

Pure Energy® Solutions

Successful Community Project Examples

Elizabeth Johnson MBE



Overview

- Very Brief History
- About the Pure Energy Centre
- Project Examples
 - Unst
 - Outer Hebrides
 - Urban Environment

Very Brief History



- 1839 – Sir William Robert Grove
 - “Gas Voltaic Battery” – 1st Fuel Cell
- 1955 – Francis Thomas Bacon
 - 5kW stationary Alkaline Fuel Cell
- 1969 – NASA
 - First Alkaline Fuel Cell on the moon.
- 2006 – Pure Energy[®] Centre!

About Pure Energy[®] Centre

- ✓ Clean Fuel Infrastructure
- ✓ Energy Storage Technologies
- ✓ Renewable Energy Solutions

About Pure Energy[®] Centre

- The Pure Energy[®] Centre comprise a multi-disciplined team with extensive experience in clean energy technology integration
 - Concept development
 - Systems design
 - System integration
 - Construction & Installation
 - Operation & Maintenance.

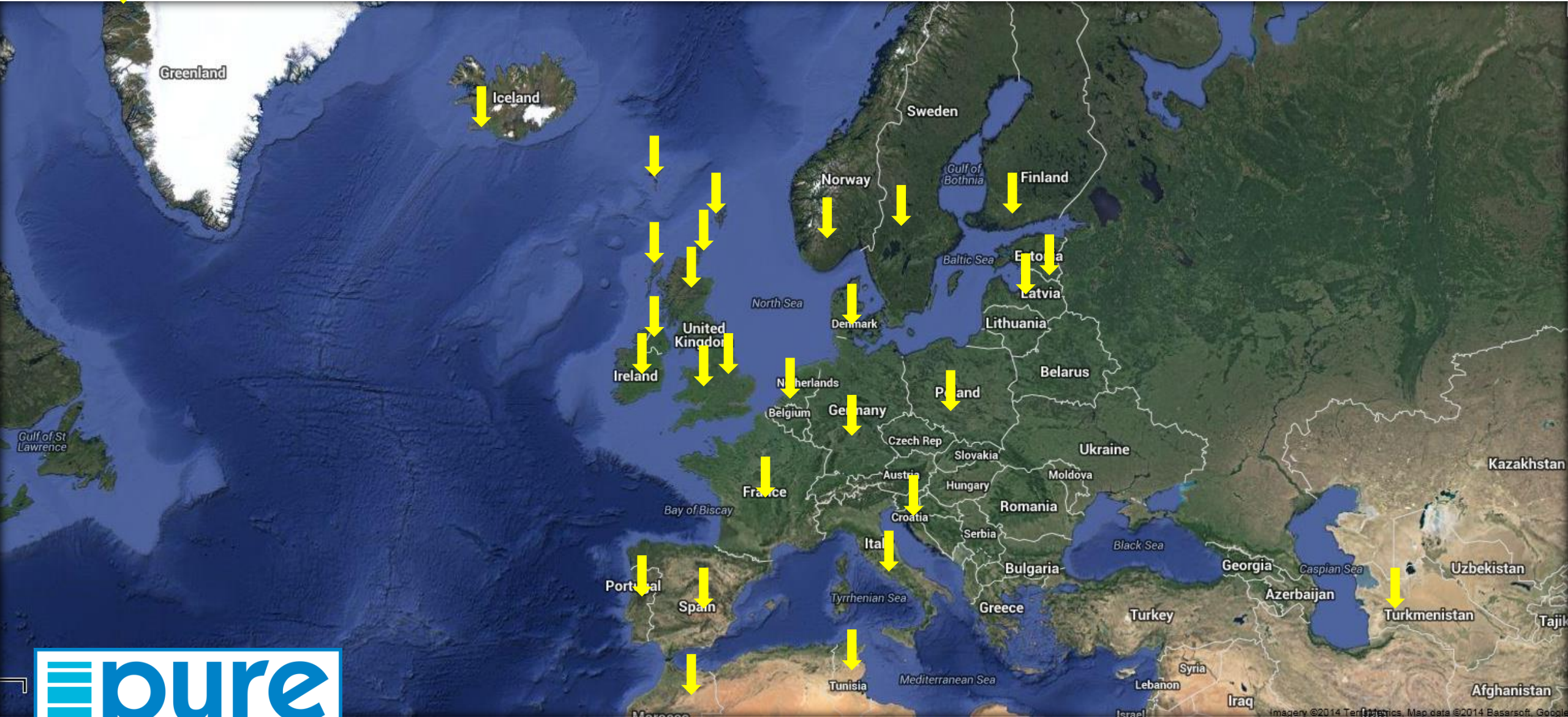


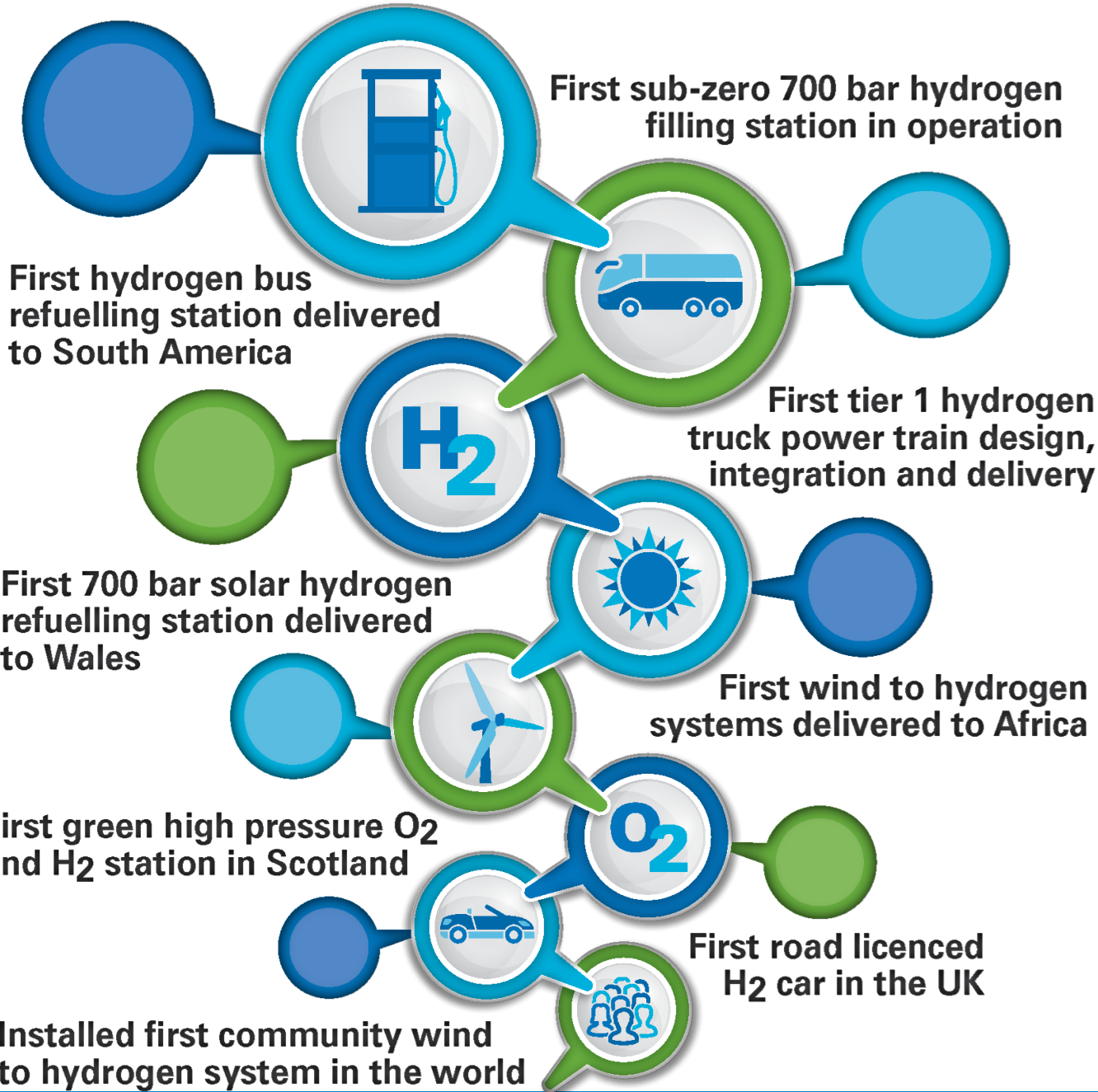
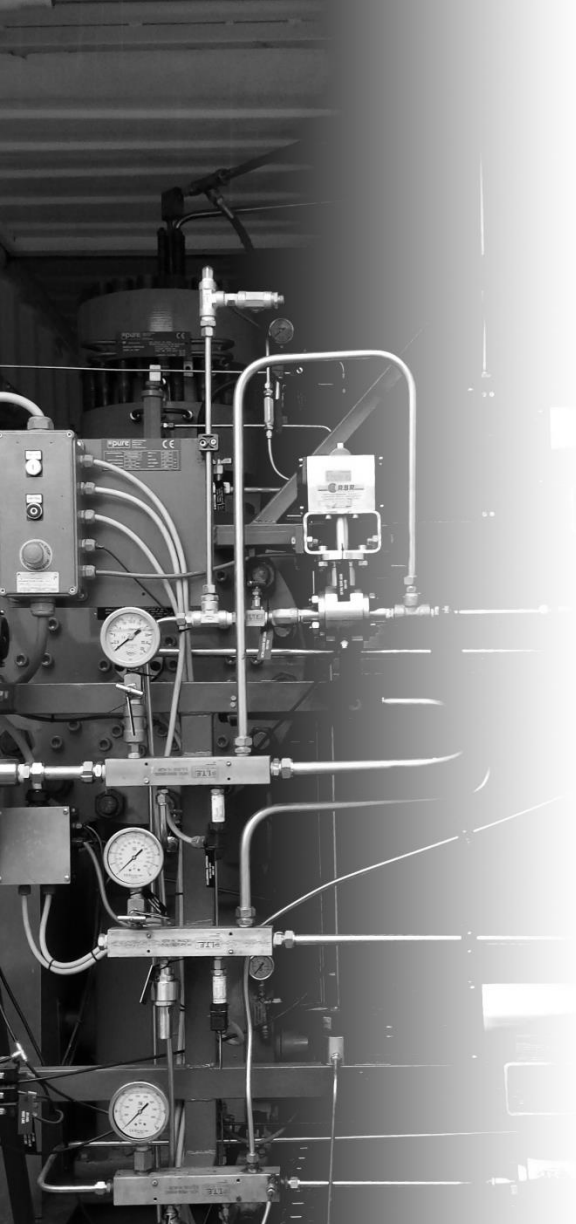
About Pure Energy[®] Centre

