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Date: 24 May 2013

Dear Beverley

**Decision to approve changes to Scottish Hydro Electric Power Distribution (SHEPD) plc's Northern Isles New Energy Solutions (NINES) project**

We have decided to approve the amendments you requested to the NINES project.

We have approved these amendments because we consider they will mitigate the challenges presented by material changes in circumstances that were beyond SHEPD's control and which have arisen since the project commenced. These amendments will allow the project to continue with the clear objective to deliver value for money to distribution customers.

This letter describes the background to your requests to amend NINES, the process we have followed to assess the costs and benefits of the requests, our decision and the next steps for the project – namely the delivery of the Integrated Plan by 31 July 2013. We will require the Integrated Plan to identify and demonstrate the estimated benefits, economic and otherwise, of NINES in line with those presented in the analysis supporting your change request submission. Failure to demonstrate this may lead to our review of the status of, and the costs incurred with respect to, this project.

**Background**

You proposed NINES as a pilot project and the first phase of your Integrated Plan. The NINES project aims to trial a set of alternative solutions (including demand side response and energy storage) that could be implemented to reduce the overall cost of meeting the electricity needs of Shetland. The original expectation was that, on completion of NINES, you would use the learning to inform the second phase of the Integrated Plan, including the replacement of the existing power station that supplies the Shetland Isles, Lerwick Power Station (LPS). In particular, the solutions trialled by NINES were expected to allow a significant reduction in the installed generation capacity of the LPS replacement and to enable the connection of more renewable generators.

The NINES project consists of the implementation of the infrastructure necessary to actively manage demand and generation on Shetland. The elements of this infrastructure will be coordinated to maximise the amount of energy generated by renewable generation while maintaining quality and security of supply. The challenge is to balance the system using generation, demand, electrical and heat storage and actively manage network power flows. This project was considered to be unique in that the trials were to take place on a standalone system which has no electrical connection

to the mainland. Consequently, the system balancing must work in order to maintain security of supply.

In carrying out NINES, two principal effects are achieved:

- a reduction in maximum demand; and
- a reduction in the electricity units generated by fossil fuels

On 15 September 2011, we issued a decision on funding.<sup>1</sup> The funding determination issued on 25 November 2011 contains the specific conditions that you committed to in receiving funding for the NINES Project.

The funding determination requires you to comply with –

- Charge restriction Condition 18A of your Electricity Distribution Licence<sup>2</sup>
- The NINES Project funding conditions.

Amongst other things, you are required to: undertake the NINES project in accordance with the commitments you made in the full submission; provide us with progress reports every six months; and inform us in writing of any events or circumstance likely to affect your ability to deliver the project as set out in your Notice.

Following ongoing discussions with you and consideration of your December 2012 progress report, we were concerned that changes in circumstances beyond your control could present challenges to the progress of the NINES project. These changes included significant difficulties with the installation and commissioning of a 1MW/6MWh NaS battery by April 2012 and the announcement by Shetland Island Council in early October 2012 that it would be withdrawing from the project. This withdrawal resulted in a loss of over 500 domestic homes from the Demand Side Management (DSM) project. To help us monitor the situation, we held regular meetings with you and from January 2013 we proposed that you submit the necessary change requests.

On 13 March 2013, you submitted two requests to amend the project direction to allow you to mitigate these challenges. We will only amend a project direction if a DNO is able to demonstrate that it experienced an event or circumstance likely to affect its ability to deliver the project as set out in the Notice. The amendment requests can be found on our website.<sup>3</sup> The Notice can be found in Appendix 2.

## Process

Following the submission of your change requests, we have continued to meet with you and discuss your proposals. Throughout this process we have sought to ensure that the project will continue to deliver the same benefits that were outlined in its original full submission and which informed our decision to award NINES funding. We asked you to provide sufficient evidence to demonstrate that the amendments are appropriate and, in particular, that the amendments are in the best interests of distribution customers.

Based on the evidence provided so far, we have not been able to assess fully the impact of the changes on the project benefits. Due to the time constraints on the project, and the requirement for you to submit the fully Integrated Plan by 31 July 2013, we are not

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<sup>1</sup> [http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES\\_Decision\\_Letter.pdf](http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES_Decision_Letter.pdf)

<sup>2</sup> <http://epr.ofgem.gov.uk/EPRFiles/SHEPD%20Plc%20-%20Special%20conditions%20-%20Current%20Version.pdf>

<sup>3</sup> Battery change request:

[http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES\\_Battery\\_Change\\_Request\\_V04\\_080513\\_3.pdf](http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES_Battery_Change_Request_V04_080513_3.pdf)

NINES DSM Change request:

[http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES\\_DSM\\_Change\\_Request\\_v05\\_080513\\_3.pdf](http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES_DSM_Change_Request_v05_080513_3.pdf)

going to continue to explore the impact of the changes on the project benefits at this stage.

## **Summary of the change requests**

On 13 March 2013, you formally submitted two requests to amend the NINES Project Direction (amendment request). You explained each material change in circumstance, the amendment to be made in response to the change and why the amendment was necessary.

In considering these requests, we have taken into account all the information provided by you within the change requests and supporting documentation. As noted previously, we have not been able to assess fully the impact of the changes to the project on the project benefits. This has been due to the complexity of the impact of the changed circumstances on the project benefits and the time constraints caused by the need to progress with the project. We have decided that, rather than causing further delay at this stage, we will require the Integrated Plan to be delivered by July 2013 to identify and to demonstrate the economic benefits of NINES in line with those presented by SHEPD's NINES change request submission (as outlined above).

## **Decision**

You have requested two amendments. We have described below our consideration of the evidence provided in each of the areas and our decision on whether to approve each amendment.

### **1. *Battery Change Request***

The original NINES project submission included the installation and commissioning of a 1MW/6 MWh NaS battery by April 2012. The battery was installed in October 2011. However, just prior to commissioning, a fire occurred in a similar installation in Japan. Following advice from NGK, the battery manufacturer, a decision was taken to halt the commissioning of the Lerwick NaS battery.

A series of reports and investigations followed, and you waited for the full and final written reports, including an independent expert review of the findings, before making a decision about the future of the battery. The reports concluded that if a fire was to occur, it would burn for a significant period and would involve evacuating the power station and potentially switching off the electricity supply to the whole island for a number of days. For these reasons, and because a method to extinguish a fire in an acceptable timescale could not be identified, you concluded that the battery was no longer fit for purpose in this location.

The proposed solution to this issue is to allow the removal and return of the original NaS battery, to be modified and relocated elsewhere, in agreement with the manufacturer and supplier. To this end, a replacement 1MW/0.5MWh battery is to be provided and installed by July 2013. By October 2013 the storage capacity of this replacement battery will be increased to 2.5 MWh. You advise that this type of battery is well understood with established safety standards.

You have confirmed that the proposed solution will be possible within the original project budget and no additional funding would be required. In addition, the University of Strathclyde have carried out analysis on your behalf to ascertain the optimum size of battery. You advised that the results of this are that a 1MW/3MWh battery is easily capable of discharging at full power output for the duration of the lunchtime peak.

