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Decision on Shetland New Energy Solution

Final decision

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Overview:

Shetland's electricity supply is largely generated from Lerwick Power Station, which is approaching the end of its operational life and was set to breach emissions targets set by the EU Industrial Emissions Directive (IED) from 2020. In April 2014, we directed Scottish Hydro Electric Power Distribution plc (SHEPD) to run a competitive process to identify the most efficient solution for Shetland's energy future. A joint bid by NG Shetland Link Ltd (NGSLL)–Aggreko was SHEPD's preferred bidder.

In July 2017, we consulted on our assessment of the costs for the preferred solution and received 15 written responses from a wide range of parties. Since we went out to consultation there have been two important developments which have impacted our assessment of the best energy solution for Shetland, notably a change to a document which sits under the IED and the UK Government's announcement of the planned timetable for the next Contracts for Difference round.

This document summarises those responses and sets out our decision to reject the proposed costs of the solution based on the information now available to us. Our decision is not a reflection of inefficiency in the NGSLL-Aggreko proposal. Rather, it reflects the changes explained above, which mean that a more cost-efficient option is now available.

Context

Shetland is not currently connected to the electricity network that serves mainland Great Britain (GB). This means that the islands have to be able to meet all of their own electricity needs. Currently the main source of electricity generation that can respond to customer demand is Lerwick Power Station, which was built in 1953 and is nearing the end of its operational life.

Our principal objective under the Electricity Act 1989 is to protect the interests of existing and future consumers. In doing so we need to ensure both that:

- the people of Shetland continue to have a reliable energy supply after Lerwick Power Station reaches the end of its life; and
- the costs of the energy supply solution for Shetland are efficient. This is important as all GB energy consumers will meet future generation costs on Shetland.

In late 2013, Scottish Hydro Electric Power Distribution plc (SHEPD) put forward plans for a replacement for Lerwick Power Station. We were not satisfied that the proposed solution provided value for money. For this reason, in April 2014 we directed SHEPD to undertake an open, fair and transparent competitive process to identify a new energy solution for Shetland.

A joint bid by NGSLL–Aggreko was selected as preferred bidder from the competitive process. We assessed whether the costs of that bid were efficient, and appropriately incentivised. In July, we published a consultation on our assessment of those costs and received 15 responses. This document sets out our decision on that assessment.

Associated documents

SHEPD's consultation documentation
https://www.ssepd.co.uk/shetlandenergy/documents/

Ofgem's determination of Scottish Hydro Electric Power Distribution plc's (SHEPD) submission required under Charge Restriction Condition (CRC) 18A
https://www.ofgem.gov.uk/sites/default/files/docs/2014/04/ofgem_determination_of_SSEN_submission_under_crc18a_0.pdf

Additional conditions on Ofgem's 22/04/14 determination on Scottish Hydro Electric Power Distribution plc's (SHEPD) submission under Charging Restriction (CRC) 2Q (formerly CRC 18A)
https://www.ofgem.gov.uk/system/files/docs/2016/04/additional_conditions_letter_15apr2016.pdf

Consultation on the cost of the new energy solution for Shetland
https://www.ofgem.gov.uk/publications-and-updates/consultation-cost-new-energy-solution-shetland

Contents

Executive Summary

Shetland's electricity supply is largely provided by Lerwick Power Station, which is approaching the end of its life. It was unlikely to have met the emissions targets proposed by the EU Industrial Emissions Directive (IED), which were expected to come into force from 2020, without substantial modification. As a result, it was expected to close in 2020.

In 2014, we directed Scottish Hydro Electric Power Distribution plc (SHEPD) to run a competitive process to find the best solution for ensuring security of supply on Shetland (the Shetland New Energy Solution). The preferred bid was a distribution link between Shetland and the mainland with a back-up diesel power station provided by NG Shetland Link Ltd (NGSLL) and Aggreko UK Ltd. In July 2017, we published a minded-to consultation on approving the costs of the NGSLL-Aggreko bid.

Since publishing our consultation in July 2017, two external developments have made it necessary to reconsider our assessment of the best energy solution for Shetland. These are:

- A document which sits under the IED was published in late July and states that new, tougher emissions targets will only apply to engines on 'small isolated systems' and 'micro isolated systems' from 2030 (as opposed to 2020). The Scottish Environment Protection Agency (SEPA) has confirmed that this later deadline applies to existing engines at Lerwick Power Station.
- In October 2017, the Government announced that, subject to receiving State Aid approval, wind farms on remote islands such as Shetland will be eligible to compete for a Contract for Difference (CfD) in the next auction for less established technologies, planned for 2019.

We therefore asked SHEPD to investigate the options available to ensure security of supply on Shetland between the start of 2021 and 2025. SHEPD confirmed that with targeted investment, security of supply can be provided until 2025 through a combination of Lerwick Power Station and additional supporting measures and that this can be done at an annual cost significantly below that of the NGSLL-Aggreko solution.

This means there is a more cost-effective way to provide security of supply on Shetland in the near term, which also allows for the possibility of further savings in the future if an integrated solution is required, notably if a transmission link is needed following the next CfD round.

On this basis, we have decided to reject the total costs of the NGSLL-Aggreko solution. This decision is not a reflection of the costs of the NGSLL-Aggreko solution, which were found through SHEPD's competitive process to be the most efficient. Rather, the two developments outlined above have altered the economics of the assessment and provided an alternative solution until the uncertainty about the need for a transmission link to the mainland is resolved.

1. Background and purpose of this document

Chapter Summary

Explains why a new energy solution is required on Shetland and SHEPD's responsibilities as the Distribution Network Operator and System Operator on Shetland. It also sets out the purpose and structure of this document.

Background to this document

Existing supply on Shetland

1.1. Shetland is not connected to the main electricity network in Great Britain (GB). This means that the islands rely entirely on local sources of generation and the supply and demand must be balanced locally. The electricity network on Shetland is made up of approximately 1,650km of overhead lines and underground cables operating at distribution voltages (33kV and below). Thirteen subsea cables join the smaller islands to the main island.

1.2. The network on Shetland is classified as a distribution network, with no voltages greater than 33kV. It is owned and operated by Scottish Hydro Electric Power Distribution plc (SHEPD), a Distribution Network Operator (DNO). SHEPD is also the system operator on Shetland, and as such is responsible for ensuring security of supply.

1.3. In 2016, the main electricity generation sources on Shetland were:

- **Lerwick Power Station** - a 67MW diesel-fired station that provides around 50% of Shetland's electricity each year. The station was built in 1953 and is owned by SSE Generation and operated by SHEPD.
- **Sullom Voe Terminal Power Station** - a 100MW independently owned gas-fired power station, which meets around 40% of Shetland's demand. The station's primary purpose is to supply electricity to the Sullom Voe gas terminal, but it also provides up to 15MW of Shetland's electricity through a third party contract arrangement put in place by SHEPD.
- **Burradale Wind Farm** - a small (3.68MW) independent wind farm, which contributes around 7% of the islands' electricity supply.

