APSE Big Energy Summit – Birmingham 2025

Renewables, waste management and AD

- Green disposal of organic waste
- Integrating renewables
- Benefits for the local economy

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Birmingham, February 2025

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957752

Background: Outer Hebrides Local Energy Hub (OHLEH)

- OHLEH was developed to maximise the potential of constrained electricity generation by utilising the existing infrastructure at Creed Park Waste Management Facility, developing green disposal routes for local sources of organic waste
- OHLEH demonstrates how different renewable energy technologies can be integrated to support local energy economies and circular supply chains
- Creed Park Waste Management Facility is the first Anaerobic Digestion (AD) plant in the UK to use 'dry' AD technology to treat municipal organic waste, designed with extra capacity for potential treatment of fish waste from the local salmon farming industry
- Combined Heat and Power (CHP) system used to generate electrical energy and heat from biogas from the Anaerobic Digester

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Background: Outer Hebrides Local Energy Hub (OHLEH)

Fish processing

Fish Hatchery

Medical Grade O2

existing infrastructure

Creed Park Waste Management Facility

Anaerobic Digester
Hygienisation equipment to allow fish waste to be processed.

Circular Economy

Hydrogen Fuel Cell

Biogas fuelled Combined Heat and Power (CHP) Plant

Electric Boiler and Thermal Store

Hydrogen fuelled RCV
Used to collect organic waste for AD Plant

O_2

H_2

Hydrogen Electrolyser
Oxygen capture, generation & storage

\+

Wind Turbine

Constrained grid connection

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Outer Hebrides engaged as ROBINSON follower islands

- The biggest legacy of a project like OHLEH is gaining and sharing knowledge
- OHLEH has not been without technical challenges but every challenge provided a new learning opportunity
- Despite (or perhaps because) the AD plant operating in a stable manner for over nine years, the addition of a relatively small amount of fish waste was enough to upset the biomass
- The Creed AD Plant operates at Thermophilic temperature (57^{o}C), this is efficient but stability is difficult to maintain
- The case-study of OHLEH was detected by **ROBINSON** project (Smart integ**R**ation **O**f local energy sources and innovative storage for flexi**B**le, secure and cost-effic**I**ent e**N**ergy **S**upply **ON** industrialized islands) as virtual replication island scenario with Biogas production at the heart of the system.

