 MW
   d. Tidal: 392 MW
   e. Biomass: 5.1 MW
   f. Hydro: 7.5 MW

   g. **Total Transmission & Distribution**-3,102.4 MW

All of these projects are located north of Beauly and they would each be affected (to a varying degree) by any delay in the Caithness-Moray project which includes a mix of subsea and onshore works.

3 ECONOMIC IMPACT ASSESSMENT

3.1 INTRODUCTION

This Chapter presents our assessment of the economic impacts associated with each of the grid upgrade options and the difference in the economic impact between the scenarios.

3.2 APPROACH TO CALCULATING ECONOMIC IMPACTS

The main aspects in estimating the economic impacts are to:

1. Calculate the economic impacts from building, installing and maintaining the renewable energy projects identified by SSE in terms of estimated direct, indirect and induced employment and GVA.
2. Compare the two potential grid solutions and their respective implications for the identified renewable energy developments. These will relate to the timing of the operational lives under the two grid update options and include 'benefit' of the economic impacts, business efficiency savings; and wider industry and supply chain impacts.

Our methods and key assumptions as agreed in discussion with the client are:

1. The impacts are calculated in terms of job creation and GVA.
2. The assessment will involve the comparison of the impacts associated with the two options for a grid upgrade.
3. In both cases it is assumed that the **absolute** impact for each of the options will be identical. In other words the energy projects that will be affected by the options for the grid upgrades will be same in terms of total generating capacity and in energy mix (i.e between onshore wind, offshore wind, tidal, wave and hydro).
4. The key difference is the date at which the energy projects would have access to the upgraded grid. These dates are 2018 and 2026.
5. Without the grid upgrade the identified energy projects would not be able to generate power to the grid.
6. We assume that all of the construction and installation impacts occur between 2015 and 2017 for Option 1 and 2023 and 2025 for Option 2.
7. We assume that all of the operation and maintenance impacts occur over a 25 year project life: 2018-2042 for Option 1 and 2026-2050 for Option 2.
8. All of the annual job and GVA impacts are discounted to 2014.
9. Job and GVA impacts for each energy source are based on existing research and available economic impact assessments.
10. The economic impacts are estimated at the Scottish and UK levels.

While these are simplifying assumptions, they allow the core of the difference in economic impact between the two options to be estimated.

SSE identified the following capacity provision that would affected by the provision of the proposed grid upgrade:

1. Onshore windfarms: 1,578 MW
2. Offshore windfarms: 1,000 MW
3. Wave: 120 MW
4. Tidal: 392 MW
5. Biomass: 5.1 MW
6. Hydro: 7.5 MW

Of these, we have discounted the impacts of distribution infrastructure required for Biomass and Hydro projects. First, we have no basis to provide economic impacts estimates associated with these two categories of energy generation and, second, they account, between them, for less than 0.5% of the total capacity that could be affected.

We have also combined the wave and tidal energy projects into one marine renewables category given the limited information we have on the impacts of wave and tidal projects other than that from an Environmental Statement for the first phase of MeyGen's tidal stream project in the Pentland Firth.

3.3 ONSHORE WIND FARMS

There is a significant amount of evidence available on the expected impacts of on-shore windfarms. Two specific studies provide estimates of the economic impacts associated with the development, construction and installation of onshore wind farms and of the operational and maintenance impacts of the windfarms:

1. *Windfarm Construction: Economic Impact Appraisal*. A Final Report to Scottish Enterprise, O'Herlihy & Co Ltd (2006).
2. *Onshore Wind: Direct & Wider Economic Impacts*. Research undertaken by BiGGAR Economics on behalf of RenewableUK and Department of Energy and Climate Change (DECC), (May 2012).

Based on these two studies as well as a number of economic impact assessments produced for Environmental Statements in support of onshore wind farm applications in the Highlands of Scotland a range of job and GVA per MW installed capacity ratios were identified for the construction and operational phases for onshore wind farms (**Table 3.1**).

TABLE 3.1: ONSHORE WINDFARM IMPACTS (DIRECT, INDIRECT & INDUCED) PER MW						
	DEVELOPMENT, CONSTRUCTION & INSTALLATION					
	Jobs per MW			GVA per MW		
	DECC	Highland Windfarm	Average	DECC	Highland Windfarm	Average
Scotland	3.44	2.92	3.18	£202,876	£210,256	£206,566
UK	5.76	4.89	5.33	£341,806	£354,240	£348,023
	OPERATION & MAINTENANCE					
	Jobs per MW			GVA per MW		
	DECC	Highland Windfarm	Average	DECC	Highland Windfarm	Average
Scotland	0.21	0.34	0.28	£21,726	£18,849	£20,288
UK	0.30	0.49	0.40	£30,233	£26,229	£28,231

Applying these assumed jobs and GVA conversion ratios, the estimated impacts associated with the development and operation of onshore windfarms with a combined installed capacity of 1,578 MW are reported in **Table 3.2**.

