

## **RESPONSE: CONSULTATION ON NEW ENERGY SOLUTION FOR SHETLAND**

**To:** Ofgem.

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**Title:** Gas-fired Power Station May Be Best Energy Solution For Shetland

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**1. About the author:** Having been born and lived most of my life in Shetland, work took me to Argyll in 1999. I recently retired (2014) after nearly 40 years with SSE, of which 21 years at Lerwick Power Station and 12 years in SSE's renewable energy division, in a variety of technical, engineering and managerial roles. I am therefore well versed in the requirements for supplying an island group such as Shetland, isolated from the Mainland grid.

For avoidance of doubt, I have no 'axe to grind' and am acting exclusively as a concerned private individual with considerable relevant experience.

If, after proper consideration of a gas-fired power station, the proposed NGSLL-Aggreko distribution link turns out to be the best option for Shetland's future energy supplies, so be it. However, as it stands, I have serious reservations about the credibility of the selection process and the potential consequences for Shetland and UK Mainland consumers (I myself am one) who will have to subsidise the proposed subsea cable solution.

## **2. Introduction.**

Energy prices vary and necessary assumptions used in calculations are always open to challenge. Thus the purpose here is to illustrate, using simple calculations for clarity, why the absence of a gas-fired power station from the final selection process is a serious omission.

Gas is cheap and is brought ashore via the Laggan-Tormore/Shetland Gas Plant production complex, in which SSE owns a 20% stake, purchased specifically to supply its own gas-fired power stations. A gas-fired power station is thus arguably an obvious potential solution for Shetland's future energy needs.

Unfortunately, that option has not been explored in the Ofgem-sponsored competition to determine a new energy solution for Shetland as no bid was forthcoming, not even from SSE.

SSE's original proposal for a gas-fired power station at Rova Head, Lerwick, was grossly over-specified and Ofgem's rejection of it does not imply a gas-fired scheme should be omitted from the subsequent competition. The lifetime cost of that cannot be compared to the competition entrants, as it was not considered in the Baringa analysis of competition bids.

SSE did not enter an improved bid. However it has little incentive to enter a profit-raising Dutch auction if it can supply Shetland via the cable, using its existing wind farms and hydro plants in Northern Scotland. That may well be more profitable for SSE however it doesn't necessarily bring "best value" for UK consumers.

Energy Savings: Up to £22.4 million per annum in energy cost savings could arise from using locally sourced gas (less other plant costs), depending on the unit price/consumption scenario.

What if the average gas price doubles? A gas-fired power station still saves £15.7 million versus imported renewable energy (median unit price and consumption).

Capital Savings: The capital cost of the NGSSL-Aggreko cable is £303 million, £103 million more than SSE's over-specified Rova Head proposal. A realistically specified plant (estimated £175 million) could save £128 million.

The competition's credibility is thus vulnerable to the criticism of lacking "*openness, fairness and transparency*", the very qualities it was intended to ensure.

**Recommendation 1:**

A serious attempt to engage other, credible bidders e.g. Scottish Power, Sullom Voe operator EnQuest, etc, is not only logical and desirable, it is essential to protect the integrity of the competition process.

If SSE is eligible and wish to join in it will be all the better.

**Recommendation 2:** Gas supply from Shetland Gas Plant must be available to such a bidder on the same terms as for SSE.

**Recommendation 3:** If no bidder can be found then SSE's original Rova Head proposal should be put through the Baringa analysis to determine its lifetime cost in the same way as the other competition bids and the results, including assumptions about unit price and fuel/other costs, made public so that transparency is assured.

**3. Main Text.**

**Gas Price.**

With the advent of shale, gas has become cheap and as the new technology grows and markets become increasingly interlinked, it may be expected to exert a moderating influence on price in the foreseeable future.

<https://www.ft.com/content/3bc0116c-e681-11e5-a09b-1f8b0d268c39>

**SSE Owns 20 Per Cent of Total's Laggan-Tormore Gas Field.**

Scottish and Southern Energy (SSE) own 20 per cent of Total's Laggan-Tormore gas field and the associated Shetland Gas Plant, where the field's output is processed.

International Business Times quotes SSE chief executive Alistair Phillips-Davies:

*"The acquisition, including the Shetland Gas Plant ..... gives access to gas .....to help secure energy for customers and to help meet the needs of our gas-fired power stations".*

**Key Point:** SSE's stated intention was to secure customers' energy supplies and supply its gas-fired power stations.

### **Where Better To Use Gas Than Its First Landfall?**

Why transport gas from Shetland to England to generate electricity for transmission all the way back to Shetland? Or force English and Welsh consumers to pay for Scottish renewable energy at 9p – 15p/kWh, plus the cost of transmission losses, in each case?

### **Ofgem Rejection.**

Ofgem rejected SSE's original £200 million proposal to build a 90MW to 120MW power station at Rova Head, Lerwick, for failing to *"adequately incentivise the efficient use of capital and operational costs of the Integrated Plan."*

### **SSE's Original Proposal (Rova Head, Lerwick) Was Over-specified.**

The Rova Head proposal specified 90MW to 120MW of plant, (depending on which version you adopt).