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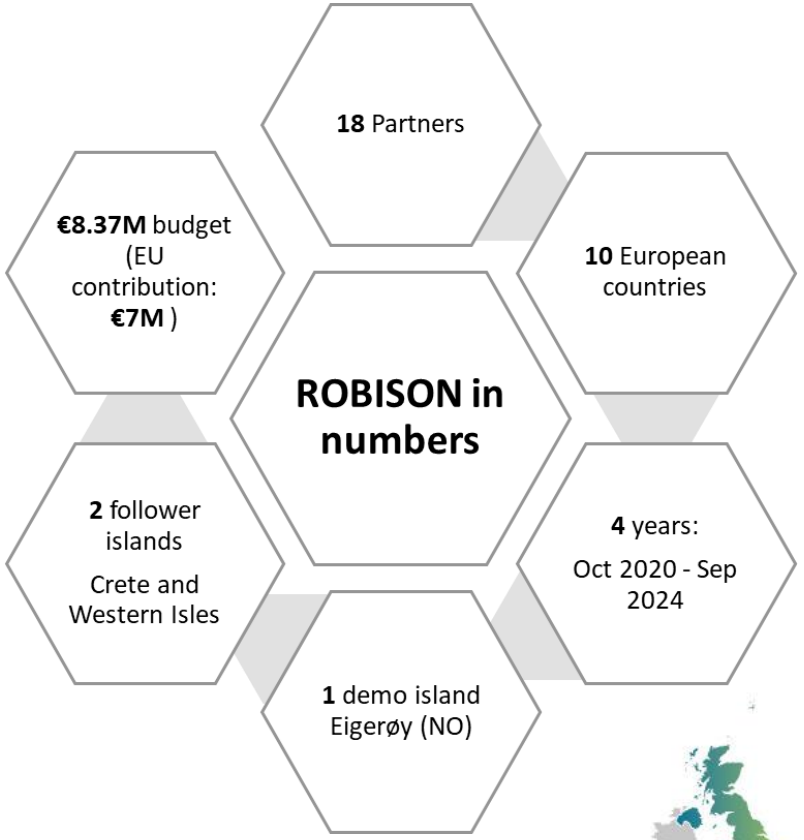
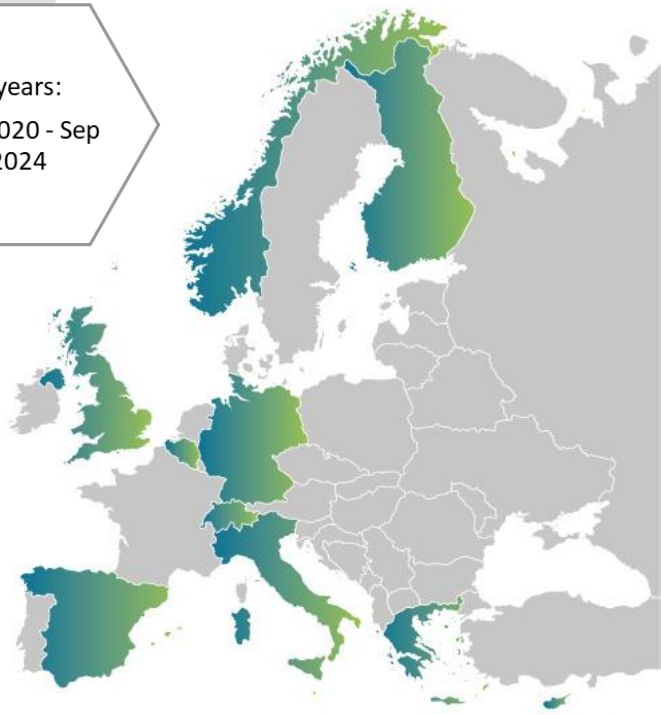
ROBINSON in a nutshell

- ROBINSON aims to help **decarbonize (industrial) islands** by developing an intelligent, robust and flexible energy management system that **integrates technologies across different energy vectors (electricity, heat and gas**).
- The ROBINSON system will be **demonstrated on the island of Eigerøy, Norway**.
- **Virtual demonstrations** will be conducted for **Crete (Greece) and the Western Isles (Scotland)**.





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Project objectives

Technological

Optimise, validate and integrate innovative technologies

Develop and validate a modular and flexible Energy Management System (EMS)

Demonstration

Demonstrate the large-scale applicability of the ROBINSON system

Replication

Replication of the modular EMS and the concepts

Wide dissemination

Impacts

Human health and the environment

System cost-competitiveness

Business model

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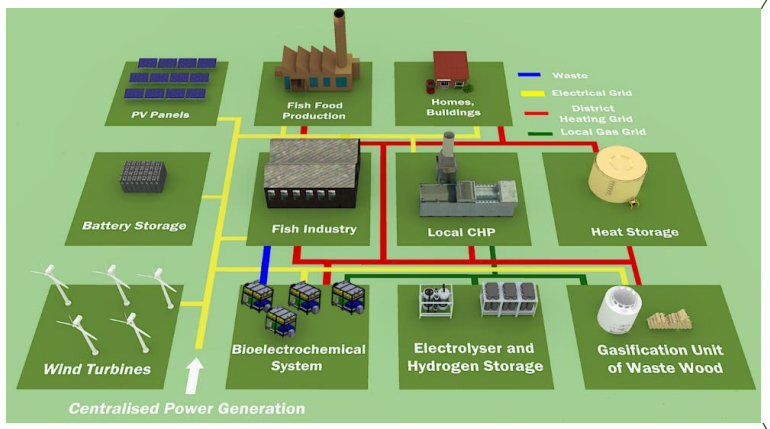
Project concept

