



NINES – Northern Isles New Energy Solutions

Thermal Store, Gremista Wind Farm and DSM Change Request

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Confidential

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Approved by: Scottish Hydro Electric Power Distribution

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Version no.	Change description	Issue Date
1.0	Issue to Ofgem	04/03/15
2.0	SHEPD issued the original change request to Ofgem on 3 March 2015. Following a period of review and the provision of further information QA on the changes between SHEPD and Ofgem between March 2015 and December 2016, Ofgem has requested that SHEPD update and re-issue the change request to reflect any changes that have taken place since the document was originally submitted to Ofgem in 2015.	02/12/16

Contents

1. Purpose of change request	2
2. Reason for change request	2
2.1 Thermal Store and Gremista Wind Farm.....	2
2.2 Open Market Demand Side Management.....	4
3. Scope of the change requested	5
3.1 Thermal store and Gremista Wind Farm	5
3.2 Open Market DSM.....	5
4. Impact of the proposed changes	6
4.1 Impact on NINES demand contribution	6
4.2 Impact on NINES allowance	7
4.3 Impact on learning	8
4.4 Impact on the new energy solution for Shetland	9

1. Purpose of change request

The purpose of this change request is to inform Ofgem of, and gain approval for, the following changes:

- The removal of the proposed 4MW boiler / 130MWh thermal store proposed by Shetland Heat Energy and Power (SHEAP) from the NINES project scope,
- A reduction in the size of the proposed Gremista Wind Farm from 6.15MW to 3MW, leading to an overall reduction in the NINES renewable generation managed connections from 11.545MW to 8.545MW,
- A proposal that no further customer recruitment by Scottish Hydro Electric Power Distribution (SHEPD) should take place associated with the Open Market Demand Side Management (DSM) model;
- The impact on the NINES capital allowance associated with these changes.

2. Reason for change request

A number of material changes to the NINES project have arisen as the direct result of third party actions, developments outside of the scope of SHEPD's control, and changes required to address the impact following the rejection of the Incentive Mechanism associated with the Integrated Plan¹ and its replacement with a competitive market based tender solution.

The Thermal Store, Gremista Wind Farm and the proposed benefits associated with DSM services within the NINES project were detailed in the original NINES documentation² and the submitted Integrated Plan. The progress made by, and risks to these elements of the project have been set out in the 6-monthly reports submitted to Ofgem.³

2.1 Thermal Store and Gremista Wind Farm

Gremista Wind Farm was originally proposed to be developed at a scale of 6.9MW. The development was proposed by SSE Renewables (SSER) in conjunction with SHEAP.

¹ Chapters 4 and 9, and Appendix O, of the Integrated Plan document submitted to Ofgem on 31 July 2013

² Annex A of Notice served on 18 November 2011

³ NINES Progress Report, SSEPD, December 2013 Section 3.3, June 2014 Sections 3.3 and 3.6.1, December 2014 Sections 3.3 and 3.6.1, June 2015 Sections 3.3 and 3.6.1, December 2015 Sections 3.3 and 3.6.1 and June 2016 Sections 3.3 and 3.6.1.

SSER secured planning permission for the Gremista Wind Farm in March 2012 and successfully gained a place on SHEPD's renewable generation connections queue in May 2013. At this time, the wind farm was specified at 6.15MW and was expected to connect in October 2015. As a 'managed connection', Gremista Wind Farm is only able to export when network conditions are suitable.

Following on from the acceptance of this offer, some good progress was made in moving these streams of the project forward. SSER and SHEAP continued working with each other to define the commercial and operational arrangements, however a number of commercial issues proved difficult to resolve. Whilst detailed work on the windfarm design and finalisation of the contractual requirement to support the commercial connection framework progressed, agreement on commercial issues proved to be a complicated and protracted process which SHEPD believe was also impacted by other issues affecting both SHEAP and SSER separately.

SHEAP continued to progress the design for the thermal store, and in late April 2014 were still progressing preparatory works associated with installing the thermal store. Unfortunately this work was put on hold by SHEAP.

Construction and civil works at Gremista were expected to commence in summer 2014 ahead of the intended energisation of the windfarm in autumn 2015.

Following revisions to its own project and investment plans, SSER submitted a reduced capacity 3MW connection application for Gremista Wind Farm in conjunction with a new investor. Based on this application a new connection offer was made. SSER accepted this offer and requested that the offer be transferred to the new investor. It is understood that SSER completed the sale of the Gremista Wind Farm development to the new investor although SHEPD have no knowledge of the commercial terms agreed.