- **Northern Isles New Energy Solutions (NINES)**[1] - an innovative trial project developed by SHEPD in partnership with third parties and approved by Ofgem in 2011. It aimed to increase renewable generation output, reduce reliance on fossil fuels and cut the cost of electricity by lowering the maximum demand on the island network. The project comprised several generation, storage and demand-side managed assets including a number of small-scale, community-based wind generators taking advantage of Shetland's above average wind conditions.

Why was a change to the current arrangements needed?

1.4. Lerwick Power Station is approaching the end of its operational life and was expected to exceed revised emissions limits set by the Industrial Emissions Directive (IED) in 2020. It has been granted a permit by the Scottish Environment Protection Agency (SEPA) until such time as adequate emissions controls are introduced through, for example, additional abatement, or the existing station is replaced. The permit conditions are time-limited and were expected to be superceded at the end of 2020. The station was unlikely to have met the revised IED emissions limits without substantial modification and consequently, was expected to close in 2020.

1.5. As a result, in our final proposals for the fifth electricity distribution price control review (DPCR5) in December 2009[2], we placed a requirement on SHEPD[3] to present to us, by 31 July 2013, an 'Integrated Plan' to manage the supply and demand of electricity on the islands. We said that the plan should:

- examine all available options to find the most efficient solution;
- involve market-based mechanisms, including the possibility to tender the replacement of the power station;
- develop partnerships and work with local communities; and
- identify a solution based on the lowest lifecycle costs that meets environmental obligations.

1.6. In its capacity as the system operator on Shetland, SHEPD submitted an integrated plan to us in July 2013 for a new full-duty dual-fuel 90MW power station to be owned by SSE Generation Ltd and delivered on Shetland in 2017.

1.7. We rejected this proposal as we considered that SHEPD had not sufficiently tested the market for an efficient and economical solution. Specifically, we were not persuaded that the costs put forward were the most efficient and competitive, as SHEPD had not provided enough evidence to demonstrate this.

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[1] Further information on NINES can be found at the following website: http://www.ninessmartgrid.co.uk/our-project/

[2] Electricity Distribution Price Control Review Final Proposals – Decision document https://www.ofgem.gov.uk/ofgem-publications/46746/fp1core-document-ss-final.pdf

[3] Through charge restriction condition (CRC) 18A of the Scottish Hydro Electric Power Distribution (SHEPD) licence.

1.8. In April 2014, we wrote to SHEPD directing it to competitively tender for a new energy solution on Shetland.[4] In May 2017, SHEPD completed the competitive process and notified Ofgem that its preferred bidder was a joint bid by NGSLL and Aggreko (the NGSLL-Aggreko Solution). The solution involves building a High Voltage Direct Current (HVDC) link between Shetland and mainland GB with a back-up diesel power station on Shetland.

1.9. An overview of the competitive process, including the key stages and the different parties involved in overseeing the process and assessing the technical and commercial aspects of the bids, was in our July consultation.[5] This is not repeated in this document.

Our July consultation and responses

1.10. Our July 2017 consultation set out our minded-to view that the costs of the NGSLL-Aggreko Solution were reasonable and efficient. We did not consult on the solution itself, as this was the product of a detailed competitive process undertaken by SHEPD and overseen by an independent auditor.

1.11. As part of our consultation process, we arranged a series of events in Shetland in July and August. These provided an opportunity to engage with a wide range of people and organisations on Shetland. The events were well attended with around 70 people attending the open sessions held in Lerwick, Mid-Yell and Brae in August.

1.12. We received 15 written responses to our consultation. These came from a wide range of parties including local residents, renewable generators, local and central government. A full summary of responses is in Appendix 1. In addition, all non-confidential responses are on our website.

Further key developments

(i) Changes under the Industrial Emissions Directive (IED)

1.13. The IED[6] is the main EU instrument regulating pollutant emissions from industrial installations. The IED aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT).

[4] https://www.ofgem.gov.uk/ofgem-publications/87381/ofgemdeterminationofshepdsubmissionundercrc18a.pdf
[5] https://www.ofgem.gov.uk/publications-and-updates/consultation-cost-new-energy-solution-shetland
[6] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

1.14. Installations subject to the IED are required to operate in accordance with a permit granted by the authorities in the Member States. The permit conditions including emission limit values must be based on the BAT. Lerwick Power Station is one such relevant installation and it currently operates under permits granted by the relevant competent authority, which, in Scotland is SEPA.

1.15. As noted above, Lerwick Power Station is reaching the end of its life and currently has permit conditions and variations relating to certain emissions limits, some of which are due to be superceded in 2020 by tighter IED limits. This was one of the key factors driving the need to find a new energy solution for Shetland.

1.16. On 31 July 2017, the European Commission Implementing Decision (EU) 2017/1442 establishing Best Available Techniques (BAT) conclusions for large combustion plants[7] was published. Section 3.2 of the document states that:

> "… *secondary abatement techniques for NOX, SO2 and dust may not be applicable to engines in islands that are part of a small isolated system (1) or a micro isolated system (2), due to technical, economic and logistical/infrastructure constraints, pending their interconnection to the mainland electricity grid or access to a natural gas supply. The BAT-AELs for such engines shall therefore only apply in small isolated system and micro isolated system as from 1 January 2025 for new engines, and as from 1 January 2030 for existing engines."*

1.17. As Lerwick Power Station is an existing plant which is part of either a small isolated system or micro isolated system (Shetland), compliance with the BAT-AELs[8] for NOx, SO_2 and dust would only apply from 1 January 2030. SEPA has confirmed that this later deadline applies to Lerwick Power Station. Therefore, the station can potentially run beyond its previous expected lifespan.

1.18. The implication of this change for our decision on the NGSLL-Aggreko Solution is discussed further in Chapter 2. For the remainder of this document these changes will be referred to as "changes under the IED".

(ii) Announcement on Contracts for Difference

1.19. In October 2017, the Department for Business, Energy and Industrial Strategy (BEIS) announced that the next Contract for Difference (CfD) auction is planned for spring 2019. The Pot 2 auction will be for less established technologies and will allow Remote Island Wind to compete.

[7] Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants.
[8] Associated Emission Levels

1.20. A CfD is a contract between a low carbon electricity generator and the Low Carbon Contracts Company (LCCC)[9]. Under a CfD, a generator is paid the difference between the 'strike price' – a price for electricity reflecting the cost of investing in a particular low carbon technology – and the 'reference price'– a measure of the average market price for electricity in the GB market. The purpose of the CfD is to give electricity generators greater certainty of revenues by reducing their exposure to wholesale prices.