- We offer a 'one-stop-shop' for our customers
 - From concept development through to implementation
 - Renewable Generation
 - Hydrogen
 - Production
 - Compression
 - Storage
 - Dispensing
 - Training



Proven Global Delivery - Are we really so remote?







Renewable Generation

- Developing renewable opportunities:
- Over 100 Installations
- Generating approximately 2'000'000kWh annually
- MCS Accredited
- RECC Assured



Systems delivered this year

- Hydrogen filling station for a private customer, including H₂ production, storage, compressing and dispensing , 10kg per day @ 700 bar
- Hydrogen filling station for Buses: including 350kW Electrolyser , compressor at 450 bar , Large H₂ storage , Dispenser at 350 bar for buses
- Hydrogen filling station for 700 bar vehicle: includes compressor up to 850 bar, storage at 900 bar, dispenser at 700 bar



Systems delivered this year

- HyPod® (Hydrogen Production Unit) 16Nm³/h @ 30 bar with purification unit
- H₂ generator 5Nm³/h @ 12 bar suitable for ATEX classified zones
- Development of H₂ FC power train for a truck
- 10kW grid connected Fuel Cell system for Grid laboratory research environment
- 5kW off-grid Fuel Cell system for use in aquaculture



Consultancy

- Major report, alongside TNEI, for Scottish Enterprise titled “Constrained Renewables and Green Hydrogen Production Study”.
- Identified four major markets for hydrogen – private customer
- Provided energy storage technologies grid support
- Supplied ESCO model for a community



Training

- Trained professional customers in 5 continents
 - Over 500 customers trained in:
 - Hydrogen Production, Compression, Storage
 - Operation & Maintenance
 - Concept to implementation.



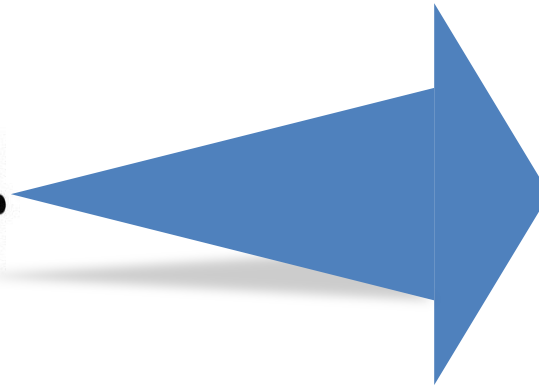
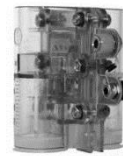
Training

