

Intelligent Energy: zero-emission fuel cell products



30 years experience in the development and manufacture of H₂ fuel cells

Based in the UK, with operations in the US, Japan, South Korea and China.

Our Mission

Powering the hydrogen future™ with our outstanding fuel cells and service.

Over **1,000** patents



Credited with ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018







Finalising plans to construct a **GW** scale global fuel cell manufacturing centre

A range of fuel cell products from **sub- 1kW to 100kW** based on IE's **patented** (PEM) fuel cell technology





Ownership

Our Charitable Trust

 The company is part of the Meditor group, a global investment business with interests across a range of industries from energy to pharmaceuticals





- Intelligent Energy's Charitable Trust launched in 2019 and donates £100,000 each year to local community groups and organisations in the Charnwood area
- Established to support local causes in need of financial assistance which, support and aid, amongst others; community groups, young people, sport and lifelong learning

Leading the team



Chief Executive Officer

David Woolhouse Started at Intelligent Energy in October 2018. Experience in leading different engineering and manufacturing sectors. He has set-up and led multi-site operations in the UK, Middle East and China and has experience in successfully growing complex engineering concerns with over 1,000 employees.



Chris Dudfield Chief Technology Officer

Held roles in Intelligent Energy since 2001. Chris has extensive knowledge and expertise of fuel cell and H₂ generation technologies.



Martin Schaefer Operations Director

Started with Intelligent Energy in 2019. Previously 10 years Tier 1 experience art NSK Steering Systems.



Greg Harris Chief Commercial Operator

Joined Intelligent Energy in 2021 with over 20 years of experience in the automotive industry, having previously worked for GKN and Ricardo.



Lauren Gurney Human Resources Director A member of the management team, Lauren has worked for Intelligent Energy since 2012.



Phil Spall Finance Director

Prior to joining Intelligent Energy in 2021, Phil previously held financial positions at Johnson Matthey.



Ashley Kells Programme Director

Joined Intelligent Energy in 2002 and is a member of the management team.

Our facilities

State of the art research, development and automated production facilities





1500sqm of fully hydrogen enabled test space



2 semiautomated stack production lines



Next generation full automated production capability in development



90 test stations suitable for a range of products



8 environmental chambers, including 2 walk in and acoustic chamber facility



Close partnerships with 3rd party test houses



Some of our partners





















AEROSPACE

TECHNOLOGY







PARRY LABS



PSA PEUGEOT CITROËN











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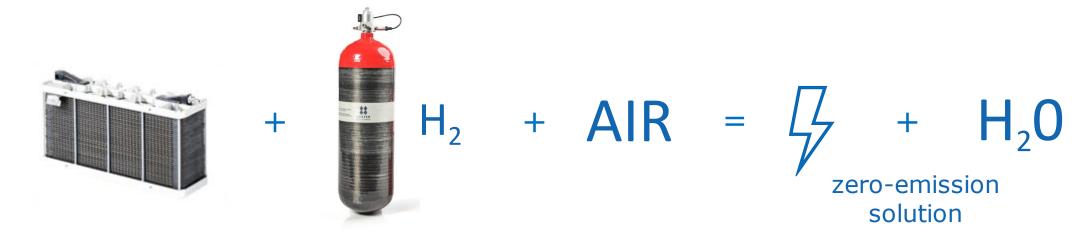
What is a fuel cell?

A fuel cell is a device that **generates electricity** through an environmentally friendly **electrochemical** reaction.

Hydrogen is combined in the fuel cell with oxygen from the air to produce electricity and pure water, creating a **zero-emissions** solution.

As long as you have hydrogen and air, you can keep generating electricity

No combustion is involved.



Fuel cell solutions developed across multiple sectors





Benefits of IE-SOAR for UAV market

- **3 to 5 times** the flight time over batteries
- Minimal maintenance
- Electrical fans only moving parts no mechanical maintenance required and no risk of mechanical failure
- Negligible noise from fans and zero-emissions
- 2-3 minute refueling



Application include:

 Pipeline Inspection, Overhead Power Line Inspection, Surveying & Mapping, Motion Picture, Filming, TV & Broadcast, Agriculture, Parcel Delivery, Security & Defence



Benefits of IE-LIFT

- Offer **zero-emission** energy solutions
- Small and compact
- Modular and scalable
- Wide environmental envelope
- Robust against high shock and vibration incidence
- Easy to **integrate**
- Configurable for wide range of applications

Applications include:

 Stationary & Standby Power Generator, Materials Handling Equipment, Lighting Towers, Welfare Cabins, Range Extenders, Telecom Towers, Hybrid Mini Grid Systems