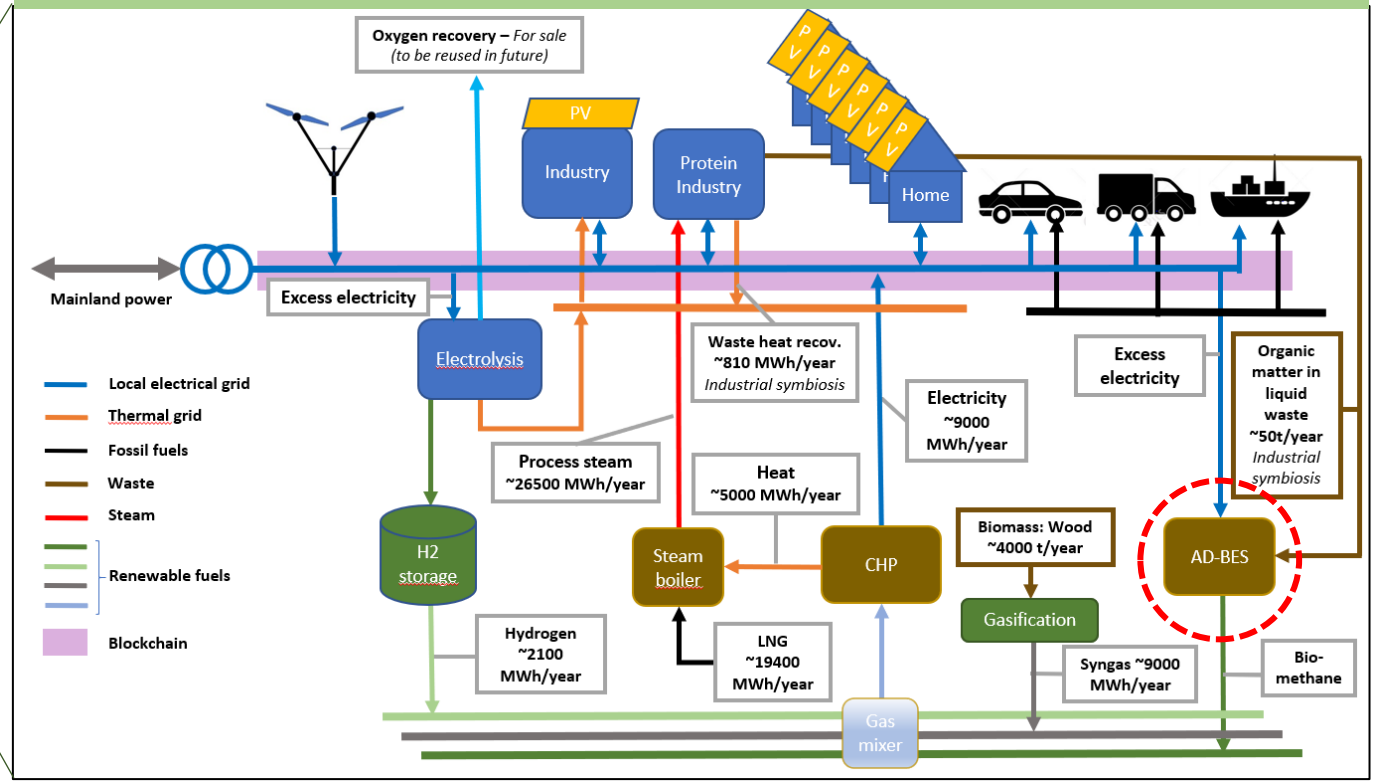
Keywords

- Energy management system (EMS)
- Different energy vectors
- Islands decarbonization
- Industrial symbiosis
- Waste valorisation



Thanks to ROBINSON, Eigerøy will move from being fully dependent on mainland and fossil fuel to an integrated, independent and low-carbon energy system!