1.21. Interested parties need to secure a CfD through an auction process. There have been two auction rounds to date. The first round was launched in October 2014 and the second in April 2017.[10]

1.22. The fact that Remote Island Wind will be able to bid into the next CfD auction opens up potential opportunities for generators on the Scottish Islands. This means that there may be parties in Shetland interested in bidding for a CfD. Based on the timing of previous rounds, we would expect the outcome of the process to be known by the end of 2019. The inclusion of Remote Island Wind in Pot 2 is subject to State Aid approval.

Purpose of this document

1.23. This document sets out our decision to reject the costs of the NGSLL-Aggreko Solution. This decision has been informed by responses to our consultation and also by the two key developments described in the sections above:

i. the implications for Lerwick Power Station of the changes under the IED; and

ii. the BEIS announcement that Remote Island Wind will be able to bid into the next CfD auction.

Impact Assessment

1.24. We considered whether to undertake an Impact Assessment (IA) in line with the requirements of section 5A of the Utilities Act 2000. On balance, we do not consider it is necessary to undertake a formal section 5A IA. Our decision maintains the status quo and does not constitute a significant change to the existing arrangements. The 2017 changes under the IED mean that Lerwick Power Station is able to run beyond 2020, and up to 2030. Had these changes been made earlier, we would likely not have compelled SHEPD to run the competitive process until after 2020.

1.25. However, Chapter 2 explains our overall assessment and decision, with Appendix 2 containing an analysis of the options that we considered, including

[9] The LCCC is a government-owned company which manages the CfD programme.
[10] https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference

environmental impacts. As such, our decision explains the costs associated with maintaining the status quo versus the NGSLL-Aggreko Solution, and why we consider this is the right decision for consumers on Shetland and in GB as a whole. For these reasons, we do not consider it necessary to publish a formal section 5A IA, and it would in any event be duplicative given the information contained in Chapter 2 and Appendix 2.

2. Our overall assessment and decision

Chapter Summary

Sets out our overall assessment of the NGSLL-Aggreko Solution and our decision on its costs in the context of the responses received to our consultation and two other key developments.

Relevant factors to our decision

2.1. We are required to approve or reject the costs of the NGSLL-Aggreko Solution. In making this decision we have considered:

- the impact of the changes under the IED on the ongoing operation of Lerwick Power Station;
- the impact of the announcement of the next round of the CfD auctions; and
- responses to the July consultation.

2.2. There are two main factors that are driving our decision. These are that the people of Shetland continue to have a reliable and secure energy supply and that the costs of the energy supply solution for Shetland are efficient and therefore in the interests of consumers.

The impact of the changes under the IED

2.3. SEPA has confirmed that the changes under the IED apply to Lerwick Power Station. In other words, the previous deadline of 1 January 2020 for the station to comply with certain emissions levels is now 1 January 2030.

2.4. SEPA did note that it will continue to review Lerwick Power Stations' emissions performance and may need to enforce/tighten emission limits in the future. For example, it may require additional controls or mitigations if it considers the extended operation of the station will pose unacceptable risk to human health and the environment. We note that these requirements already apply to Lerwick Power Station. SEPA is committed to working with SHEPD to monitor emissions from the station over the coming years so that upward trends in combustion emissions can be detected and addressed as early as possible.

Continued operation of Lerwick Power Station

2.5. As system operator on Shetland, SHEPD is responsible and obligated to ensure security of supply on the island. In light of the publication of the changes under the IED, we sought assurance from SHEPD that security of supply on Shetland could be maintained until at least 2025. SHEPD confirmed that with targeted

investment, security of supply can be provided until 2025 through a combination of Lerwick Power Station and additional supporting measures.

2.6. We also sought information from SHEPD on the costs of continuing to operate Lerwick Power Station to ensure security of supply in the period from 2021/22 to 2024/25 i.e. the first four years during which the NGSLL-Aggreko Solution would operate. SHEPD has estimated the equivalent annualised cost of meeting security of supply is approximately £32 million per annum over the period 2021/22 to 2024/25.

Announcement of next CfD auction

2.7. In addition, in October 2017, BEIS announced that the next CfD auction is planned for spring 2019. It addition, Government has sought State Aid approval from the European Commission to amend the CfD scheme to allow Remote Island Wind projects to be eligible to bid into the next CfD auction. The auction will also offer support to less established renewable technologies, such as offshore and marine energy.

2.8. This opens up opportunities for parties in Shetland to bid into the CfD auction, which could, were they successful in securing sufficient support, result in the need for a transmission link to export the power.

2.9. However, the outcome of any future CfD process is uncertain as it is a competitive auction with many potential bidders.

Responses to the July consultation

2.10. The information provided by respondents did not change our view that NGSLL-Aggreko submitted efficient costs. We have outlined the reasons for this and our position in the previous chapter. While a number of respondents did indicate some areas that might result in upward cost pressure, we note that NGSLL-Aggreko had a robust plan for delivery of the project and were fully committed to delivering the solution in line with the agreed parameters.

2.11. Further, the responses did not provide evidence of an existing option that would be more efficient than the NGSLL-Aggreko Solution. We do, however, note that a large number of respondents highlighted the potential merits of a larger transmission link to Shetland and argued that there should be no decision on the Shetland New Energy Solution until the outcome of the next CfD auction (and the need for a transmission link) is known. We recognise that it is important to have an integrated solution for Shetland. We also note the risk that if we were to approve the NGSLL-Aggreko Solution in 2017 and a transmission link were to come forward in the future and meet security of supply requirements on Shetland, then this outcome may not, with hindsight, offer the optimal cost solution for Shetland and consumers in the long-run.

2.12. We note that a number of respondents to the consultation suggested the introduction of a break clause. Under this approach, the NGSLL-Aggreko Solution would progress as planned, with the final decision on the Shetland New Energy

Solution being taken once there was greater certainty on the likelihood of a transmission link. We do not consider a break clause in SHEPD-NGSLL's contract would be appropriate. This is because a significant proportion of NGSLL-Aggreko's costs would already be spent by the time the outcome of the CfD is known, and the NGSLL-Aggreko Solution would be fully or partly built. In such case, we do not consider it would be in consumers' interests to pay for a stranded asset.

2.13. Appendix 1 contains a summary of the responses received and our views.

Assessment of NGSLL-Aggreko Solution vs. continued operation of Lerwick Power Station

Costs

2.14. The costs of the NGSLL-Aggreko Solution were set out in our July consultation. Our evaluation calculated the cost to consumers of the NGSLL-Aggreko Solution over its 20-year lifecycle to be approximately £40m per annum and a Net Present Value (NPV)[11] of the evaluated costs of £581.7m.[12]

2.15. To compare the solution on a like-for-like basis with the option of continuing to operate existing arrangements, it is necessary to use the NPV cost of the NGSLL-Aggreko Solution that includes the wholesale energy costs over the project's lifespan. The impact of this increases the lifecycle cost to around £50m per annum.

