

# Wi-Fi code

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Social Media: #ERA24Conf  
@EnergyRA

Thursday 25 January 2024. Aerospace Integration Research Centre (AIRC)

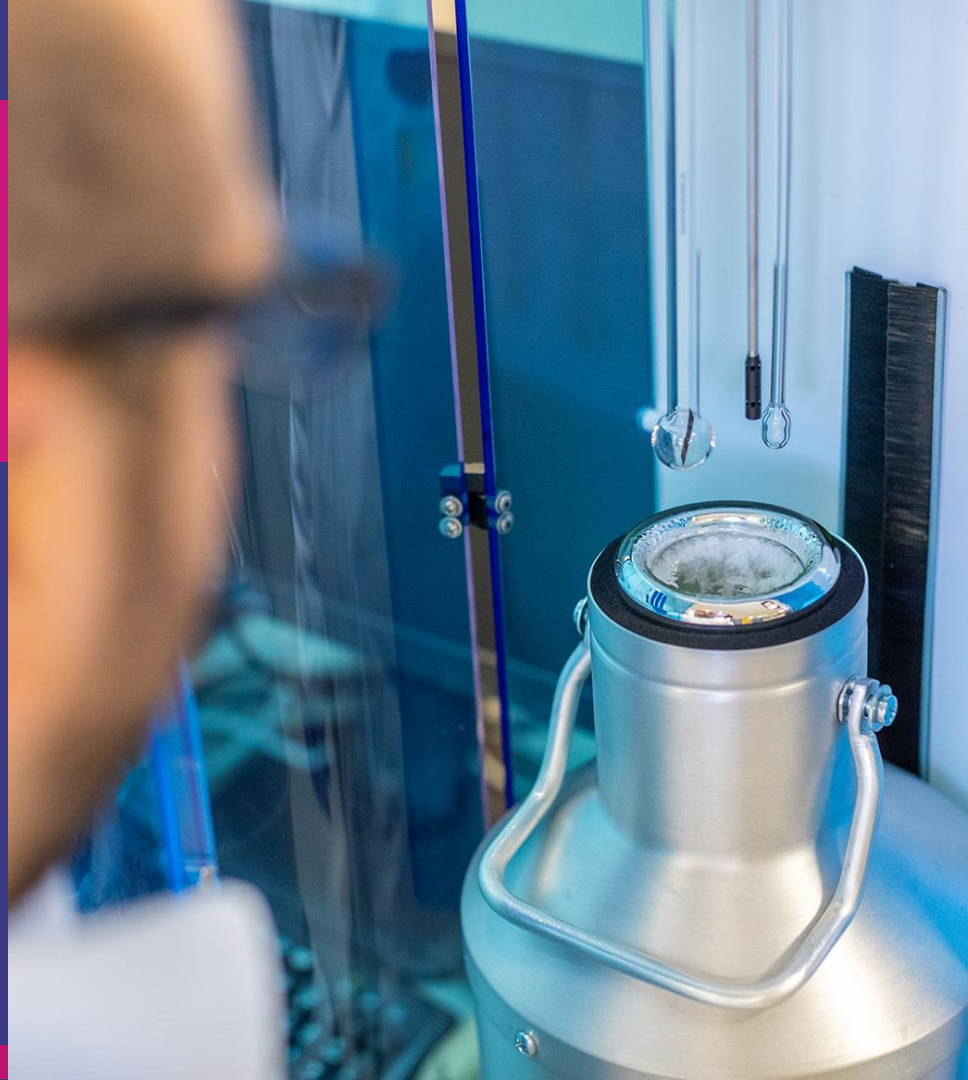
# Conference: A race against time

Energy innovation for net-zero

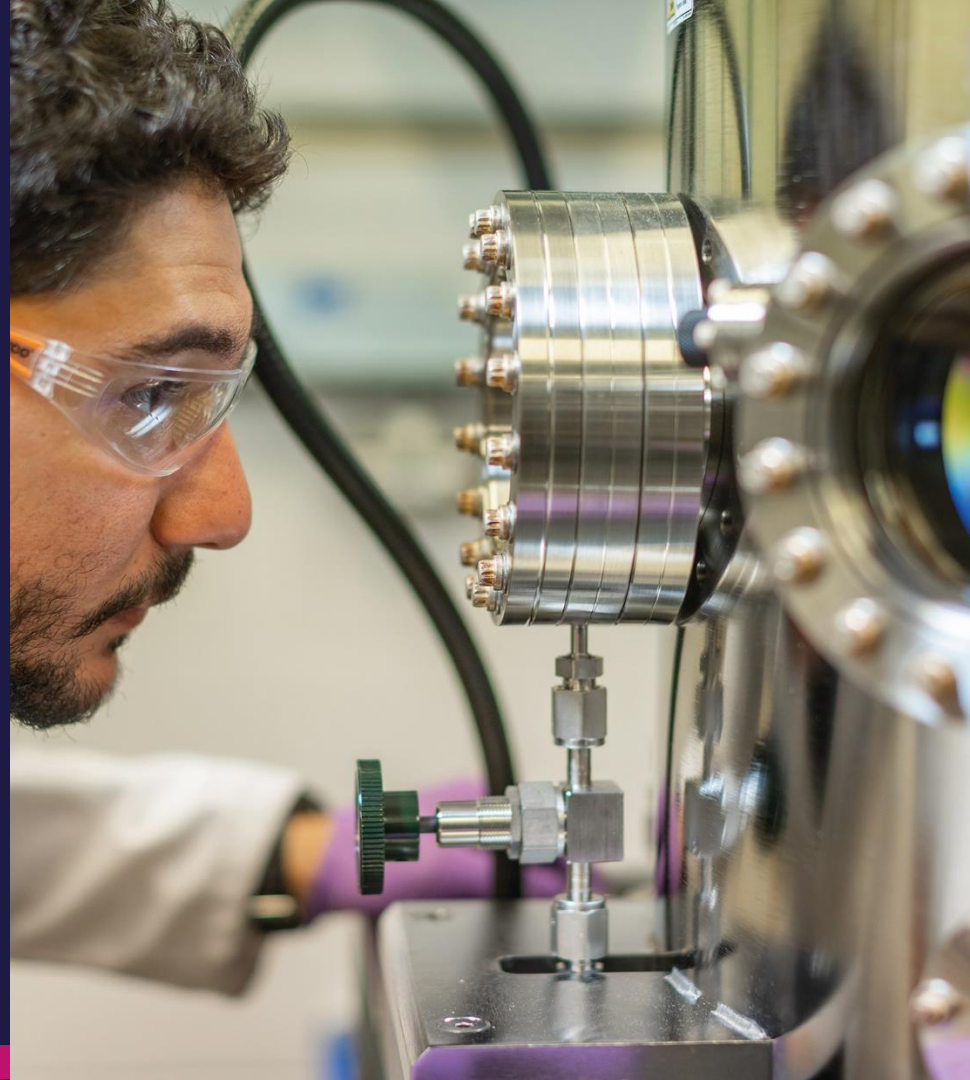
Thursday 25 January 2024. Aerospace Integration Research Centre (AIRC)

# Welcome and Introduction

**Professor Chris  
Fogwill**  
PVC, Cranfield  
University



**Professor Martin Freer**  
Director, Energy  
Research Accelerator



# Agenda

#ERA24conf

 @EnergyRA

- 9.30am Welcome and Introduction from Prof Chris Fogwill, PVC Cranfield University
- 9.50am Keynote: Rachel Fletcher, Octopus Energy
- 10.20am ERA's National Activities, Professor Martin Freer, ERA Director
- 10.40am Panel Discussion on the UK's energy challenges
- 11.30am Refreshments and Networking
- 11.50am The Regional Energy Picture: Faye McAnulla, ERA Programme Director
- 12.05pm Panel discussion on Midlands Energy Opportunities
- 1pm Lunch – Cranfield tours, poster competition, Tesla test drives
- 2.10pm Workshop sessions
- 3.10pm Feedback
- 3.30pm Closing remarks
- 3.45pm Finish