Based on the evidence provided, we agree that it is prudent for you to take steps to replace the battery. We are satisfied that you have carried out the necessary due diligence and worked with the manufacturers and suppliers to ensure that a

replacement battery is installed at no additional cost to the project. The decision to approve this amendment is subject to the condition of no additional cost to the project.

We expect learning from the project to feed into our ongoing work in work stream 6 of the Smart Grid Forum. Amongst other things, this group is investigating commercial and regulatory issues surrounding the ownership and operation of storage. This will inform the business model for the roll out of storage devices, within the regulatory framework.

## 2. *DSM Change Request*

The original NINES submission included the installation of DSM into 750 homes provided by Hjaltland Housing Association (HHA) and Shetland Islands Council (SIC). However, SIC announced in October 2012 that it would be withdrawing from the project. This resulted in a loss of over 500 of the 750 homes to be installed with new storage heaters and hot water tanks, along with communication to provide DSM capability.

In order to increase the number of domestic homes involved in the project (which currently stands at 234 domestic homes from HHA), you are proposing to expand the offering of DSM beyond the social housing market.

To achieve an offering which would be suitable to the open market, you wish to work with appropriate consultants to develop a sustainable Market Model for DSM in Shetland, which could be used to attract different customer types. The intention is then to implement and use the model to sign up to 500 homes with active control of DSM by December 2016. The new model should attract additional DSM as well as disseminate the knowledge and learning which can be gained from implementing DSM on Shetland.

Having reviewed the proposals contained within this change request, we requested an accompanying letter from your academic partner (University of Strathclyde) to provide confirmation that the project will still deliver statistically valid learning under the new proposed model (including for the worst scenario of DSM uptake). In the letter<sup>4</sup>, the University of Strathclyde confirmed that the Modelling and Simulation activities undertaken on the NINES project would provide statistically valid analysis of the data collected on Shetland, even in the worst case scenario.

We also requested additional evidence that the market model was commissioned following a competitive tender process. You explained that you had already undertaken work with relevant consultants to develop an outline market model for DSM through a direct procurement exercise and that you had ensured they had an appropriate scope of work for this activity and that the price provided was commensurate to the work being undertaken.

Furthermore, you explained that, from the work undertaken in a related Innovation Funding Incentive (IFI) project<sup>5</sup>, you now had a better understanding of the required scope for stage one of the work. This, combined with your understanding of applicable market rates for this type of work, has given you a high degree of confidence that the budget proposed is reasonable. Given the timescales and the work which you have already carried out, you do not intend to conduct a full tender exercise for this activity, but envisage placing the work with Engage Consultancy/Wipro Technologies as a direct procurement exercise.

You say the costs of stage one of the amended proposal are:

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<sup>4</sup> NINES Supporting Letter from University of Strathclyde 29 April 2013: [http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES\\_Supporting\\_Letter\\_from\\_UofS\\_29Apr2013.pdf](http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES_Supporting_Letter_from_UofS_29Apr2013.pdf)

<sup>5</sup> More information on IFI projects can be found at: <http://www.ofgem.gov.uk/Networks/Techn/NetwrkSupp/Innovat/ifi/Pages/ifi.aspx>

- developing the Market Model (£330k); and
- Customer and Stakeholder Engagement (£20k).

You envisage that these costs can be absorbed within the existing project budget through cost savings made elsewhere.<sup>6</sup> The cost of stage two is dependent on the detailed market model which is implemented, and therefore, on completion of stage one, you will have gained sufficient knowledge to provide indicative costs for stage two. You envisage that these costs will form part of the incentive/certified installation benefit.

The approval of this amendment is subject to there being no additional cost incurred to the total funding amount for NINES (£15.33m).

### **Other issues**

Throughout the process, you have attempted to highlight the impact of project developments on the wider benefit of the project. Based on the information provided, we have been unable to understand fully and agree this impact. The scope of this document therefore extends only to the approval of the two specific amendments detailed above, subject to the conditions stated.

Due to time constraints and to prevent any further delay, the Integrated Plan to be submitted by 31 July 2013 must deliver the benefits anticipated in the analysis supporting your change request submission. There must be a robust evidence base to demonstrate that the deployment of the NINES solutions will reduce the maximum demand as predicted and that the expected reduction in the electricity units generated by fossil fuels will be achieved. Failure to demonstrate this may lead to a review of the status of, and the costs incurred with respect to, this project.

If you would like to discuss any of the issues raised in this letter, please contact Olivia Powis at [Olivia.powis@ofgem.gov.uk](mailto:Olivia.powis@ofgem.gov.uk) or 020 7901 3879.

In accordance with Section 8 of the conditions of the NINES Funding Determination, the Authority hereby agrees to the amendments set out by SHEPD in Sections (4.11), (4.12), (6.3.a), (6.3.b) in the Special Condition CRC 18A, Notice of a proposed relevant adjustment to the Charge Restriction Conditions in the manner set out in Appendix 2 of this letter.

This constitutes notice of reasons for this decision pursuant to section 49A of the Act.

Yours sincerely



Andy Burgess  
**Associate Partner, Transmission and Distribution Policy**

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<sup>6</sup> Detailed in page 8 of the DSM Change Request

## Appendix 1 Schedule to NINES Determination

### **Funding Conditions**

#### 1. **PROJECT BUDGET**

The Project Budget is set out in Table 1. SHEPD must not spend more than 110 per cent of any category total (e.g. Labour) without the Authority's prior consent (such consent is not to be unreasonably withheld).

**Table 1. Project Budget**

<b>Labour</b>	
Project Management / System Studies and Design	£2,857k
ICT and System Integration	£1,627k
Automatic Network Management Scheme	£399k
SHEAP Thermal Store and District Heating Extension	£400k
Domestic Storage - ph1 - 750 homes	£678k
Non Domestic Storage	£60k
Modelling - Learning and Dissemination	£632k
NAS Battery	£178k
<b>Equipment</b>	
ICT and System Integration	£257k
SHEAP Thermal Store and District Heating Extension	£100k
Domestic Storage - ph1 - 750 homes	£729k
Non Domestic Storage	£75k
Modelling - Learning and Dissemination	£241k
NAS Battery	£1,355k
<b>Contractors</b>	
Automatic Network Management Scheme	£2,462k
Domestic Storage - ph1 - 750 homes	£175k
Modelling - Learning and Dissemination	£911k
NAS Battery	£568k
<b>IT</b>	
ICT and System Integration	£1,171k
SHEAP Thermal Store and District Heating Extension	£100k
Modelling - Learning and Dissemination	£120k
NAS Battery	£20k
<b>Travel &amp; Expenses</b>	
Project Management / System Studies and Design	£117k
<b>Decommissioning</b>	
NAS Battery	£100k

#### 2. **PROJECT IMPLEMENTATION**

SHEPD must undertake the project in accordance with the commitments it has made in its Notice pursuant to the terms of this Determination. These include (but are not limited to) the following:

- (i) undertake the project in accordance with the description set out in Section 4 (Phase 1 (NINES) of the Integrated Plan) of Annex A of the Notice served on 18 November 2011;

- (ii) complete the project on or before the project completion date of 31 December 2013; and
- (iii) disseminate the learning from the project at least to the level described in Section 10 (Learning Dissemination) of Annex A of the Notice served on 18 November 2011.

