Óglaigh na hÉireann
IRISH DEFENCE FORCES

ESB
Energy for generations

Case Study - HPU Deployment to Lynch Camp, Kilworth in collaboration with ESB Generation and Trading

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Overview

- Lynch Camp
- Defence Forces Objectives
- Deployment Overview
- Operational Philosophy
- Site Configuration
- Key Learnings



Lynch Camp – Kilworth, Co. Cork

- **Training Installation** for Defence Forces Ireland
- **24/7/365** Operational Facility
- Varying loads with **surge occupancy of exercising troops**
- Recent energy upgrades to facility including; ground mounted **100kWp Solar PV, A2W HP** to accommodation buildings and **EV charging**



HPU (Hydrogen Power Unit)



Type	Emissions for typical 250kVa Diesel Generator	Emissions for Green H2 HPU
CO2	960g / kWh of operation	0g
NOX + HC	932.5g per hour of operation	0g
CO	327.5g per hour of operation	0g
PM	45g per hour of operation	0g

A **Hydrogen Power Unit** is a transportable, zero-emission power generator that uses hydrogen and Proton Exchange Membrane fuel-cell technology with an integrated Battery Energy Storage System

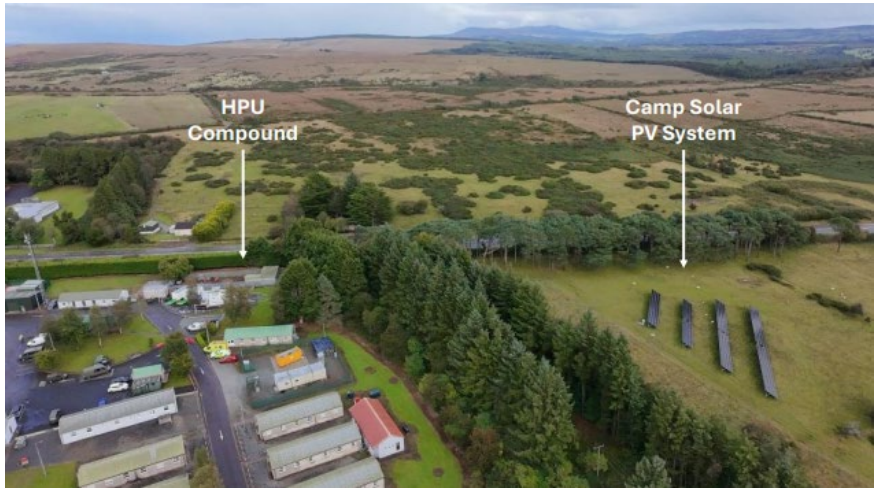
Defence Forces - Objectives

- Evaluate **hybrid energy systems** for **fully resilient** islanded military camp using 100% renewable energy supply
- Understand **application of H2 Fuel Cell technology** into an existing operational site
- **Displacement** of fossil fuel generation sources
- **Interconnection of a renewable source of energy** to take the camp off-grid for the duration of the project

Deployment Overview

The **Kilworth Camp HPU Deployment** was a **6-week** demonstration project at the Defence Forces Camp in Kilworth, Cork. It aimed to **prove the concept** of integrating **HPUs** (Hydrogen Power Units) with **solar PV** for **off-grid**, **mission-critical power supply**.

- **Purpose**: Demonstrate **hybrid hydrogen** and **solar** power generation with battery backup.
- **Method**: **Two HPUs** (250kWe each) + **100kWp solar PV** system. September–October 2025 **(6 weeks)**.
- **End State:** Delivered **23,132kWh** of **low carbon** energy off-grid and provided necessary resilience whilst proving benefits of the integration of renewable energy systems with HPU technology



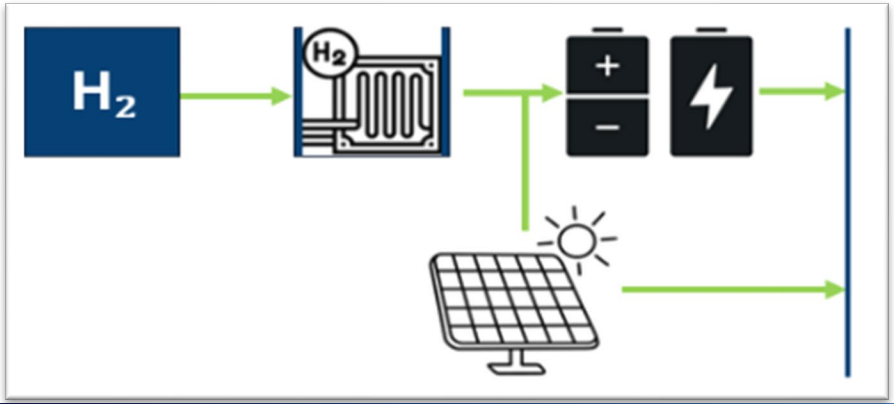


Operational Philosophy

- **ATS switched** from **mains to generator** supply taking the Camp off-grid
- **PV system** to supply the Camp, and the **HPUs** treated as a load on the camp
- **HPUs** take a charge (when available) from the **Solar PV**
- **Excess demand** from site (above PV production) supplemented by the **HPU's battery storage and fuel cell**
- Site to be supplied by **solar energy or low carbon hydrogen gas** for the duration of the project
- **Two HPUs** are provided to ensure that there is **resilience** on the project.