The ROBINSON concept applied on Eigerøy Island (Norway)



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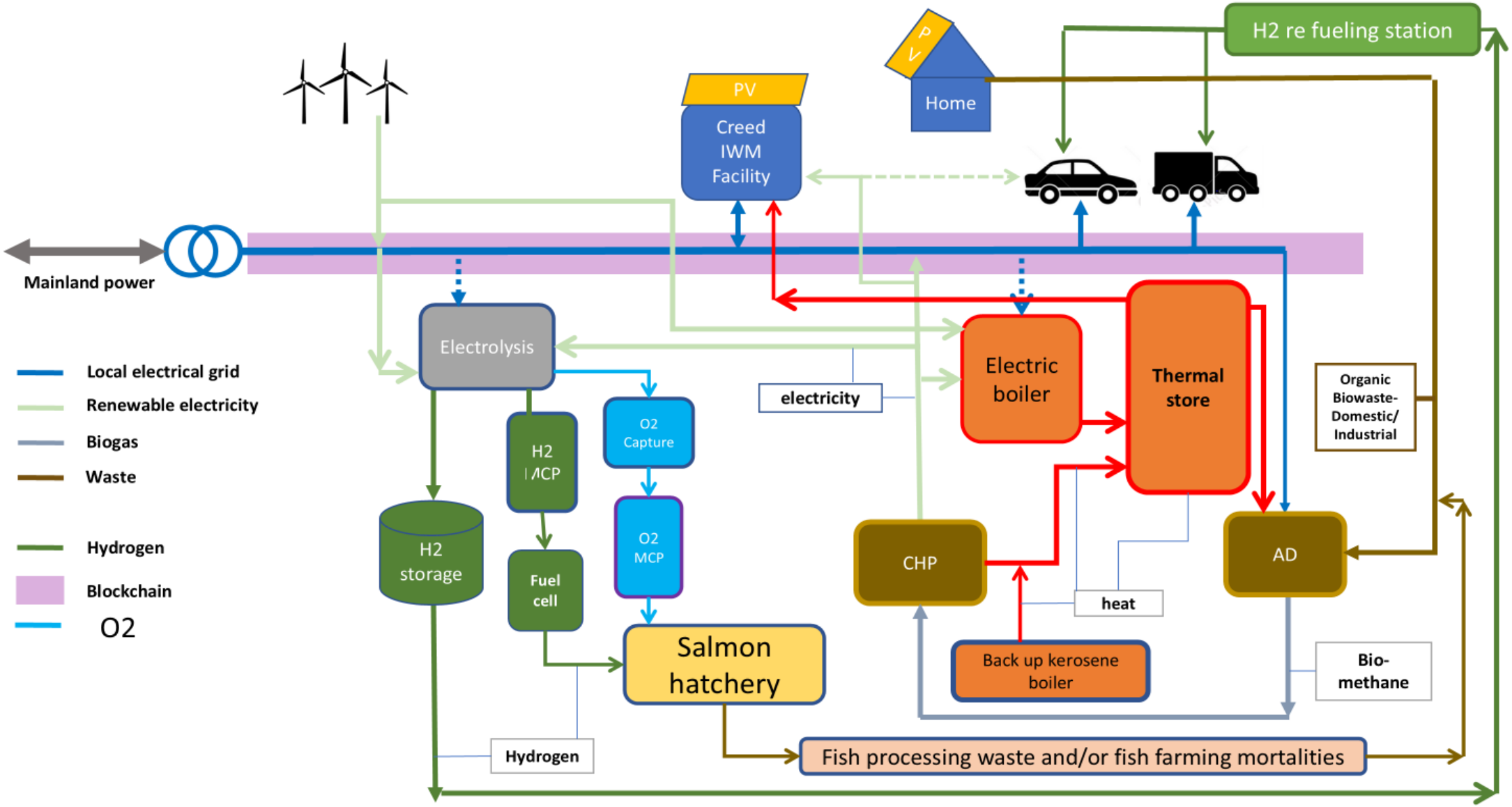
Western Isles Current Installation



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WHAT NEXT ?

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Creed Hydrogen Skills & Innovation Centre

A unique Public, Private and Academic Sector partnership accelerating the development of the green hydrogen sector in the Outer Hebrides