### **3. REPORTING**

#### Project Progress Report

SHEPD must provide a detailed report (the "Project Progress Report"), on **1 June 2012** and then **at least every six months subsequently**, of sufficient detail to allow the Authority to evaluate progress of the project. The Authority will provide guidance about the structure and content of the reports.

SHEPD must also report on expenditure against each line in the Project Budget, and explain any projected variance against each line total in excess of 5 per cent as part of its Project Progress Report. The Authority will use the reported expenditure and explanation to assess whether the funding has been spent in accordance with this Determination.

SHEPD must submit to the Authority, within two months of the date of this Determination, how it will assure us that the information in the report is accurate.

#### Close-Down Report

SHEPD must provide a detailed report (the "Close-Down Report") of sufficient detail to provide information for third parties to understand what has been learnt from the project.

SHEPD must submit its Close-Down Report to the Authority **within three months** of the project completion date set out in this Determination, or if a project has been halted, **within three months** of the Authority approving the halting of the project.

In the event that the Authority considers that a Close-Down Report is of an unacceptable standard, it may ask the SHEPD to resubmit the Close-Down Report.

The Authority will issue more detailed guidance on what should be included within this Close-Down Report at a later date. This will be similar to the guidance as issued for LCN Fund projects.

The Project Close-Down Report may be published on the Ofgem website. SHEPD must clearly identify any information contained in the Close-Down Report that it considers to be confidential. If the Authority agrees that it has demonstrated that it (or its project partners) will face commercial harm from disclosure and that the information is considered eligible for exemption under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004, then SHEPD must provide a non-confidential version of the Close-Down Report which can be published by the Authority.

### **4. PROJECT AUDIT**

This project may be subject to an audit. This will include requiring SHEPD to demonstrate that the project is compliant with this Determination. This audit may be undertaken by the Authority, or by a third party appointed at the discretion of the Authority.

### **5. INTELLECTUAL PROPERTY RIGHTS (IPR)**

SHEPD must undertake the project in accordance with the default IPR arrangements set out in Chapter 2 of Section Five of the LCN Fund Governance Document<sup>7</sup>.

<sup>7</sup> The LCN Fund Governance (version 4) can be downloaded from:  
<http://www.ofgem.gov.uk/Networks/ElecDist/lcnf/Documents1/LCN%20Fund%20Governance%20doc%20v%204.pdf>

## **6. CUSTOMER PROTECTION**

SHEPD must:

- (i) submit to the Authority a plan of how it, or any of its project partners, will engage with, or impact upon, customers as part of the project. SHEPD and its project partners must comply with the approved plan at all times. The plan must include:
  - a. a communications strategy which sets out inter alia:
    - i. any proposed interaction with a customer or premises of a customer or proposed interruption to the supply of a customer for the purposes of the project, and how the customer will be notified in advance;
    - ii. ongoing communications with the customers involved in the project; and
    - iii. arrangements for responding to customer queries or complaints relating to the project; and
  - b. information on the Priority Services Register Customers<sup>8</sup> who will be involved in the project and how they will be appropriately treated (including providing information to any person acting on behalf of a Priority Services Register Customer in accordance with condition 26 of the Electricity Supply Licence, where applicable);
  - c. details of any safety information that may be relevant to the project; and
  - d. details of how any consents that may be required as part of the project will be obtained; and
- (ii) publish the plan by making it readily available on its website.

SHEPD and its project partners must also comply with the following conditions:

- (i) not visit a premises of a customer for sales or marketing activities in connection with, in the context of or otherwise under the guise of the project; and
- (ii) have regard to the implementation of the smart meter roll-out in its Distribution Services Area<sup>9</sup> to ensure that the project does not impede the implementation in any way.

In addition, if SHEPD or any of its project partners is installing any equipment at the customer's premises as part of the project, SHEPD and the project partners must comply with the following conditions:

- (i) not enter the premises of a customer, other than for the purposes contained in the Licence or for communication purposes (set out above), unless it first obtains the prior consent of the customer, such consent to be formally recorded;
- (ii) where the equipment is any form of smart meter, SHEPD, its project partners must first notify the customer's Electricity Supplier; and
- (iii) provide the customer with information (which should be identified as part of the communications strategy) on how the equipment will be installed, how long it will be installed for, and how it will be decommissioned.

## **7. DATA PROTECTION**

SHEPD must submit a strategy for dealing with personal data (as defined in the Data Protection Act 1988) to the Authority. The strategy must set out the following:

- (i) what personal data will be collected for the purposes of the project;
- (ii) how this personal data will be used;
- (iii) how consent for use of the personal data will be obtained;
- (iv) what information will be provided to the customer prior to consent being sought;
- (v) if Priority Services Register Customers are included in the project, how their personal data will be obtained;
- (vi) who owns the personal data;
- (vii) how long the personal data will be retained; and

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<sup>8</sup> Priority Services Register Customers has the meaning given to it in standard condition 10 of the electricity distribution licence.

<sup>9</sup> Distribution Services Area has the meaning given to it in standard condition 1 of the electricity distribution licence.



- (viii) how this personal data will be managed (which should be based on a 'privacy by design' approach, as advocated by the Information Commissioner's Office).

## **8. AMENDMENT OR REVOCATION**

SHEPD must inform the Authority promptly in writing of any event or circumstance likely to affect the ability of it to deliver the project as set out in its Notice.

If SHEPD considers that there has been a material change in circumstance that requires a change to this Determination, it may submit a request for a change to the Authority. This request should provide sufficient detail to allow the Authority to decide whether the change would be appropriate in the circumstances, including whether it would be in the best interest of customers. Once the Authority has enough information to make this decision, it will provide its response in writing to SHEPD, including any revisions it has accepted to this Determination. The Authority expects that any changes made to the Determination at the request of SHEPD will only be made in exceptional circumstances.

## **9. HALTING OF THE PROJECT**

SHEPD may put a request to the Authority to halt the project, for example because it has become clear that the project is not viable or there are other reasons why it does not make sense or is not possible to continue. SHEPD may suspend the project from the time it puts in this request, pending a decision from the Authority to the request to halt. The Authority may also request that SHEPD halts the project. From the time that either a SHEPD or the Authority puts in the request to halt the project, SHEPD must not spend any further money on the project unless:

- (i) funds have already been committed to the project; or
- (ii) SHEPD can demonstrate to the Authority that the funds are required to be incurred as part of the suspension of the project.

As part of the process to evaluate whether a project should be halted, either by the Authority or SHEPD, SHEPD will need to provide the Authority with sufficient information to evaluate whether halting the project will be appropriate in the circumstances, including whether it would be in the best interest of customers and identifying any costs it will incur and the actions required in halting the project.

If the Authority is satisfied that it is appropriate in the circumstances, including whether it would be in the best interests of customers to halt the project then it will confirm in writing that it shall require that the project be halted. It will also identify the amounts for the  $UNC_t$  term<sup>10</sup> set out in this Determination which has not yet been spent, less funds already committed and less any costs that the Authority has agreed can be incurred to halt the project. The Authority will then issue a revised Determination setting out revised values for  $UNC_t$ .

A project that is halted must still comply with the other requirements of this Determination, including the requirement to provide a Close-Down Report.