Following this sale and the new owner's acceptance of the connection offer for Gremista Wind Farm in August 2014, the new owner developed a single turbine 3MW site which leaves the potential to use one of the two remaining consented bases for other purposes. It is understood that the 3MW turbine / connection offer was considered by the applicant to be the optimal size of connection which could be financed, constructed and connected in this location whilst minimising connection costs (3MW was able to connect to the local 11kV network, whilst 6.15MW required connection to the 33kV network). The new owner continued discussions with both SHEPD and SHEAP on how best to develop the existing windfarm planning consents and connection offer. Gremista Windfarm (also known as Luggie's Knowe Windfarm) was subsequently connected on 10 December 2015.

2.2 Open Market Demand Side Management

Work has been ongoing on the identification of a suitable methodology to be adopted to replace the 500 Shetland Islands Council customers which were part of the original NINES DDSM proposal. A change request submitted to Ofgem in October 2013 outlined a proposal to produce an Open Market Model⁴ that could be used to recruit 500 additional customers. Significant progress was made on the design for this enduring solution which was intended to see 500 customers being recruited by December 2016. Notes of interest were received from circa 200 customers and 16 customers returned signed contracts intimating their desire to proceed. One trial customer was connected to further clarify the connection process and highlight any difficulties this may cause. Following on from the trial installation a number of processes and procedural changes were made to improve the customer experience.

The solution proposed was designed and developed to complement the original SHEPD Integrated Plan submission, where control and scheduling of the devices would form part of both the daily operation and the enduring operation of the proposed new power station.

Initial recruitment identified a number of areas of concern from customers in terms of compliance with building regulations environmental certifications, SAP rating, tariff availability etc. Although there are options to overcome these concerns, it is now believed that following on from the rejection of the IM associated with the original Integrated Plan submission and the obligation on SHEPD to run a competitive process, that recruitment of these customers would sit better with an aggregator or similar party as a bid made under the "Demand Reduction" services section of the proposed new solution tender process (or subsequent Shetland tendering processes). Furthermore NINES DSM is part of the NINES trial which is due to complete in December 2016. As we have no direct control over the potential solution(s) which may come out of the competitive process, thus we have no certainty on how this element would / could fit into the overall solution. SHEPD may be expected to act as "system operator", potentially scheduling demand reduction services as part of that role. It may be more appropriate and transparent if the owner of the DSM service was a party other than the SO, and this would also be a key step in testing the commercial viability of DSM. Similarly it is felt that if SHEPD were to actively recruit customers in advance of the new competitive tender exercise, this may be perceived as reducing the available scope for DSM (reducing the availability of DSM customers to third parties), and may reduce the appetite for and number of participants willing to take part in the competitive process, and limiting the interest from potential bidders for aggregation services etc. It is further believed that it may also prove difficult to recruit customers with no certainty of what will happen to them post December 2016.

⁴ <https://www.ofgem.gov.uk/ofgem-publications/43521/ninesdsmchangerequestv050805133.pdf>

3. Scope of the change requested

3.1 Thermal store and Gremista Wind Farm

As a consequence of SHEAP putting a hold on their project, it is now highly unlikely that the boiler and thermal store will go ahead in its current proposed form.

SHEPD have continued discussions with SHEAP with regards to potential opportunities which could allow an alternative connection and storage facility to be constructed⁵.

As indicated above, SHEPD was continuing to work with SHEAP to identify other options which could achieve similar project benefits. However whether SHEAP's heat pump proposal will progress is unclear. There is lack of certainty around near-term alternative options, and as a result SHEPD, reflecting on the proximate end of the NINES project, believe that any alternative option is more likely and more beneficial to form part of a future open market solution.

In light of this, we consider it necessary to propose the removal of the SHEAP boiler and thermal store from the scope of the NINES project, and to reflect the reduced capacity of the Gremista Wind Farm site to 3MW. This however still leaves 8.545MW of contracted generation which is in the range of expected connections under NINES proposals. There may also now be the opportunity for other smaller connectees pursuing developments to pick up the spare capacity as part of the new solution following consultation and competitive tendering process.

3.2 Open Market DSM

Since the DSM Change Request Version 0.5⁶ was approved by Ofgem in May 2013, SHEPD have developed a proposal to bring forward the recruitment of 500 customers to provide DSM services as part of an enduring solution. This was included in options proposed as part of the integrated plan submission in July 2013. Since this time SHEPD have refined the proposal, trialled a connection and commenced the process to secure the 500 homes required by December 2016. However with the new obligation to undertake a competitive process which includes an invitation for the market to come forward with service offerings against Reliable Capacity, Intermittent Capacity, Demand Reduction and Additional Services, and SHEPD also likely to formally fulfil the SO role, SHEPD believes that, as discussed separately with Ofgem, the best option is for the NINES project to be split into its component parts and to allow the market itself to further develop enduring solutions as part of this and future competitive tender processes. We envisage that DSM services could be offered by aggregators as part of Demand Reduction or Additional Services offerings as part of the competitive process.

