Leicestershire Innovation Festival24

llep creating economic prosperity Leicester & Leicestershire Enterprise Partnership

Leicester & Leicestershire CAREERS HUB

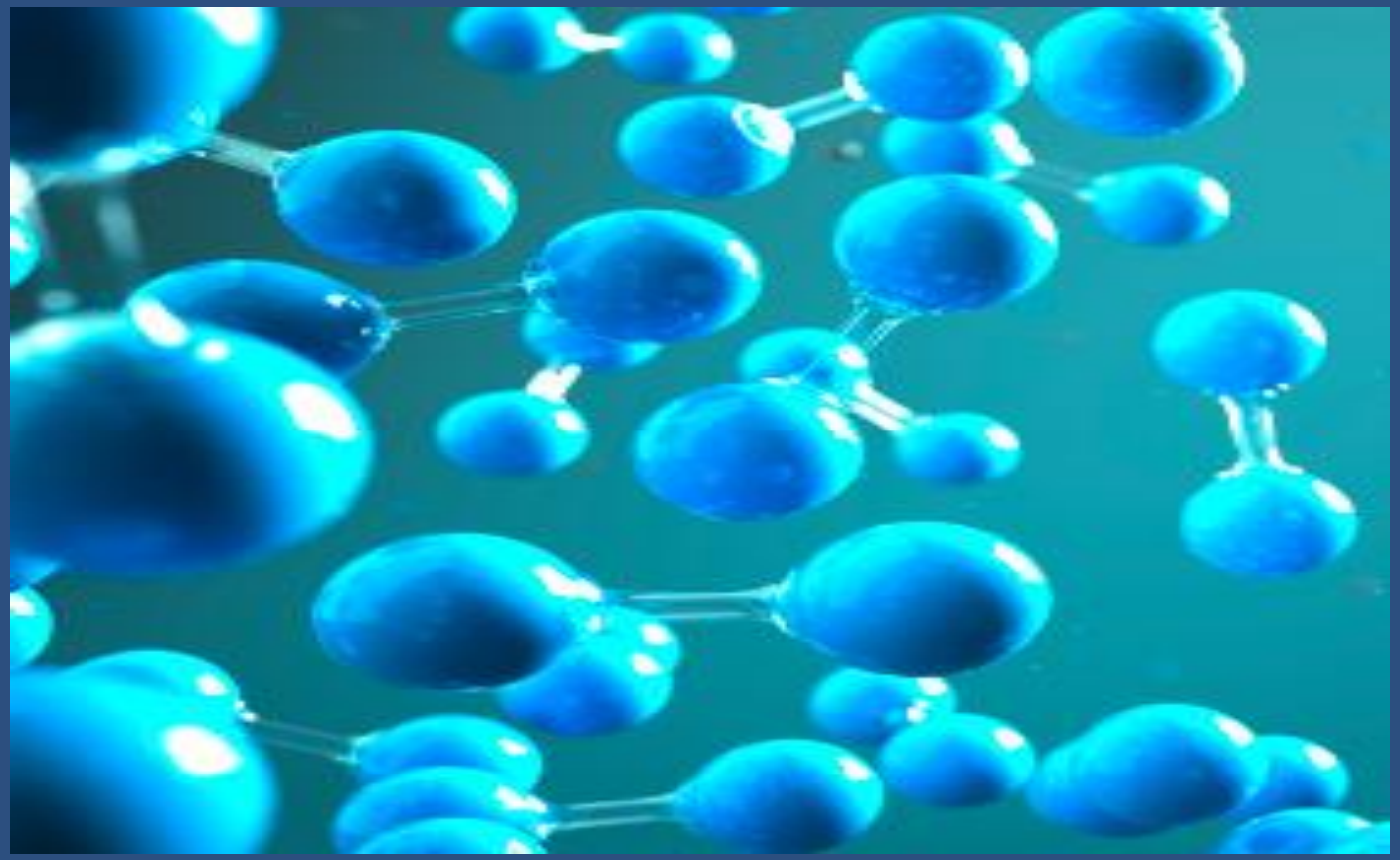
THE CAREERS & ENTERPRISE COMPANY

llep growth hub business gateway

Welcome!

Fuelling Futures: Hydrogen Skills

Small Change, Big Impact



#LIF2024

Leicestershire Innovation Festival24

Agenda

2.00	***Welcome***	***Anna Cyhan, LLEP Economic Growth and Investment Officer-skills***
2.05	***Introduction to hydrogen***	***Chair*** ***Dennis Hayter, Head of External Affairs, Intelligent Energy***
2:15	***Scene Setting***	***Will Morlidge*** ***Chief Executive, D2N2*** ***East Midlands Hydrogen Partnership***
2:25	***Business insight***	***Sarah Windrum,*** ***MIRA Technology Park – overview of MIRA onsite hydrogen developments***
2:35	***Business insight***	***David Manley,*** ***Head of Sustainability, Forterra*** ***Forterra use of hydrogen***
2:45	***Local skills offer and hydrogen***	***Rachel Quinn*** ***Executive Director*** ***East Midlands Institute of Technology***
2:55	***Local skills offer and hydrogen***	***Lisa Bingley*** ***Operations Director*** ***MIRA Technology Institute***
3:05	***Panel discussion- open for audience questions***	***All speakers plus Kathryn North from HYDEX and Craig Line from NWSLC*** ***Led by Chair***
3:20	***Wrap up and closing summary.***	***Chair*** ***Dennis Hayter, Head of External Affairs, Intelligent Energy***