In the event of the Authority deciding to halt the project, the Authority may issue a statement to SHEPD clarifying the effect of that halting decision as regards the status and legal force of the conditions contained in this Determination.

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<sup>10</sup> As defined in the electricity distribution licence, Charge Restriction Condition (CRC)4 - Restriction of Distribution Charges: calculation of the Allowed Pass-Through Items

**Special Condition CRC 18A – Arrangements for the recovery of costs for an integrated plan to manage supply and demand on Shetland**

**Notice of a proposed relevant adjustment to the Charge Restriction Conditions**

Scottish Hydro Electric Power Distribution (SHEPD), in accordance with the provisions of Part B of Special Licence Condition CRC18A, hereby give notice to the Authority of a proposed relevant adjustment to the Charge Restriction Conditions in order to recover Shetland Trial Costs.

In accordance with Special Licence Condition CRC18A, this notice includes -

1. Details of the Shetland Trial;
2. A proposal for a relevant incentive mechanism; and,
3. A proposal for a relevant adjustment to the Charge Restriction Conditions.

With regard to item 1 above, details of the Shetland Trial, as required by CRC18A.16(d), are contained in Annex A of this document.

With regard to item 2 above, the proposed relevant incentive mechanism is the existing IQI Incentive Mechanism.

With regard to item 3 above, the table below contains the relevant adjustment to the Charge Restriction Conditions to recover the Shetland Trial Costs, which are not otherwise recoverable by SHEPD or pursuant to any of the Charge Restriction Conditions of the SHEPD's licence.

	2012/13	2013/14	2014/15
UNct	£3.964m	£1.049m	£1.075m

All prices shown in 10/11 prices

SHEPD proposes that the relevant adjustment will have effect from 1st April 2012.

## Annex A - Proposals for the development of the Integrated Plan for Shetland

### 1. DEVELOPMENT OF THE INTEGRATED PLAN

1.1. During the latest Distribution Price Control settlement, a licence obligation was put in place requiring Scottish Hydro Electric Power Distribution (SHEPD) to present an Integrated Plan to manage supply and demand on Shetland. The Shetland Islands are not connected to the main interconnected GB electricity network and, as such, face unique electrical challenges – but also a unique opportunity to decarbonise supply. Under the current licence condition, this Integrated Plan is to be presented to the Authority by 31 July 2013 and SHEPD are required to demonstrate that it has identified a solution based on the lowest lifecycle costs taking into account its environmental obligations.

1.2. As part of the Integrated Plan, SHEPD is considering, amongst other things, the upgrading or replacement of Lerwick Power Station, the impact of third party generation requirements, the abundance of renewable energy resources and the future demand on Shetland.

1.3. The factors influencing the supply and demand issues on Shetland necessitates an innovative approach to their management. However, with innovation comes the need to trial solutions before reaching an answer. As a result, SHEPD propose to split the implementation of the Integrated Plan into two phases:

- Phase 1 Shetland Trial (Northern Isles New Energy Solutions 'NINES') – implementation of the infrastructure necessary to actively manage demand, generation, reactive compensation and energy storage assets. These elements will be coordinated to maximise the amount of energy harvested from renewable generation while maintaining supply quality and security. In doing so, two principal effects are achieved:
  - a reduction in maximum demand; and
  - a reduction in the electricity units generated by fossil fuels
- Phase 2 (Shetland Repowering) – upgrading or replacement of Lerwick Power Station, taking into account the learning acquired during Phase 1 and, where appropriate, extending the Phase 1 technology.

This information constitutes SHEPD's compliance with CRC18A.15 to propose the Shetland Trial (NINES) by 31<sup>st</sup> October 2011.

1.4. This paper constitutes SHEPD's proposal for Phase 1 of the Integrated Plan and seeks to -

- Outline the current arrangements and challenges on Shetland;
- Set out the Shetland Repowering considerations;
- Explain Phase 1;
- Set out the costs for Phase 1

- Identify the project delivery methodology and risks; and
- Outline a mechanism to amend the current licence obligation to allow for Phase 1.

1.5. Phase 2 of the Integrated Plan will continue to be developed during the implementation of, and learning from, Phase 1. Phase 2 will be presented to the Authority by 31 July 2013.

## **2. CURRENT ARRANGEMENTS AND CHALLENGES ON SHETLAND**

### 2.1. Supply and Demand

2.1.a. The Shetland Isles are located some 130 miles to the north of the UK mainland.

2.1.b. The islands are not physically connected to the GB electricity system and, as such, rely entirely on local sources of generation. The main generation sources are: Lerwick Power Station (LPS), a 67MW diesel-fired station; the Sullom Voe Terminal (SVT) Power Station, which has an installed capacity of 100MW, but currently exports, at most, 22MW to the Shetland system; and Burradale Wind Farm, a 3MW privately-owned wind farm. In addition, there are a number of small-scale community-based wind generators.

2.1.c. LPS is owned by SSE Generation and operated by SHEPD. The plant consists of two stations, 'A station' and 'B station', with six and three units respectively. 'A station' was first commissioned in 1953; 'B station' was commissioned in 1983. SHEPD calls on LPS to balance supply and demand on Shetland on an instantaneous basis and, in doing so, LPS is required to provide many of the ancillary services that would normally be offered to the system operator through a diverse plant portfolio; all of this places considerable demands on LPS. Given the age of the plant, LPS has become increasingly expensive to maintain and operate. Furthermore, it is becoming increasingly difficult to ensure environmental compliance in and around the station. The Scottish Environmental Protection Agency (SEPA) has granted LPS a number of derogations in terms of environmental compliance, most notably a relaxation of its emissions limits under the Large Combustion Plant Directive. However, these derogations are contingent upon clear steps being taken to either introduce adequate emissions controls or to replace the existing station.

2.1.d. SEPA is aware of the original provisions within the current price control for SHEPD to come forward with an Integrated Plan, including Shetland Repowering by 31<sup>st</sup> July 2013, and the nature and timescales of the derogations reflect this. It is not possible to retrofit the existing LPS in order to meet environmental standards due to constraints on the location and size of the site and the age of the existing engines. As such, this has not been considered an option to be put forward in the Integrated Plan.

2.1.e. The SVT power plant is an independently owned gas turbine plant located in the north of the island. Its primary role is to supply the requirements of the Sullom Voe gas terminal, but through a commercial power purchase agreement with SHEPD, it also provides power to help meet the islands' wider energy

requirements. The Sullom Voe plant is of a similar vintage to LPS and is anticipated to require refurbishment or replacement within similar timescales to LPS.

2.1.f. Burradale Wind Farm is located close to Lerwick. Burradale operates at an average output (capacity factor) of around 50% taken over a full year. Average European wind power capacity factors are closer to 20%. Burradale Wind Farm therefore ranks among the most effective wind farms in the world. In more recent years, the introduction of feed in tariffs, in particular, has increased the interest in these types of installations on Shetland.

2.1.g. Demand on the islands varies between 11MW and 48MW and much of this is concentrated in the main town of Lerwick. It is important to note that these demand figures exclude SVT's industrial demand, which at present is supplied directly by the terminal's on-site generation. If SVT is taken into account, the total island demand is within the range 31MW and 68MW.