⁵ Letter from Neville Martin, General Manager, SHEAP 13/01/15

⁶ <https://www.ofgem.gov.uk/ofgem-publications/43521/ninesdsmchangerequestv050805133.pdf>

Continuing part responsibility to own / operate a solution for DSM while also expecting the market to come forward in competition with NINES DSM seems unlikely to succeed, and furthermore is likely to be deemed as unfairly competitive in the eyes of tenderers.

4. Impact of the proposed changes

4.1 Impact on NINES demand contribution

The electrical boiler and thermal store originally proposed by SHEAP were intended to allow an extension to the district heating scheme (DHS). SHEAP expected to be able to recruit a significant number of customers (two thirds of which would be expected to be current electrically heated homes) to transfer across to the district heating scheme to enable the proposed benefits to be achieved. These elements were forecast to connect in mid to late 2014 and were proposed to be capable of displacing 0.9MW of electrical demand at periods of peak system demand. The existing district heating scheme is currently supplied by a waste to heat plant utilising waste from Shetland, Orkney and the offshore industry but also relies on quantities of oil to meet the requirements of the scheme. The new boiler and thermal store were intended to provide the capacity to extend the over-subscribed district heating scheme and also substantially reduce the current scheme's reliance on oil.

Aside from helping meet the demand for connections to the district heating scheme, the other benefit offered by this arrangement was expected to come from the thermal store's ability to respond instantaneously to situations arising on the network, such as providing a frequency responsive source of controllable demand when required. At periods of reduced demand when the windfarm would be otherwise constrained off, renewable output would have been diverted to the thermal store and at periods of high demand the renewable output would have been fed into the network.

As there will be fewer homes connected to the district heating scheme than anticipated as a result of the removal of SHEAP's boiler and thermal store, the level of demand reduction expected from NINES, as set out in the original Integrated Plan document, will be lower as a consequence. The displacement of 0.9MW of electrical heating demand for 8 hours per day (presumed to be used 50% of the time), and reduction in energy consumption of 1,314MWh per year, will not be achieved by this part of the project. SHEPD included these new district heating connections as part of each of the low, mid and high NINES cases presented in the Integrated Plan.

The reduction in size of Gremista Wind Farm from 6.15MW to 3MW means that the total revised amount of renewables proposed to connect (8.545MW) will now sit closer to the worst case presented in the original Integrated Plan submission (8MW). However the main impact is actually through energy provided, which is expected to drop from 30.3GWh as presented in the "Mid Case" scenario presented in the Integrated Plan down to 25.6GWh under the revised proposal. It is likely that there may be marginal improvements to the

curtailment levels of renewable generators below Gremista Wind Farm in the connections queue, as a result of the reduction in its installed capacity and its generation output due to the Last In, First off (LIFO) methodology applied to the NINES queue order. This will be subject to further modelling by SHEPD as part of the continuing competitive process. It may also be expected that bidders within the “Intermittent Capacity” section of the competitive process could make up any shortfall, and this improvement may make the opportunity to tender under the competitive process more attractive.

The proposal that no further recruitment of customers should take place under the Open Market Demand Side Management model means that the predicted demand from private customers will not be achieved. This was expected to be 1.11MW by December 2016 in the NINES mid case scenario presented in the Integrated Plan submission. This shortfall could be made up as part of the open market tender process, or subsequent tender processes, whereby aggregators or larger organisations could bid in demand reduction services. It is expected that removal of this element of the NINES project by SHEPD could actually improve the take up of this element as the incumbent DNO will not be seen to be competing against new entrants in this market.

Demand Reduction (MW)	Mid-case presented in Integrated Plan submission (to December 2016)	Current Proposed
Battery (MW)	1	1
SHEAP (MW)	0.9	0
HHA (MW)	1.05	1.05
Private (MW)	1.11	0
Total (MW)	4.06	2.05

Renewables	Mid-case presented in Integrated Plan submission (to December 2016)	Current Proposed
Energy removed (GWh / annum)	30.3	25.6
Renewables connected (MW)	12	8.545

4.2 Impact on NINES allowance

The main impacts on the NINES allowance will come in two areas.