2.16. SHEPD have confirmed that the expected costs of an interim security of supply solution over the period 2021/22 to 2024/25 would be ~£119m in NPV terms.[13] This would give a lifecycle cost to consumers of around £32m per annum.

2.17. This means that the option of continuing to operate Lerwick Power Station in conjunction with additional supporting measures over the four year period 2021/22 to 2024/25 could be cheaper by around £69m. However, we consider this to be an upper estimate and there are a number of factors that could impact this:

- NGSLL-Aggreko may have incurred costs since their announcement as preferred bidder. We consider this to be a matter for SHEPD and NGSLL-Aggreko as the contracting parties for the Shetland New Energy Solution. SHEPD have indicated that they may seek to recover any such costs through their licence. If a claim is made, this will be subject to a cost assessment and

[11] The NPV is the value of a sum of money at a particular period in time (or base year). Often this is evaluated for the present value of money. However, independent consultants, Baringa calculated the NPV with a base year of 2021.
[12] This NPV value is the scenario-weighted cost of the NGSLL-Aggreko bid evaluated by independent consultants, Baringa, discounted by Social Rate of Time Preference (STPR) of 3.5%.
[13] We have accumulated SHEPD's indicative costs (2017 prices) to calculate an NPV with a base year of 2021. We have discounted costs using the same STPR.

potentially to a consultation by us. It will, therefore, be important for us to understand the basis upon which any such claim is being made, including quantum.

- SEPA will review Lerwick Power Station's performance and could require additional controls or mitigations if it considers the extended operation of the station will pose unacceptable risk to human health and the environment. This may entail additional costs. However, SEPA last assessed emissions at the station in 2015 and, at that stage, found it was operating at acceptable emissions levels. Therefore, while costs associated with additional controls may be incurred, we consider the likelihood of any such costs being significant, to be low at this stage.

- Our decision means a future competitive process will likely be needed, either for a full new energy solution, should a transmission link not go ahead, or for back-up to a future transmission link to ensure security of supply. There will likely be additional costs associated with running such a process.

2.18. On balance, we do not believe the combination of these potential additional cost areas significantly reduces the benefits of continuing to run Lerwick Power Station until 2025. Our more detailed analysis is in Appendix 2.

Security of supply

2.19. A key element of the assessment process undertaken as part of the competitive process was each solution's ability to meet Shetland's security of supply requirements. The NGSLL-Aggreko Solution clearly met these standards. In line with the requirements of Marine Scotland, the cable would be protected to ensure it could not incur accidental damage. Further, the back-up generation on Shetland was designed to be able to meet energy demand during any periods of planned or unplanned outage of the HVDC cable. Overall, the NGSLL-Aggreko Solution was expected to provide at a minimum, the same reliability as the GB electricity network.

2.20. In the case of Lerwick Power Station, we note that this currently meets the security of supply requirements but that investment is needed to continue to meet them. Ofgem sought assurance from SHEPD that security of supply on Shetland could be maintained until at least 2025. SHEPD confirmed that with targeted investment, security of supply can be provided until 2025 through a combination of Lerwick Power Station and additional supporting measures.

Environmental impact

2.21. The NGSLL-Aggreko Solution would likely provide environmental benefits when compared to a full-duty liquid fuel generation solution. This includes reductions in greenhouse gas emissions on Shetland, which may contribute to both Scotland and the UK's wider climate change targets. Further, the NGSLL-Aggreko Solution would be likely to make Shetland's electricity system more able to accommodate renewable generation. NGSLL estimated that the HVDC cable (in its current

specification) would allow the development of further renewable generation on Shetland.

2.22. The main environmental impact of extending the life of Lerwick Power Station for four years from 2021 will be atmospheric emissions from the combustion of diesel. Compared with the NGSLL-Aggreko Solution, operating Lerwick Power Station will result in higher emissions of nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and carbon dioxide (CO_2) over the period 2021 to 2025. The difference in CO_2 emissions over the four years, with a carbon valuation of approximately £5 million, is relatively modest.

2.23. In relation to renewable development, the extension of existing arrangements would not have the same benefits in terms of facilitating renewable development. However, SHEPD are exploring a range of investment options and additional measures, including upgrades to plant and flexible network solutions. A number of these have the potential to promote additional renewable development.

Our decision

2.24. We have decided to reject the costs of the NGSLL-Aggreko Solution. The reason for our decision is that following the publication of the changes under the IED, Lerwick Power Station (with supporting measures) can now provide security of supply on Shetland in the near-term at a cost significantly below that of the NGSLL-Aggreko Solution. We have therefore decided that this is the most appropriate solution for managing security of supply in Shetland for the period 2021-2025.

2.25. We calculate the upper level of total savings over the four-year period at around £69m, with the range reflecting our estimate of competitive process costs to date. Expanding the consideration to include social costs of carbon (~£5m) and wider environmental impacts does not materially change this picture. We consider this represents the optimal level of cost efficiency currently available.

2.26. Proceeding with this near-term option for ensuring security of supply on Shetland also enables potential further savings to consumers from a joined-up solution, should a transmission link be needed.

2.27. Our decision means that another competitive process will likely be needed. This will be either for a whole new energy solution, should a transmission link not go ahead, or for back-up to a future transmission link to ensure security of supply.

2.28. Our decision is not a reflection of any inefficiency in the costs NGSLL-Aggreko put forward in their proposal. Rather, it is that in light of recent changes, a more cost-efficient option is now available which has the additional benefit of being able to wait until the outcome of the CfD auction is known and potentially reducing overall costs to consumers through an integrated solution. We consider the interests of GB consumers, who will ultimately pay for the enduring solution, are better protected and Shetland's security of supply when Lerwick Power Station closes will be ensured.

3. Next steps

Chapter Summary

This chapter sets out the next steps for putting in place a new energy solution for Shetland.

3.1. We retain the view that the way to secure the best energy solution for Shetland is likely to be through a competitive process. The value of this has been demonstrated through this recent process, in which the preferred bid would have provided savings to consumers of up to £188m compared with the reserve bid.

3.2. We will shortly start developing the plans and timescales for the process to put in place a solution for security of supply in Shetland in the longer term, i.e. post 2025. In doing so, we will work closely with BEIS regarding the timing and process of the CfD auction, as well as engaging with SHEPD, as system operator on Shetland, and other relevant parties. One option is to run a competitive process to align with the next CfD round. Any solution needs to be efficient, protect consumers' interests and ensure Shetland's security of supply once Lerwick Power Station closes.