**Rachel Fletcher**  
**Director of Regulation**  
**Octopus Energy**





# Key Challenges in achieving Net-Zero

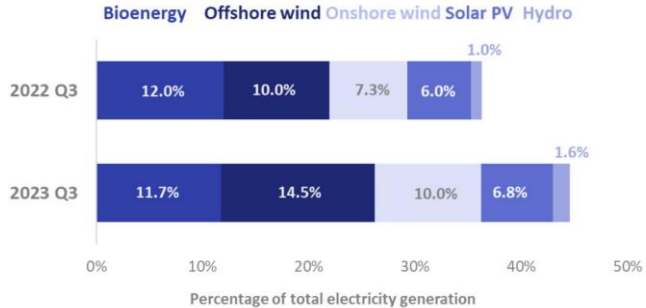
25 January 2024



# Key challenges in getting to net zero

Renewable energy investment is a UK success story, significant YoY growth

Chart 6.3 Renewables' share of electricity generation – Q3 2022 and Q3 2023 ([Energy Trends Table 6.1](#))



Now need to focus on:

1. Connecting low carbon assets to the grid quickly and cheaply
1. Operating a renewable system efficiently and securely
1. Helping people decarbonise their homes

Tackling the remaining challenges require focus to shift:

- from producers to consumers
- from building big assets to optimising assets on the system

Doing this will allow us to get to net zero quicker and cheaper. But it does require us to challenge traditional thinking and make sure we are not duped by fossil fuel interests.



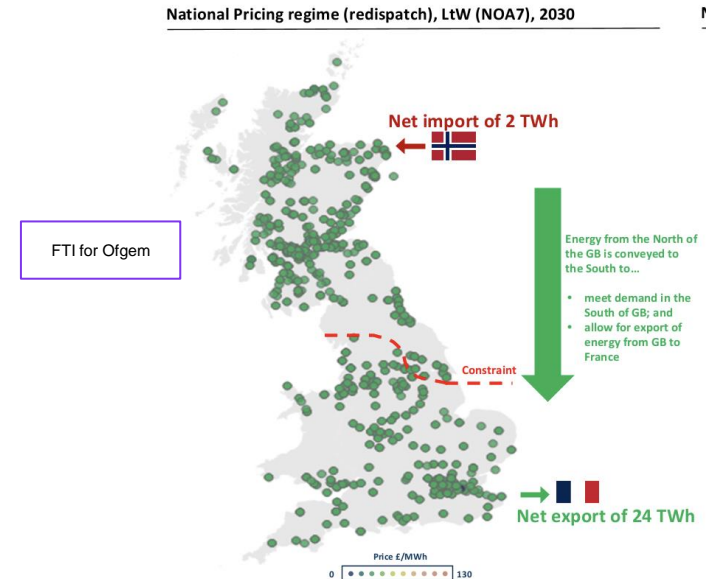
# 1. Stop “grid lock” holding up renewable deployment

Some stark facts:

- Most projects have a connection offer AFTER 2030
- Transmission connection Q over 400GW at the end of 2023 - multiple times the new capacity required
- It takes 14 years to build a transmission line
- In the next 6 years need to build 5 x more transmission lines than built over the last 30 years

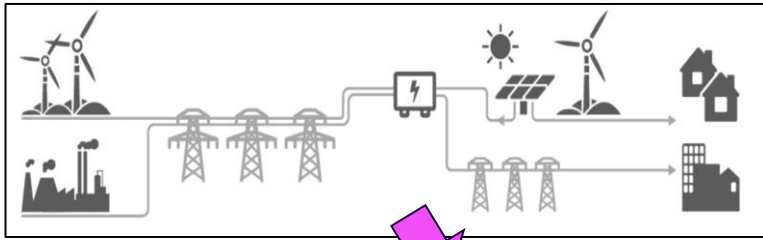
Winsor and other recommendations need to be implemented quickly

AND we could massively reduce the need for new transmission and save £12bn if we “just” used the interconnectors properly.



# 2. Use fresh thinking to operate a renewable system efficiently

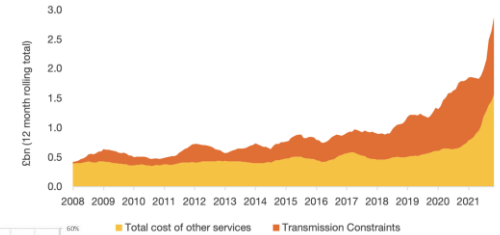
*“Reaching net zero isn’t turning a brown caterpillar into a green caterpillar but into a butterfly” RenewX*



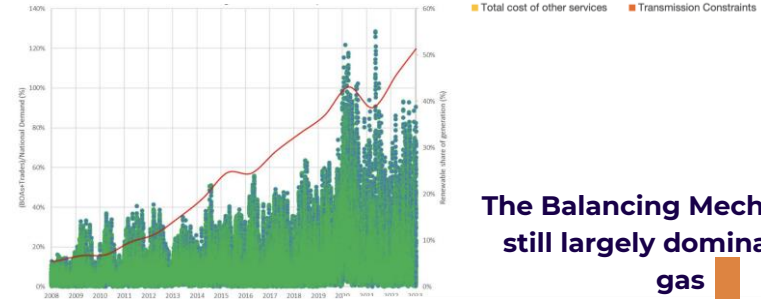
- Decarbonised
- Distributed
- Bi-directional
- Democratic
- Digital



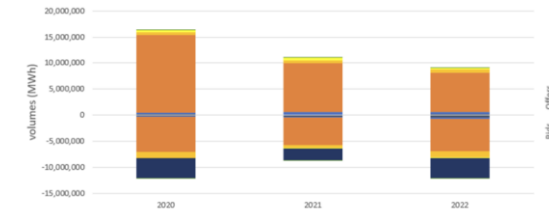
The cost of balancing services is increasing



The ESO is having to redispatch an increasing portion of the market



The Balancing Mechanism is still largely dominated by gas



# Massive potential to use flexibility in electrified transport and heat to save £bns for everyone



- Half of residential demand will come from flexible resources by 2035
- By 2050 we could be reducing peak electricity by around 25%/25GW if new household load is managed smartly
- Cornwall Insight estimate by 2040 smart consumer demand could be saving the country over £14bn a year - if optimised to smooth peaks
- Fewer wind farms, fewer networks, less dependence on fossil fuels, cheaper balancing costs

## Smart demand management is already a reality - GB is leading the world:

- 1.5m Octopus Energy Customers and growing
- EV customers saving 66%, Heat Pump customers saving £200+ ; 800MW “virtual power plant”
- Free electricity in windy hours for 25k customers in certain postcodes
- 10 year zero bill guarantee for those with PV + batteries + ASHP

### 3. Help people decarbonise heat (transport is at exponential growth already)

Electrification has to be the answer -  
“electrify where you can, use hydrogen for the rest”:

- Heat Pumps 3x more efficient than gas fired heating and 6x more efficient than using green hydrogen
- Heat Pump technology is improving and becoming less costly and more suitable for more housing types
- Electrical heating is flexible load - automation helps to flatten system peaks

*Technology revolutions are never linear - we need to beware of linear thinking.*



Technology S Curve in action:  
6kW heat pump installed for between £5k to £8k (less than £500 with grant) - reaching boiler parity with scale  
Purpose built to be faster to install and easier to maintain  
Room sensors to automatically control while providing comfort

