



# NINES

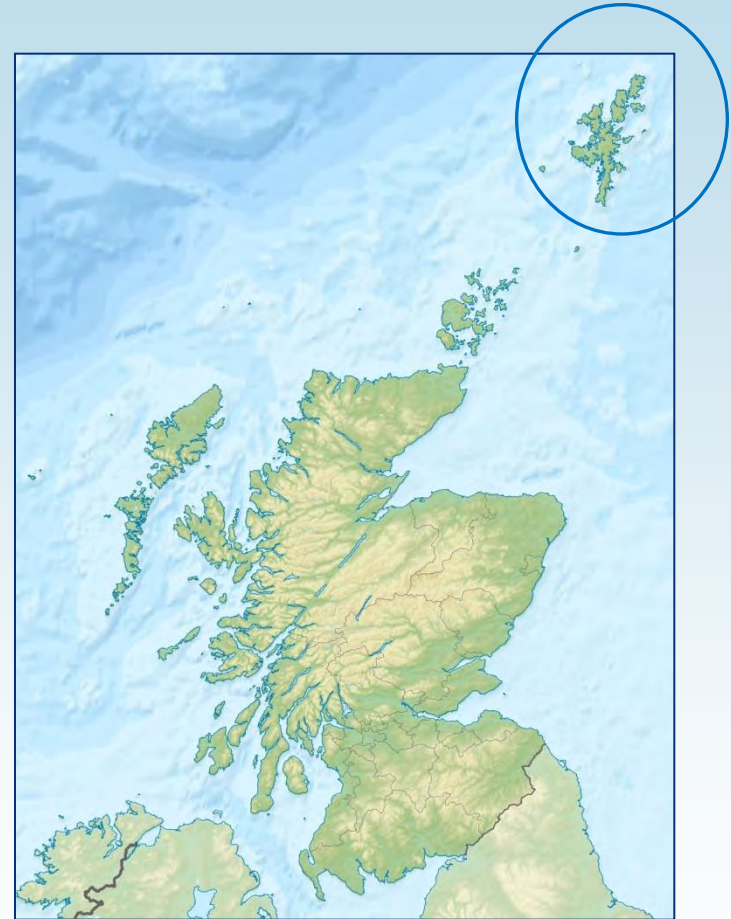
## Northern Isles New Energy Solutions Future Networks and Policy Team

# Shetland: An energy island

Shetland is not connected to the UK electricity network

Viking Wind Farm proposal (103 turbines, 370 MW) may bring link to UK grid if connected - this could be available in 2016

For now, Shetland remains an energy island



# Matching generation and demand

As an energy island, the maximum amount of energy used on Shetland each year sets a limit for the maximum amount of energy that can be generated in each year:

**Shetland annual electricity consumption**                      **215GWh**

The island's energy use also sets a limit for the maximum that can be generated at any moment in time:

**Winter maximum demand**    **47MW**

**Summer minimum demand**    **10MW**



# NINES: Supporting a sustainable future

Despite massive renewable resources, just 7% of energy is from renewables



Most generation on Shetland is from fossil fuels

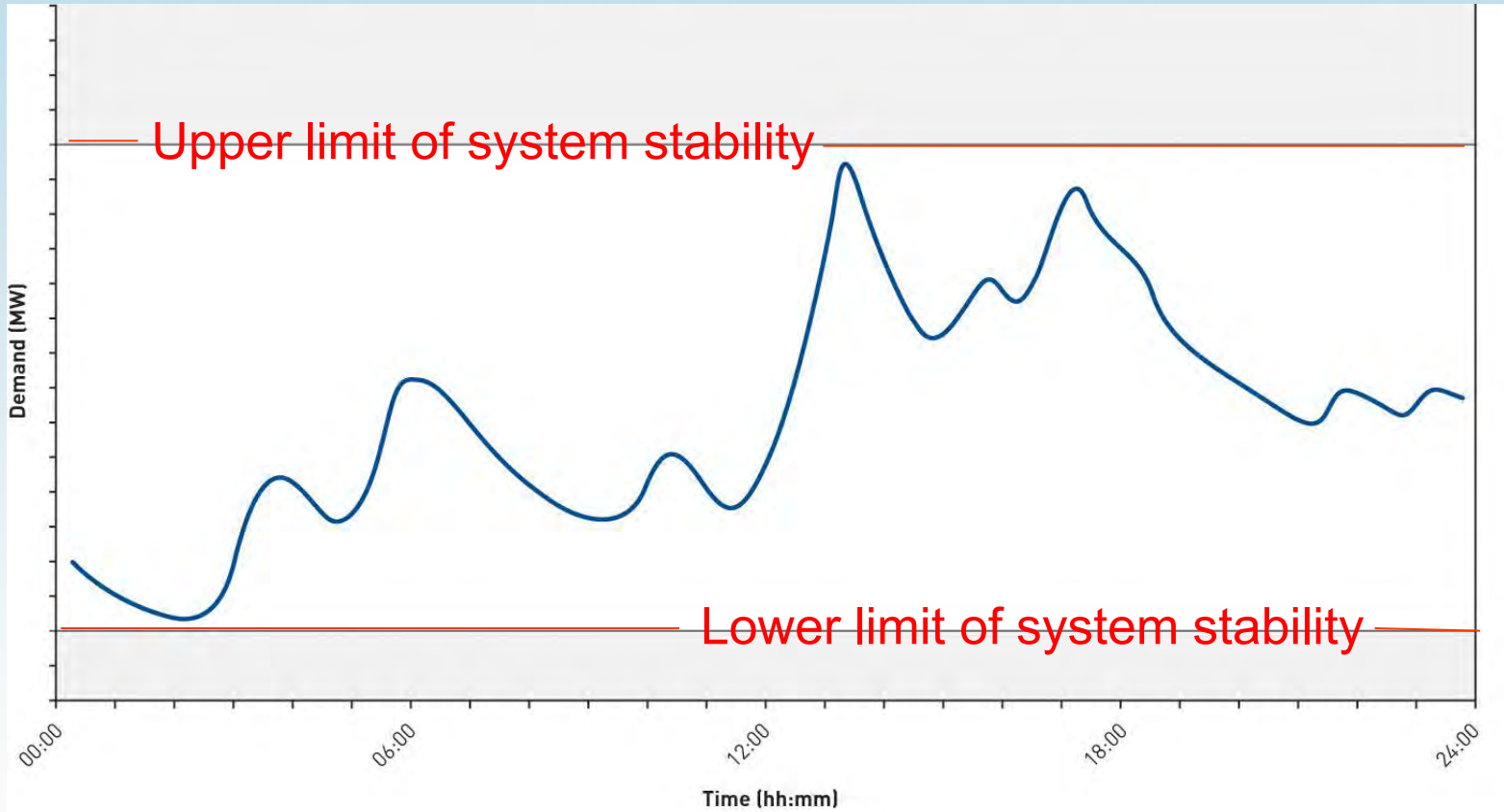


Opportunity for change - Lerwick Power Station needs to be replaced

NINES – innovation to allow more renewables to connect to network, reduce reliance on fossil fuels and reduce carbon emissions