Site Configuration

- **Two HPUs** positioned within a fenced compound with **two MEGCs** (Multi Element Gas Containers) hydrogen gas storage trailers.
- Each HPU utilised onboard **integrated battery** storage (216kWh per HPU) for dynamic load response and store of electrical energy.
- **Dual feed** from **Solar PV** and **HPU** to busbar, with supply cable from busbar to HPUs.





Set-Up to Live Optimisation

At Lynch Camp, two 250 kWe HPUs, 100 kWp solar PV and 432 kWh of onboard batteries were integrated behind a shared busbar.

SET UP

01

Two HPUs and two MEGCs connected to the camp LV switchroom.

ASSURE

02

ATEX/HAC controls, fencing/access and emergency procedures established.

COMMISSION

03

Voltage monitoring and inverter tuning stabilised the system.

OPERATE & LEARN

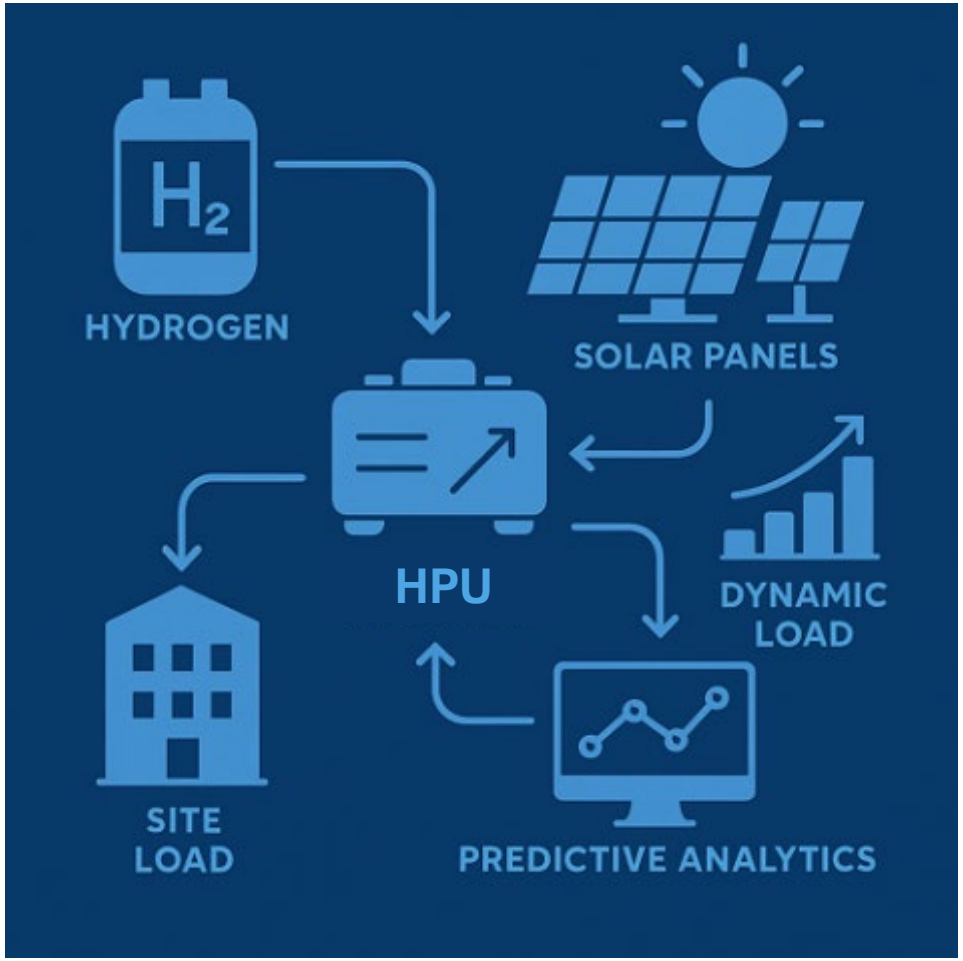
04

Live loads tested solar charging, battery response and hydrogen optimisation.

Result: 23,132 kWh delivered off-grid. Solar reduced hydrogen use by 222.9 kg; hybrid carbon intensity 72% below the grid benchmark over same period.

Key Learnings

- HPU's **battery storage** smoothed the solar **variability** and reduced hydrogen use required for **Balance of Plant** in HPUs.
- HPU's **dynamic load handling** demonstrated resilience under varying demand – batteries offer **fast response** to fluctuating loads.
- Opportunities identified to **expand scope** for larger solar PV sites or site with small scale wind and higher capacity factors
- On-site hydrogen storage gave the camp **fuel security** independent of the grid, and local production would further strengthen **resilience**
- Project **proved concept** for off-grid energy systems, integrating **solar with hydrogen and battery storage**



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Thank you

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