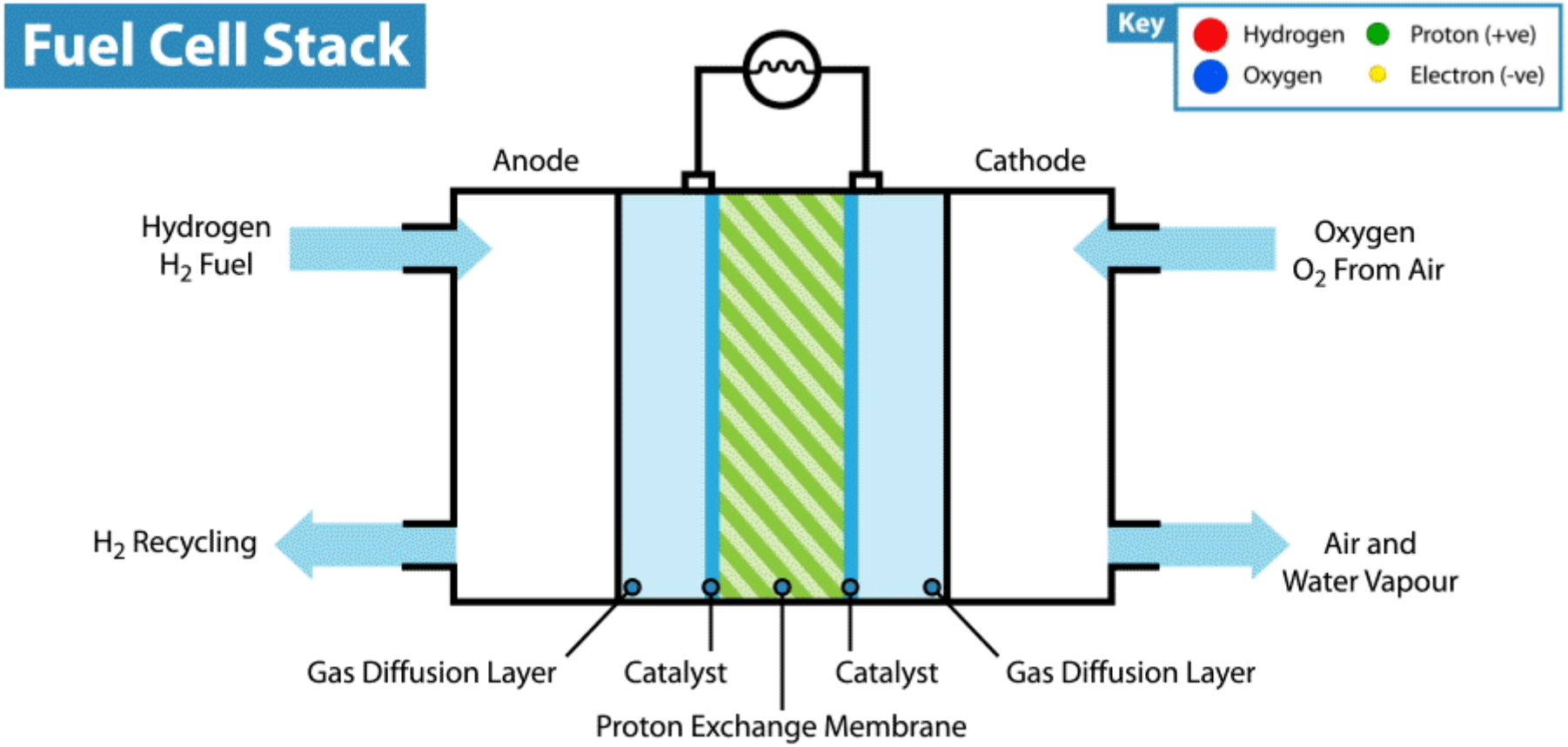
LIF 24 Hydrogen Skills

Fuelling Futures

Dennis Hayter

15th February 2024

Hydrogen is a fuel – and a fuel cell provides zero emission power



Hydrogen and fuel cells…

Fuel cells **generate electricity** through an environmentally friendly **electrochemical reaction**.

A **zero-emissions** solution.

Produces continuous power when hydrogen and air are supplied.

No combustion is involved with a fuel cell – but H2ICE is a transition technology.