3.3. We will shortly consult on SHEPD's additional costs associated with continuing to run Lerwick Power Station from 2019 until 2025.

Appendices

Index

Appendix 1 – Consultation responses

1.1 This chapter sets out a summary of responses to the July consultation and our responses.

1.2 There were 15 responses to the consultation. Four responses were marked confidential, either in whole or in part. The following table provides a list of the respondents.

	Respondents to the Shetland New Energy Solution Consultation
1	Confidential response
2	Confidential response
3	Confidential response
4	Confidential response
5	Douglas Ingram
6	Element Power
7	Energy Isles Ltd
8	Highland & Island Enterprise
9	John Tulloch
10	Scottish Government
11	Shetland Aerogenerators
12	Shetland Charitable Trust
13	Shetland Heat and Power
14	Shetland Islands Council
15	Viking Energy Shetland

Overview of main themes

1.3 There were six key themes raised by the responses. We use these to structure this Appendix. These are:

- Costs of the solution
- Providing the optimal level of cost efficiency
- Suitability of the proposed incentive arrangements
- Security of supply and meeting maximum demand
- Impact on a new transmission link
- Planning and community considerations

Costs of the NGSLL-Aggreko Solution

Respondents' views

1.4 Fourteen respondents commented on the costs of the new solution. Of those, two respondents noted that the NGSLL-Aggreko Solution seemed to be the most cost-effective and sensible solution. Another considered that the solution itself might require additional investment to meet the security of supply requirement but that, with a lifetime cost difference of £188m, it should be possible to improve the security of supply issue with the NGSLL-Aggreko bid and they still be the preferred bidder.

1.5 Eight respondents questioned the relative costs on a £MW/£MWh basis compared with those of the proposed 600MW Shetland HVDC Link.[14] The respondents presented a range of values but one compared the NGSLL-Aggreko Solution cost of £99/MWh with a Shetland HVDC Link cost of £26/MWh. One respondent noted that the cost-effectiveness of the proposed HVDC link was significantly less than other Ofgem-approved and commercial interconnector projects. Another respondent agreed that the costs of stand-by generation had become so competitive that they underpinned a cable and standby generation solution, but that a 600MW cable could also meet Shetland's needs and remove the need for the NGSLL-Aggreko Solution cable.

[14] https://www.ssen-transmission.co.uk/media/1514/shetland-hvdc-link-consultation-summary-booklet-august-2016.pdf

1.6 Three respondents highlighted issues that might raise the cost of the NGSLL-Aggreko Solution. These included:

i. the challenges of going through the planning processes and the cost of delays

ii. the collapsing of the trench based on current plans to excavate the trench one year ahead of installation

iii. the absence of connectivity with the Caithness-Moray infrastructure

iv. additional costs to consumers if both the NGSLL and Shetland HVDC Link cables were constructed

1.7 Two respondents noted that the consultation did not provide sufficient information in the following areas:

i. whether the solution included the cost of the electricity at the Distribution System Operator busbars

ii. whether the Overall Solution Evaluation Costs (OSEC)[15] included the costs for reinforcement works in the North of Scotland necessary to facilitate export

iii. the economic analysis, specifically a breakdown of how the total NPV was split between the NGSLL cable and Aggreko

iv. the power output that was assumed for calculating 30 days' fuel storage

Our views

1.8 We recognise the comments focused significantly on the potential comparison between the costs of the NGSLL-Aggreko Solution and a transmission link.

1.9 A transmission link was not put forward as part of the competitive process and therefore it cannot be concluded on this basis alone that the NGSLL-Aggreko costs are somehow less efficient. However, we do recognise the importance of having an integrated solution for Shetland and that if we approve the NGSLL-Aggreko Solution and a transmission link were to come forward in the future, then it may not offer the optimal cost solution for Shetland.

1.10 On the issues that might raise the costs of the solution, we recognise all of the points raised and that these are indeed issues that can lead to upwards cost

[15] The evaluation of relevant costs such as the tendered pricing of the services, plus the additional elements including GB power imports, wind utilisation and losses.

pressures. However, NGSLL-Aggreko had a robust plan for delivery of the project and were fully committed to delivering in line with the contractual timescales and cost parameters, the only exception being the impact on costs of changes in foreign exchange rates. Any additional cost pressures following our decision would have been a matter for NGSLL-Aggreko to manage in line with the costs set out in its bid and summarised in our minded-to consultation.

1.11 In relation to the points raised regarding potential wider benefits, it must also be noted that NGSLL-Aggreko developed the project proposals in line with the requirements of the tender, which was to secure demand on Shetland. It is on this basis that it won the competitive process, having been assessed as providing the most economically advantageous solution. There are significant benefits delivered by replacing a power station with a cable, which include giving access to lower carbon intensity generation from the mainland.

1.12 In relation to the specific questions in paragraph 1.7 above, the answers are as follows:

i. The total evaluated cost (OSEC value) of the NGSLL-Aggreko Solution included the cost of electricity produced in GB which would be supplied via the link to Shetland, as well as the cost of the electricity produced on Shetland by the standby power station and other generators on Shetland when the link would be out of service for planned and unplanned outages.

ii. The OSEC methodology used in the competitive process was developed to identify the cost of meeting Shetland demand. As the tender was technology-agnostic, it did not specify a requirement for, nor therefore assess, export capability. As a result, the OSEC did not include the costs for network reinforcement necessary to facilitate any export into the North of Scotland.

iii. The overall OSEC did not identify or seek to calculate the NPV for the distinct NGSLL and Aggreko components, which were tendered and evaluated as a joint proposal. The Availability services for the cable and standby service provided by the solution were priced on a combined basis. Further, the NPV of the OSEC related to the cost to consumers, not to the tenderers' investment case.

iv. The standby solution was designed to provide for planned maintenance and in the unlikely scenario that there was an unplanned outage, it could run for extended periods. It was required to have on-island access to 30 days' fuel.

Providing the optimal level of cost efficiency

Respondents' views

1.13 Eight respondents did not consider that the proposed solution offered the optimal level of cost efficiency. All considered that the most economic solution was a transmission link with standby generation and that no decision should be made until

the outcome of the BEIS consultation on the treatment of non-mainland wind was known. Similarly, another respondent urged flexibility and contingency to be built into the process until there is greater certainty on the 600MW interconnector. Another respondent argued that Ofgem should look for a joined up solution which addresses the issues that lead to the need for a cross-subsidy.

1.14 Three respondents considered it was not optimal if the other needs of Shetland were not considered e.g. the connection of renewable energy generation, long-term decarbonisation of Shetland and further interconnection. Similarly, a fourth respondent noted that the proposal did not consider the additional benefits from being able to distribute unused energy, which would be to the economic benefit of the community.