2.1.h. Despite the Sullom Voe gas processing terminal, there is no gas supply on the island. The heat demand on the islands is therefore provided largely through oil boilers and electric storage heaters. For around 1,000 customers in Lerwick, their heating needs are met through the District Heating Scheme, which uses a waste to heat energy plant sited just outside Lerwick. This scheme is operated by Shetland Heat Energy and Power (SHEAP) Ltd.

2.1.i. Although the electricity supply in Shetland comes from only three sources, all customers on the island can still choose who they wish to be supplied by in exactly the same way as mainland customers. In this respect, Shetland customers are able to fully participate in the liberalised GB energy market and continue to benefit from retail competition.

## **2.2. The Network**

2.2.a. On the mainland, transmission networks (defined in Scotland as those of 132kV and over) collect power from generators and transport it to distribution networks, which then deliver the electricity to end customers. It is the responsibility of the GB System Operator, National Grid, to ensure that the power generated equals the power demanded.

2.2.b. However, as there are only lines of 33kV or below on Shetland, the existing network on Shetland is entirely at distribution voltages, i.e. the distribution network collects power from generators and delivers it to the end customers. SHEPD owns and operates this network and, in the absence of a mainland link, provides a system operator role to maintain a balanced system. This role has always existed, but was more formally recognised at the introduction of the British Electricity Trading and Transmission Arrangements (BETTA) in 2005, when provisions were made within SHEPD's distribution licence to allow it to recover its resulting costs.

2.2.c. As with any network, maintaining the balance between generation and demand is critical. As Shetland is not connected to the mainland, the network must be balanced using only the assets available on the islands. In other words, at any given time, there cannot be more generation than demand, or vice versa,

and to be able to achieve this, a significant percentage of this generation must have a reliable and controllable output. At present, the balance is such that it is not possible to offer any new generation connections on the islands. The current mix of generating plant is not sufficiently flexible enough to cope with any additional intermittent renewable generation whilst maintaining network stability. This is particularly true during the summer where the low demand on the islands makes it impossible to accommodate any further renewable generation. If new generation was to be introduced without equivalent new demand to warrant it, the system would be at risk of becoming unstable and this would result in a loss of supply.

### **3. WIDER CONSIDERATIONS FOR SHETLAND'S ENERGY SYSTEM**

3.1. We have already described the pressures facing the main sources of generation on Shetland. The islands' repowering is a unique opportunity to review the islands' arrangements as a whole and to develop an integrated solution designed to make the most of Shetland's renewable resources and reduce its dependency on thermal generation.

3.2. There are, however, a number of wider issues that need to be considered.

#### **3.3. Securing supplies to Shetland**

3.3.a. SHEPD has a licence obligation to ensure that supplies to Shetland are maintained to Engineering Recommendation P2/6. This recommendation states that, for a location the size of Shetland, there must be an alternative means of maintaining supply to the area in the event of a fault.

3.3.b. It is this obligation which fundamentally drives the requirement for a reliable and efficient local power station on Shetland, as opposed to relying on intermittent renewable generation, third party contracts or a single mainland HVDC cable link. These sources might form a part of the solution. However, to comply with P2/6, SHEPD must be sure that if any one energy source was not available, an alternative supply was there to be deployed.

#### **3.4. New demand**

3.4.a. The scale of any replacement thermal generation plant will be directly related to the islands' peak demand. Ignoring the industrial load at SVT, which is met by on-site generation, the islands' peak demand, at present, stands at 48MW.

3.4.b. Given our duty to offer terms for connection on request, and the lack of generation capacity to meet this demand, SHEPD will make any current demand connection offers contingent on the proposed mainland link. Going forward, there may be additional demand requirements and the Integrated Plan should allow for this to be accommodated.

#### **3.5. Mainland link**

3.5.a. A plan to build a single circuit HVDC link to the mainland has been developed to facilitate the connection of proposed large-scale renewable generation on Shetland into the main GB system.

3.5.b. This link to the mainland is expected to operate with around a 98.5% reliability factor. Therefore, Shetland can expect a link to the mainland much of the time but must still have an alternative means of supply for the times when the cable is unavailable. This is particularly important as, due to the challenges of access to subsea cables, repair of faults or routine maintenance in these kind of cable links are likely to be of a significantly longer duration than those on overhead lines.

3.5.c. The Integrated Plan is therefore necessary regardless of whether the mainland link exists or not to meet the requirement for a reliable local power supply. In particular, the learning from Phase 1 can be applied to any enduring solution, be it a full duty station or a standby station.

### **3.6. Viking wind farm**

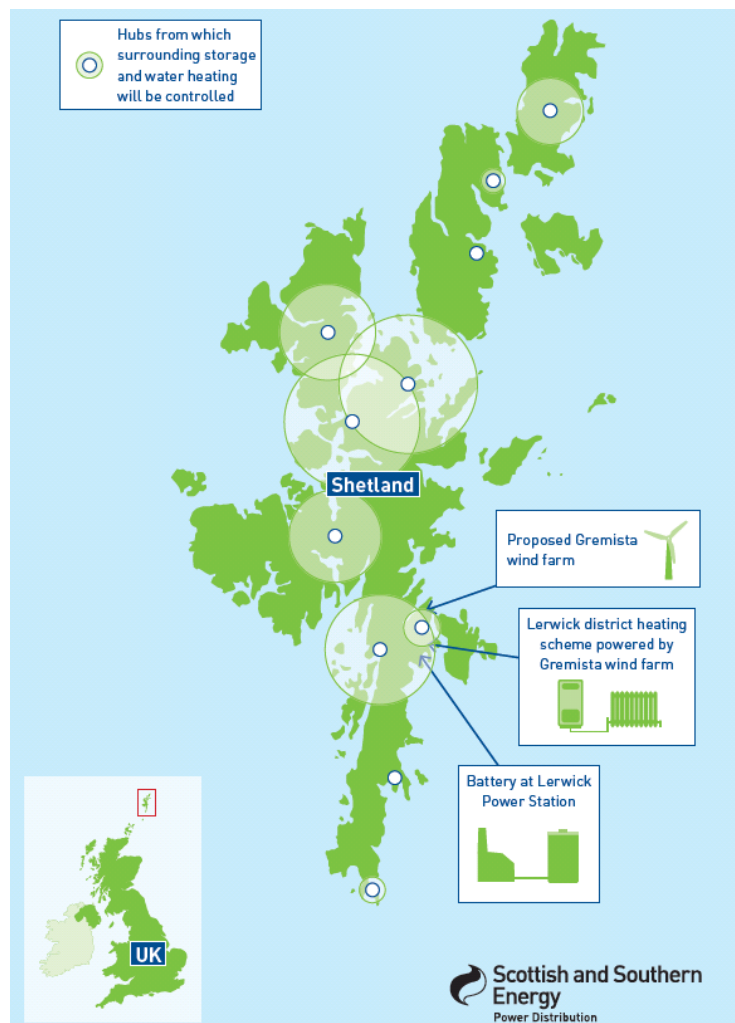
3.6.a. As mentioned in **Error! Reference source not found.**, there are proposals for a large-scale (around 450MW) onshore wind farm on Shetland. In light of these proposals, consideration has been given to the contribution that this wind farm could make to the continuation of supplies on the island during a fault on the mainland HVDC link.