Fuel cell stack

+

Hydrogen

+

Air

=

Electricity

+

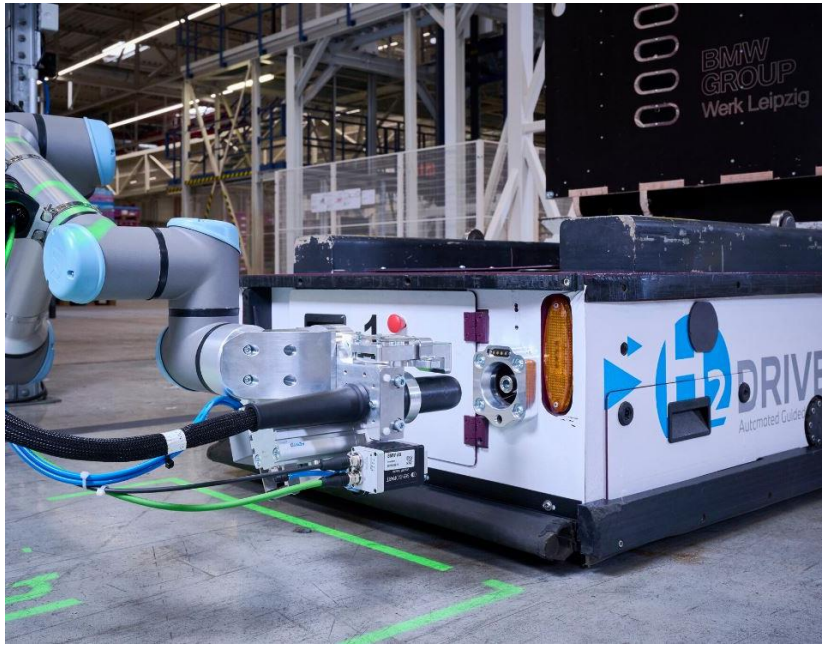
Pure water

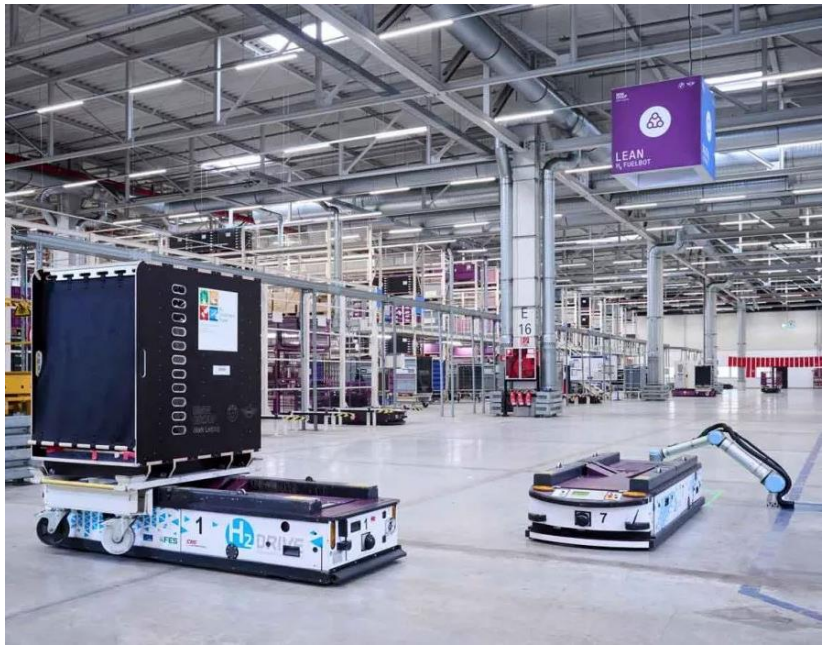
Hydrogen power in the air

Hydrogen powered flight has been happening since 2008, and will continue into the net zero future

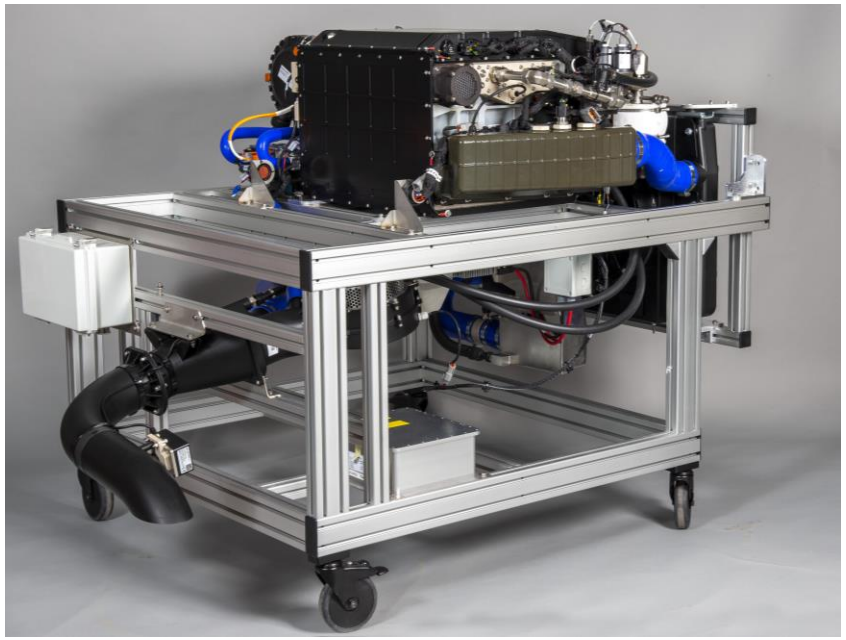
Hydrogen power on the road

Hydrogen power on the ground – indoor and outdoor operations





A future with fuel cells, hydrogen, hydrogen fuelling, and as rocket science…



To find out more, please visit the following:

www.intelligent-energy.com

https://uk.linkedin.com/company/intelligent-energy

East Midlands Hydrogen

Introduction to East Midlands Hydrogen

Will Morlidge
Chief Executive
D2N2 Local Enterprise Partnership

What is East Midlands Hydrogen?