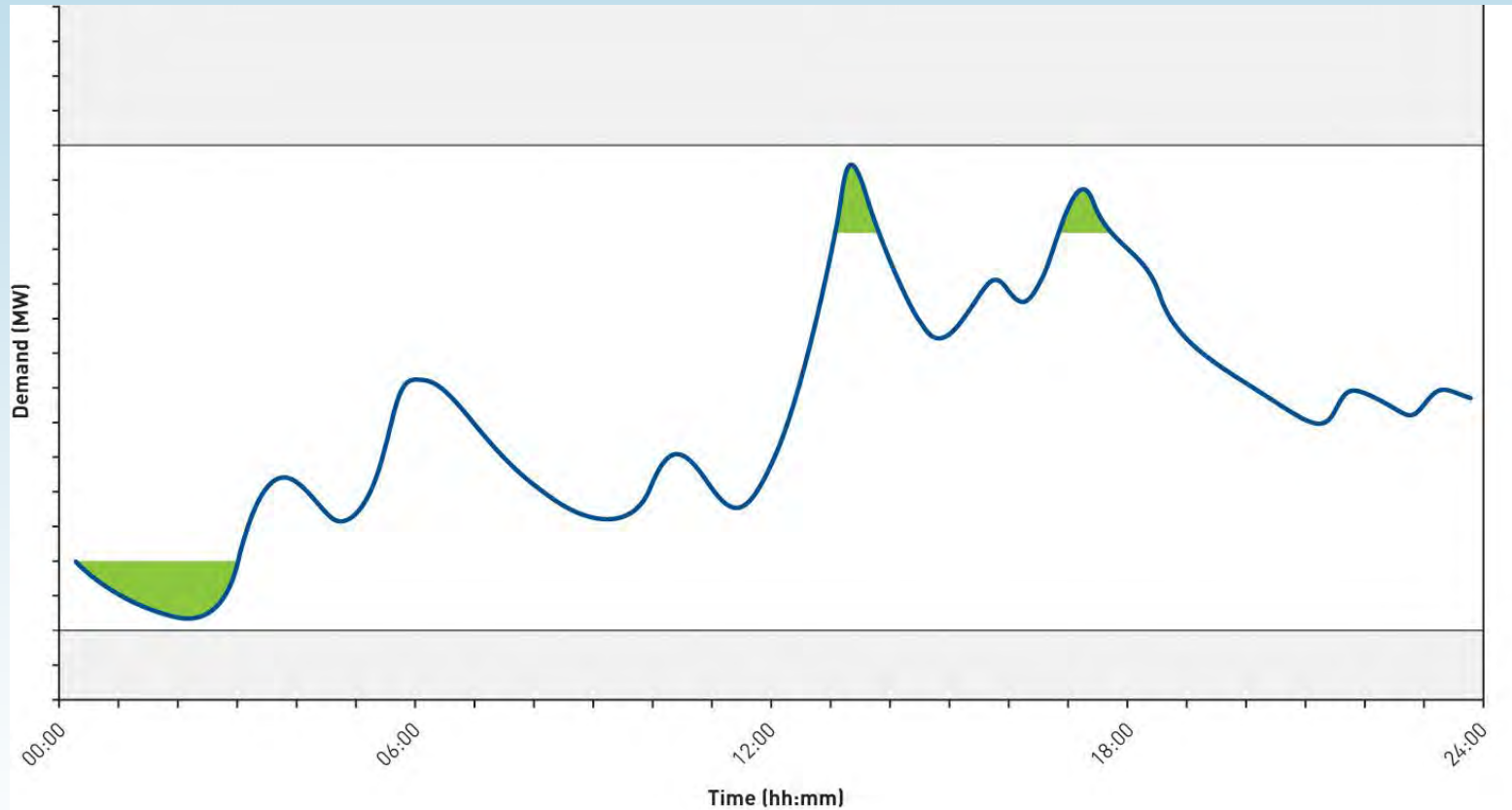


# Shetland daily demand



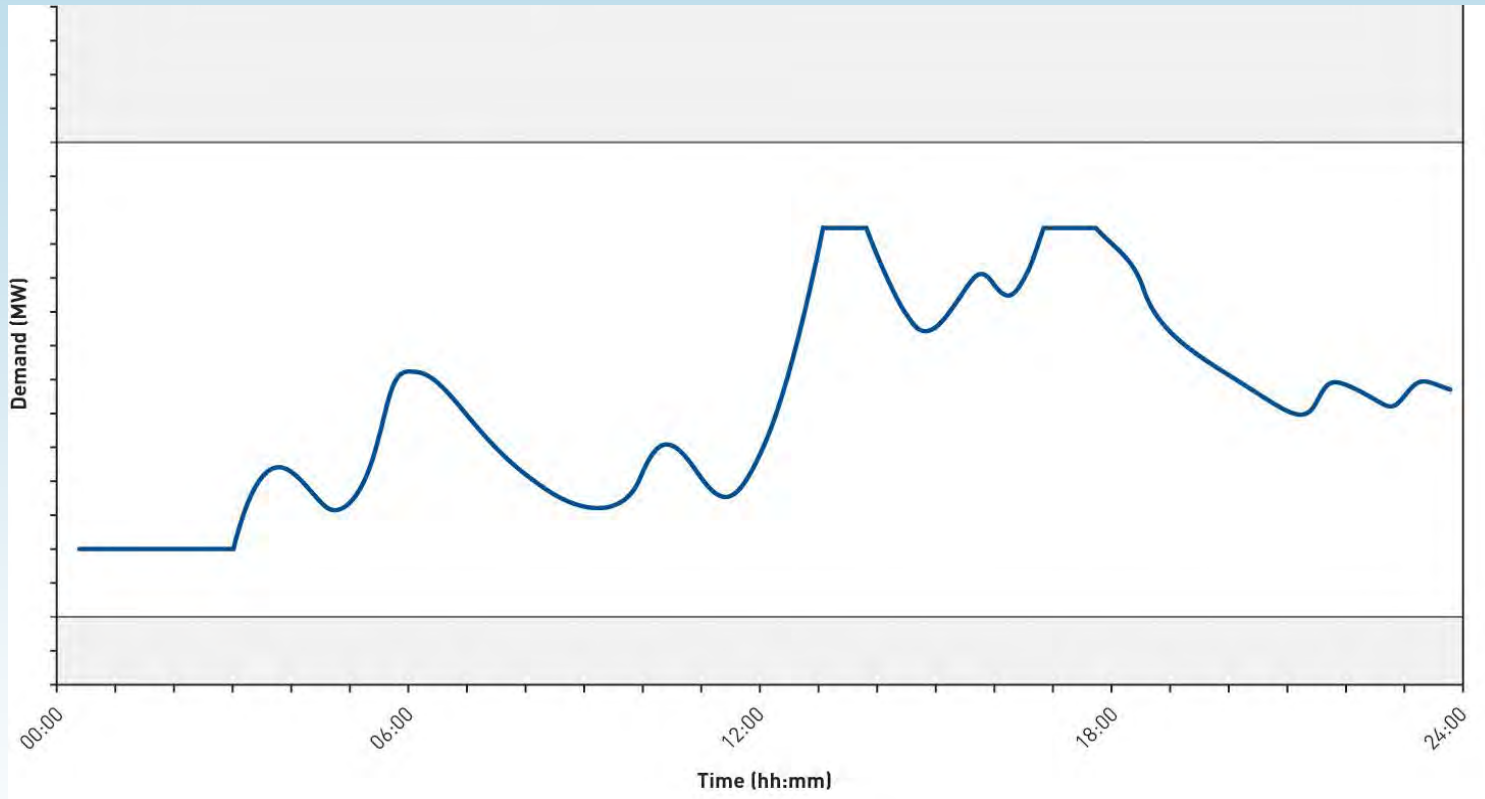
Why only 7% renewables? The system is full - current demand approaching limits of stability. Extra renewable generation could exceed system limits