3.6.b. Based on evidence from existing Shetland wind farms, it is anticipated that the output of this wind farm will be less than the demand on Shetland for up to 30% of the year. As such, this wind farm, on its own, is insufficient to secure supplies on the islands. In addition, it cannot be guaranteed to have sufficient output in the event of loss of the HVDC link.

### **3.7. New small and medium scale wind generation**

Given the abundance of renewable resource on Shetland, there is significant potential for small and medium scale wind generation on the islands. The connection of this renewable generation is an important driver for the Integrated Plan.

## 4. PHASE 1 (NINES) OF THE INTEGRATED PLAN



- 4.1. Phase 1 of the Integrated Plan has been developed with the main aim of informing the optimum repowering solution. Whilst its primary objective will be to trial 'smarter' initiatives, importantly it will fund elements and infrastructure that we fully expect to endure as part of Phase 2 of the Integrated Plan.
- 4.2. The Phase 1 approach was previously explored in a bid, titled 'NINES', under the Low Carbon Networks Fund (LCNF).
- 4.3. When reviewing the original 'NINES' LCNF submission, Ofgem recognised the value of the project in addressing the current challenges on Shetland and noted that - *'aspects of the NINES project solution could potentially provide a lower carbon and lower cost approach to meeting the energy needs of Shetland compared to replacing the ageing Lerwick diesel power station with a similarly sized diesel plant.'*
- 4.4. The current Phase 1 approach, whilst technically identical to 'NINES', has been somewhat refocused on providing infrastructure and learning for Phase 2, rather than having a broader UK focus.
- 4.5. There has been significant support, both on Shetland and further afield, for what the original 'NINES' project was intended to achieve. Given that the output, for the islanders, of Phase 1 will be very similar to the proposals in 'NINES', we intend to 'brand' the Phase 1 approach as 'NINES' in order to provide continuity.



4.6. Central to the project will be the creation of an integrated set of models designed to anticipate the impact of NINES. This set of models is expected to cover the following themes:

- Dynamic Stability modelling
- Steady State modelling
- Unit Scheduling modelling
- Customer demand forecast model
- System Development optimisation model
- Strategic Risk and Operational risk model
- Shetland Economic model
- Commercial model

4.7. During phase 1 these models will be validated to allow them to be used to inform phase 2 with the level of certainty that would be required for such a significant investment.

4.8. Facilitated by modelling and practical learning the aims of Phase 1 are to:

4.8.a. Undertake specific projects that increase understanding of how best to accommodate Shetland's significant wind potential on a small distribution network; and

4.8.b. Undertake specific projects that increase understanding of how the existing and known future demand on the island can be best managed on a constrained, isolated system.

4.9. The purpose of Phase 1 being to inform the design of Phase 2 of the Integrated Plan and, specifically, through trial and learning optimise the supply and demand infrastructure on the islands.

4.10. There are six core elements in delivering the Phase 1 project and these elements are set out below. However, one of the key early outputs from Phase 1 will be a series of models. As stated earlier these models will serve to predict the behaviour of the energy systems on Shetland and will validate each of the key elements of Phase 1 as they are added. Following this validation process, these models will be used to reliably inform the design of any replacement of Lerwick Power Station. Overall, with the successful operation of Phase 1, we expect to create the infrastructure and know-how to reduce the peak capacity requirement for any replacement power station by up to ~~20MW~~11MW.

#### 4.11. **1MW battery at Lerwick Power Station**

4.11.a. A 1MW battery will act as an energy storage system and in addition to facilitating the connection of new renewables, the battery will seek to help to optimise and stabilise the operation of the existing island network by helping to reduce demand peaks. Initial models suggest, conservatively, that the battery can accommodate the connection of up to 400kW of new small scale renewable generation. As SHEPD gains a greater understanding of the battery's operational performance, it is envisaged that further renewables can be connected as

confidence in the system and the associated models increases. Once commissioned, it will be the largest battery in use anywhere on the GB network.

4.11.b. The capital cost of the battery is being part funded by DECC via a Smart Grid Demonstration Capital Grant for £1.1m and £1m from SHEPD's First Tier Low Carbon Network Fund. The remainder will be funded through Phase 1 and the learning will inform the battery's role in the repowering solution (Phase 2 of the Integrated Plan).

#### 4.12. **Domestic demand side response with frequency response**

4.12.a. SHEPD is working with ~~Shetland Islands Council and~~ Hjalmland Housing Association to install advanced storage heating and water heating in around ~~750~~ 234 existing homes. Following the loss of SIC we also plan to recruit a further 500 private homes, bringing the total under the project to 734. ~~These~~ These new storage and water heaters (~~which~~which will replace existing traditional storage heaters) are being provided through ~~SIC~~, Hjalmland and ERDF funding and have been specifically designed to use a much more flexible electrical charging arrangement. This new charging arrangement will be determined based upon the predicted demand, weather forecasts, availability of renewables and any other network constraints.

4.12.b. These heaters will incorporate additional insulation to minimise heat loss and will be fitted with programmable timers to allow users much better control of temperature and operating times as compared with conventional storage and water heating systems.

4.12.c. The new heating system is anticipated to be more efficient, while also allows the customer full control of both temperature and operating time and equally allows for charging at times that best suit the network.

4.12.d. This initial roll out will help to gauge how effective storage and demand side response is at the domestic level. If successful, it is anticipated that this could be voluntarily extended up to a further 250 to give 1000 homes and ultimately through customer choice, to all electrically heated houses in Shetland. This can be achieved at relatively low incremental cost as the communications infrastructure and core Active Network Management scheme will already be in place to service the original 750 homes. It is anticipated that this will also give the opportunity to provide further learning on implementing these new storage heaters within the private sector.

4.12.e. The programme for the initial installation within the ~~750~~ 234 HHA properties is phased ~~over the next three years from May 2013 to July 2014.~~ Therefore, extending this solution will form part of Phase 2 of the integrated solution and will be informed by the learning in Phase 1.

#### 4.13. **Additional 'flexible' demand through 130MWh thermal store rated at 4MW**

4.13.a. Shetland Heat Energy and Power (SHEAP) is proposing to extend the existing Lerwick district heating scheme by installing a 4MW electrical boiler, which will be linked to a new thermal store capable of storing around 130MWh of

hot water. The existing district heating scheme is currently supplied by waste heat from the islands waste to energy plant and also relies on significant quantities of oil to meet the requirements of the scheme.

4.13.b. The new boiler and thermal store will provide the capacity to extend the over subscribed district heating scheme and will also substantially reduce the current scheme's reliance on oil.

4.13.c. Aside from helping meet the demand for connections to the district heating scheme, the real benefit offered by this arrangement is expected to come from the thermal store's ability to respond instantaneously to situations arising on the network. For example, if there is insufficient demand on the island system relative to generation, the intention is that SHEPD will be able to call on SHEAP's thermal store to increase island demand and 'soak up' the surplus generation, thereby helping to maintain a balanced system. Similarly, if the reverse situation arises, the intent is that SHEPD can ask SHEAP to withhold its demand until a time when the system is more able to accommodate it.