- Delivery of bespoke Hydrogen training platforms

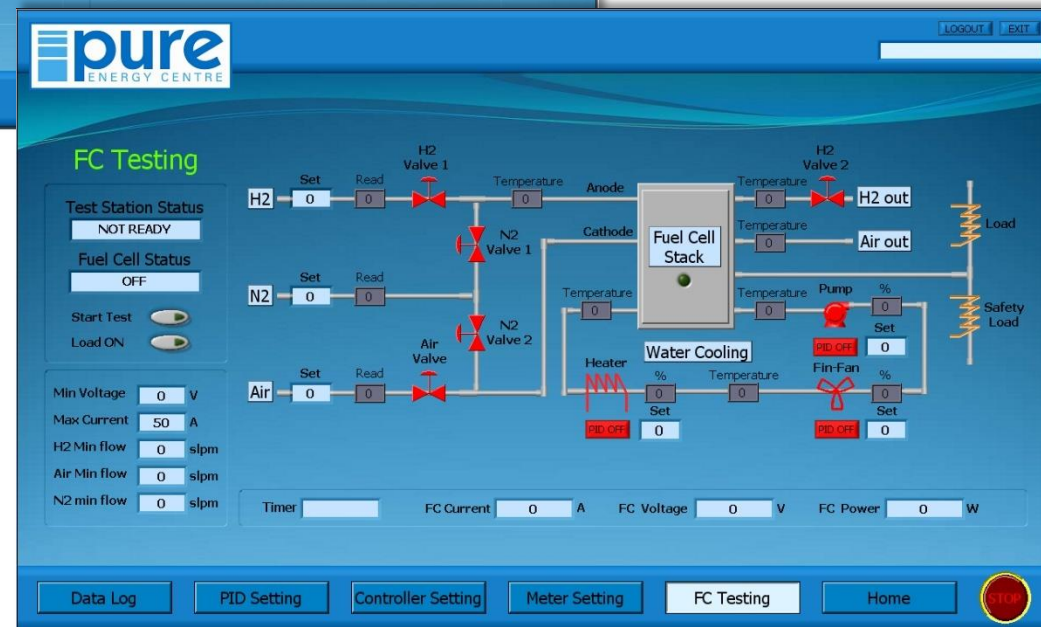
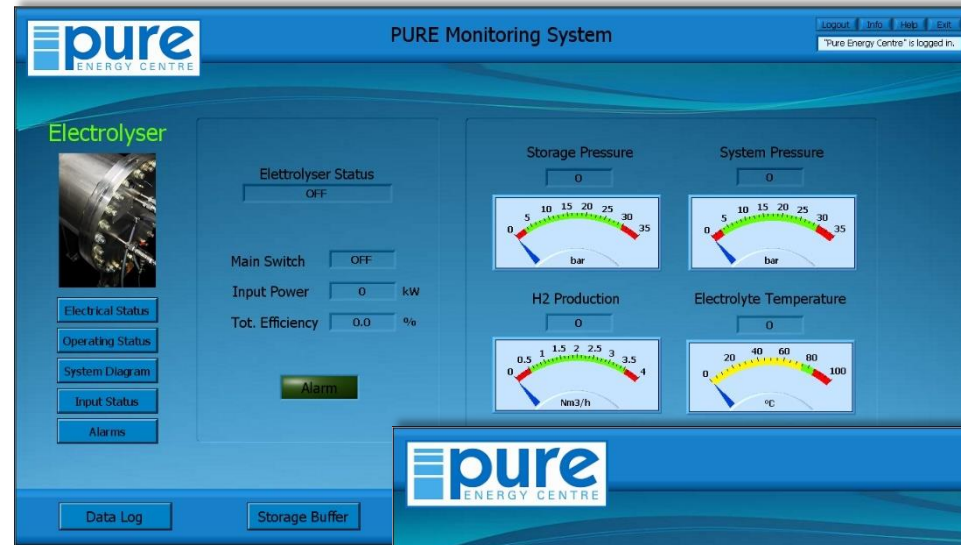
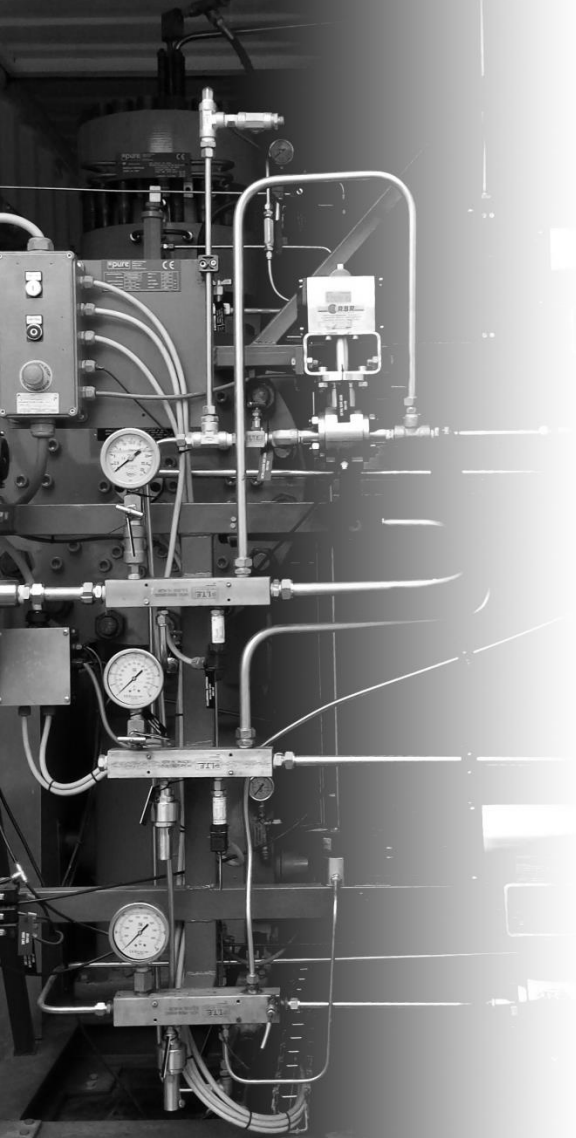