Yet, from SSE's own documentation (2015), Shetland's maximum demand has not increased for over 20 years (author was employed there from 1974-1999) and while they point to hypothetical future demand increases, these are being constantly eroded by various insulation and renewable energy schemes. And until potential industrial developments are given the go-ahead, enquiries about power supply are just that, enquiries.

### **75MW Extendable Plant Should Be Adequate.**

The author's own extensive experience of island operation suggests that a 75MW modern power station, extendable, if and when hypothetical demand increases show evidence of materialising, would be comfortably adequate.

### **Capital Cost Savings.**

This would lead to a substantial reduction in capital cost versus the £200 million projected cost of the Rova Head proposal, especially, if the plant were located at Sullom Voe, saving a further £60 million on the capital cost of a gas pipeline to Lerwick. The cost of upgrading the distribution network between Sullom Voe and Lerwick should be covered 2-3 times by the saving, depending on the upgrade specification.

I also understand the Rova Head gas-fired plant was to have had diesel oil storage for 17000Te! What on earth for? When I worked at LPS it was a full-duty diesel station using three types of fuel (light, intermediate and heavy) and we never had or needed more than c.10,000 Te of storage, all told.

What other excesses may have been included?

### **Revised Capital Cost Estimate Versus Original Proposal.**

Capital savings of £20-£50 million, depending on location and ultimate specifications, might reasonably be expected. Assume a revised capital cost estimate of £175 million, representing a £128 million saving over the NGSSL-Aggreko cable.

### **Ofgem-SSE Competition.**

In rejecting the Rova Head proposal, Ofgem instructed SSE (2014) to run a competition specifically designed to address lack of incentives and determine the source of Shetland's future energy supply.

The competition concluded recently and the National Grid (NGSLL)-Aggreko won with their bid to install a Caithness-Shetland subsea inter-connector cable.

The purpose of the competition was to *"incentivise efficient use of capital and operational costs"*. Ofgem directed SSE to undertake *an open, fair and transparent comparative process to identify a new energy solution for Shetland"*.

That was a constructive approach whose outcome, unfortunately, has fallen short of expectations.

### **No Gas-fired Bid?**

Given SSE's above-quoted intentions for its Laggan-Tormore investment, any *"open, fair and transparent comparative process"* would surely then have included bids for gas-fired plants located at Lerwick and/or Sullom Voe? Alas, no. No such bid was entered.

### **Competition Result.**

The competition ended with a comparison of only two proposals, one the successful subsea grid inter-connector and the other, a diesel power station. The original Rova Head proposal was not entered in the competition.

### **High Cost and Environmental Damage of Diesel.**

Ofgem notes in its Consultation Document that the key difference between the two bids was the high cost of diesel fuel (and hence of the electricity produced) versus energy imports via the NGSLL-Aggreko cable.

Interesting. By the author's calculations, heavy diesel fuel (10-yr average) comes out at around 7.6p/kWh. What grade of fuel and imported energy unit price were assumed in the analysis of competition entries?

### **SSE Aimed To Avoid High Cost/Environmental Damage Of Diesel**

Part of the rationale for SSE's original (2014) gas-fired Rova Head proposal was specifically to avoid the exorbitant cost and environmental damage associated with heavy diesel fuel. So why was the only alternative to the cable a diesel power station?

Why was there no gas-fired entry? SSE had already done most of the preparatory work and they own the gas, which they purchased specifically to supply gas-fired power stations?

### **Why did SSE not enter the Competition? Was it Disqualified?**

Was SSE disqualified from entering an improved bid because it was running the competition? If so, by far the most promising alternative to a subsea cable would be automatically ruled out?

### **Little Incentive To Enter A Dutch Auction.**

SSE has little incentive to enter a profit-razing Dutch auction.

Renewable energy has pole position in the order of energy use i.e. no competition and secure, high profits. SSE can use their own wind and hydro generation in North Scotland to supply Shetland via the new distribution link and pass on the cost and cable usage charges to consumers in England and Wales.

### **Gas May Yet Be the Best Option**

The rejection of the Rova Head proposal does not mean that a 'no frills', sensibly sized, gas-fired power station would be uncompetitive and the competition's credibility is damaged by its absence.

As it stands, we may never now know for sure whether a gas-fired power station would be the most efficient use of consumers' money. However, there is ample evidence to suggest that it may very well be exactly that, the 'best value' option.

### **Waste Heat And Gas For District Heating Reduce Fuel Costs.**

Lerwick's district heating scheme may now never benefit from the power station's substantial waste heat (60 per cent of fuel energy), nor from access to its gas supply (to replace oil) for top-up heat, both at around 1p -2.0p/kWh which, in turn, would replace consumers' use of electricity, thus reducing power station fuel costs and maintenance.