# Shetland daily demand: peaks and troughs



We need to make more room on system – reduce the peaks of demand and shift that demand to a quieter time

# Shetland daily demand: lopped



This would give more headroom – allow new renewables to connect  
How? – build energy storage to store renewables when surplus and release when needed

# Creating controllable demand



Thermal store  
– hot water  
tank to extend  
existing district  
heating



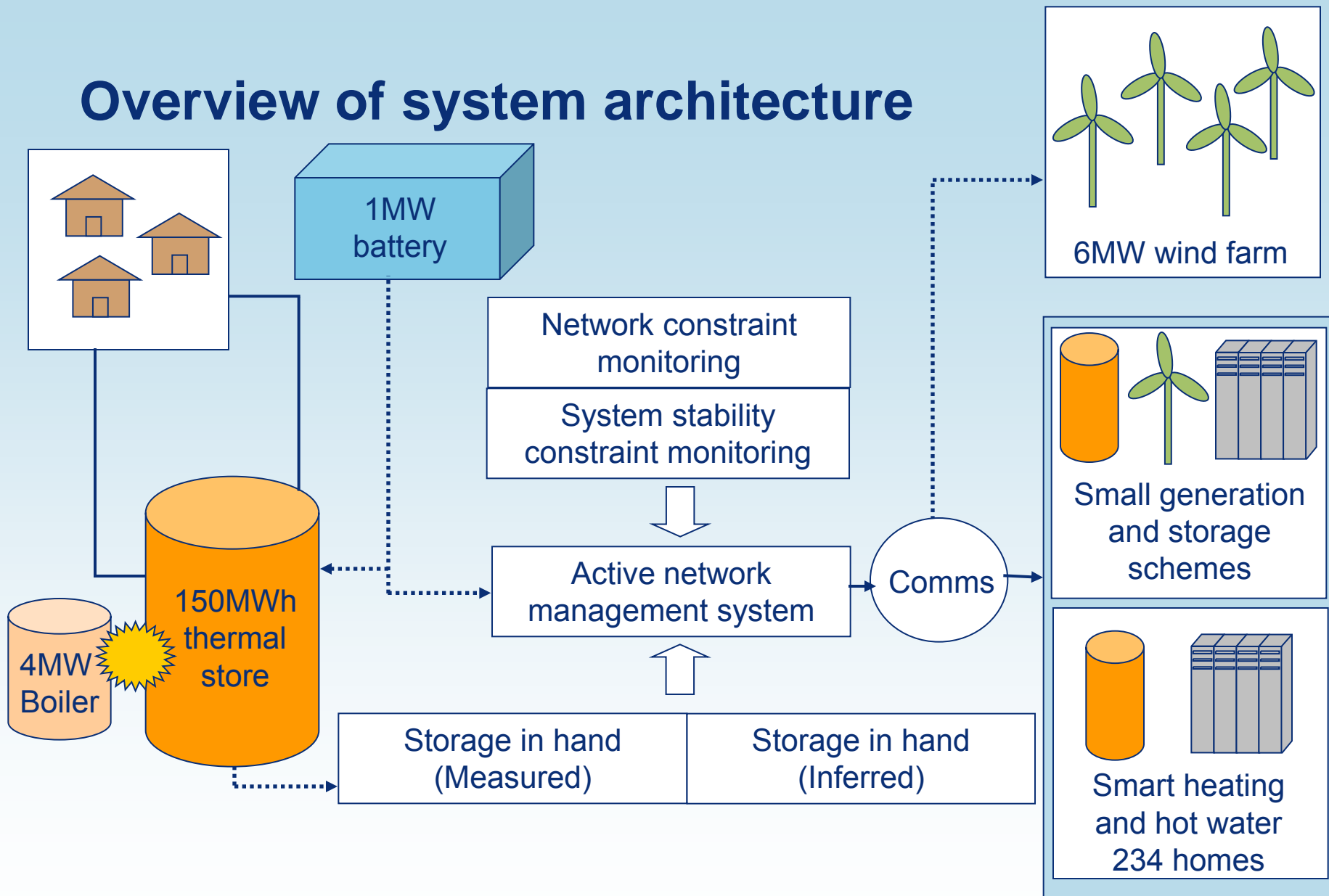
Electrical store -  
1 MW battery



Domestic electric  
storage and water  
heating – more  
controllable for  
customers, also  
balances system



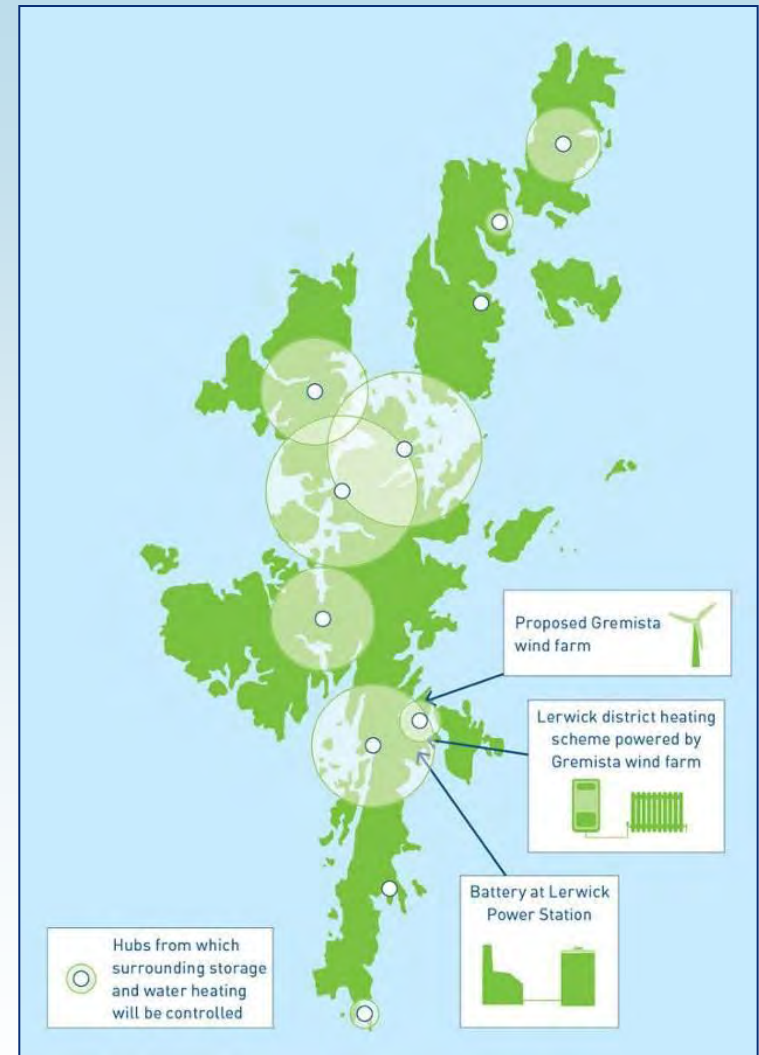
# Overview of system architecture



# Shetland-wide distribution

Lerwick: battery and thermal store for district heating system, with new wind power

Throughout Shetland: 234 domestic storage and water heaters - circles show areas where main concentrations will be



# Managed connections



Extra network capacity released by using storage to shift demand can be used by new small and medium sized renewable energy generators

‘Managed’ connections will be offered – when plenty of space on system, no limits on generation, but when system limits approached, generators will have to turn down output



**NINES team**

**futurenetworks@sse.com**