Certified and Scalable

- Modular design approach
- Watts to Megawatts

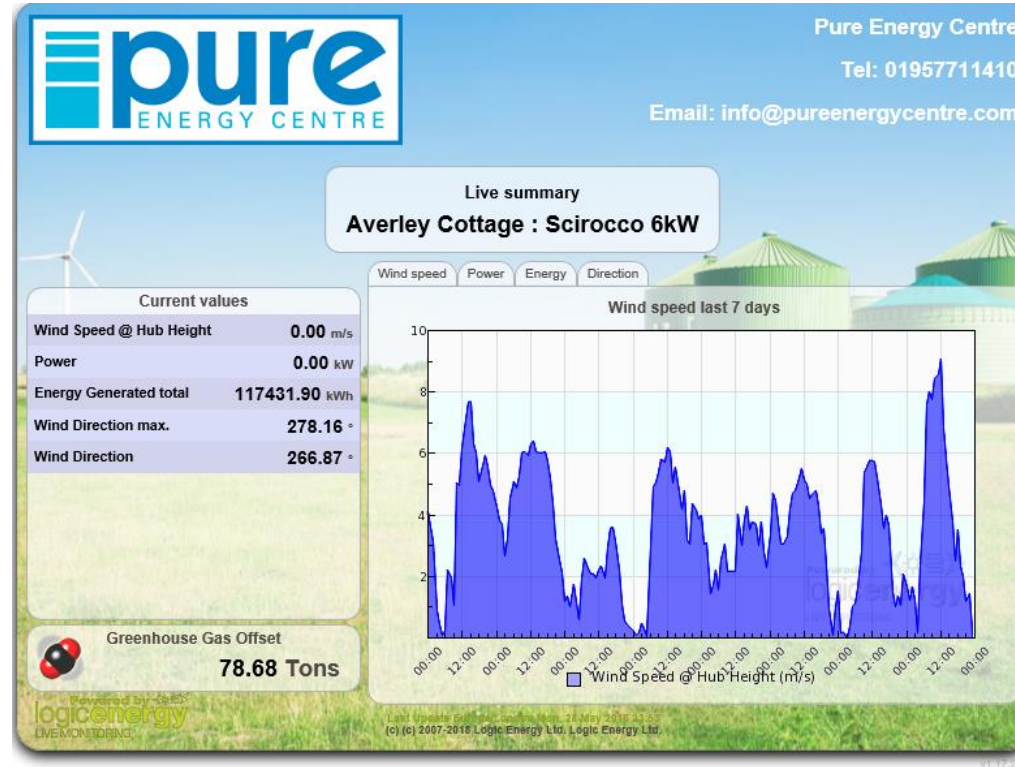


Pure[®] Control & Monitoring



Pure Energy[®] Centre control, monitoring and integration

Pure[®] Control & Monitoring



Pure Energy[®] Centre control, monitoring and integration

European Project Delivery Partner



...pure energy solutions

- Experienced project partner in numerous Pan-European projects

– C2C Islands



– Safe H Power



– SMALLEST



– BATTERIE



– E-Harbours



European Project Delivery Partner

- Continued involvement in Pan-European projects

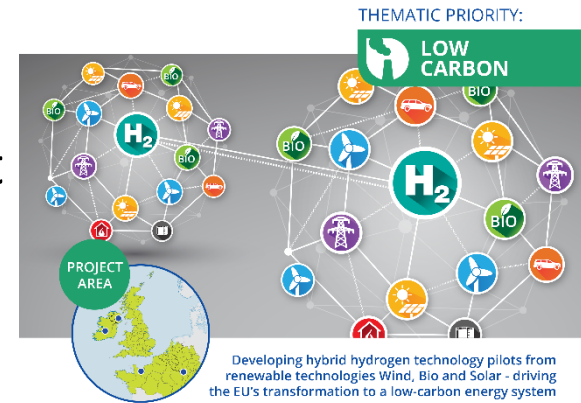


...pure energy – GenComm solutions

- Will address the energy sustainability challenges of NWE communities through the implementation of smart hydrogen-based energy matrixes. The project validates the maturity of hydrogen technologies by implementing 3 pilot plants