Works proposed to facilitate the connection of the wind farm were still required, as were the works which have taken place to define commercial agreements between parties. , As the thermal store will not connect, no expenditure on this specific element is required. The original cost estimate for this element was £450k (ancillary service payments were estimated as £150k per annum for 3 years). The original cost estimate for connection 500 private homes was £397k (installation costs, proposed levelisation and incentive payments).

These are based on the cost estimates provided to Ofgem in October 2013 as part of the DSM Open Market Proposal document⁷ and summarised in the table below.

	Cost Per home	Total No Of Homes Year 1 (2015)	Total No of Homes Year 2 (2016)	Cost Year 1	Cost Year 2	Total
Installation costs (one off cost)	£450	150	500	£67,500	£157,500	£225,000
Incentive Payment (annual cost)	£50	150	500	£7,500	£25,000	£32,500
Levelisation Payment (annual cost)	£214.52	150	500	£32,178	£107,260	£139,438
Total				£107,178	£289,760	£396,938

The NINES project was originally intended to complete in December 2013,⁸ and was subsequently extended to be completed in December 2016. No additional allowances were provided to cover operation of the trial in this extension period. Consequently, while several project elements have not progressed, this has been offset by applying the allowances to managing, operating and optimising the active elements of the project, continuing the benefits of facilitating a reduction in maximum demand and displacing electricity generated through burning fossil fuels.

4.3 Impact on learning

Key learning associated with the project was described in section 9 of the NINES notice to Ofgem document provided in October 2011. SHEPD believe that although there will be an impact on learning associated with the changes included within this request, it will be minimal in terms of the overall learning associated with this project.

The key learning in relation to this change to the project was in relation to the interaction of the windfarm, boiler and thermal store. The windfarm was intended to supply power for SHEAP's boiler and thermal store via a private electrical network, with any surplus electricity being exported to the grid. Gremista Wind Farm was also expected to work in conjunction with the boiler and thermal store to provide a range of ancillary services. This part of the project, incorporating renewables and thermal storage, would have provided an opportunity for SHEPD and project partners to understand and test the commercial agreements needed to make these arrangements work, including agreements for managed generation connections, flexible demand connections including ancillary services agreements, and payments. It was envisaged that if successful, these

⁷ NINES DSM Open Market Model v1.0.pdf issue date 31/10/13

⁸ Appendix 1 - Schedule to NINES Determination, Section 2 – Project Implementation

agreements could have encouraged other potential customers to come forward to provide connections on a similar basis.

To date the project has provided some useful learning in these areas and the work in developing commercial contracts could be reused in future similar projects with useful understanding being gained regarding the complexities in making these types of agreements work. Managed generation connection learning will still be provided through the other renewable connections. We also understand a number of the renewable developers are looking at ways to minimise their constraints by incorporating storage or other load connections, e.g. one developer is looking at providing energy to a potential thermal store project and battery storage is being investigated by another. SHEAP are also continuing to investigate a heat pump connection which again may have learning opportunities.

These additional learning opportunities are however dependant on the outcome of the competitive process and where developers choose to develop their bids - for example, windfarm connection offers and the bid process may impact upon the appetite to develop storage solutions. Additional services contracts will also form part of the new competitive process and may also allow novel approaches to be bid in.

The main areas of learning associated with the DSM work have still been achieved, albeit on a smaller scale through working with the Hjaltland Housing Association trial customers only. Impacts associated with recruitment and management of customers, customer retention, controllability etc have all still been achieved. Similarly the learning associated with frequency responsive devices and levels of storage in hand has also still been achieved. Documentation associated with connections to private homes outlining connection and proposed commercial arrangements has been finalised and can be made available to and used by aggregators to assist in demand reduction areas of the current or future competitive processes.

4.4 Impact on the new energy solution for Shetland

This change has minimal impact on the current process in so far as participants are still able to develop solutions which can be incorporated within the overall solution which will support Shetland in the future. Learning from the main elements have continued and processes and procedures are available for roll out should this be required.

SHEAP are continuing to investigate funding sources and opportunities to expand DHS. If the business case is proven then we would envisage that SHEAP would come forward to bid in a proposal in a future tender process that could integrate some form of heat source and expanded storage facilities as part of the new solution.

The impact of the reduction in capacity and energy to be provided by the Gremista Wind Farm will actually free up some capacity to potentially improve the viability of new entrants who may be able to develop some form of smart solution utilising the learning to date on the project.

Allowing DSM to be taken on by 3rd party aggregators will remove the perceived barriers to entry of competition with the incumbent DNO, and open the market to new participants and encourage free participation in the market.