APSE Big Energy summit Birmingham February 2025

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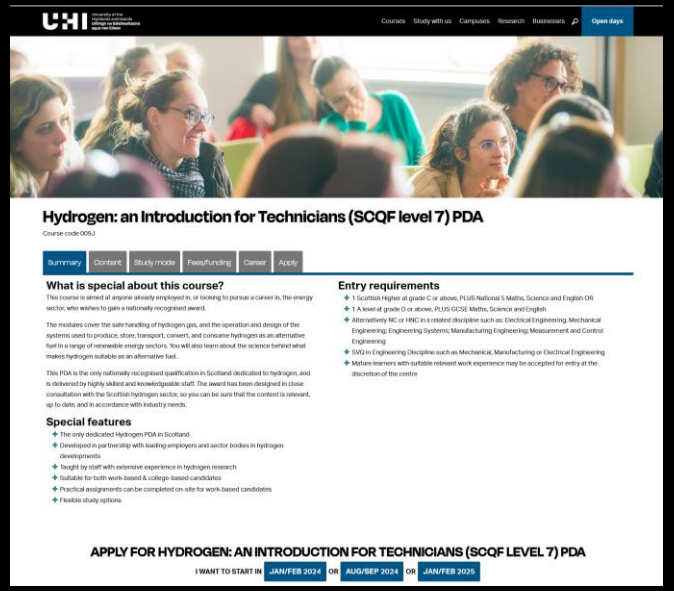
PlusZero
Making Hydrogen Happen

Background –Unique combination of partner experience

CnES Outer Hebrides Local Energy Hub facility at Creed



UHI's Lews Castle College developed first SQA certified hydrogen technician training courses

Harris based PlusZero is a leader in deployment of Hydrogen based technology

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PlusZero
Making Hydrogen Happen

The Project – Key Objectives

Commercial Production, Skills and R&D

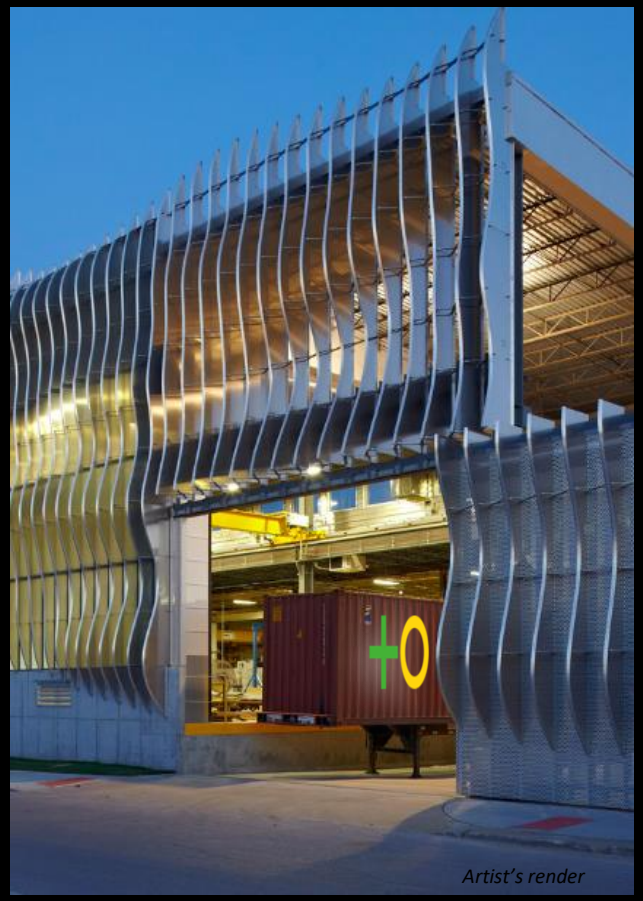
1. Create a reliable and commercially viable new green hydrogen and oxygen production facility that can support and encourage the adoption of hydrogen application technology on the Island.

2. Create a hands-on training and learning environment that supports UHI Lews Castle College deliver its SQA certified Hydrogen Technician Training courses:
   - start to build skills in the local workforce and supply chain to support future expansion of green hydrogen production.

3. Create a facility that will support the field testing of new prototype electrolyser technology and allow early access to next generation equipment.

4. Create a facility that will add value and learning for the wider ICNZ programme

The Project – Key Elements



- £2.2m partnership project between Western Isles Council, PlusZero and UHI North, West and Hebrides.
- £1.1m capital grant (50% of costs) awarded in May23 from Scottish Government Emerging Energy Technology Fund.
- New Council owned building at Creed to house H2 production equipment and facilities for UHI "hands on" technician training, equipment testing and research.
- New and refurbished equipment increases H2 production from 12kg/day to approx 120kg/day (and 1000kg of O2/day).
- CnES will own new building, and PlusZero Energy will own H_2 and O_2 production equipment and run plant as commercial operation.