– HYLANTIC

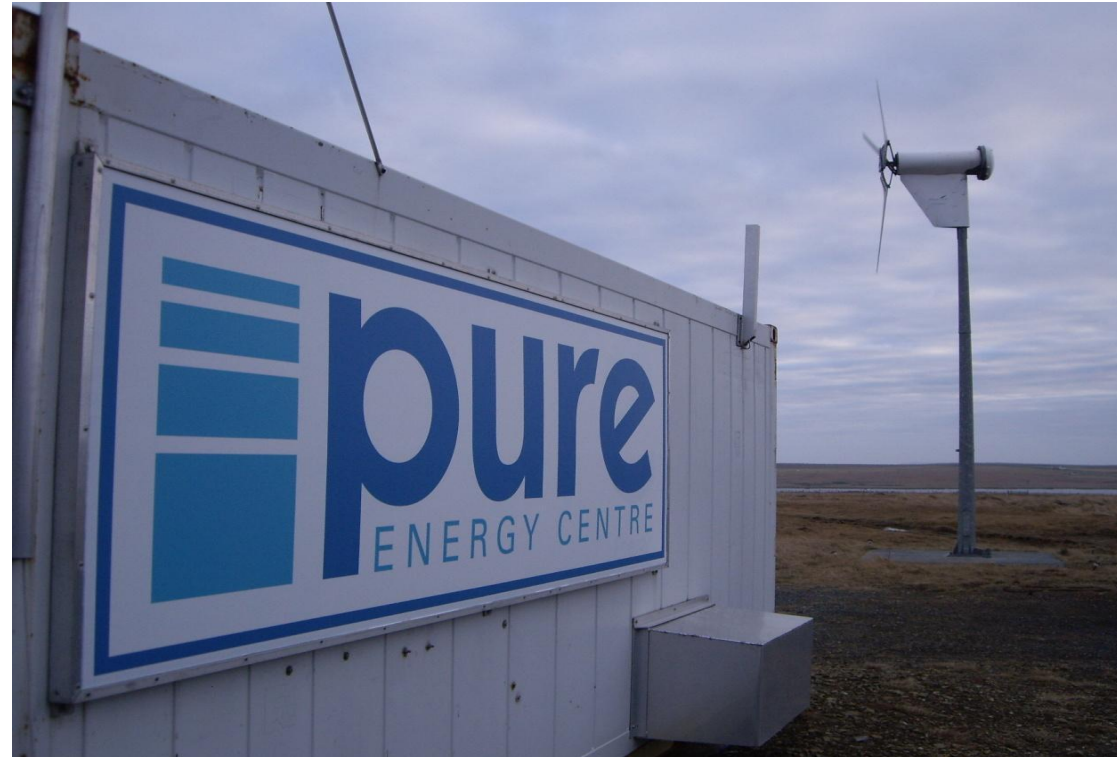
- The Atlantic Network for Renewable Generation and Supply of Hydrogen to promote High Energy Efficiency - HYLANTIC project addresses global energy issues and focuses on the challenge of ensuring a sustainable and efficient energy supply with low carbon emissions



Successful Community Project Examples



PURE[®] Project



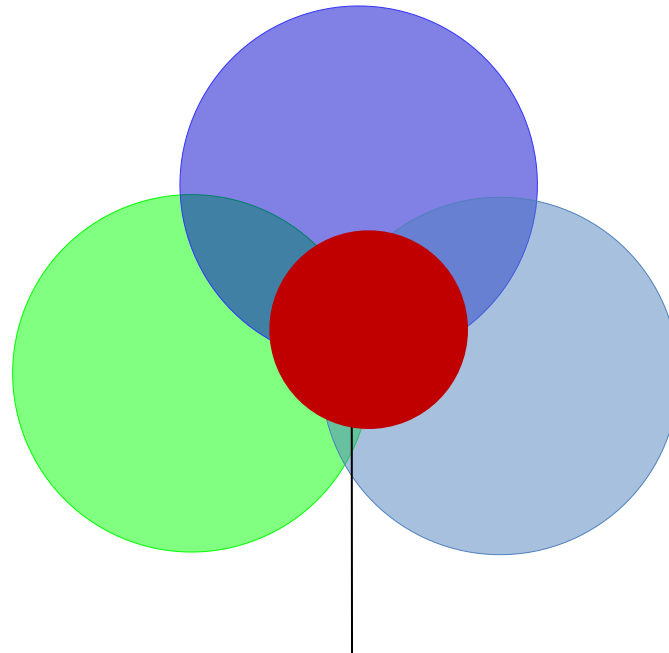
World's First Community Owned renewable hydrogen project consisting of wind generation, wind heating both dry and wet, fuel cells, fuel cell cars, refuelling station, hydrogen storage, heat storage, battery storage, off-grid offices, hydrogen production facilities and hydrogen barbecue