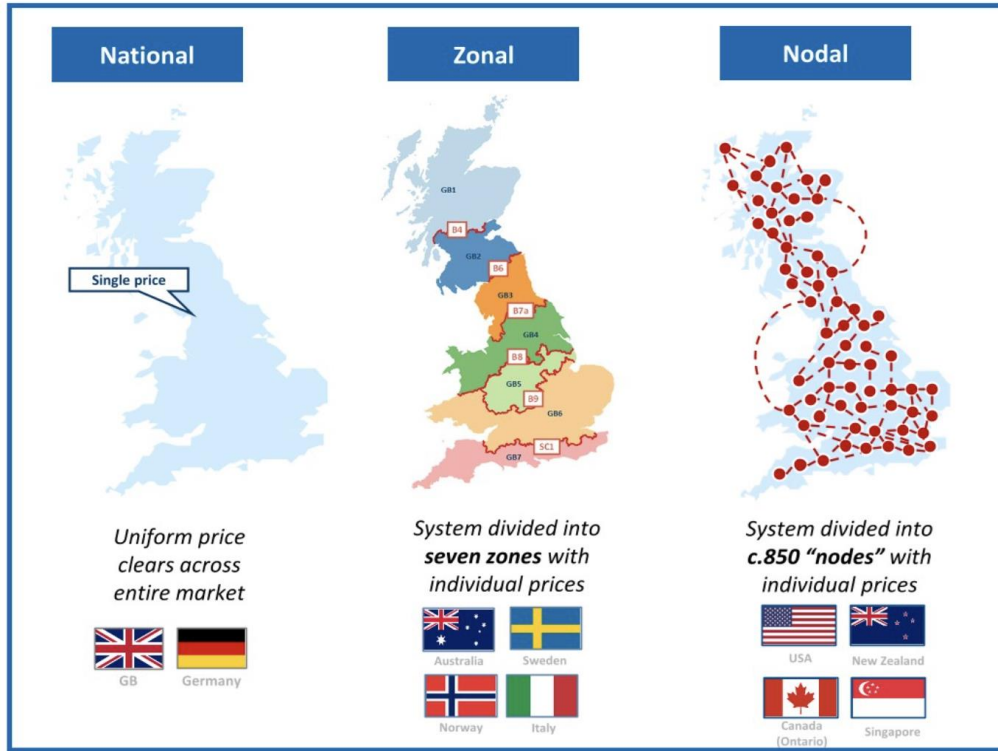
# Solutions are more about markets and enablers, less about Government funding

- Radical wholesale reform and dynamic DNO charges to solve issues with interconnectors and make better use of consumer flex and other low carbon flex (grid scale batteries etc)
- Short term - routes to market for consumer flex - currently not allowed to participate in the BM and Capacity Market participation is difficult
- Remove remaining barriers to customer heat pump adoption - enduring support for lower income households (£ms a year)
- Focus on consumer protections and retail market that can drive innovation for net zero

Vs

- Building big assets, subsidising CCUS (£20bn), increasing balancing and constraint costs (£2bn+ p/a)
- Continued dependence on fossil fuels to meet system peaks - paying coal to stay on the system (£400m p/a)
- Government subsidy for hydrogen - currently £2bn a year
- Consumers left out of the transition, and asked to pay for it.

# Radical wholesale market reform required to optimise the operation of millions of new assets on the system



- With a single GB wholesale price EVs scheduled at the wrong time for the system about 30% of the time - not getting the most from flexible load
- No signal for energy intensive industrial load to locate to where power is plentiful and cheap
- Scotland/NE England has some of cheapest power in Europe, so could help levelling up and reduce the cost of constraining off excess wind through better price signals
- Total social benefits £25bn++ over 16 year period

# We have the potential to create a smarter, leaner and lighter energy system... not just a greener one

- We need fresh thinking - caterpillar knowledge doesn't help us understanding butterflies
- We need to innovate for the customer - helping them decarbonise and support and be part of the electricity system
- We need to be digital - to optimise multi-million of assets doing different things at different times and places across the country
- We need to avoid linear thinking and limiting assumptions about technology and how it can help solve today's problems

Britain has the potential to lead the world in showing how to integrate renewables onto an electricity system in an innovative way that saves £bns a year, and helps to boost the economy as well as helping the planet. We just need to get on with it.

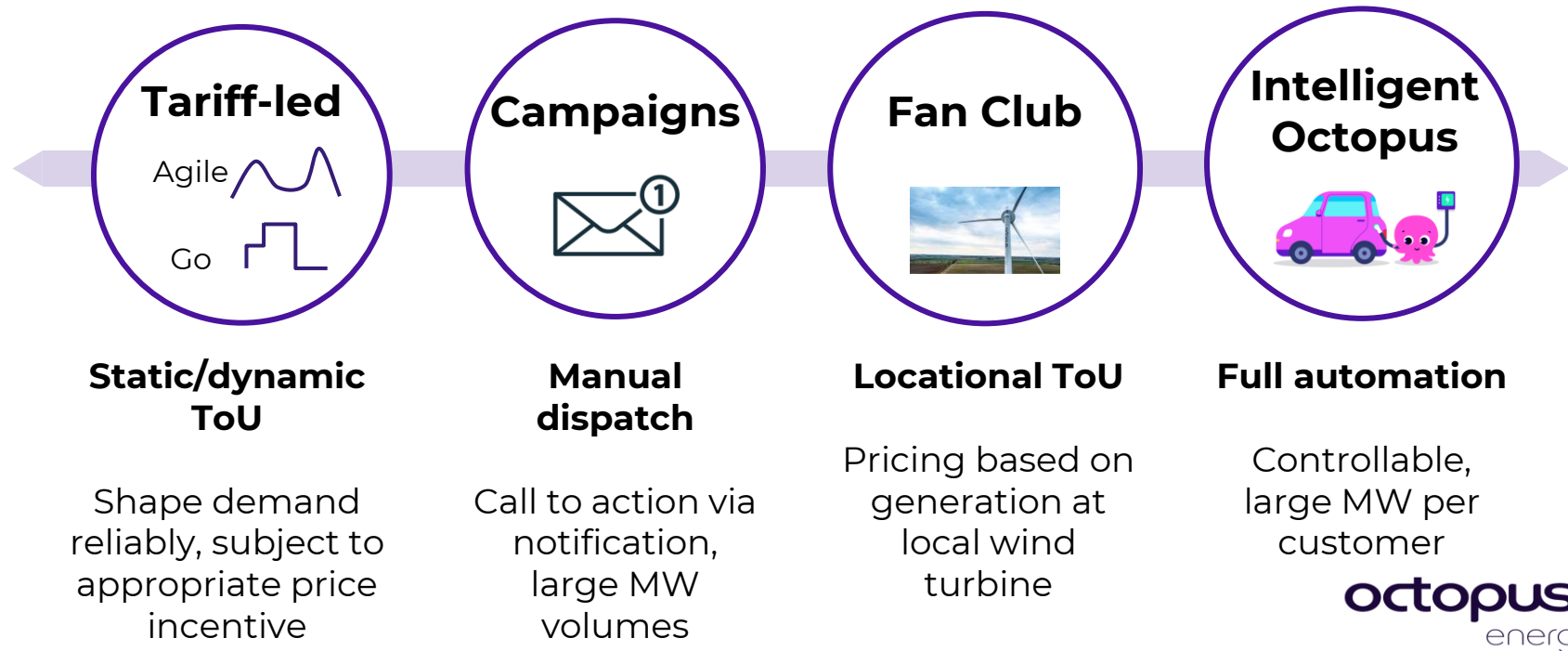
THANK YOU

**Annex**



# Context | Activating consumer flexibility has different flavours that are available today

*Examples of consumer flexibility products designed and executed on Kraken within day(s)*