### **Cost Efficiency Of Solution Not Demonstrated**

SSE's original, over-specified, Rova Head proposal was projected to cost £200 million. The NGSSL-Aggreko proposal will cost £303 million - £103 million more.

Furthermore, Scotland is a net exporter of renewable energy with output steadily increasing. The energy imported is likely to be almost entirely from renewables, which in any case, take first priority for use. The cost of that is 9p -15p per kWh.

### **Possible Scenarios**

2015 consumption (207.6GWh) => cost = £18.7 to £31.4 million p.a.

2033 (hypothetical) cons'n 277.6GWh => Cost = £25 to £41.6 million p.a.

Median Consumption (242.6MWh) => Cost = £21.8 to £36.4 million p.a.

Median Unit Price (12p/kWh) and Cons'n => Cost = £29.1 million p.a.

Island Strike Price (Shetland renewables) => Cost = £27.9 million p.a.

### **Costs: Gas-fired Power Station**

It is acknowledged that the international gas price varies considerably over time however the expansion of shale gas technology should be a powerful, benign influence. To cater for this a calculation is included below that assumes the gas price long-term average is double the 2016 price of \$4.00/mmBtu.

Using the recent price of UK gas imports (\$4.00/mmBtu, 2016 – see Appendix 1) and assuming thermal efficiency of 40% and sterling-dollar exchange rate of \$1.30/£1.00, a gas-fired power station would generate at around **2.75p per kWh (fuel cost only)**.

**=> 242.6GWh (median) consumption would cost £6.7 million p.a. (fuel only)**

1. At current consumption and cheapest renewables price (9p/kWh),  
=> Saving from gas = £18.7-6.7 million p.a. = **£13 million p.a.**

2. At median consumption and median renewables price (12p/kWh),  
=> Saving = £29.1 - £6.7 million p.a. = **£22.4 million p.a.**

3. At median consumption and Island Strike Price (11.5p/kWh),  
=> Saving = £27.9 -£6.7 million p.a. = **£21.2 million p.a.**

4. What if 20-yr average price of gas turns out to be double the current price?  
Then unit price = 2.75p x 2 = 5.5p/kWh  
=> Cost of fuel = 2x 6.7 million = 13.4 million p.a.  
=> Saving (median cons'n/renewable price) = £29.1- £13.4 = **£15.7 million p.a.**

#### **“Other” Costs**

Of course, other power station costs e.g. maintenance, consumables, overheads, etc. must be subtracted from these projected savings and unfortunately reliable figures are unavailable however experience suggests that they would fall well within the potential savings.

Furthermore, the “generation –friendliness” of gas versus heavy fuel implies these “other” costs should be substantially less overall than for a diesel power station.

Importantly, a gas-fired power station cost of £175 million would also bring a capital saving of £128 million versus the £303 million for the NGSSL-Aggreko cable.

#### **Interest Saving Alone Could Cover “Other” Costs.**

Interest saved on £128 million at 5% p.a. would be £6.4 million p.a. which, if it did not fully cover the power station’s ‘other’ costs, would go a long way towards doing so.

#### **Summary of Potential Savings From Gas-fired Power Station**

Capital Saving = £128 million (assuming full £175 million for realistically-specified plant).

Energy Cost Saving = £13 - £22.4 million per annum.

Such potential savings suggest that the competition process is incomplete due to the absence of a gas-fired bid.

### **5. Conclusion: Competition Credibility Compromised**

As it stands, those responsible for managing the Ofgem-SSE competition cannot reasonably claim demonstrably to have identified the optimal solution for Shetland's energy needs.

Potential savings of £128 million (capital) and £13-£22.4 million p.a. (energy) are potentially available from a realistically specified gas-fired power station versus the proposed NGSSL-Aggreko subsea cable.

Interest savings alone could cover most, if not all, other costs associated with a gas-fired power station.

Quite simply, a glaringly obvious candidate has been omitted which, however extenuating the circumstances may be, undermines the credibility of the entire process.

**Recommendation 1:** A bid for a gas-fired power station should be sought.

A serious attempt to engage other, credible bidders e.g. Scottish Power, Sullom Voe operator EnQuest, etc, is not only logical and desirable, it is essential to protect the integrity of the competition process.

If SSE is eligible and wish to join in, it will be all the better.

**Recommendation 2:** Gas supply from Shetland Gas Plant must be available to such a bidder on the same terms as for SSE.

**Recommendation 3:** If no bidder can be found then SSE's original Rova Head proposal should be put through the Baringa analysis to determine its lifetime cost in the same way as the other competition bids and the results, including assumptions about unit price and fuel/other costs, made public so that transparency is assured.

If the NGSSL-Aggreko solution turns out to be the best, so be it. However, without serious consideration of a credible gas-fired bid, the process will be forever vulnerable, to the criticism of lacking "*openness, fairness and transparency*".

### **5. Appendices**

#### **Appendix 1: Gas Price Article (Financial Times).**

<https://www.ft.com/content/3bc0116c-e681-11e5-a09b-1f8b0d268c39>