Unst Islands Pure hydrogen[®] Partners

Funders and financiers

Unst Community



Unst Islands Pure Hydrogen[®] project

The Unst project was conceived,
designed and delivered in 2 years

Hydrogen projects can now be
delivered quickly and efficiently

Benefits

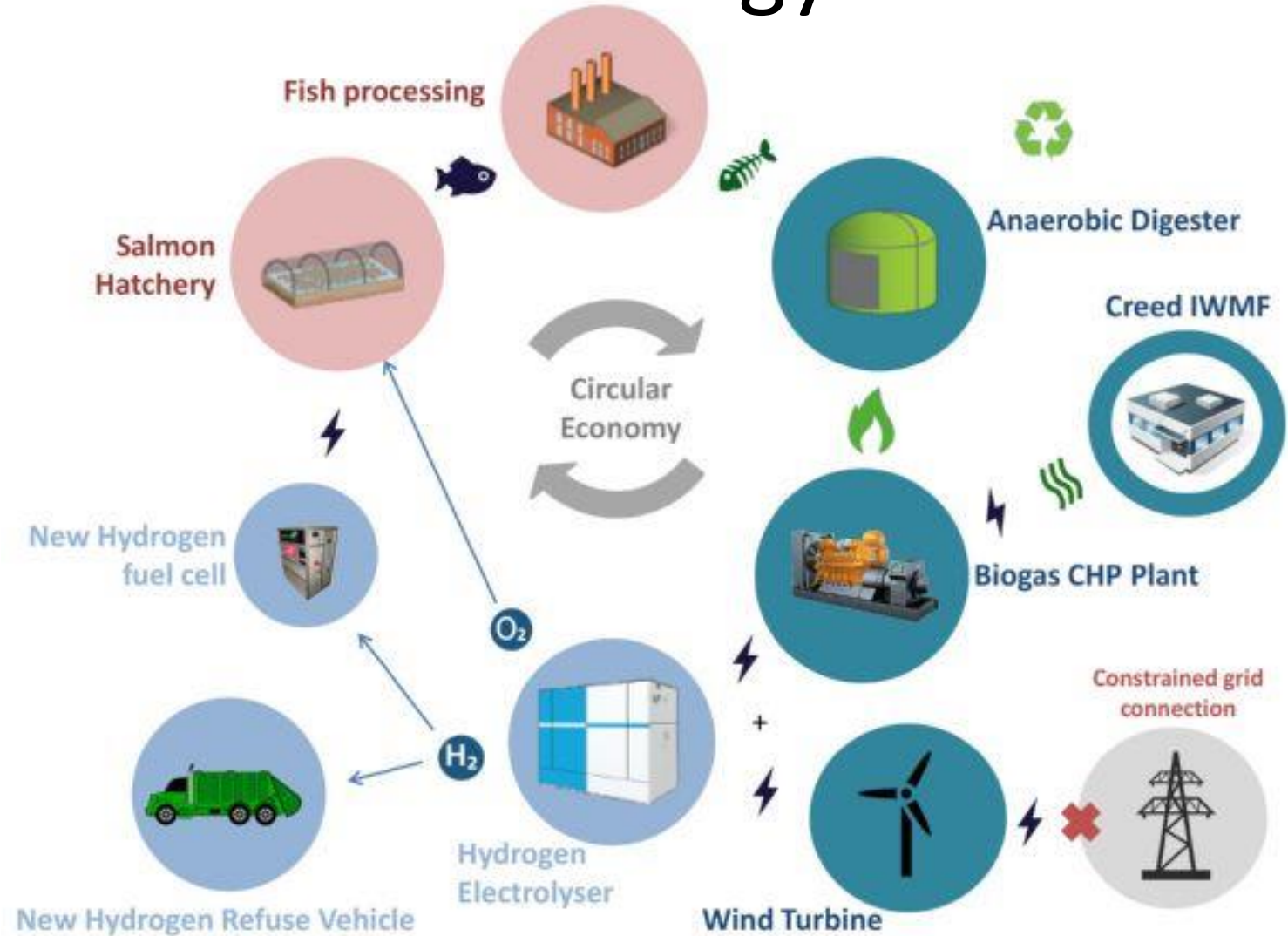


- Challenge the myth that H2 is a ‘thing’ of the future
- Created a new business venture in a community
- Inward migration
- Support the local community by re-investing in it
- Green technology brought technology tourism
- Raised the profile of the island

Outer Hebrides Local Energy Hub



Outer Hebrides Local Energy Hub



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Outer Hebrides Local Energy Hub