**This is how demand  
patterns on the energy  
system are changing**

Energy Use

00:00

12:00

23:00



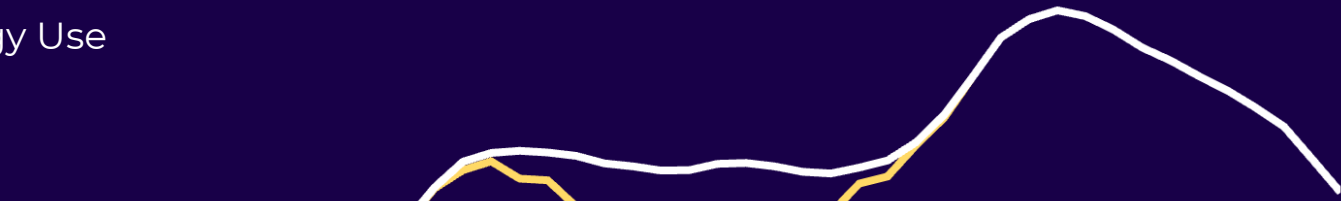
Energy Use

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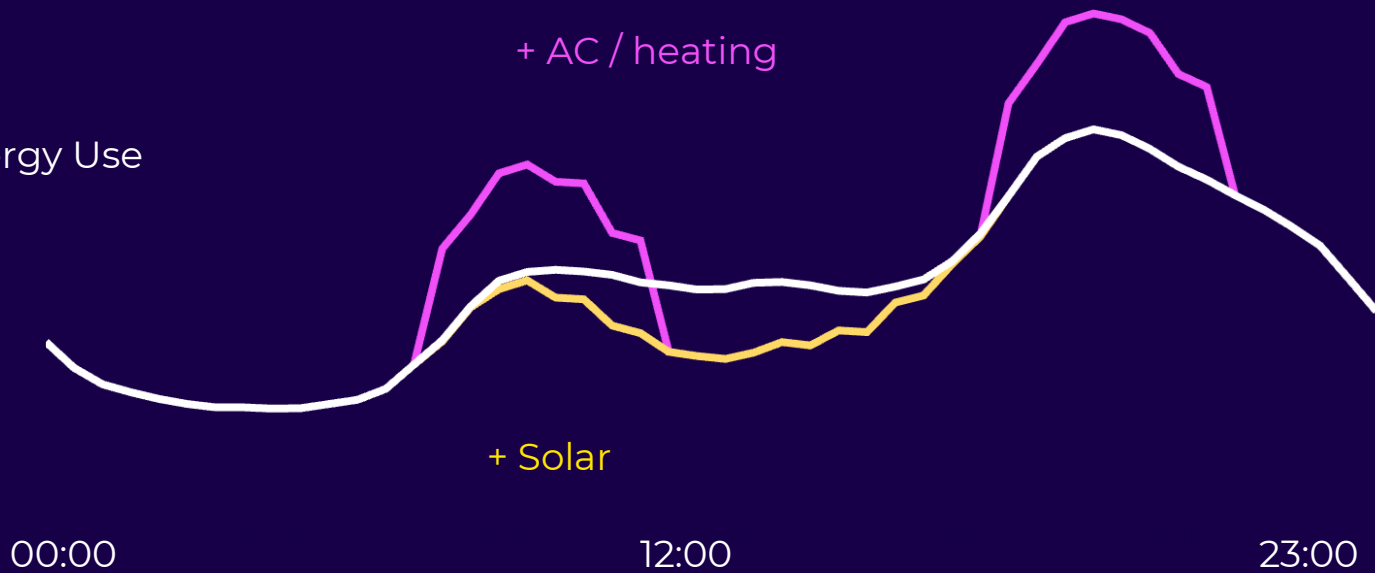
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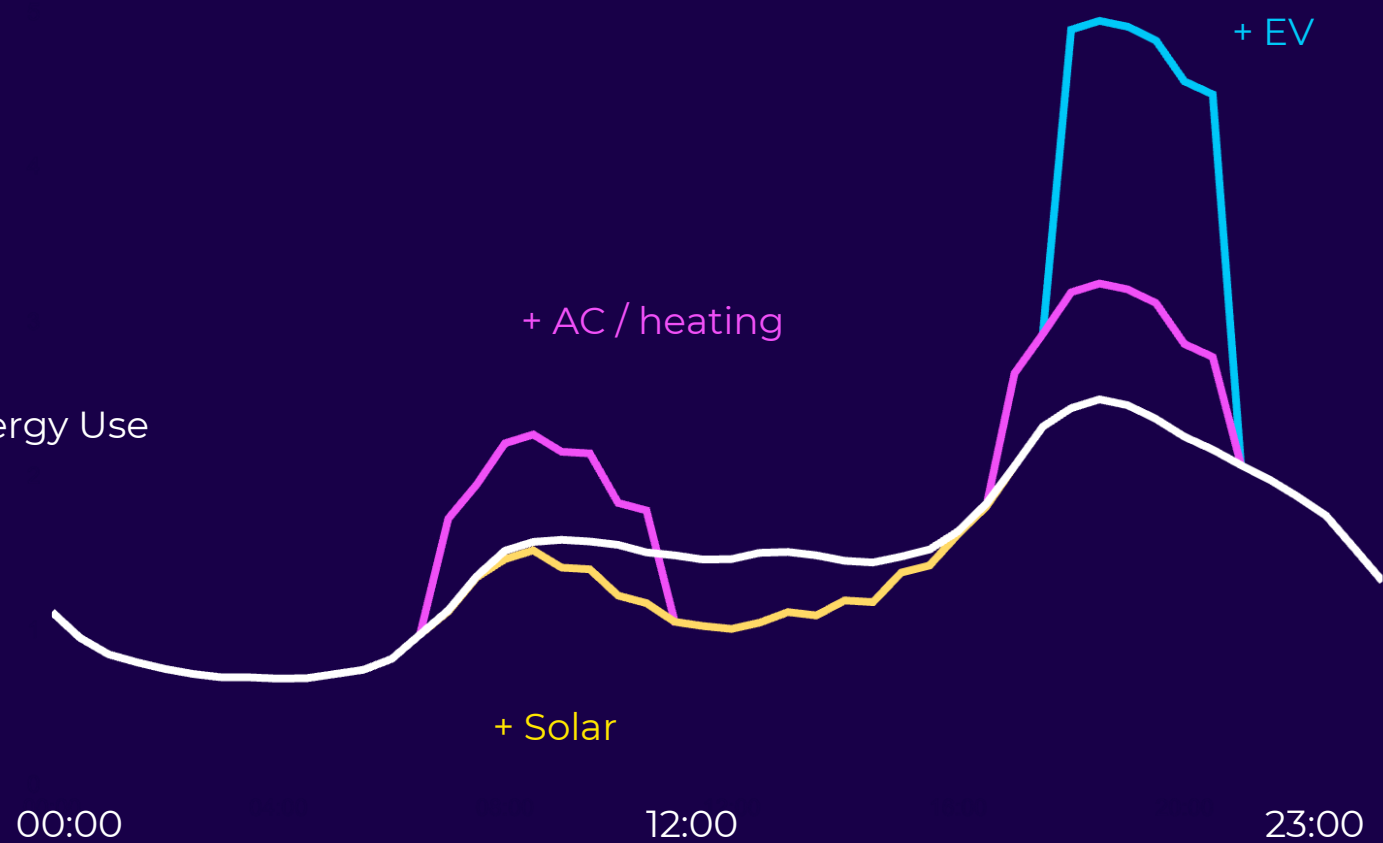
+ Solar