TABLE 3.2: DIRECT, INDIRECT & INDUCED FTE JOB YEARS (1,578 MW ONSHORE WIND)		
	Development, construction & installation	
	Jobs (total job years)	**GVA (total)**
Scotland	5,018	£326,000,000
UK	8,411	£549,000,000
	Operations & Maintenance	
	Jobs (annual)	**GVA (annual)**
Scotland	442	£32,000,000
UK	631	£45,000,000

3.4 OFFSHORE WIND FARMS

The offshore windfarm identified by SSE is Beatrice Offshore Windfarm (BOWL). The estimated jobs impact is taken directly from: *Beatrice Offshore Wind Farm Environmental Statement: Non Technical Summary* (April 2012). The report provides a lower and upper case depending on the extent to which the supply chain is Scottish. We have taken the average (mid-point) of these two estimates as potential jobs at the Scottish level and the upper estimate as the UK level figure. In both cases we have made an allowance for induced impacts by applying a factor of 1.25. GVA estimates are based on the GVA/MW data from the marine renewable estimates. The estimates are reported in **Table 3.3**.

TABLE 3.3: DIRECT, INDIRECT & INDUCED FTE JOB YEARS (1,000 MW OFFSHORE WIND)		
	Development, construction & installation	
	Jobs (total job years)	**GVA (total)**
Scotland	11,844	£451,000,000
UK	14,750	£676,000,000
	Operations & maintenance	
	Jobs (annual)	**GVA (annual)**
Scotland	331	£17,500,000
UK	425	£22,500,000

3.5 MARINE RENEWABLES

SSE identify marine renewables projects (tidal and wave) with an installed capacity of 512 MW. The main relevant impact assessment research available is contained within the *Environmental Statement for MeyGen Tidal Energy Project Phase 1*.

Based on their research we have made the following assumptions for marine renewables projects:

1. Temporary jobs associated with manufacturing, construction and installation phase: 20 jobs per MW. MeyGen assume 50% of these accrue to Scotland. We, in addition, assume that 75% could accrue to the UK.
2. O&M FTE (direct, indirect and induced) jobs: 1.337 per MW.

Using these assumed conversion ratios, estimates of the jobs and GVA impacts associated with the development and operation of marine renewables projects with a combined installed capacity of 512 MW are reported in **Table 3.4**.

TABLE 3.4: DIRECT, INDIRECT & INDUCED FTE JOB YEARS (512 MW MARINE RENEWABLES)		
	Development, construction & installation	
	Jobs (total job years)	**GVA (total)**
Scotland	5,120	£231,000,000
UK	7,680	£346,000,000
	Operations & maintenance	
	Jobs (annual)	**GVA (annual)**
Scotland	555	£29,350,000
UK	685	£36,220,000

3.6 ALTERNATIVE ENERGY PROJECT PROFILES

We undertook alternative versions of the impact assessment based on a phased construction time line for each of the energy sources. The assumed profiles are reported in **Tables 3.5-3.8**. Option 1 and Option 2 refer to the subsea and overland cables respectively. All construction occurs over the period 2015-2017 (Option 1) and 2023-2025 (Option 2). The operational phase occurs over the 25 year period 2018-42 (Option 1) and 2026-2050 (Option 2).

TABLE 3.5: SCOTLAND-JOBS PROFILE					
Option 1	**2015**	**2016**	**2017**	**2018**	**2042**
Option 2	**2023**	**2024**	**2025**	**2026**	**2050**
Onshore wind	0	2,509	2,509	442	442
Offshore wind	3,948	3,948	3,948	331	331
Marine	1,706	1,707	1,707	555	555
TOTAL	**5,654**	**8,164**	**8,164**	**1,328**	**1,328**

TABLE 3.6: UK-JOBS PROFILE					
Option 1	**2015**	**2016**	**2017**	**2018**	**2042**
Option 2	**2023**	**2024**	**2025**	**2026**	**2050**
Onshore wind	0	4,205	4,206	631	631
Offshore wind	4,916	4,917	4,917	425	425
Marine	2,560	2,560	2,560	685	685
TOTAL	**7,476**	**11,682**	**11,683**	**1,741**	**1,741**