The Hydrogen filling station

Outer Hebrides Local Energy Hub



The Oxygen filling station

Outer Hebrides Local Energy Hub



The fuel cell FC-Pod

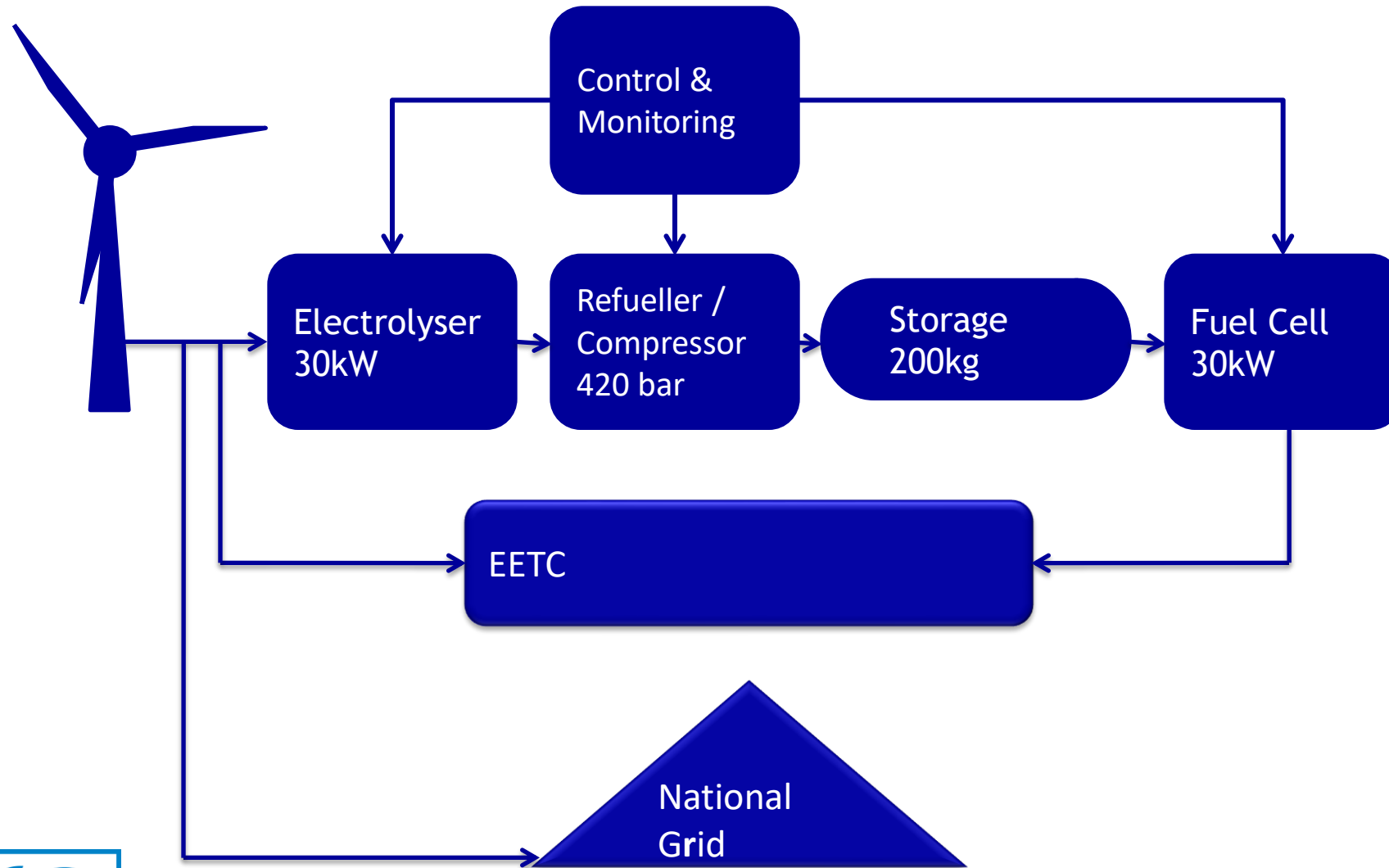
Outer Hebrides Local Energy Hub

- The main criteria for the project were:
 - Green Oxygen is sold to a local hatchery
 - Green Hydrogen is also sold to the hatchery
 - Green Hydrogen is used to fuel a refuse truck
 - Other refuse collection vehicles are being planned and there is now a higher demand for oxygen

The Yorkshire Forward - Urban Case



The YF project – the EETC building



Hydrogen Mini Grid System - YF

The Hydrogen building, refueller and storage



Hydrogen Mini Grid System - YF



The fuel cell and inverters



The electrolyser control system

The EETC Building

- The main criteria for the EETC were:
 - Iconic building
 - Use of innovative technology
 - ‘Zero carbon building’
 - Iconic Renewable Hydrogen System
 - Support enterprising and innovation of products
 - Exploit opportunities arising from low carbon economy

Pure Hydrogen[®] can be produced in an urban environment!



Community benefits

- Promote H2 and potential for further projects
- Create new business ventures in a community
- Inward migration
- Potential for new exciting jobs
- Support the local community by re-investing in it
- Green technology brings technology tourism
- Raise the profile of your area
- New ventures attract other businesses
- Do not be afraid to aim high
- Always ensure community benefits are high and any project contains budgets for local management
- Upskilling of workforce – stop the brain drain
- Energy/fuel security
- Income generation



Pure Energy® Solutions

Elizabeth Johnson MBE

info@pureenergycentre.com

+44 (0) 1957711410