Energy Use



Energy Use



+ AC / heating

+ EV

+ Solar

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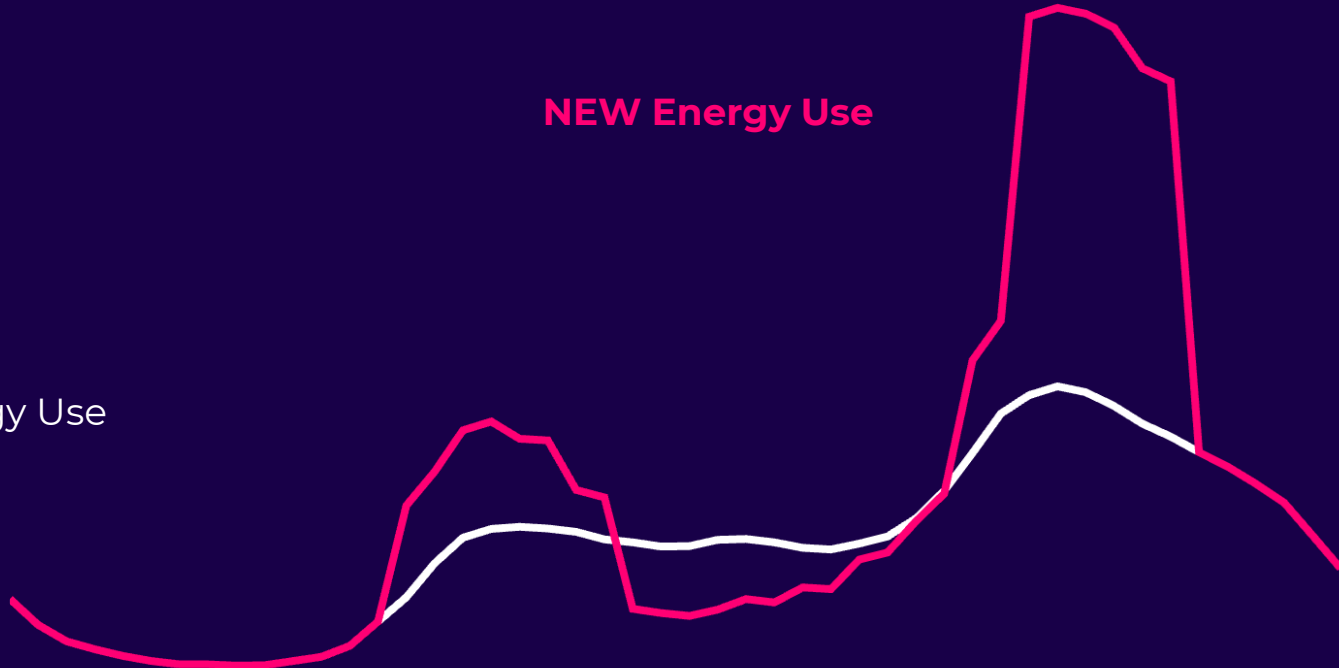
Energy Use

**NEW Energy Use**

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# Managed smartly, consumer products could help reduce total peak system demand

Figure ES.03: ACS Electricity Peak Demand

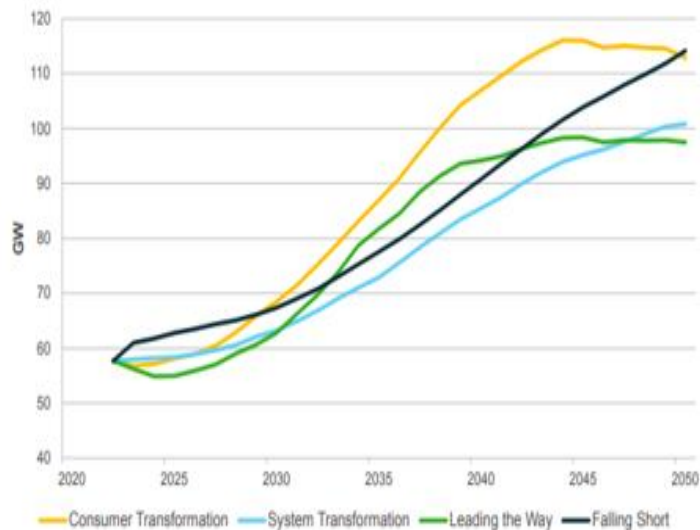
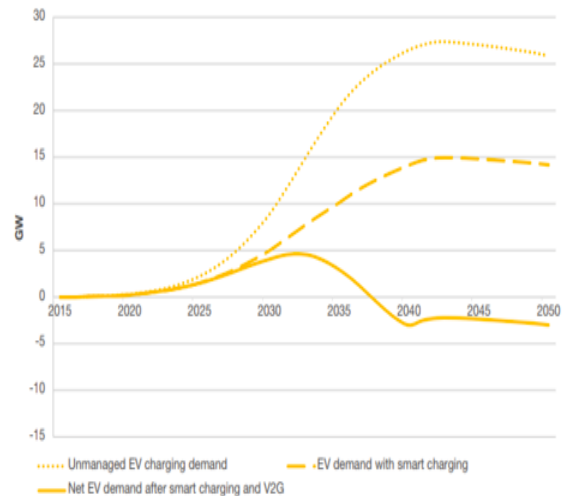


Figure FL.12: Electric vehicle charging behaviour at ACS winter peak system demand  
Consumer Transformation





# ERA's role in the Net Zero challenge

**Professor Martin Freer**  
Director of ERA

**ERA** ENERGY  
RESEARCH  
ACCELERATOR

Conference 2024

@EnergyRA  
#ERA24conf



# ERA ENERGY RESEARCH ACCELERATOR

Accelerating real-world energy innovation

9 WORLD-CLASS MIDLANDS PARTNERS

MORE THAN 1400 RESEARCHERS

60 ERA PHD STUDENTS



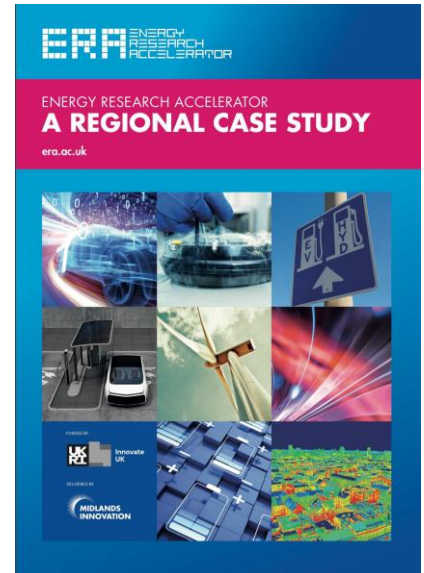
DELIVERED  
**£110 MILLION**  
INDUSTRIAL CO-INVESTMENT

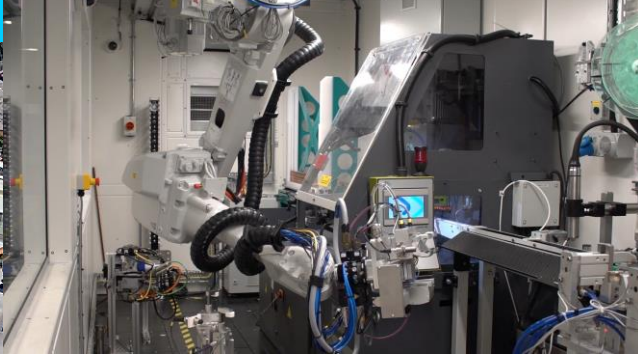


CATALYSED  
**£250 MILLION**  
IN FOLLOW-ON FUNDING



PERFORMANCE  
BENEFIT-TO-COST  
RATIO HIGHER  
THAN ESTIMATED **9:1**

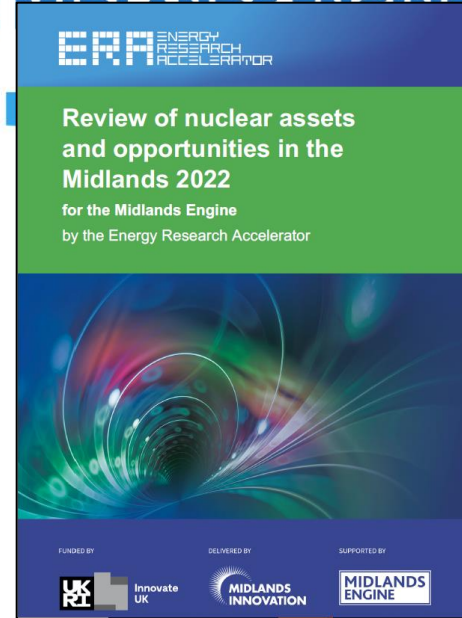
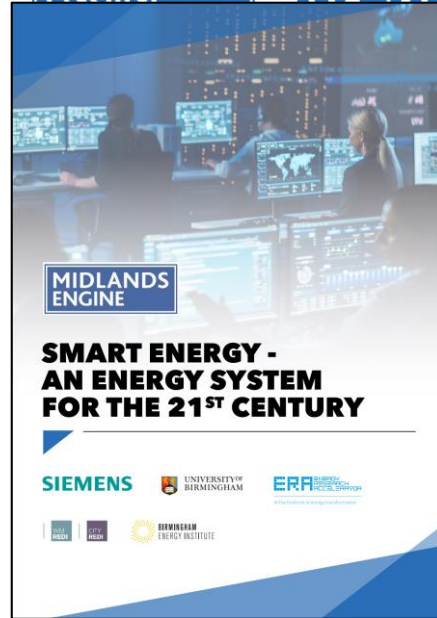
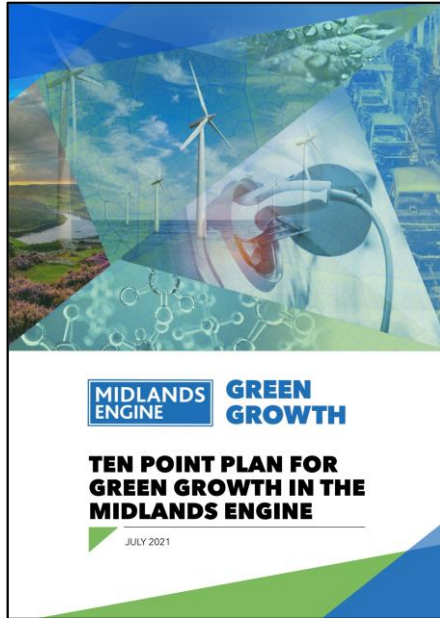