East Midlands Hydrogen

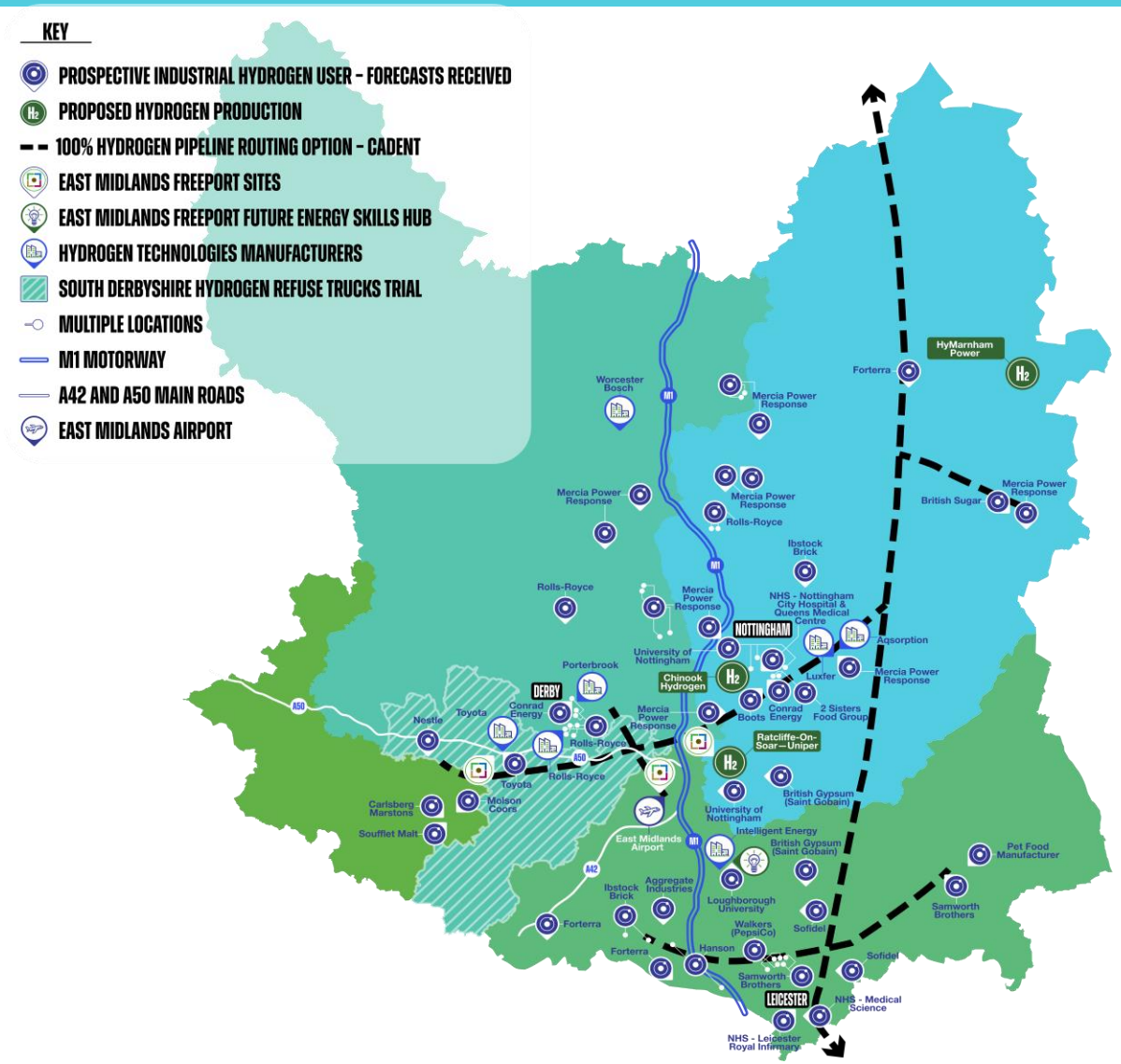
A partnership who will:

1. **Support** bids for investment in low carbon **hydrogen production and storage**
2. **Drive** the development of **hydrogen distribution infrastructure**
3. **Encourage fuel switching to hydrogen** by industrial and commercial organisations
4. **Ensure** that hydrogen is accounted for in **Local Area Energy Planning**
5. **Grow** our hydrogen **education and skills** offering
6. **Accelerate** hydrogen freight decarbonisation
7. **Promote** and support **hydrogen technology companies** and regional innovation

Why the East Midlands and why now?

East Midlands Hydrogen

- Growing demand, actual & potential, for hydrogen in the region
- Clusters of industry that cannot fully electrify, eg bricks, automotive, building materials, food & drink
- Huge potential hydrogen production forecasts, leading up to Gigawatt scale by 2050
- Key strategic partners:



East Midlands Freeport

EAST MIDLANDS DEVELOPMENT COMPANY

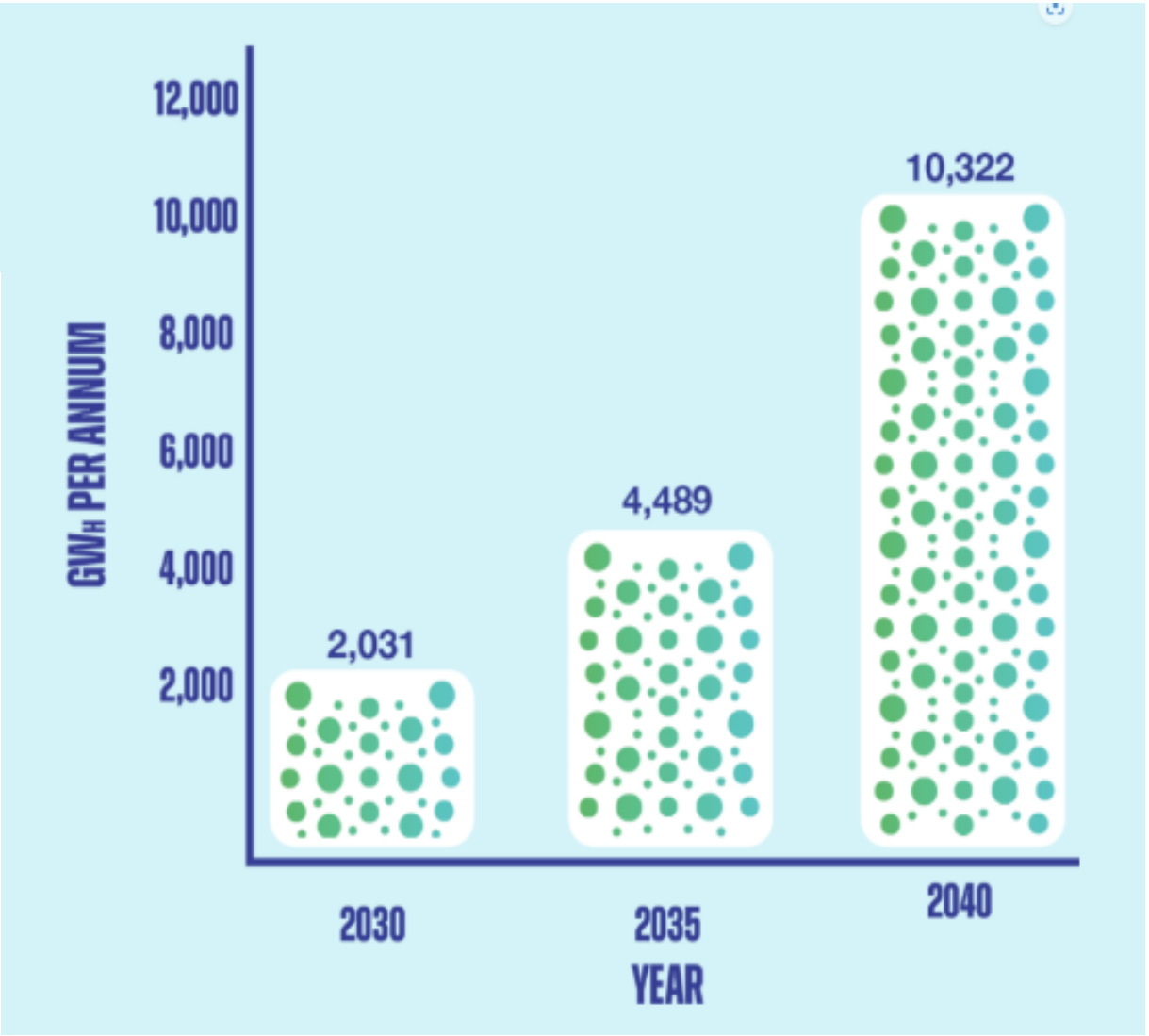
EAST MIDLANDS INSTITUTE OF TECHNOLOGY

Industrial demand

Hydrogen forecasts received by Cadent from:

20 COMPANIES

70 SITES



Production capacity

East Midlands Hydrogen

Hydrogen forecasts received to date total:

650MW PRODUCTION CAPACITY

GW-SCALE PRODUCTION CAPACITY POSSIBLE BY 2050, MAKING USE OF EX-COAL-FIRED POWER STATION SITES AND 'MEGAWATT VALLEY' ELECTRICITY INFRASTRUCTURE

Economic Impact

East Midlands Hydrogen

Development of a full hydrogen supply chain the East Midlands leads to:

£10 BILLION
GROSS VALUE ADDED

110,000
JOBS CREATED OR PROTECTED

Environmental benefits

East Midlands Hydrogen

Fuel switching alone would abate:

1.9 MILLION TONNES OF CO2 PER YEAR...

... WHICH IS EQUIVALENT TO NATURAL GAS CONSUMED BY 860,000 HOMES EVERY YEAR

Current activity

East Midlands Hydrogen

- Supporting potential bids to EU Horizon, HAR2, IETF, PBIAA…
- Working with the EM Freeport and Institute of Technology to map and support the green skills ecosystem.
- Working with the Combined Authority on future investment plans and to develop a shared vision for inward investment.
- Preparations are well underway for the next detailed design phase for the hydrogen pipeline route, running from April to Sept 24.

UPSTREAM
Hydrogen Producers

MIDSTREAM
Transportation and Storage

DOWNSTREAM
Prospective Hydrogen Users

LOCAL STAKEHOLDERS
Regional and Local Partners

East Midlands Hydrogen

Thank You

MIRA TECHNOLOGY PARK

UK LAUNCH PAD

FOR SUSTAINABLE INNOVATION

MIRA TECHNOLOGY PARK

OUR HERITAGE

1946
The Motor Industry Research Association formed

1948
RAF Lindley chosen for research laboratory and proving ground

2011
Amongst the first awarded Enterprise Zone status
Created 202,000 sqft new tenant space

2015
Acquired by HORIBA - renamed to HORIBA MIRA

2023
£60m+ of high value employment on-site

Our Technology Park is a globally unique combination of engineering talent, test facilities, and a collaborative cluster environment

Hydrogen & Battery Technology Development

Connected & Autonomous Vehicle Development

Driving Simulation Centre

Cyber Security

Passive Safety Centre

Training & Skills

The **outcome**: speed to market!
We enable rapid product development, validation, and market opportunity

