

# A FLOW BATTERY FOR RENEWABLE GENERATION CONSTRAINT MITIGATION: PAPER 0333

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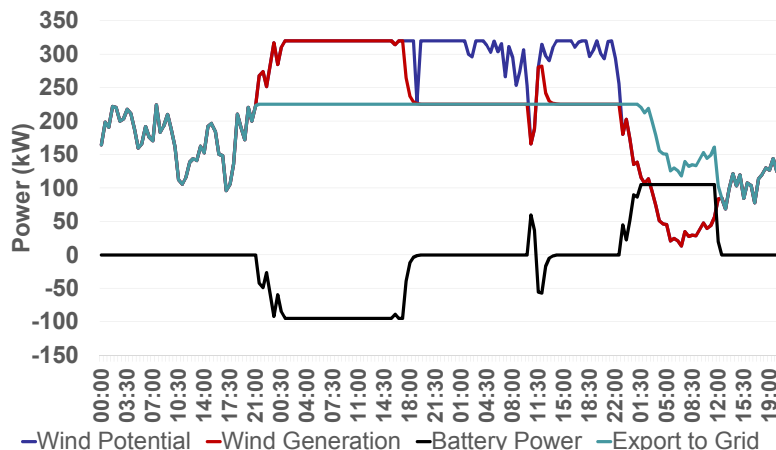
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## Project Overview

This £4 million project is developing, testing and installing a novel grid-scale energy storage solution on the Scottish Isle of Gigha to overcome a distribution network constraint (due to voltage rise on the 11kV network) which constrains renewable generation.

Supported by the UK's DECC, REDT lead a consortium delivering this 105kVA/1.68MWh Vanadium Redox Flow Battery.



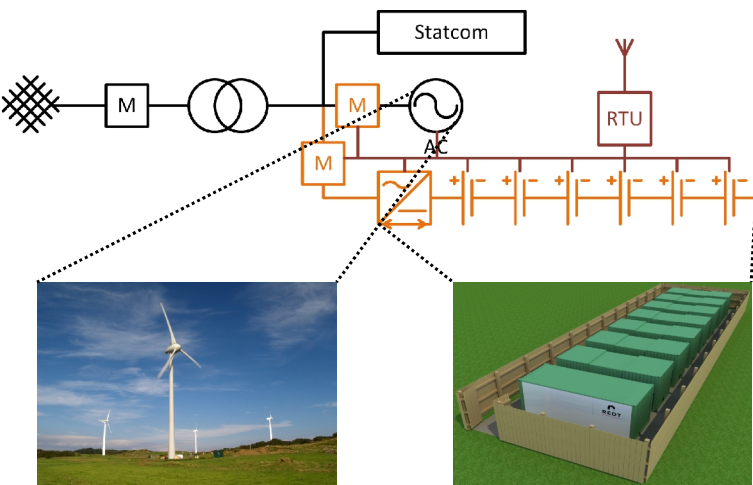
## Example of Constraint Avoidance

### Project Timeline

Environmental Approval	Summer 2014
Planning Approval	Autumn 2014
System Build	Underway
System Test	Summer 2015
Commissioning	Autumn 2015
6 Months Operation	To March 2016

### Key Learning

- Design led by safety has been approved by environmental regulator and independent consultants.
- Community engagement is vital: Gigha's community have supported the project through planning and environmental review
- Arbitrage, frequency response and constraint avoidance applications challenge existing regulatory regime.
- Requirement for high resolution data recording to enable the DNO to verify the constraint is maintained.
- Renewable generation incentives can be claimed with storage connected but multiple sub-meters needed.



The Gigha System

## Background

- Distribution network constraints limit Gigha's 330kW wind turbine to 225kW at 0.85 power factor
- This will cost 3 GWh of generation during the lifetime of the wind turbine
- A long duration flow battery will capture 60% of this energy and export to the grid when the wind speed drops
- This is the first grid-scale Energy Storage project in the UK supporting renewable generation