# Regional engagement

## MIDLANDS ENGINE

## TEN POINT PLAN FOR GREEN GROWTH



**BLUE-GREEN PLACES**  
Where people and nature flourish

# Midlands Nuclear

- ERA has launched Midlands Nuclear Industry by bringing together the supply chain with developers, generators, researchers and skills providers
- Initial areas of focus: skills and siting



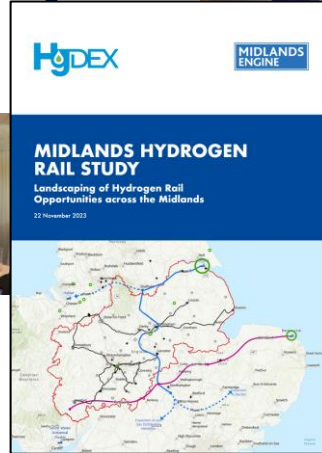
# Developing the hydrogen economy in the Midlands



Beijing



Hydrogen Awards



Toyota



Brussels



Delivering:

- Skills and training
- Demonstrators
- Policy
- Business Support
- International bridges





# Industrial Advisory Group



**Baxi**  
Jeff House



**British Ceramic Confederation (BCC)**  
Jon Filtney



**Bosch and Worcester Bosch**  
Martyn Bridges



**Cadent Gas**  
Sally Brewis



**Intelligent Energy**  
Dennis Hayter



**ITM Motive**  
Duncan Yellen



**JCB**  
Tom Beamish  
Tim Burnhope



**MAG Airports**  
Jon Bottomley



**Cenex**  
Keith Budden



**Centrica**  
Luke Bannar  
Chris White  
William Mezzullo



**D2N2 & Wider LEPs Network**  
Will Morridge  
Frank Horsley



**EDF**  
Rebecca Rosling



**Midlands Energy Hub**  
Michael Gallagher



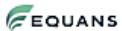
**Midlands Engine**  
Daniel Routt  
Roger Mendonca



**National Express**  
Richard Ball  
David Bradford



**Progressive Energy**  
Chris Manson-Whittom  
Tommy Isaac



**Equans**  
Ben Watts  
Chris O'Connor



**FAUN Zoeller**  
Simon Hyde



**Horiba MIRA**  
Declan Allen



**HS2**  
Neil Waite  
Andreas Davidson



**Siemens**  
Paul Beasley  
Zac Cesaro



**TfWM/WMCA**  
Steve Hayes  
Martin Gallagher



**Toyota**  
Jon Hunt



**Uniper**  
Dave Potter

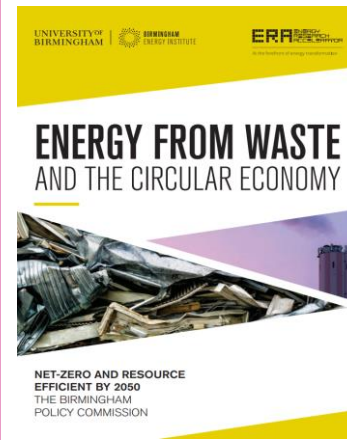




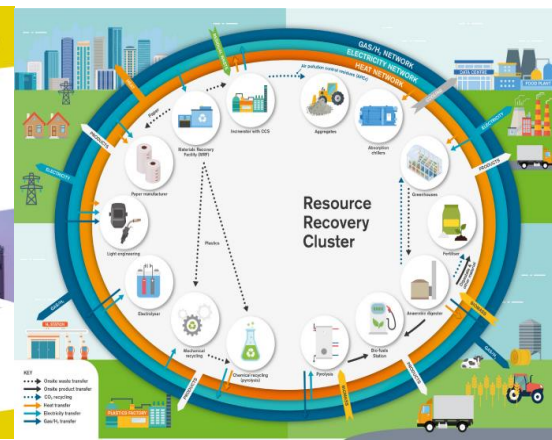
# Influencing energy policy



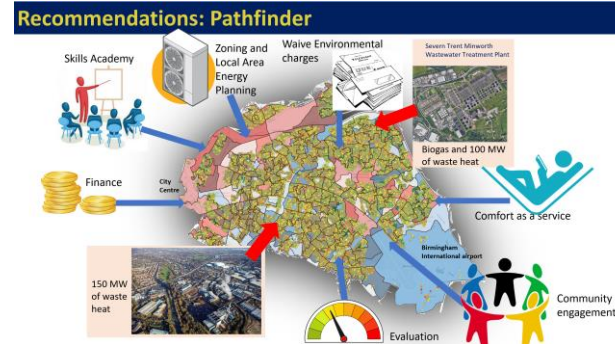
**Role of regions in energy innovation**  
 Established Energy Capital and Energy Innovation zones




**Moving thinking on energy from waste**



**Long Duration Energy Storage Debate**




# Influencing Energy Policy



## Assessing the case for public ownership in the energy sector

A report by the Energy Research Accelerator



@EnergyRA


Lord Billmorla (Chair)

### Commissioners

First name	Surname	Job title
Adam	Berman	Deputy Director
Nina	Skorupska	CEO
Rachel	Fletcher	Director of Regulation
Heleen	Andrews-Tipper	Head of Policy
David	Boardman	Head of Strategy
Phil	Longhurst	Professor
Martin	Freer	Director
Faye	McAnulla	Programme Director
Benet	Northcote	Founding Partner
John	Loughhead	Chair of Environmental Energy Technology
Andy	Manning	Energy System

### Witnesses

First name	Surname	Job title	
Donal	Brown	Director of Sustainable Design Collective	
Philip	McNally	Chair of Young Professionals Forum	
Rob	Saunders	Challenge Director	
Phil	Beach	CEO	
Paul	Spence	Director of Strategy	
Morten	Duedahl	Business Development Manager	
Jonathan	Friel	Associate Director	Mace
Nina	Skorupska	CEO	REA



The Energy Research Accelerator invites you to the launch of its Policy Commission on

## Assessing the case for public ownership in the energy sector

Wednesday 31 January 2024, 3.30pm - 5pm,  
 Cholmondeley Room and Terrace,  
 House of Lords

Last year was the hottest on record, causing extreme weather all over the world, and global emissions are still rising. It has never been clearer that we need to radically accelerate the shift to cheaper clean energy. The question is how?

One idea gaining traction in the UK is a return to public ownership. The Energy Research Accelerator (ERA) has drawn on a wide set of stakeholders to think through in detail the potential roles of a publicly owned company in areas such as offshore wind, grid development, energy storage and critical infrastructure through to local energy. This event will set out the findings of our report and how a well-focused public energy company could provide the maximum benefits.