Benefits of IE-DRIVE for automotive market

- A **modular** fuel cell system, suitable for a range of applications
- High power fuel cell systems
- IE's patented evaporative cooling technology
- Continuous power up to 100kW
- Modular 'one-box' design, scalable to 500kW+

Application include:

Trucks, Vans, Bus / Coach, Rail, Marine, Construction and Stationary
 Power





Scaling up: IE's 2GW global manufacturing centre

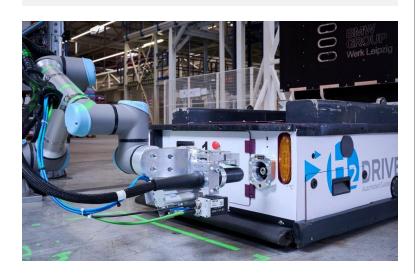
- State-of the-art Gigafactory facility (2GW pa) to support volume manufacture of IE fuel cells
- Fuel cell manufacturing facility with expanded presence (UK)
- Locations shortlisted
- Manufacturing fuel cell stack modules and fully integrated fuel cell systems across all application areas
- IE personnel growth to ~800 staff and indirect supply chain growth of 1,000+ personnel



News

BMW Group

- German automotive manufacturer, BMW, choose Intelligent Energy's fuel cell modules to power Leipzig factory.
- The Leipzig factory will have a fleet size of 27 hydrogen powered AGVs by the end of 2022.
- The AGVs are powered by FES' H2 E-Pack and our IE-LIFT™ 1T.



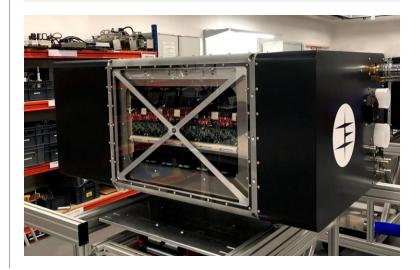
Shell

- Shell Pipeline Company choose IE hydrogen fuel cells for pipeline inspection operations in the North-eastern United States.
- Using Intelligent Energy's IE-SOAR™
 2.4kW on a Harris Aerial H6 airframe, the company was able to compare fuel cells with ICE hybrid technology.



160kW milestone

- Our IE-DRIVE™ HD fuel cell stack hit 160kW, a milestone figure from a single auto stack.
- We are working with partner, Hogreen Air, to assemble HD modules under licence for South Korea and other Asian countries with an initial order for one hundred 100kW IE-DRIVE HD fuel cell systems starting in 2024.





Automotive applications by Intelligent Energy

London Taxi (UK)

- Intelligent Energy led an industry consortium with London Taxi Co. to develop and trial the world's first zero emission hybrid fuel cell black cab.
- Ready for London Olympics (venue transport service for the Mayor's VIP guests); London running for 4 years and 100,000+kms





Suzuki JV (UK-Japan)

- Formal JV with Suzuki Motor Company: SMILE FC Co. based in Yokohama.
- Intelligent Energy led a yearlong collaborative project to trial a fleet of fuel cell scooters with Suzuki and the London Metropolitan Police





Tri-Ring (China)

- IE signed an MOU in 2019, with the Hubei Tri-Ring Truck & Motor Group
- Agreement to collaborate in the Chinese automotive (truck) market to deliver zero emission trucks for freight transport





Changan & Alexander Dennis (UK-China)

- Working with Alexander Dennis and Changan's UK R&D Centre, IE
- Establishing a UK fuel-cell production for large passenger cars, buses and heavy-duty transport.
- Developing a new modular fuel cell system







Aerospace applications by Intelligent Energy

Boeing

- First manned fuel cell flight achieved in 2008
- IE developed and installed a lightweight 25kW EC fuel cell system
- IE engaged with both Boeing Phantom Works and Boeing Spain (BRTE)





ENFICA-FC

- The 'ENFICA-FC' aircraft completed flights out of Reggio Emilia airport, Italy
- Established new speed and endurance records for electric powered class C airplanes
- Take off & climb 36kW, Cruise 18kW, 30-40 min level flight





Airbus

- IE developed a multifunctional fuel cell APU for evaluation by Airbus.
- Airbus won the German Aviation Innovation Award in 2018 thanks to a concept demonstrator developed with Intelligent Energy





Project H2GEAR

- IE partnered with GKN
 Aerospace in an ATI project
 which involves the
 development of a ground breaking hydrogen powertrain
 for regional and sub-regional
 aircraft.
- Entry-into-service of hydrogenpowered aircraft could be as early as 2026







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