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PlusZero Making Hydrogen Happen

AND THERE'S MORE!

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ADVETEC

Overview of innovative waste reduction technology due to be installed and commissioned in Benbecula on 17th March 2025.

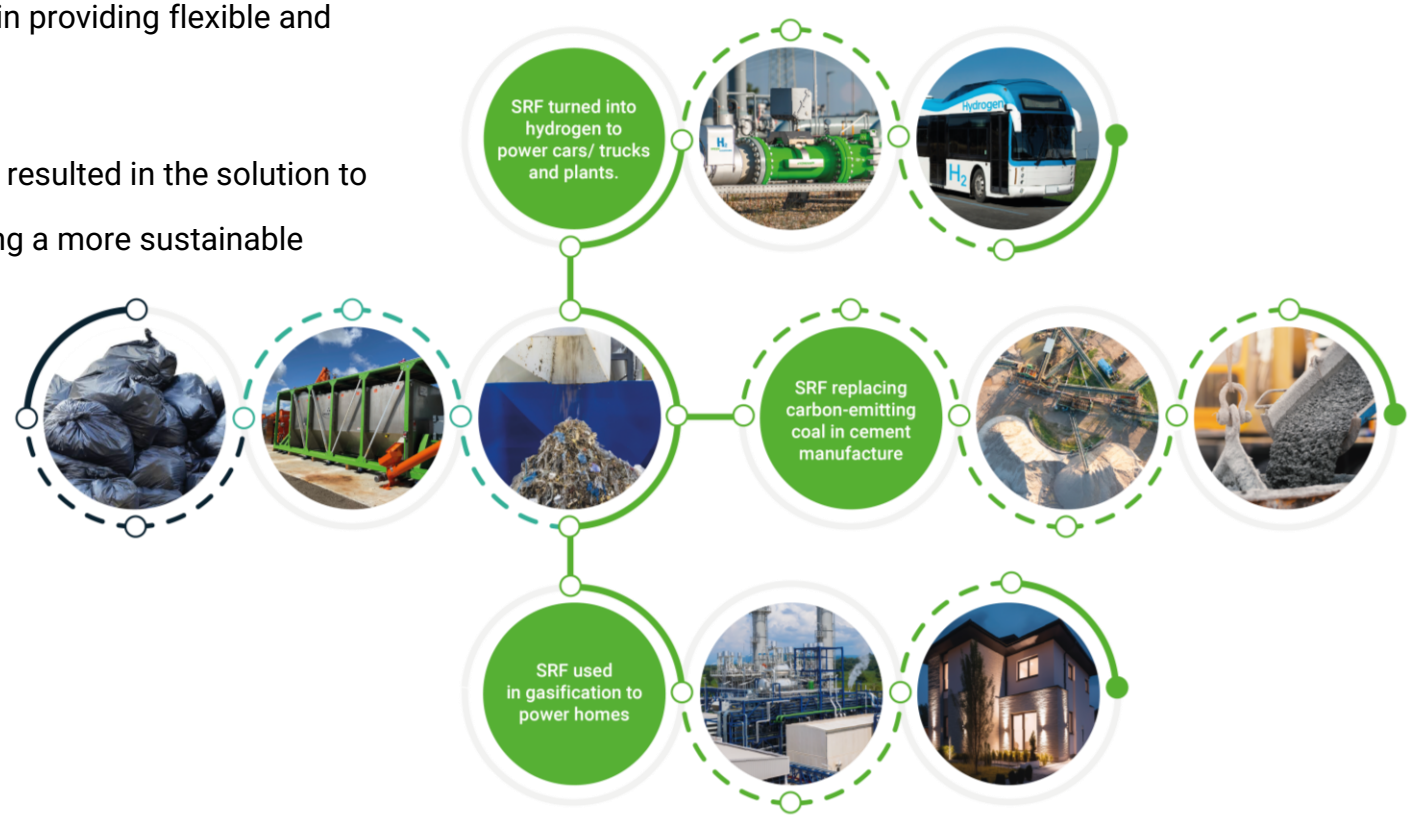
Local waste solution, **real world impact**

About Advetec

Local waste solution, **real world impact.**

We are an environmental biotechnology company specialising in providing flexible and scalable solutions for mixed contaminated waste streams.