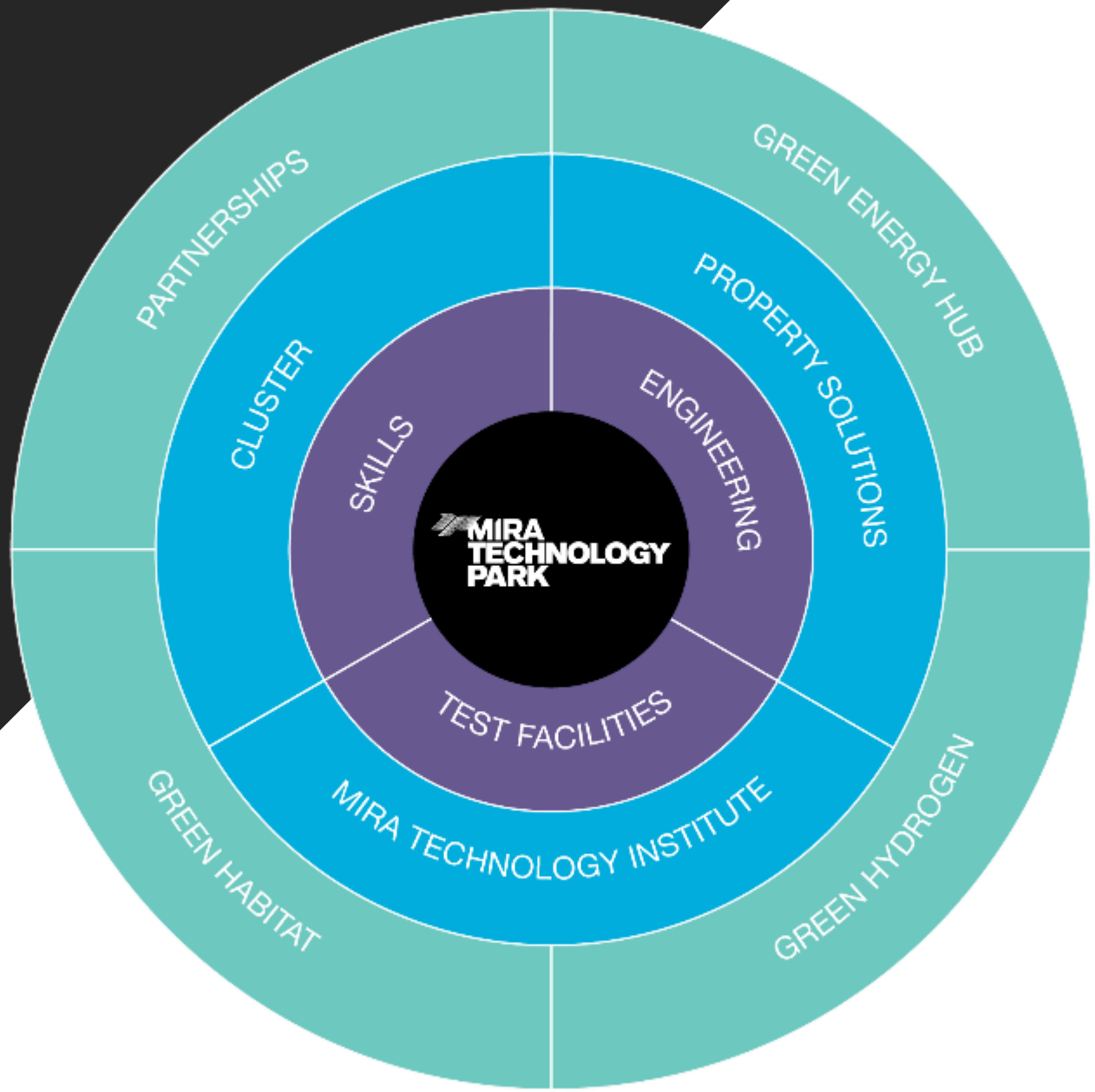
MIRA TECHNOLOGY PARK

OUR CAMPUS

We accelerate technologies to commercialisation
- Supported tenants to billion-dollar valuation
- Over $6 billion private investment raised by tenants

We provide a competitive path to Net Zero
- Virtual simulation and prototypes
- Sustainable location: energy, waste, water, wildlife

We are at the heart of innovation
- Over £120m in Innovate UK projects
- Technology Cluster: automotive, defence, energy
- Tenants creating 20,000+ patents!



MIRA TECHNOLOGY PARK

OUR TECHNOLOGY CLUSTER

- 1.6m sqft specialised R&D space
- £500m+ vehicle engineering & testing facilities
- 40 global tenants
- Critical mass of hydrogen technology developers
  - Enabling energy optimisation
  - Commercial vehicles
  - Fuel cell technologies
  - Combustion applications

plug™

FIRST HYDROGEN

HVS

ceres

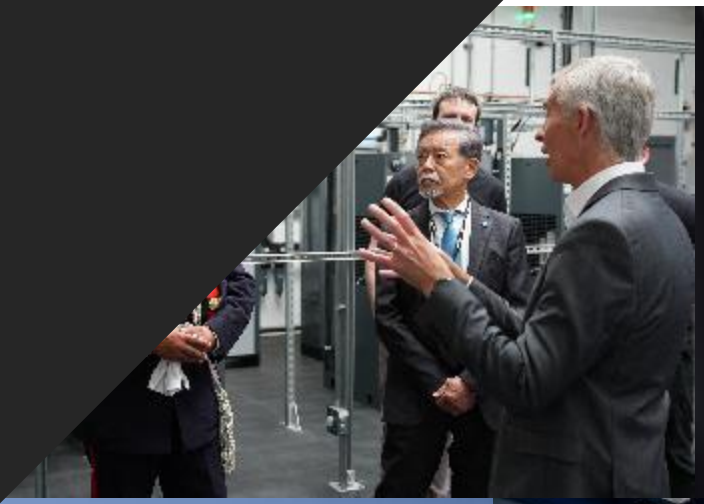
TEVVA

VIRITECH

MIRA TECHNOLOGY PARK

£20M+ INVESTMENT IN HYDROGEN

- ‘Hydrogen ready’ Vehicle Development Facilities
  - Climatic Chambers
  - Passive Safety
  - Thermal testing
  - Electromagnetic
- Tenant Workshops
- Green hydrogen infrastructure
  - 7MW solar array producing green hydrogen
  - Hydrogen refuelling Hub (350 / 700bar)



MIRA TECHNOLOGY PARK

WORLD FIRST HYDROGEN HYPERCAR

Viritech's 'Apricale': Proof of concept for hydrogen fuel cell vehicles

Zero-emission powertrain same weight as petrol equivalent

HORIBA MIRA engineering expertise supported

- Aerodynamics, attributes, performance
- Software design
- Prototype build
- Testing & training

Led to APC funded Project ICEBreaker

- Commercial viability for hydrogen HGVs
- HORIBA MIRA 'digital twin' engineering

MIRA TECHNOLOGY PARK

HYDRODEN BEYOND MOBILITY

£10m+ invested in partnership with Ceres Power

- SOEC and SOFC Fuel Cells for industry, maritime, data centres

Cleantech Test Centre accelerating technology to market

- Testing-as-a-Service with HORIBA MIRA expertise
- HORIBA equipment for testing cells, stacks, & systems