4.13.d. Clearly, for this to work, the commercial framework between SHEPD and SHEAP will have to reflect both the needs of SHEAP's customers, who are reliant on the thermal store for their heating and hot water, and the needs of SHEPD in terms of ensuring that SHEPD has this flexibility at times when it is of value. These arrangements will be informed by early modelling that is part of the Phase 1 project. The actual elements of this proposal are forecast to connect mid to late ~~2012-2014~~ and, once connected, will be able to further validate the overall model that will inform Phase 2 of the Integrated Plan that is to be submitted to the Authority in ~~July~~ ~~June~~-2013. However, clearly, once installed this learning does not stop and we envisage that we will be able to reflect further on this learning ahead of actual repowering during Phase 2.

4.13.e. To supply power for the boiler and thermal store, SHEAP is in discussions with SSE Renewables to bring forward a 6.9MW wind farm on adjacent land. The capital costs of the store and its onsite generation will be funded by the respective partners. This new wind farm will be connected to the boiler via a private electrical network, with any surplus electricity being exported to the grid. This will be a 'managed connection' whereby the wind farm will only be able to export if network conditions are suitable. Additionally, taken together, the boiler and thermal store will be able to provide a range of ancillary services for both the new wind farm and also for other renewables.

4.13.f. Whilst the capital costs of the store and its onsite generation will be funded by the respective partners, the focus of the Phase 1 funding will be on understanding and testing the commercial agreements needed to make this arrangement work. These include agreements for managed generation connections, flexible demand connections including ancillary services agreements and payments. If successful, these agreements will encourage other potential customers to come forward to provide connections on a similar basis which will help inform Phase 2 of the Integrated Plan.

#### 4.14. **Renewable generation**

4.14.a. Shetland has some of the richest renewable resources in Europe and there is significant interest on the islands to connect a range of new renewable generators. These are primarily wind generators and range in scale from 10kW up to 7MW. However, this generation cannot connect to the current system due to the underlying voltage and stability constraints. Connecting more renewable generation, which is unavoidably intermittent, would exacerbate these problems.

4.14.b. To address this, Phase 1 will trial an active network management regime which will seek to offer renewable developers an earlier connection date. In return, they will be required to give their agreement to being constrained when the system cannot accommodate their generation. It is hoped that the measures that are being developed and trialled under Phase 1 will reduce this constraint by being able to actively provide demand when there is renewable resource available.

4.14.c. Indeed, these arrangements will be necessary even if Shetland is to become electrically connected to the mainland at some point in the future. Our understanding is that the economic case for a mainland link only allows for a single HVDC cable. If damaged, this could result in a prolonged outage, which would mean that Shetland would once again be electrically islanded. Therefore, even then, the prospect of and ability to constrain will remain for generators on Shetland, albeit on a less frequent basis.

#### 4.15. **Active Network Management (ANM) system**

4.15.a. This is the Phase 1 project's nerve centre: it will monitor the different parameters affecting the network, including embedded constraints, frequency stability and weather and will manage an appropriate response. It will also respond to, and tune, the models, which are being developed to monitor and understand how new storage assets will behave. This is being funded entirely through Phase 1, but will provide the core functionality for the enduring solution through Phase 2.

4.15.b. By creating flexible demand on the island we expect to be able to maximise Shetland's wind generation potential and minimise the capacity of replacement thermal generation. Whilst the Phase 1 project will see an increase in the overall electrical demand on Shetland through the use of electricity rather than oil in SHEAP's existing district heating system, it will allow for a higher proportion to be delivered from renewable sources.

4.15.c. Initial studies suggest that it should ultimately be possible to reduce the peak demand by up to ~~20MW~~11MW, facilitated through the elements set out above. This is primarily based upon the storage solutions and flexible demand offered through:

- The new ~~NAS-1MW~~ battery at Lerwick Power Station (1MW of storage);
- The installation and active network management of storage and water heaters in ~~750-1850~~ homes (which offers the potential to flex up to ~~15MW~~9MW of existing demand); and

- SHEAP's thermal store and associated extension (funded by SHEAP and ERDF) to the current district heating scheme (which offers up to ~~4MW~~ 1MW of flexible demand).

4.16. A key driver for the trial will be understanding how these elements work and interact in a real-life environment. Whilst in theory the above trial elements offered SHEPD up to theoretical maximum of 20MW of storage/flexible demand at any one time, the learning from Phase 1 to date has demonstrated that 11MW is the maximum winter peak load reduction achievable and further learning from phase 1 will demonstrate to what extent this is actually available in practice. This will give SHEPD the confidence it needs in order to be able to incorporate these elements on a larger-scale as a part of the overall Shetland repowering proposal in Phase 2.

4.17. Importantly, the above initiatives as part of this first phase of Phase 1 target just ~~20%~~ 8% of customers on the islands. There is therefore scope to use the learning from this phase to provide wider benefits on the island. The wider potential for the storage and water heaters is, for example, already being explored. The key is that by using this first phase of Phase 1 to provide and verify the infrastructure and the impact of the Active Network Management solution, the incremental cost of widening the scope of the trial is minimal. It is therefore our view that an 11MW ~~20MW~~ reduction in the peak demand is a realistic objective in terms of the full repowering solution.

4.18. As well as reducing the peak demand on the islands and therefore the size of any replacement thermal generation, the Phase 1 project also has wider benefits:

- Phase 1 will seek to significantly increase the volume of renewable energy that can be connected to the islands' network.
- In the medium to long term, by managing 'smoothing' the peak demand and increasing the amount of renewable generation on the islands, the requirement for LPS will be reduced. This will result in lower fuel costs and reduced operation and maintenance costs at Lerwick Power Station. It is estimated that the initial elements of the project committed during the Phase 1 deployment will result in an annual reduction in operating costs of approximately £1.1m per annum dependant on final fuel choice. This is reduction in costs expected to increase as Phase 1 progresses and more storage and renewables are connected.
- Phase 1 has already attracted a significant level of external funding (up to £21m), some elements of which are already approved and committed such as the c.£1m Smart Grid Demonstration Capital Grant Programme from DECC and the c.~~£2.41.0~~ £2.41.0m from ERDF/~~Shetland Island Council~~ and Hjaltland Housing Association for the energy efficient storage heating systems. Other partners, including Shetland Heat Energy and Power, SSE Renewables and Smarter Grid Solutions, continue to develop their elements of the project and are still fully committed to delivery of Phase 1. The involvement of

these partners will ensure the earliest possible delivery of the elements of Phase 1.

- In addition, we believe that a good opportunity exists to access further external funding for Phase 2, should elements of Phase 1 form part of an innovative solution for this later stage. Compared with this more innovative approach, a more conventional solution is much less likely to attract external funding which would result in SHEPD customers having to pick up the excess costs of providing a supply on Shetland in full.

4.19. The principle aim of Phase 1 (NINES) is to inform Phase 2. The effect of this knowledge will be to de-risk the decisions in relation to Phase 2.

## 5. THE CAPITAL COST FOR NINES

5.1. The cost profile of delivering Phase 1 is set out in Table 2 below. Importantly, whilst this phase will cost £33.54m in total to deliver; SHEPD customers will fund less than half of this.