Over 15 years of scientific development and smart engineering resulted in the solution to **turn waste into a high-value alternative fuel called SRF**, creating a more sustainable future.



Our offices are in the UK and the USA.

Our Green Credentials

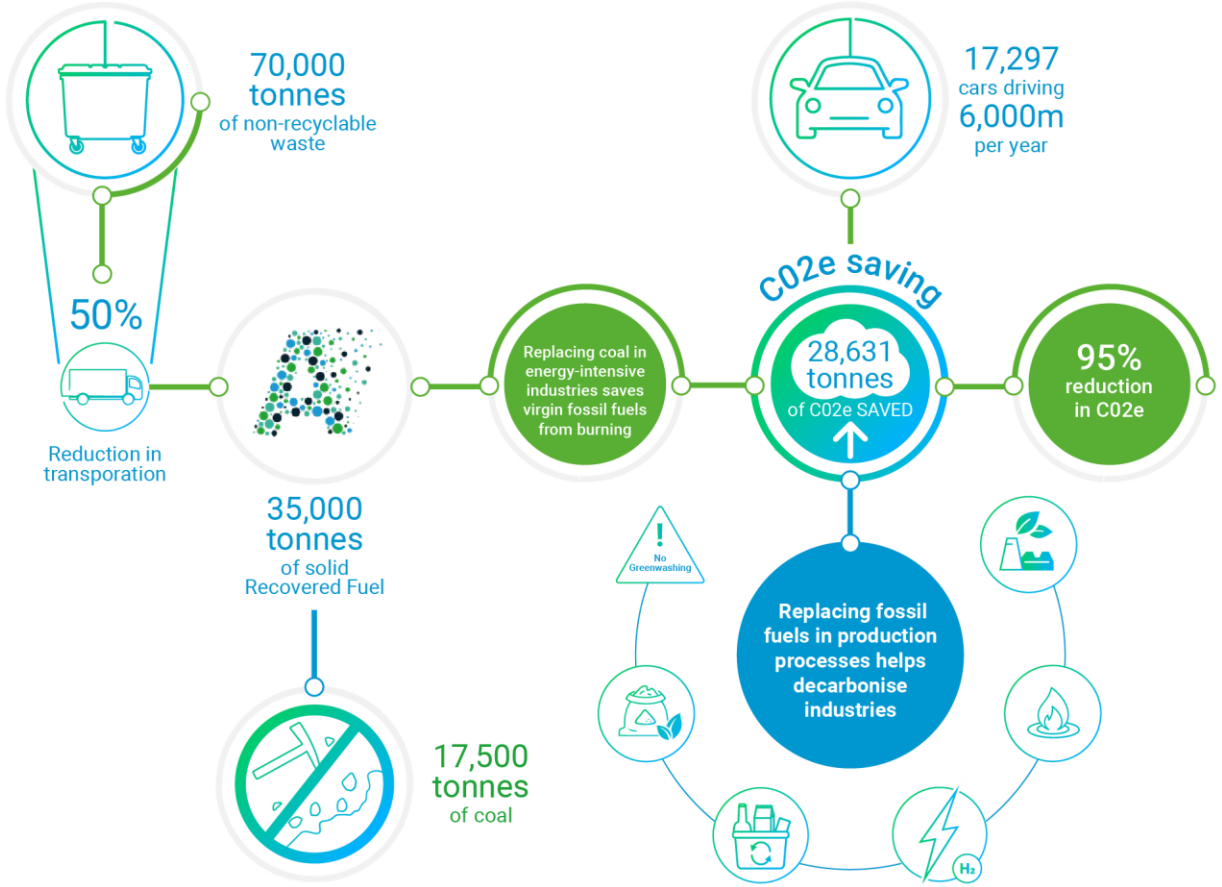
Reducing CO2 emissions

Advetec works with non-recyclable waste streams containing organic matter and moisture.