1.15 Two respondents argued for other technologies. One respondent considered that building a new diesel powered station would not cost any more in the long-term and would provide security of supply, which could not be guaranteed by the proposed solution. The other respondent strongly supported the case for a sensibly sized (c75MW) gas-fired power station as the obvious optimal potential solution. The respondent considered the absence of such a power station from the final selection process a serious omission. The same respondent queried whether SSE Generation was able to enter the competitive process.

Our views

1.16 We note the views of a number of respondents that a transmission link would provide a more cost-efficient solution. We consider that the changes under the IED now mean that there is a more cost-effective way to provide security of supply on Shetland in the short-term, which also allows for the possibility of further savings in the future if an integrated solution is required, notably if a transmission link is needed following the next CfD round.

1.17 On the issue of the additional benefits to Shetland, we note that the NGSLL-Aggreko Solution would have provided a number of benefits in relation to supporting renewable generation and decarbonisation. We recognise the point respondents were making, which is that these benefits might be even greater with a transmission link. In relation to unused energy, NGSLL considered the potential to provide heat in this fashion proposed by the respondent but concluded that it would not be viable at that time. This is discussed further below.

1.18 We recognise that a number of respondents considered other technologies may provide a more optimal level of cost-efficiency. It is important to highlight that SHEPD ran an open, fair and transparent competitive process to identify a new energy solution for Shetland. A wide range of parties put forward potential solutions, including diesel power stations and a dual-fuel power station and there was nothing to prevent SSE Generation entering that process. The outcome of the process, which was overseen by an independent auditor, was that NGSLL-Aggreko's bid was the preferred bidder. Its bid was evaluated as around £188m more economic over the lifetime of the contract than the only other technically compliant bid.

Suitability of incentive arrangements

Respondents' views

1.19 Three respondents welcomed the proposed incentive arrangements in the document but sought further information on a number of areas including:

i. the agreed liability caps for delay-related liquidated damages and operational direct losses

ii. the extent and timeline over which availability payments would be reduced in the event of service failure

iii. the costs of alternative sources that would provide replacement services in the event of a major service breach

iv. information on how the SEPA permits and risks would be managed and the associated incentives on Aggreko and NGSLL

v. specific information on the contract e.g. compensation for island generators, response times to reinstate the cable

1.20 Another respondent queried how the NGSLL-Aggreko Solution might impact their existing generation assets. They accepted the outcome would probably be positive but noted that they had not seen any detailed modelling to support this view and would like to do so.

1.21 One respondent noted National Grid SO's recent consultation on facilitating the evolution of the future balancing services markets and noted that it had turbines capable of contributing elements of ancillary service and would not like to see its access to these limited by the NGSLL-Aggreko Solution.

1.22 One respondent queried the efficiency of having three control rooms supporting the operation of the NGSLL-Aggreko Solution.

1.23 Another respondent did not agree with the choice of technology.

Our views

1.24 In relation to the range of specific questions asked, the key points are as follows (these follow the same numbering as above):

i. The agreed liability caps (for liquidated damages and direct losses) were considered to be typical of the values used in the commercial market for electricity supply projects. Liability caps do not represent unlimited protection

for a service provider, as incurring a liability in excess of a cap can, in certain circumstances, lead to the contract being terminated.

ii. The contract was based on the principle that Availability payments would always be reduced for periods where the services were not being provided. Provision was made for planned and low levels of forced maintenance, where no reduction in payment would be imposed. This is also typical in the market.

iii. The cost of services in a major service breach scenario, where both the cable and standby power station were unavailable, would be common for all tenders received, and was not therefore included within the OSEC.

iv. The management of SEPA permits impacts the running of Lerwick Power Station. It would not have impacted the incentive arrangements for the NGSLL-Aggreko Solution.

v. The contract did not include specific requirements for the time allowed to return the NGSLL cable to service, as it was not possible to know in advance if any failure of the NGSLL cable could be repaired quickly, or would result in a longer outage. The standby plant was required to be available at all times in order to meet demand whenever the cable was on an outage. However, the contract did include strong financial incentives for a speedy return to service (the Availability payment incentive, reducing the level of payment made, and direct loss provisions, would have applied). The contract included provisions on the response time of the Aggreko power station starting up to respond to unexpected failures of the NGSLL cable such that electricity supply could be restored, if it was lost, in accordance with the obligations placed on SHEPD by Ofgem. Further, NGSLL would have operated its cable under an iDNO licence, and therefore would have been subject to regulatory obligations that drive at keeping the link in a well-maintained, available and functioning state.

1.25 In relation to the impact of the proposal on existing generation, the evaluation calculated theoretical load factors for intermittent generators on Shetland, and assumed that energy produced by these generators is used before imports on the cable. This highlighted the expectation that the performance of the NGSLL cable would be such that there would be an opportunity to reduce the level of constraint for existing renewable generators on Shetland, even if the NGSLL cable did not export electricity to mainland GB. However, this would have been subject to further specification by NGSLL and modelling by SHEPD.

1.26 The reason for having three control rooms was driven by security of supply considerations. To mitigate risks associated with islanded operations and increased system resilience, NGSLL selected two control rooms for the link and one for the back-up generation. There would have been a permanently manned control room for the link located at Scalloway. A secondary control room, at Dounreay, was primarily a back-up control room and was not intended to be manned. A third control facility was planned by Aggreko for the back-up generation. The Aggreko control room was necessary for managing their equipment and was required for smooth operation and is standard industry practice.

Security of supply and meeting maximum demand

Respondents' views

1.27 Three respondents commented on security of supply issues raised by the NGSLL-Aggreko Solution and two respondents queried whether a 60MW cable would be sufficient to meet maximum demand over time, particularly given the potential for electric vehicles growth (including electric ferries). It was also noted that the 60MW capacity should be reviewed to ensure export capacity was maximised and highlighted a comment made by NGSLL that this could be scaled up to 200MW, based on the proposed technology. However, another respondent recognised the importance of security of supply and noted that they were reassured by the detail provided by NGSLL, SHEPD and Ofgem.

1.28 Two respondents said the consultation was unclear on whether the proposal involved laying two single cables in a single trench or a two-core single cable. Both respondents noted that the cable would inevitably sustain damage at some time and may take time to repair. On this basis, both respondents suggested it would be better to lay two separate cables.

1.29 Two respondents did not consider the Aggreko generators to be an adequate back-up solution and cited issues such as maintaining and storing the fuel supply, dirty/contaminated fuel from bacterial growth in the containers, maintenance challenges (particularly during bad weather) and the impact of low level exhaust emissions on the community. A third respondent argued that security of supply concerns would have to be addressed, including through a second cable and by replacing the Aggreko-style back-up station with a more permanent standby station.