**Table 1: Phase 1 cost profile**

£m (10/11 prices)	10/11	11/12	12/13	13/14	14/15	Total
Total	3.851.36	19.206.89	11.905.75	13.44	6.10	34.9533.54
External costs funding	2.201.15	11.762.05	5.241.80	7.11	6.10	19.2018.21
SHEPD customer funding costs	1.650.21	7.384.84	6.303.95	6.33		15.33

~~A more detailed cost breakdown is included in Appendix 1.~~

## 6. PROJECT DELIVERY

6.1. The NINES Project will be delivered in accordance with SHEPD's Large Capital Project Governance Framework and its associated documents and procedures. This process has been prepared to assist in the delivery of approximately £6.7bn of capital investment over the period 2000-2013. This process is compulsory for all capital projects with a value over £10m

6.2. Project Governance structure is appended and the sponsorship and engagement of senior management reflects the profile and level of support afforded to this project. It also includes the range of external partners committed to the delivery of the NINES project.

~~See Appendix 2: Organogram~~

6.3.SHEPD's preparation for delivery of this project has included development of detailed Work Packages for the various elements. Key early stage activities have been scoped in detail ready for commencement :

6.3.a. Detailed design and subsequent procurement process for 1MW battery have been concluded. Installation commenced in April 2010. ~~Completion is now anticipated to be April 2012.~~ Following significant technical difficulties following a fire in a similar installation, SHEPD have agreed to continue with a strategy to replace the original battery with an alternative technology. The replacement battery is expected to commence installation in July and be fully operational by October 2013.

6.3.b. Following the decision by Shetland Islands Council to withdraw from the project in October 2012, Hjalmland Housing Association along with a range of partners including SHEPD, have secured approximately ~~£2m-£1m~~ of ERDF funding as part of a programme to upgrade heating and hot water installations in ~~over 750~~234 homes on the Islands. An initial 6 home trial commenced in 2010 to meet ERDF /SHQS standards with full roll out for the HHA homes planned to commence in ~~December 2011~~July 2013.

6.3.c. Partners SHEAP and SSE Renewables have jointly developed necessary information to submit planning application for Gremista Wind Farm and associated electric boiler. ~~This is currently being considered by Shetland Islands Council~~Planning permission for the Gremista windfarm was secured in February 2012.

6.4.SHEPD has established significant full-time resource, along with collaborator resource for the delivery of the project. ~~This is reflected in the appended Project Plan—See Appendix 3~~

## 7. PROJECT RISKS

7.1.Risk management will be conducted in accordance with SHEPD's Large Capital Project Governance Framework Manual. This document requires the Project Director to be responsible for the creation of a register of risks, containing as a minimum, SHE, commercial, reputation, intellectual property, development, construction and operational risks and shall be compiled, complete with costed mitigation and planned responses.

7.2.The current Risk Register is appended ~~—Appendix 4~~

7.3.The risk register will be developed and monitored throughout the project to identify all risks and associated mitigating actions.

## 8. RISK MONITORING

As stated previously the NINES project will be delivered in accordance with SHEPD's Large Capital Project Governance Framework. Risk Management is a fundamental element of our Framework.

- 8.1.As identified in the Organogram (Appendix 2) the Project Director will be responsible for:
- 8.1.a. The overall co-ordination of relevant project materials – risk/issue registers; planning; document control; finance control and project status reporting.
  - 8.1.b. Preparing materials for the monthly Project Review Board-.
- 8.2.The Project Development Manager and Project Delivery Manager will be responsible for preparing regular control reports.
- 8.3.Risk monitoring procedures will be in accordance with SHEPD’s Large Capital Project Governance Framework and associated documents.
- 8.4.The Project’s risk monitoring procedures will be supported by the establishment of a Project Review Board for quality management ~~an~~ and technical review purposes. See Appendix 2: Organogram
- 8.5.The Project Board will be drawn from relevant SHEPD personnel, whose credentials in this area are vital to the status of the Project and will provide an essential ‘peer review’ of the project.
- 8.6.The implementation of Phase 1 of the Integrated Plan (the ‘NINES’ project) is an excellent opportunity to trial an innovative approach to active network management on an isolated system. Using the learning obtained from Phase 1, Phase 2 of the Integrated Plan will deliver a more informed and cost-effective solution to Shetland Repowering.

## 9. INCREMENTAL LEARNING

- 9.1.Shetland’s status as an electrical island, not connected to the UK grid, makes it the ideal research environment where rigorous study can be undertaken at a manageable scale.
- 9.2.We anticipate that learning from this project will inform and address amongst others.
- 9.2.a. How can a distribution system be securely operated with a high penetration of renewable generation?
  - 9.2.b. What is the relationship between intermittent generation and responsive demand, including storage?
  - 9.2.c. Areas in which we will generate most learning will include the effectiveness of frequency responsive demand side management, maintaining network stability in an active operational environment and the interaction of the numerous variables on Shetland’s closed electrical system.
  - 9.2.d. What is the economic impact on industry participants and other stakeholders of the low carbon operation of the network?
  - 9.2.e. What new commercial arrangements are needed to support a low carbon network?



- 9.2.f. What is the impact of the low carbon network on domestic and industrial customers?
- 9.2.g. Key learning points will include the effect on fuel poverty, changes of attitudes, awareness and behaviours amongst consumers and the extent of the financial impact on participants.
- 9.2.h. To what extent do the new arrangements stimulate the development of and connection to the network of more renewable generation and reduce the area's reliance on fossil fuels?
- 9.2.i. What effect does the NINES project and its legacy have on Shetland's economy and on the area's carbon footprint?

## **10. LEARNING DISSEMINATION**

- 10.1. Learning from the NINES project will be disseminated in a wide variety of ways, reflecting the breadth of knowledge that the project will generate. The dissemination method will be tailored to each audience, although clearly there will be efficiency-driven overlaps where one dissemination route serves a number of audiences.
- 10.2. Efficiency is as relevant to this part of the project as to all others and we will periodically review the way in which we are disseminating information to ensure it delivers the most useful learning to the most relevant audiences.
- 10.3. The key communication methods for sharing learning to the relevant audiences are noted below:

10.3.a. Industry - SHEPD will continue to integrate NINES within all of its LCNF dissemination activities along with all of our current and future IFI, Tier1 and Tier 2 projects. For example SHEPD presented NINES at the Low Carbon Network Conference in July and we will continue to do this as the project progresses. Information will be made available to industry participants via a variety of methods, including conferences and seminars, via the ENA and professional bodies including the Institute of Engineering and Technology. Industry participants will also be alerted to the publication of academic papers produced by the academic modelling team. It is also proposed to arrange a number of workshops to share project learning with key industry participants.

10.3.b. Academia - Key to the academic learning is the publication of papers in relevant journals and online, and their presentation at key technical committees.

10.3.c. Community – Ongoing communication with all our stakeholders is an essential element and regular formal and informal meetings will be held with stakeholders on Shetland and on the mainland. This will build on previous events including the NINES launch held in Lerwick in February 2011, which was followed by an informal 'surgery' for potential applicants to discuss their particular requirements.

10.3.d. Online – SHEPD will develop a NINES website to update on project progress and share learning.

## **11. IPR ARRANGEMENTS**

11.1. At present it is proposed that the IPR arrangements are broadly in line with those proposed in our original LCNF submission.