This event is kindly hosted by Baroness Verma, and other speakers include:

- Dr Alan Whitehead MP, Shadow Secretary for Energy Security
- Dr Nina Skorupska (CBE), Chief Executive of the REA (The Association for Renewable Energy and Clean Technology)
- Professor Martin Freer, Director of the Energy Research Accelerator and Birmingham Energy Institute

Register for this special event

Complete the registration form at: [PublicEnergy.eventbrite.co.uk](https://publicenergy.eventbrite.co.uk) by Wednesday 24 January.

Or email: [Nick.King@era.ac.uk](mailto:Nick.King@era.ac.uk) if you have any questions.

First name	Surname	Job Title	Organisation
Tom	Greatrex	CEO	Nuclear Industry Association
Sara	Vaughan	Chair	Elecon
Tony	Curzon-Price	Economist Strategy Adviser	Self-employed & Ofgem
Michael	Liebreich	Energy consultant and thought leader	Liebreich Associates
Ryan	Jude	Programme Director	Green Finance Initiative
John	Flint	CEO	UK Infrastructure Bank
Christopher	Taylor	Technical Director	Vital Energy
Jon	Gibbins	Director	UK Carbon Capture and Storage Research Centre
Caroline	Bragg	CEO	Association of Decentralised Energy
Seamus	Garvey	Professor	University of Nottingham
Rachel	Fletcher	Director of Regulation	Octopus
Giles	Wilkes	Senior Fellow	Institute for Government
Lord	Deben	Former Chair	UK Climate Change Committee
George	Dibb	Head of Centre for Economic Justice	IPPR
Sandy	Hager	Senior Lecturer International Political Economy	City University
Melanie	Brusseler	Senior Researcher	Common Wealth
Adrienne	Buller	Director of Research	Common Wealth
Chris	Hayes	Senior Analyst	Common Wealth

### Project team

First name	Surname	Job title	Organisation
Martin	Freer	Director	Energy Research Accelerator
Faye	McAnulla	Programme Director	Energy Research Accelerator
Nick	King	Marketing Manager	Energy Research Accelerator
David	Strahan	Writer	
Gill	Williamson	Graphic Designer	Gill Williamson Brand & Design

# ERA Skills programme





- **Fellowships:** Wind-turbine, Net zero systems, Electric switching, Energy digital twins,
- **Sandpits:** Water Industry, Small Modular Reactors, Hydrogen, Industrial decarbonisation, Built environment, Energy storage, User behaviour, Circular economy.
- **Training:** Peer-to-peer, expert-led, industry-relevant, video impact, professional development, careers.
- **Industry:** Secondments, placements, networking grants, funding development grants, peer review (sandpits).
- **Impact:** Annual conference, Policy showcase, Dragon den style event, Business engagement events.

# Current research and development focus

- Energy and the Built Environment
- Decarbonisation of Industry
- Data and AI
- Energy Generation and Systems
- Transport and Mobility
- Sustainability and People

	Energy and the Built Environment	Energy Generation and Systems	Transport and Mobility	Sustainability and People	Decarbonisation of Industry
	Heating and cooling	Energy generation	Electric and hydrogen flight and airports	Circular economy and critical materials	Hydrogen for industry
	Thermal efficiency	Energy storage and materials	Space travel and applications	Habitable earth and climate justice	Energy efficiency and storage
	Local Area Energy Planning	Smart energy	Batteries and hydrogen	Sustainable fuels and biochar	Low cost energy
	Net zero buildings	Energy markets	E-mobility, trucks and trains	Nature inspired materials	Next generation manufacturing
Social Science and Policy	Low carbon heating uptake	Energy crisis, energy costs	Integrated transport	Consumers and net zero	Intensive energy use and cost
Skills and training	X	X	X	X	X
TRL upscaling, value/supply chains analysis	X	X	X	X	X
Data and AI	Data in the built environment	Energy systems data, digital twins	Telemetry, vehicle data and digital twins	Sustainability and resilience modelling	Low carbon planning

# Panel discussion: National energy challenges

- Michelle Bentham: Chief Scientist, British Geological Survey
- Tom Greatrex: Chief Executive, Nuclear Industry Association
- Dennis Hayter: Managing Director, Intelligent Energy
- David Wright: Director of Electricity Transmission, National Grid

# Regional research and innovation

Faye McAnulla,  
Programme Director,  
ERA

**ERA** ENERGY  
RESEARCH  
ACCELERATOR

Conference 2024

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#ERA24conf



# Meet the team



**Professor Martin Freer**  
Director



**Faye McAnulla**  
Programme Director



**Nick King**  
Marketing and Communications



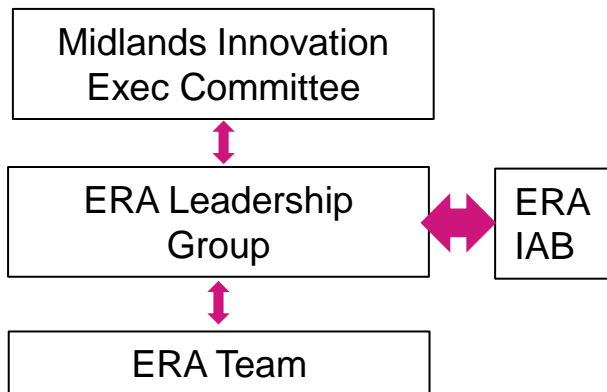
**Anu Khandelwal**  
Project and Executive Coordinator



**Lennie Foster**  
ERA Skills Manager



**Dr Kathryn North**  
Head of ERA Skills



**Suzanne Robey**  
Project Manager



**Sarah Gomes**  
Skills Officer



**Katherine Mycock**  
Business Engagement Officer



# Innovation and commercialisation



HyPER, Cranfield



LAES, Birmingham



Battolysers, Loughborough



Urban Biochar, Aston



FlexFuel Engine, Nottingham



Batteries, Warwick

# Freeport funding for Loughborough and Nottingham universities

- £5m+ pledged by East Midlands Freeport, match-funded by the University of Nottingham and Loughborough University, for the first phase of a zero carbon innovation centre
  - anticipated to complete in mid 2024
  - based primarily at Nottingham's Jubilee Campus
- Access to technology and laboratories to progress research in electrification, hydrogen propulsion systems, and advanced manufacturing – for industry use
  - attracting international investment
  - providing support for businesses of all sizes
- Construction to begin for a green hydrogen production, testing and training facility at Loughborough University Science and Enterprise Park (LUSEP)
  - installation of new battery-electrolyser

Contact: Dr Sarah Malone,  
[zerocarboncluster@nottingham.ac.uk](mailto:zerocarboncluster@nottingham.ac.uk)



# East Midlands Hydrogen

- Nottinghamshire, Derbyshire and North Leicestershire
- 44 members (including HyDEX/ERA)
- Demand exceeds 10TWh by 2040 across 70 sites (=61% of ind, comm, power gas demand).
- Potential for significant carbon abatement

Contact: Sally Brewis  
 sally.brewis@cadentgas.com



# Aston: Urban Biochar & Sustainable Materials Demonstrator

- EBRI funded by GBSLEP to deliver an Urban Biochar and Sustainable Materials Demonstrator project.
- Develop biochar for urban environments, and local economies;
- Research how biochar can be used in urban landscapes and carbon capture merits of biochar.