Our views

1.30 All bids were evaluated by a specialist technical engineering consultancy against a comprehensive Security of Supply standard. The NGSLL-Aggreko Solution met the Loss of Load Equivalent (LOLE) requirement of <3 hours and the N+2 redundancy requirement.[16]

1.31 In relation to the points raised regarding whether the NGSLL-Aggreko Solution would have met the required demand on Shetland, we note that the capacity of the solutions proposed in the competition was in response to comprehensive demand forecasting carried out by SHEPD. Although some growth was anticipated, this was expected to be mitigated by the expansion of smart technologies and usage (such as Time of Use Tariffs). SHEPD also committed to revising its demand forecasting every two years over the period of the contract, to

[16] LOLE represents the number of hours per annum in which, over the long-term, it is statistically expected that supply will not meet demand. The LOLE requirement of <3 hours is in line with Security of Supply standards in GB. In addition, it was agreed that solutions would need to meet N+2 where N is catering for (total capacity minus two largest sources).

ensure that any unexpected changes in demand were captured and appropriately managed.

1.32 As regards the potential to scale up the cable, this was not part of the tender requirements. As a result, the cost of doing so was not included in the bid costs of the NGSLL-Aggreko Solution and therefore could not be assessed.

1.33 In relation to whether the Aggreko solution provided adequate back-up, the standby solution was designed to provide for planned maintenance and in the unlikely scenario of an unplanned outage, it could have run for extended periods. We note it was required to provide a 30-day fuel storage capacity.

Impact on a new transmission link

Respondents' views

1.34 A number of respondents argued that there should be no decision on the NGSLL-Aggreko Solution until the outcome of the next CfD auction (and the potential funding of the 600MW Shetland HVDC Link) is known. Respondents suggested inserting a break clause into the contract between SHEPD and NGSLL. Under this approach, the NGSLL-Aggreko Solution would progress as planned, with the final decision on the Shetland New Energy Solution being taken once there is greater certainty on the likelihood of a transmission link.

1.35 One respondent noted that this was in line with Ofgem's process for Strategic Wider Works (SWW). Some respondents noted that if the NGSLL-Aggreko Solution was ultimately not required then NGSLL should be able to exit on a "financially whole" basis.

1.36 One respondent queried the costs of the Grid Connection Agreement and noted that they saw no reason why the competitiveness of the NGSLL offer for the NGSLL-Aggreko Solution could not be reflected in a potential future Shetland HVDC Link Grid Connection Agreement.

1.37 One respondent queried the proposed route of the link given constraints in Caithness would limit capacity of the export of renewables. They suggested it would be better to follow the proposed 600MW route to Gils Bay or access the onward connection to the Caithness-Moray interconnector.

Our views

1.38 We recognise that the building of separate distribution and transmission links may, if a future transmission link is built, not represent the most cost-efficient solution. Therefore, an approach which could be developed to respond to further clarity on the outcome of the CfD process may have some merit. However, we note that a "break clause" would mean the construction of the NGSLL-Aggreko Solution would proceed as planned until there is certainty on a transmission link. Given the CfD timeline and NGSLL-Aggreko's investment plans, a substantial proportion of the

costs would be incurred before the CfD outcome is known. This would either result in the construction of a stranded asset or making a significant payment to NGSLL to make them whole for an asset that would not be completed. We would regard this as an inefficient and therefore undesirable outcome for consumers.

1.39 In relation to whether the competitiveness of the NGSLL offer would be reflected in a future connection agreement for the Shetland HVDC Link, as this is hypothetical, it could not be taken into consideration in the assessment of the costs of the NGSLL-Aggreko Solution.

1.40 The route of the NGSLL cable was selected in order to meet the requirements set out in the tender documentation, which specified that the solution was required to meet the demand on Shetland. As such, NGSLL chose the optimal route when balancing several factors, including environmental factors, marine conditions, impact on pre-existing fixed installations and economic considerations including length of cable. The connection to the Scottish mainland was determined based upon the most economic option of meeting demand on Shetland. NGSLL consulted with the incumbent Transmission Operator – SHE Transmission – during this process.

Planning and community considerations

Respondents' views

1.41 Two respondents queried a number of details regarding the NGSLL-Aggreko Solution, including plans for:

i. addressing the impact on numerous fixed installations in the seas around Scalloway representing salmon farming and mussel growing interests;
ii. where the converter station would be sited given its size;
iii. the track of the AC cable to Lerwick and securing the necessary wayleaves; and
iv. whether it could minimise waste by providing cheap electricity to convert into heat and store for distribution.

1.42 One respondent considered that the consultation did not adequately discuss how the NGSLL-Aggreko Solution would address the wider needs of the community. This respondent highlighted in particular high levels of fuel poverty, low energy efficiency housing, high-energy use, constraints on generation, which do not support community scale renewable potential, and the need for grid strengthening.

1.43 One respondent considered that the proposal could have a negative impact on Shetland's renewable potential and that this would not be positive for the Shetland economy as a whole.

Our views

1.44 With respect to the issues raised in paragraph 1.41 above the key points to note are as follows:

i. NGSLL appointed a Fisheries Liaison Officer to work with any marine interests affected by the works associated with development, construction, and operation of the link. The officer would have continued to engage with all affected parties with marine interests and other stakeholders to ensure that their concerns were managed in line with industry best practice.

ii. The location of the converter station would have been influenced by several factors, including the minimisation of the visual impact of the station, environmental considerations, and other known constraints.

iii. NGSLL appointed land agents to identify and liaise with all affected parties in relation the track of the alternating current cable to Lerwick. Further, they committed to work with Shetland Islands Council and other bodies to ensure that, where necessary, disruption to highways would be minimised and temporary traffic management plans would be implemented.

iv. NGSLL considered the potential to provide heat in this way and concluded that it would not be viable at that time due to the relatively small scale of the operation and would therefore not be in the best interests of electricity customers. One advantage of HVDC is that converter stations are relatively efficient and thus heat waste is relatively low.

1.45 In relation to the concerns raised regarding the impact of the NGSLL-Aggreko Solution on the community, we note that it would have provided environmental benefits to the Shetland community and created a number of long-term, high quality jobs. We would expect any future solution to have similar benefits.

1.46 We disagree with the view that the NGSLL-Aggreko Solution would have had a negative impact on renewable development and thus the Shetland economy. We acknowledge the point being raised by the respondent is that a transmission link would be expected to provide additional benefits for renewable generators. However, the NGSLL-Aggreko Solution would have reduced the curtailment of existing intermittent generation on Shetland and would have also had future export capability. Again, we would expect any future solution to have similar benefits.