Our technology:

- Reduces the use of virgin fossil fuels such as coal in the energy-intense industries,
- Reduces GHG emissions associated with transportation,
- Stops methane emissions when disposed at landfill,
- Reduces the amount of non-recyclable waste material by 50%,
- Potential for further segregation and recycling of these waste streams.

Worked example:
20 XO22 units processing waste into SRF and replacing coal in energy-intensive industries

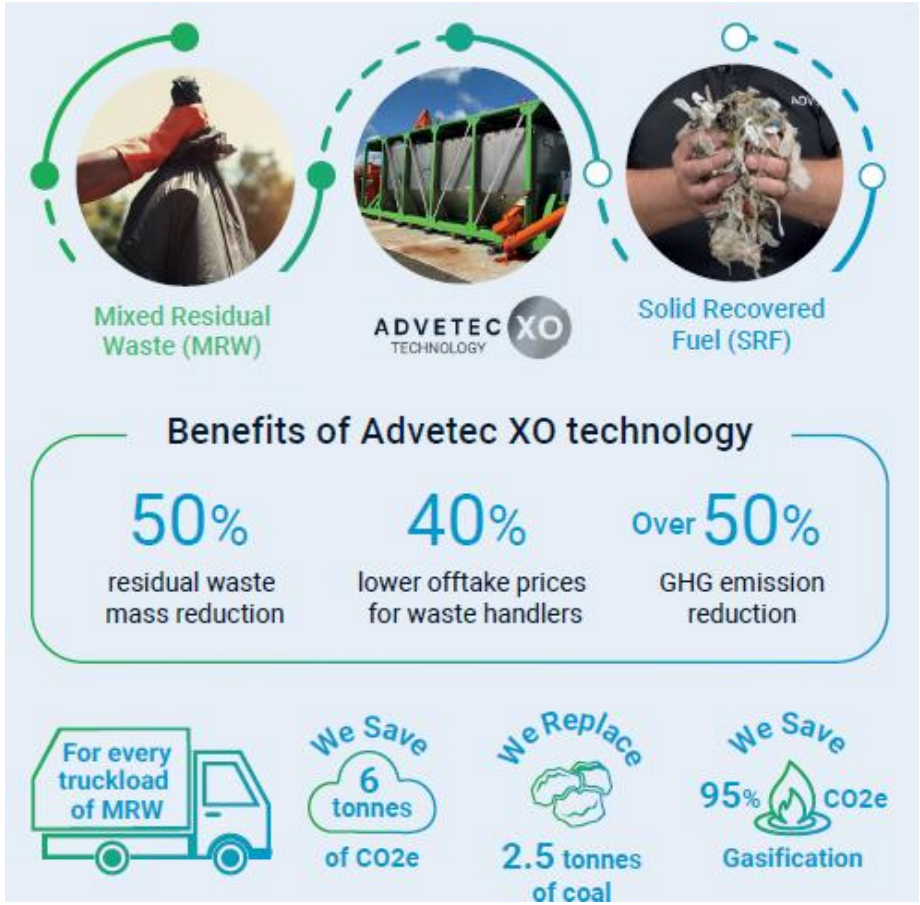


The Benefits of Advetec XO Biotechnology

Clever Biotechnology

Thanks to the **Advetec's blend** of bacteria and biostimulants, organic reduction of waste material can be achieved in just 72 hours, generating zero methane and producing a dry, odour neutral and biologically stable output called Floc.

The output, Floc, can be utilised as **Solid Recovered Fuel (SRF)** to replace coal in energy-heavy industries, gasification, or in chemical mining.



A Truly Unique Player

A way for rural and remote communities to turn waste into a commodity.

50% waste mass reduction cuts down waste management and disposal **costs**

High-value **SRF** production that replaces coal in heavy energy industries or can be used in gasification

Considerable **GHG emissions** reductions and **carbon footprint** improvements

Seamless and safe **on-site integration** which tailors to your processes

A collaborative approach to meeting **regulatory and environmental** requirements

Over 50% reduction in **transportation**

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Thank you!

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