*Heats wood and plant material without oxygen using 'pyrolysis' process. Produces valuable byproducts including gases, oils and biochar. Prevents release of greenhouse gases and long-term capture of carbon.*



Contact: Tim Miller  
t.miller1@aston.ac.uk

# University of Leicester and Space Park Leicester, World-leading space and Earth observation cluster

- Nuclear systems can enable missions that would otherwise be impossible.
- In 2019, UoL generated usable electricity from americium, produced during the radioactive decay of used fuel from nuclear reactors and emits power for more than 400 years.
- Have now developed the first ever working prototype radioisotope thermoelectric generator (RTG) system, capable of providing 200W of heat and 50W of electrical power in space.
- Contact: [kjt7@leicester.ac.uk](mailto:kjt7@leicester.ac.uk)



# Midlands Green Innovation Network

- ERA is running a regional network for businesses.
- Provides SMEs with information and practical support & advice to maximise their potential.
- Programme of events and activities have taken place, including:
  - Funding for Green Innovation
  - Intellectual Property
  - Thinking and Working Innovatively
  - Skills for Green Innovation
  - Remodelling Your Brand for Net-Zero
  - Sustainable Product Development
  - Developing a Sustainability Action Plan

Register and more details at: [www.MGIN.co.uk](http://www.MGIN.co.uk)

Contact: [Nicholas.King@era.ac.uk](mailto:Nicholas.King@era.ac.uk)



# Developing the hydrogen economy in the Midlands



Commercialisation and Innovation  
Supporting industry to enter and innovate in the sector

Skills and Training  
Developing training programmes  
Engaging on skills development



Demonstration  
Development of hydrogen facilities at our partner sites

International  
Developing relationships internationally to encourage knowledge exchange and investment



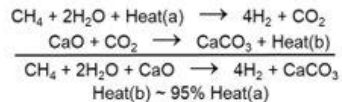
Contact: [f.e.mcanulla@bham.ac.uk](mailto:f.e.mcanulla@bham.ac.uk)

Policy

Inputting to policy development and working with policymakers



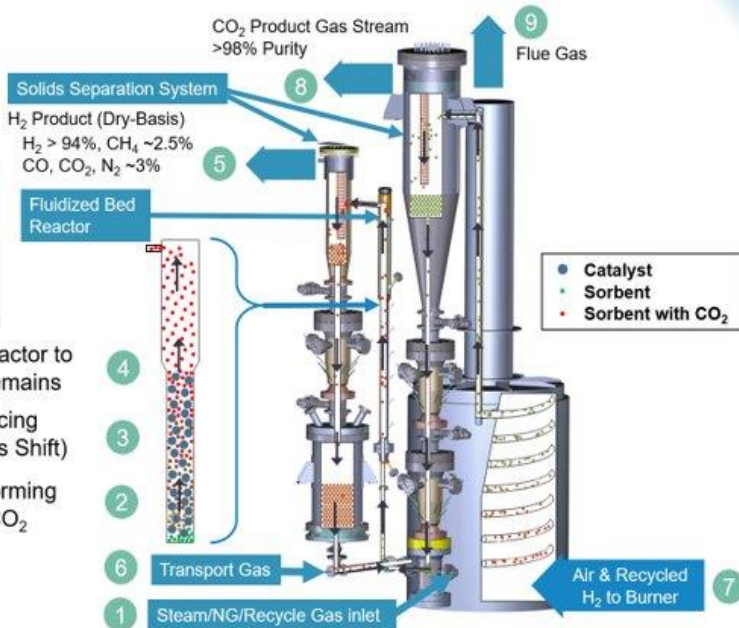
**Sorption Enhanced Reforming (SER)**



Sorbent elutriates through reactor to filter while heavier catalyst remains

CO<sub>2</sub> absorbed by sorbent forcing more CO<sub>2</sub> to form (Water-Gas Shift)

Steam Methane Reforming produces H<sub>2</sub>, CO & CO<sub>2</sub>





# H2GP Programme

- Launching the UK programme
- Programme for secondary school children
- Design, test and race radio controlled cars
- Programme running from Jan to July 24 with UK final and world final in the Summer
- Keen to hear from sponsors and schools



[www.era.ac.uk/projects/horizon-hydrogen-car-project/](http://www.era.ac.uk/projects/horizon-hydrogen-car-project/)

Contact: [f.e.mcanulla@bham.ac.uk](mailto:f.e.mcanulla@bham.ac.uk)



# Hydrogen Winter School 8-12 January 2024

- Five-day programme with accommodation
- Mix of academic lectures and industry guest speakers
- Visits to the hydrogen research facilities at our university partners.



Summer event EOI being taken for interested attendees.

Contact [S.Gomes@lboro.ac.uk](mailto:S.Gomes@lboro.ac.uk)



- Flex Dual-Fuel Heavy-Duty Engine
- H2, NH3 ... and more!



University of  
Nottingham  
UK | CHINA | MALAYSIA

**MAHLE**  
Powertrain



**Decarbonisation via  
Dual-Fuel Operation**

---

**100% Diesel  
Operation Possible!**

# Innovation Report: Hydrogen Rail for the Midlands

- Rail Feasibility Study with Midlands Engine, Vanguard
- STS, University of Birmingham and Arup
- Stakeholder workshop - opportunities & challenges
- Report identified four priority routes
- Successful trial could unlock a larger commercial opportunity and support rail decarbonisation
- Report prepared; launch planned
  
- Contact: Suzanne Robey,  
[Suzanne.Robey@nottingham.ac.uk](mailto:Suzanne.Robey@nottingham.ac.uk)



- HyDEX Innovation Fund is currently supporting 9 SME's from across the Midlands to develop a hydrogen technology/service +1 TLR level.
- Networking events
- HyDEX off Road Network
- Hydrogen Skills in person and online (see Hydrogen skills Hub)



# Summary of benefits of engaging with us

- Collaboration opportunities to apply for research and innovation grants
- Knowledge exchange from attending conferences, networks and talks/workshops
- Involvement in our skills development programmes
- Access to ERA partner facilities for R&D and demonstration facilities
- Promotion of your initiatives through the ERA comms channels
- KTP and PhD opportunities



# Upcoming events – ERA & HyDEX

Event title	Date	Details
<b>ERA Policy Commission report launch</b>	31 Jan	Launch of the Policy Commission report on 'Assessing the case for public ownership in the energy sector' in Westminster, London
<b>Hydrogen Awards</b>	27 Feb	Opportunity for any researchers in the ERA/HyDEX network to enter the Hydrogen Awards
<b>EU-UK Hydrogen Engagement</b>	March and June 2024	Policy engagement events planned in the UK and Brussels
<b>H2 Grand Prix</b>	June 2024	We will be showcasing the programme at Hydrogen UK Conference. Finals in June

# ERA ENERGY RESEARCH ACCELERATOR

## Thank you for your time

f.e.mcanulla@bham.ac.uk

[era.ac.uk](http://era.ac.uk)

[@EnergyRA](https://twitter.com/EnergyRA)

[Linkedin: energyresearchaccelerator](https://www.linkedin.com/company/energyresearchaccelerator)





# Panel discussion: Regional opportunities

- Ian Cuddinton: Director of Economic Development, Rolls-Royce
- Kelly Manders: Regional Development Manager, Cadent
- David Horsfall: Director of Tyseley Energy Park
- Katie Greenhalgh: Green Growth Lead, East Midlands Freeport

# Lunch break

- Don't forget
- HyPER hydrogen demonstrator tour
- Student posters and stands
- Tesla test drives!
- See you back here at 14:00

# Workshops

- **AI and Data - Ground Floor:** Rob Shipman, (Uni of Nottingham)
- **Decarbonising Industry – Main Room:** Vasilije Manovic, (Cranfield Uni)
- **Energy and the Built Environment – Main Room:** Dominika Walker, (Tomato Energy)
- **Hydrogen Storage – Pod room (back of Main Room):** Kat Mycock (HyDEX) & Gordon Arnott (Uni of Nottingham)
- **Skills for the Net-Zero transition - Ground Floor:** Lennie Foster (ERA), Keith Wishart (IBM), Swathi Mukundan (C-DICE), Nazmiye Ozkan (Cranfield)
- **Transport and Mobility – Ground Floor:** Martin Freer and Faye McAnulla (ERA)

# Workshop feedback

Please feedback 3 or 4 main points  
from your discussion group



# Summary and final thoughts

Professor Martin Freer,  
ERA

Professor Chris  
Fogwill, Cranfield  
University



**ERA** ENERGY  
RESEARCH  
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# Thank you for attending the ERA Conference 2024

Have a safe journey home

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