

Energy Expertise

// Hydrogen and Fuel Cells

Main expertise areas

- Leadership in hydrogen energy systems research, technologies, and commercialisation
- In depth understanding of UK net zero ambition and a vision for the translation into practical real-world solutions
- Strong track record in developing funded hydrogen research proposals and projects
- Established collaborations across local, regional, national, and international stakeholders working towards the goal of decarbonisation for net zero carbon emissions
- Strong partnerships with Tees Valley Combined Authority, Teesside Industrial Cluster, Teesside University NELEP, NEPIC, PD Ports, MPI, TWI and the UKRI Catapults
- Whole systems approach to hydrogen fuelled transport and heating and cooling including life cycle assessment, economic appraisal, and social justice

Background

Hydrogen can be used directly or stored to efficiently produce electricity and heat. Emerging low carbon strategies have identified Hydrogen technologies as essential to decarbonise sectors that are hard to electrify, such as Industry, Transportation, Heating and Cooling. The emergence of energy from renewable sources has enabled the development of cleaner hydrogen production technologies and, as a result, hydrogen is now a pillar in the UK Government Green Industrial Revolution and Energy White Paper with hydrogen roadmaps being developed by countries and Governments around the globe.

There are many challenges that require research and innovation in the production, transportation, distribution, storage and use of hydrogen; combined with the development of regulatory and policy structures to support the hydrogen economy. Research at Durham University is at the forefront of addressing these challenges and is leading the way in driving forward Hydrogen innovation in the UK and globally.

Research team

The team is managed by **Professor Tony Roskilly**, who is Chair of Energy Systems at Durham University and is a Director of the Durham Energy Institute (DEI). Other team members are:

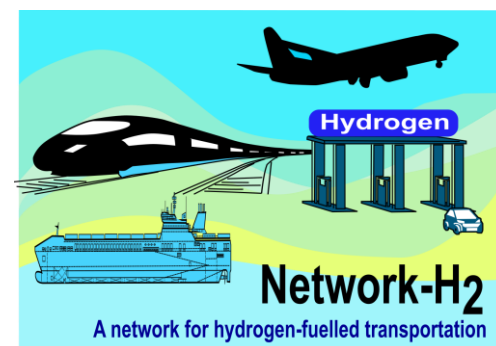
Professor Hongjian Sun
Dr Andrew Smallbone
Dr Simon Beaumont

Dr Abdullah Malik
Dr Yaodong Wang
Dr Huashan Bao

Dr Janie Ling-Chin
Dr Sumit Roy
Dr Alessandro Giampieri

There is a wide range of research interests and expertise within this group which include:

- A Network for Hydrogen-fuelled Transportation (Network-H2);
- Heating and Cooling Zero Network;
- Multi-disciplinary research teams on the decarbonisation of energy, heat, transport, and industry;
- Decarbonising transportation, the hydrogen economy, renewable energy generation, electric vehicles, free-piston engines; and
- Waste heat recovery, energy efficient temperature and humidity control and hydrogen.



Examples of current research

- **Growing Teesside's Hydrogen Economy and catalysing a just transition to net zero.** This is an £11m collaboration with Teesside University to accelerate decarbonisation and the use of hydrogen through supporting industrial research and development and capacity building in the Tees Valley.
- **Energy systems integration of renewable energy from offshore wind for hydrogen production through electrolysis.** This project will strengthen the regional Net Zero energy offer by linking offshore-wind, green hydrogen, and decarbonisation.
- **Developing a heterogeneous photocatalytic system for hydrogen production from wastewater and visible light.** This project is exploring the possibility of producing hydrogen through photocatalysis of wastewater.
- **Sewage sludge waste pyrolysis plant for sustainable hydrogen, syngas, and high-quality pyrolytic char production.** This project is exploring the possibility of industrial production of hydrogen and syngas through the pyrolysis of sewage sludge waste.
- **Network-H2: EPSRC Network for Research into hydrogen fuelled transportation.** Advancing the rapidly advancing hydrogen-enabled transport sector energy, for the marine, on-road, rail, and aviation sectors.
- **ICHP: Zero Carbon Emission Integrated Cooling, Heating and Power Networks** exploring the potential to supply heating and cooling to domestic, commercial, and industrial end-users via integrated zero-carbon emission cooling, heating and power (ICHP) networks using hydrogen.
- **Hydrogen for Heat: a hydrogen powered Combined Heat and Power System.** The project will establish a facility to demonstrate hydrogen fuelled heating, storage, and power generation with potential commercial applications.
- **HyNTS Future Grid Research.** The project is a partnership with National Grid to prove that the transmission network for hydrogen can be relied on in the same way as the current natural gas transmission network.
- **Tees Valley Multi-modal Hydrogen Transport Hub Development.** This project supports the Tees Valley Combined Authority in planning for the Hydrogen Transport infrastructure.
- **Strategic Collaboration and Technological Development of Clean Energy Technologies for Transport Sector** The project will create strategic partnerships for the UK-China university experts working with industries and government to promote the technological development of clean energy technologies tackling Climate Change Challenges in the energy and transport sectors.

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