



CONSORTIUM FOR
BATTERY
INNOVATION

Batteries: The Future of Europe's Sustainability

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Presented by:
Joana Coimbra
Communications Officer



CBI Interactive Map of energy storage





Energy storage case studies – advanced lead batteries in action

Rolls BATTERY INNOVATION **Rolls BATTERY ENGINEERING**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

Rolls Battery Engineering / Surrette Battery Company
Reliable Power For Remote Scottish Island

Isle of Muck, Scotland, UK
The Isle of Muck, a 2-mile long island lying off the west coast of Scotland is home to 38 people.

With no mainland grid connection, the existing wind turbine and diesel generator system dating from 2000 was upgraded in 2013 with new solar panels, wind turbines and a lead battery energy storage system.

The system was designed to allow the island to support 24-hour power despite variable output from renewable energy sources. Providing 150 kWh a day, the system now supports 26 domestic properties, a school, community hall and three small workshops.

"The Isle of Muck system has offered residents dependable uninterrupted power for several years. Not to mention that our Rolls deep cycle batteries have been chosen for this and other island microgrid systems in the region."

Technical Specification
Switched on in March 2013, the new system consists of three 3 phase clusters each with 3 x Sunny Island 5 kW inverters each with a 33 kWh Rolls 48 VDC deep cycle battery bank.

The entire installation comprises three battery banks provided by Rolls Battery Engineering, each consisting of 24 x 48VDC Rolls deep cycle batteries. Each battery bank is connected to a Multiplier Box 12.

The batteries give 48 VDC with a capacity of 2342 Ah. This is approximately total for the whole system of 150 kWh usable capacity to 50% depth of discharge.

The inverter system uses the full backup diesel generators, 40 kW or 25 kW, if the batteries require charging.

Six 5 kW wind turbines and a PV array with an output of 33 kW complete the system.

BATTERY INNOVATION **EXIDE TECHNOLOGIES**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

Exide Group
Battery Production Powered By Solar Energy

Paragali
In two state-of-the-art solar installations, Exide Group is powering its battery production and recycling facilities using advanced lead battery energy storage.

With a combined capacity of 4.5 MWp between the two installations, located in Catarina and Ribeirão and Arambujá in Portugal, Exide has reduced carbon emissions by an average of 20% across both sites.

The batteries give 48 VDC with a capacity of 2342 Ah. This is approximately total for the whole system of 150 kWh usable capacity to 50% depth of discharge.

The inverter system uses the full backup diesel generators, 40 kW or 25 kW, if the batteries require charging.

Six 5 kW wind turbines and a PV array with an output of 33 kW complete the system.

"More companies will rely on storage-backed self-generated power in the years ahead, and we are excited to be at the forefront of this trend. Our Sommerschen A600 gel battery technology is extremely capable in this application."

Stavros Loukas, CEO and President of Exide Technologies

Technical Specification
By pairing the solar installations with advanced lead battery storage, this project is providing an exciting option for energy-intensive manufacturing facilities to reduce both carbon emissions and energy costs.

Using their own batteries for storage, Exide is utilizing solar energy to provide cost-effective and renewable energy by storing the energy generated during the day.

The system is one of the largest self-generation installations backed by energy storage in Europe, featuring:

- 290 cells Sommerschen A600 Gel
- 500 kWh of stored energy

Producing enough energy to supply over 1,500 homes, the system showcases the benefits of using advanced lead batteries for large scale energy storage projects.

BATTERY INNOVATION **Narada**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

Narada
Frequency Regulation For The German Power Grid

NARADA, Leisnig, Germany
Narada, one of China's leading battery energy storage system suppliers has partnered with energy storage operator, Upside Group, in a large project for frequency regulation for the German power grid. The installation is located at Langenreuthbach, near Leipzig.

The battery capacity is 25 MWh and the system is specified to provide 15 MW for one hour for primary control reserve in the overseas market.

"This frequency regulation energy storage PCS project is a symbol of transformation. This grid scale large BESS is Narada's first investment and operation model project in the overseas market. Narada will take this opportunity to accelerate the promotion and application of the energy storage business in Europe and the global market."

Chris He, CEO, Narada

Technical Specification
The battery is comprised of 10,584 units 1200 Ah lead carbon valve-regulated cells housed in 18 containers and delivers power through new inverters supplied by SMA Solar Technology, each capable of delivering 1.8 MVA.

The system is managed by two controllers also provided by SMA so that the battery discharge and recharge are precisely controlled to match the grid requirements for maximum efficiency.

All the battery cells are individually monitored to ensure any deviation in performance is detected and corrected before there is a problem.

BATTERY INNOVATION **HOPPECKE POWER FROM INNOVATION**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

HOPPECKE
Mini-grid System For Europe's Leading Eco-Centre

Centre for Alternative Technology, Wales
Located in Europe's leading eco centre is a mini-grid system supported by lead batteries.

The Centre for Alternative Technology was set up 40 years ago as a place to demonstrate more sustainable living with less wasteful use of resources and energy.