£43m Ceres license agreement with Delta Electronics

- Deployment in international markets
- Production to start in 2026

MIRA TECHNOLOGY PARK

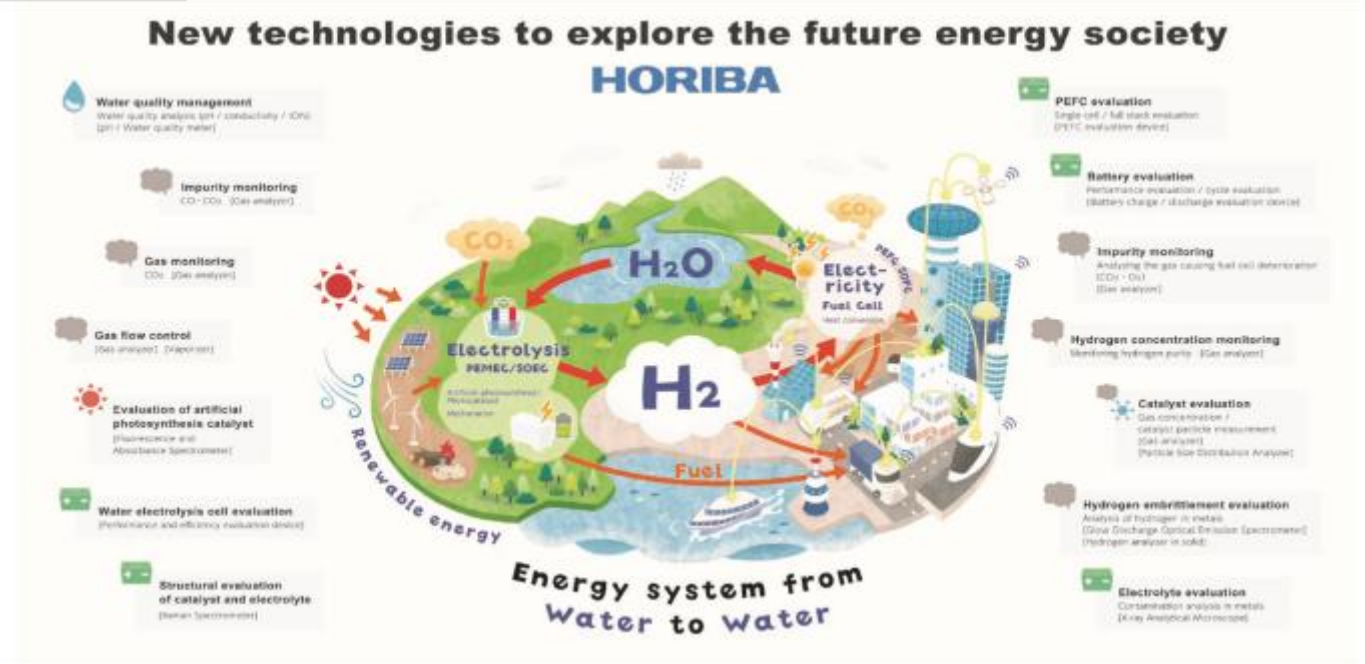
OUR PARTNERSHIP WITH HORIBA

HORIBA Energy & Environment

- Hydrogen
- Carbon Capture
- Battery Manufacturing & Recycling
- Energy Usage Optimisation

HORIBA Hydrogen

- Fuel cell materials, production, performance
- Engineering & evaluation across use cases
- Hydrogen production processes
- Hydrogen operational safety & efficiency
- Water electrolysis evaluation



MIRA TECHNOLOGY PARK

OUR TALENT

Onsite Centre of Excellence for Transport Skills Development

MIRA Technology Institute opened in 2018

- Partnership with Higher and Further Education
- 17,000 delegates trained
- Hydrogen Level 1-3 courses
  - Fuel cell maintenance
  - Impact of hydrogen HGVs
  - Hydrogen as alternative fuel in vehicles

Industry-led Talent Development Pipeline

MIRA Skills Academy established in 2013

- One-day corporate course in hydrogen
  - Role in decarbonising economy
  - PEMFC and SOFC technologies

PhDs

Masters

Bachelor's Degrees

Higher Level Apprenticeships

Advanced Apprenticeships & BTEC

Bespoke and non-accredited courses & sessions

MIRA TECHNOLOGY PARK

OUR POTENTIAL

Site potential for 4 million sqft from incubator to production

Expanding customer base

- Zero Emission Vehicle Manufacturers
- Enabling Technology Developers
- Clean Energy Production

Supporting next generation of scale-ups

- Flexible property
- Energy Security
- Decarbonised Heat
- New skills - technology & chemistry

MIRA TECHNOLOGY PARK

IMPROVING LIVES

THE FUTURE IS BUILT HERE

sarah.windrum@horiba-mira.com

David Manley
Head of Sustainability
Forterra

ABOUT FORTERRA

Forterra is one of the leading manufacturers of building products for the UK construction industry and employs circa 1,500 staff across 17 manufacturing facilities within the UK.

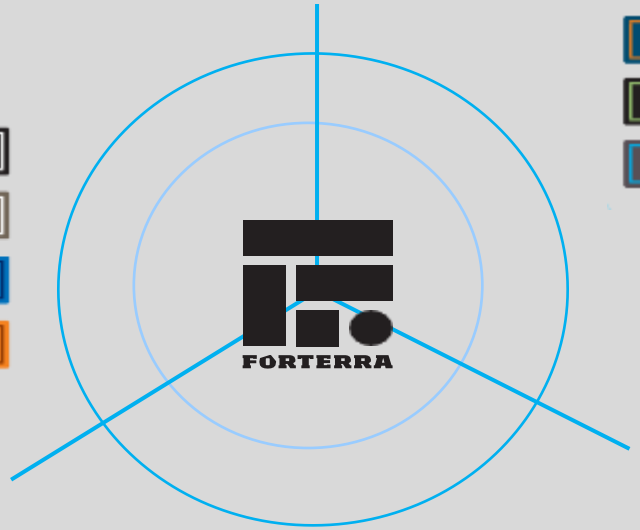
The unique mix of brands, products, people and expertise that, together, make Forterra has evolved over 200 years. We're constantly adapting to meet the changing needs of our customers.