TABLE 3.7: SCOTLAND-GVA PROFILE (millions)					
Option 1	**2015**	**2016**	**2017**	**2018**	**2042**
Option 2	**2023**	**2024**	**2025**	**2026**	**2050**
Onshore wind	0	163.0	163.0	32.0	32.0
Offshore wind	150.3	150.3	150.3	17.5	17.5
Marine	77.0	77.0	77.0	29.4	29.4
TOTAL	**227.3**	**390.3**	**390.3**	**78.9**	**78.9**

TABLE 3.8: UK-GVA PROFILE (millions)					
Option 1	**2015**	**2016**	**2017**	**2018**	**2042**
Option 2	**2023**	**2024**	**2025**	**2026**	**2050**
Onshore wind	0	274.5	274.5	45.0	45.0
Offshore wind	225.3	225.3	225.3	22.5	22.5
Marine	115.3	115.3	115.3	36.2	36.2
TOTAL	**340.6**	**615.1**	**615.1**	**103.7**	**103.7**

3.7 DISCOUNTED ECONOMIC IMPACTS

Based on the assumed deployment and operational timings and associated jobs and GVA profiles, **Table 3.9-12** report the discounted jobs and GVA impacts for the two cabling options.

TABLE 3.9: ALL RENEWABLES (SCOTLAND) JOBS		
	Option A (Subsea cable)	**Option B (Overland)**
Construction years	2015-2017	2023-2025
Operating years	2018-2042	2026-2050
Construction jobs (total)	21,982	21,982
Annual O&M jobs (max)	1,328	1,328
Net Present Value (2014)	**40,189**	**30,520**
Average annual jobs (28 years)	**1,435**	**1,090**

TABLE 3.10: ALL RENEWABLES (UK) JOBS		
	Option A (Subsea cable)	**Option B (Overland)**
Construction years	2015-2017	2023-2025
Operating years	2018-2042	2026-2050
Construction jobs (total)	30,841	30,841
Annual O&M jobs (max)	1,741	1,741
Net Present Value (2014)	**54,546**	**41,423**
Average annual jobs (28 years)	**1,948**	**1,479**

TABLE 3.11: ALL RENEWABLES (SCOTLAND) GVA (millions)		
	Option A (Subsea cable)	**Option B (Overland)**
Construction years	2015-2017	2023-2025
Operating years	2018-2042	2026-2050
Construction GVA (total)	1,007.9 million	1,007.9 million
Annual O&M GVA (max)	78.9 million	78.9 million
Net Present Value (2014)	**2,108.9 million**	**1,601.5 million**
Average annual GVA (28 years)	**75.3 million**	**57.2 million**

TABLE 3.12: ALL RENEWABLES (UK) GVA (millions)		
	Option A (Subsea cable)	**Option B (Overland)**
Construction years	2015-2017	2023-2025
Operating years	2018-2042	2026-2050
Construction GVA (total)	1,570.8 million	1,570.8 million
Annual O&M GVA (max)	103.7 million	103.7 million
Net Present Value (2014)	**2,999.6 million**	**2,277.9 million**
Average annual GVA (28 years)	**107.1 million**	**81.4 million**

On average, the delay in the onshore and offshore wind farms and the marine renewables projects having access to the grid upgrade results in c32% greater jobs impact under the subsea cable option compared to overland option. ***(Note: this does not mean a difference in the absolute number of jobs but the 'benefit' of these jobs taking into account social time preference where a job is 'worth' more now than in a years time).***

3.8 WIDER CONSIDERATIONS

There are a number of other potential consequences associated with the timing delay between the two upgrade options. Basically, delaying the availability of a grid connection by eight years could have the following consequences:

1. Developers of onshore windfarms either abandon or reduce the scale of their proposed projects as they look to other investment opportunities.
2. Delays in offshore windfarms and marine renewables projects delays the development of the relevant supply chains. Potential supply chain companies have faced continuing delays in projects coming to fruition. As a consequence there is less incentive for them to invest in training and capital expenditures in anticipation of potential future work for them in this sector.
3. Supply chains in other European countries, especially in relation to offshore windfarms, develop more rapidly than in the UK resulting in loss of potential competitive advantage of Scottish/UK supply chain and potential reduction in the attractiveness of Scottish locations for OEMs etc.