Appendix 2 – Analysis of options

1.1 The confirmation that the changes under the IED will apply to Lerwick Power Station is a significant development. This means that there is no longer the same urgency to replace the station by 2020 to meet demand on Shetland. In light of this development, we have considered whether it is in the interests of GB consumers to either proceed with the NGSLL-Aggreko Solution, to be in service for 20 years from 2021, or to extend the operation of Lerwick Power Station with appropriate investment (the Augmented Lerwick Power Station Solution) until at least 2024/25.

1.2 In our analysis, we have looked at both options to consider:

- The short-term impacts - the comparative costs and impacts for GB consumers in the interim period i.e. between 2021/22 and 2024/25. This also considers the environmental costs of continuing to run Lerwick Power Station until 2024/25.

- The longer-term impacts - we have qualitatively assessed the potential longer-term impacts of each option under two scenarios: (a) a transmission link does not proceed and Shetland remains unconnected to the mainland; and (b) Shetland-based generation secures a CfD and a transmission link is built in 2024/25.

1.3 Overall, our analysis supports the view that the Augmented Lerwick Power Station Solution is a better economic option for GB consumers as:

i. We expect that the Augmented Lerwick Power Station Solution will result in a financial saving for GB consumers of approximately £69m for the period up to 2024/25 compared to the NGSLL-Aggreko Solution.

ii. Although the Augmented Lerwick Power Station Solution will result in an increase in CO_2 emissions compared to the NGSLL-Aggreko Solution, the difference over the four years, with a carbon valuation of approximately £5 million, is relatively modest. Further, we note that as part of the Augmented Lerwick Power Station Solution, SHEPD will explore a range of investment options including upgrades to plant and flexible network solutions. These measures should serve to reduce emissions from Lerwick Power Station and help to mitigate its environmental impact.

iii. Given the uncertainty about the future energy landscape on Shetland and how that might affect the economics of a future energy solution, the Augmented Lerwick Power Station Solution represents a 'no regrets' option compared to committing now to a significant capital investment for a new enduring energy solution.

1.4 Table 1 below compares the capital costs and the Net Present Value (NPV) of the Augmented Lerwick Power Station Solution and the NGSLL-Aggreko Solution. To

compare both solutions, we are using the NPV cost estimate of the NGSLL-Aggreko Solution that includes the costs of the wholesale energy over the project's lifespan.

Table 1: Costs of options

£ million	Augmented Lerwick Power Station	NGSLL-Aggreko
Capital costs	£17	£316[1]
Operational lifespan	4 years to 2024/25	20 years to 2040/41
NPV of Lerwick Power Station - total cost for period to 2021/22 to 2024/25	£119	
NPV of NGSLL-Aggreko project - total cost for period 2021 to 2041		£705

[1] The capital cost is slightly more than the value in our July 2017 consultation due to a foreign exchange adjustment.

1.5 Table 1 shows there are significant differences in the capital costs and NPV of the two options. Therefore, a direct comparison of these costs is problematic as there are differences in the timespan of the options. To assess the two options on a like-for-like basis, we have used an Equivalent Annualised Cost (EAC) approach to compare the annual cost of each option over its lifespan. These estimates are presented in Table 2.

Table 2: Equivalent annualised costs of options

£ million	Augmented Lerwick Power Station	NGSLL-Aggreko
Equivalent annualised cost of project[17]	£32m per annum (over 4 years)	£50m per annum (over 20 years)

Short-term cost impacts

1.6 To assess the value of the Augmented Lerwick Power Station Solution, we have estimated the costs avoided in the short-term by not proceeding with the NGSLL-Aggreko Solution. A key assumption underlying this approach is that a project with the same NPV and lifespan as the NGSLL-Aggreko project (therefore the same EAC) will come into service after the Augmented Lerwick Power Station Solution closes in 2024/25. This assumption allows the £50m in Table 2 to be a measure of the avoided costs for each year of the Augmented Lerwick Power Station is operating.

[17] The Equivalent Annualised Cost approach (EAC) is a method to compare mutually exclusive projects with unequal lives. The EAC approach calculates the constant annual cost of a project over its lifespan as if it is an annuity.

1.7 The equivalent annualised cost of the Augmented Lerwick Power Station Solution is significantly less than NGSLL-Aggreko Solution. The difference in value suggests that extending the operation of Lerwick Power Station is more cost-effective in the short-term. Over the period 2021/22 to 2024/25, the Augmented Lerwick Power Station Solution is expected to result in a £69 million cost saving for GB consumers compared to the NGSLL-Aggreko Solution.

Short-term carbon impacts

1.8 The carbon intensity of electricity generated from a diesel-fired power station is higher than power imported from the mainland. Consequently, the Augmented Lerwick Power Station Solution will have a larger carbon impact than the NGSLL-Aggreko Solution over the period 2021/22 to 2024/25. We estimate the difference in CO_2 emissions will have carbon valuation of approximately £5 million in total.[18]

Long-term impacts: managing uncertainty for GB consumers

1.9 There is ongoing uncertainty around whether or not a transmission connection between Shetland and the mainland will be built in the future. If a transmission connection does go ahead, this will be in combination with a large increase in renewable electricity generated on the island. These potential developments represent a fundamental change to the energy landscape on Shetland and could significantly change the scope of the option needed to ensure security of supply in the future. This uncertainty means that there is a potential risk of regret of making an investment today if the future turns out to be different to expectations.

1.10 We expect the uncertainty around the transmission connection between Shetland and the mainland to be resolved by 2020. However, by that time, a significant proportion of the capital costs for the both the NGSLL-Aggreko Solution and the Augmented Lerwick Power Station Solution would have been invested. Therefore, a decision on either solution today means there is a risk of regret associated with both solutions. However, we consider the level of potential regret of the Augmented Lerwick Power Station Solution to be much smaller because the capital cost of the Augmented Lerwick Power Station Solution is much lower (see Table 1 above), and it is not locking in a long-term energy solution. Instead, the Augmented Lerwick Power Station Solution allows time for material uncertainties to be resolved before committing significant capital investment.

1.11 We have also considered the potential regret of the two options in the event that the transmission connection to the mainland does not proceed. The main regret of proceeding with the NGSLL-Aggreko Solution now is that it will come into service in 2021, a few years in advance of when needed. In such a situation, consumers will pay more than the lowest cost option of meeting demand on Shetland over the years 2021/22 to 2024/25, i.e. the Augmented Lerwick Power Station Solution. The regret for GB consumers would be equivalent to this unnecessary cost.

[18] We have used BEIS' 2016 short-term traded carbon values for UK public policy appraisal.

1.12 Under the Augmented Lerwick Power Station Solution, we expect that there will not be any regret in the event that the transmission connection is not built in future. We anticipate that another competitive process may be required to align with the CfD process and find an economic enduring energy solution for Shetland. This would involve some costs for running another competitive process in future but, at a minimum, we expect GB consumers would be no worse off overall than the NGSLL-Aggreko Solution.