With 60 staff and a host of volunteers, CAT is an educational charity that researches and communicates practical solutions for a sustainable future including the use of renewable energy.

Technical Specification
The energy storage project utilizing lead batteries forms a key element of the site's electrical system has been designed for low energy consumption whilst being used. Electricity comes from a range of renewable sources on site: solar PV panels, a hydro system and wind turbines.

The 30 kW backup system comprises:

- 4 x 5BU-5000 Sunny Backup inverters
- Automatic switch box AS-500-03
- HOPPECKE lead batteries providing 2.5 x 37 kWh storage
- Hydro turbines and wind turbine connected via Windy Boy inverters
- 20 kW PV, 4 kW Hydro, 3.5 kW Hydro and 400-W wind connected to the mini-grid

Fitting in with the Centre's energy-efficient and sustainable ethos, the system uses low-embodied-energy materials such as sustainable timber.

"The battery system is an essential element of the CAT electrical system, providing us with a reliable back up for this busy site."

Centre for Alternative Technology

BATTERY INNOVATION **Narada**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

Narada
Large-scale Grid Frequency Regulation System

Ramswil, Germany
Located in Ramswil, Saxony, is a large-scale, 25 MWh lead carbon battery energy storage system.

Narada, one of China's leading battery energy storage system suppliers partnered with energy storage operator, Upside Group, in a 18 MWh frequency regulation project for the German power grid.

The 25 MWh installation has been connected to the local utility grid since May 2016.

"As Narada deploys more and more projects in Germany and worldwide, this is an exciting step forward for our company and our innovative technology, bringing us further into the energy storage market."

Phil Kemp, CEO, Narada

Technical Specification
The battery system houses more than 10,500 individual battery cells with nine battery inverters, in 18 containers.

The batteries used are 1200 Ah lead-carbon valve-regulated provided by Narada.

SMA is delivered through nine SMA Sunny Central Storage Inverters, supplied by SMA Solar Technology, each capable of delivering 1.8 MVA.

SMA also installed a hybrid Controller for optimal battery charging and discharging.

The coordinated system solution allows optimal control to provide grid relief for the entire region, and the substitution of the Central European utility grid.

BATTERY INNOVATION **M5+ BAT** **EXIDE TECHNOLOGIES** **RWTH AACHEN UNIVERSITY**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

Exide Technologies / RWTH Aachen University
Unique Hybrid Battery Energy Storage System

Aachen, Germany
As the growing demand for renewable energy results in an increased need for battery energy storage, a hybrid project in Aachen has been testing different battery technologies since 2016.

With optimized high-current capability and long cycle life expectancy, Exide Technologies' advanced lead batteries are one of the key storage technologies featured at the M5W M5BAT project.

With the objective of testing the technical and economic viability of different battery technologies, advanced lead batteries at M5BAT are playing a central role in the strive to optimize battery performance for grid stability and integrating renewables into the energy market.

Technical Specification
DCSM system
The DCSM battery system at M5BAT consists of 800 x 16-DCSM 2320 VA, with a total AC capacity of 1.3 MVA.

DCSM batteries offer maximum performance and energy stability due to Copper-Spunch Metal (CSM) technology.

Long-term efficiency of the battery system is achieved via a water replenishment system and electrolyte circulation.

The DCSM system is divided into two strings which can be operated separately from each other. One string consists of 300 cells, connected in series.

"Based on an intelligent energy management system and low procurement costs, lead batteries are a good solution for high energy loads."

Jensens Institute, Research Institute, RWTH Aachen University

BATTERY INNOVATION **Rolls BATTERY ENGINEERING**

LEAD BATTERIES: ENERGY STORAGE CASE STUDY

Rolls Battery Engineering / Surrette Battery Company
Remote Community Now Has 24-Hour Power

Fair Isle, Scotland, UK
Fair Isle is an isolated Scottish island half way between the Orkney and Shetland Isles and is one of the UK's most isolated communities. Until recently, electricity was provided by a diesel generator with some wind power. Night time blackout was from 11.30pm until 3.30am.

Now, with a solar photovoltaic (PV) system, new wind turbines and a battery installation, the community has been provided with continuous power.

"We are very pleased to have been part of this unique and monumental energy installation, and we work closely with global partners to offer a full range of high-quality products for small to large-scale renewable energy applications. The lead batteries chosen for this system will provide years of uninterrupted power and dependable energy storage for the residents of Fair Isle."

Phil Kemp, Marketing Manager, Rolls Battery Engineering

Technical Specification
The whole system has 52.99 of PV panels connected to three SMA Sunny 15 kW inverters, three 50 kW Harbor wind turbines and there are two 60 kW diesel generators now used only for backup.

These batteries each feed into an inverter cluster comprising three Sunny Island inverters and a total of 21 inverters provide a power output of 125 kW with 288 kWh of stored energy available.

The whole system is monitored and controlled by an SMA Data Manager which can be remotely accessed at any time.



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Thank you!