OUR PRODUCTS

Forterra's brands are steeped in history and recognised everywhere for their quality.

Bricks

Our clay brick range, which includes the iconic **London Brick** along with our **Butterley**, **Ecostock** and **Cradley** bricks, provides a comprehensive range of wire-cut, pressed, thrown and special shaped products to satisfy a variety of end-use markets.



Blocks

Our inner leaf walling products include **Thermalite**, a leading lightweight, thermally efficient block used within residential construction, and the **Conbloc** range of dense and lightweight aggregate blocks. Landscaping solutions are provided by our **Formpave** concrete paving range.

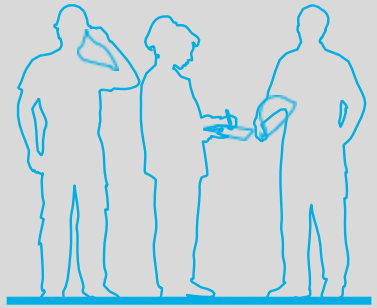
Bespoke Products

Bison Precast provides a range of offsite manufactured concrete walling, flooring and ancillary products. **Jetfloor**, our insulated ground floor system leads our offering into the new build residential market. **Red Bank** manufactures clayware essentials, including roof ridge tiles, air bricks and liners, chimney pots and concrete flue systems.

WHERE DO WE OPERATE?

...across multiple locations!

Circa 1,500 people...



...17 manufacturing facilities

OUR SUSTAINABILITY TARGETS & ACTIVITIES

FORTERRA

People

- Zero harm ambition for health and safety
- 5% of employees in “earn and learn” positions by 2025
- Improved ethnic and gender diversity

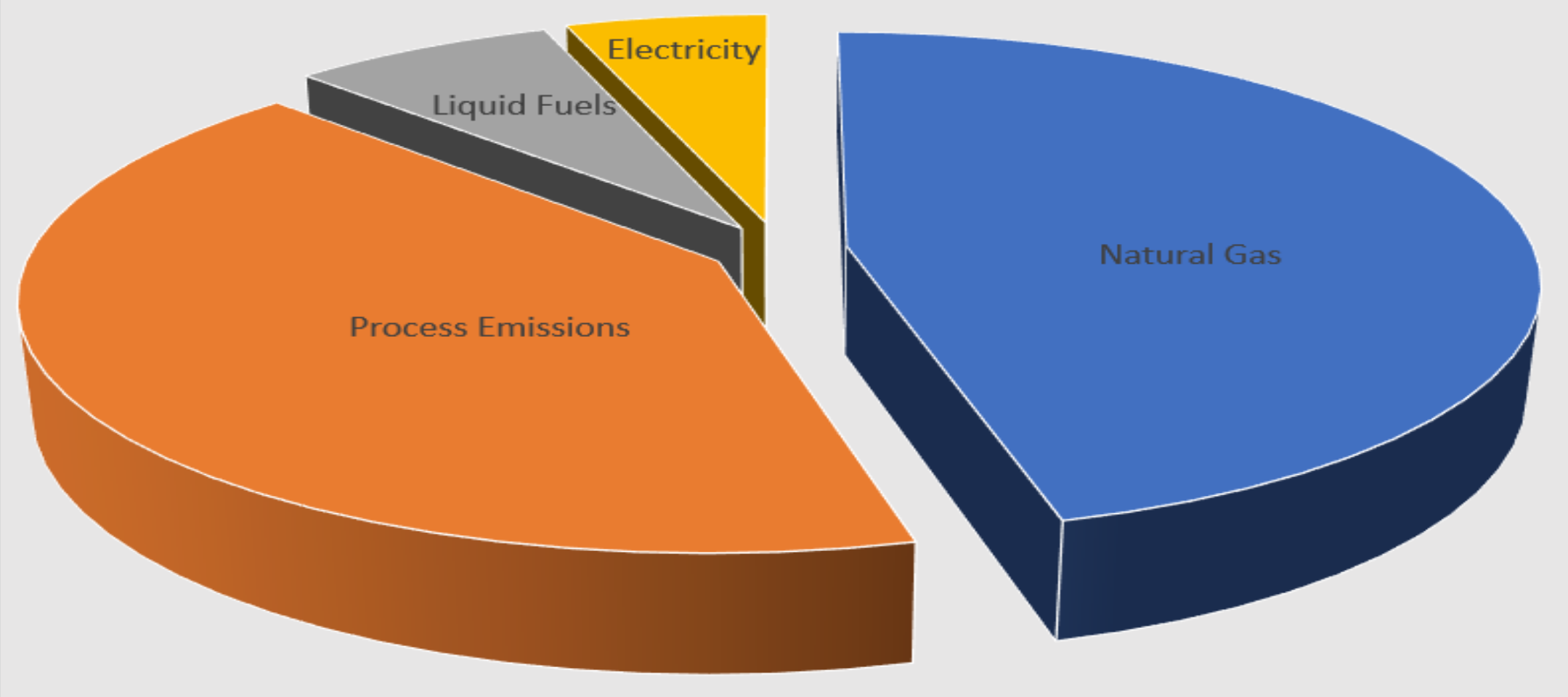
Planet

- CO2 emissions / tonne targets (2019-2030):
  - 33% reduction within clay products
  - 80% reduction within concrete products
- Zero waste to landfill
- 10% of electricity use generated from onsite renewable sources by 2025

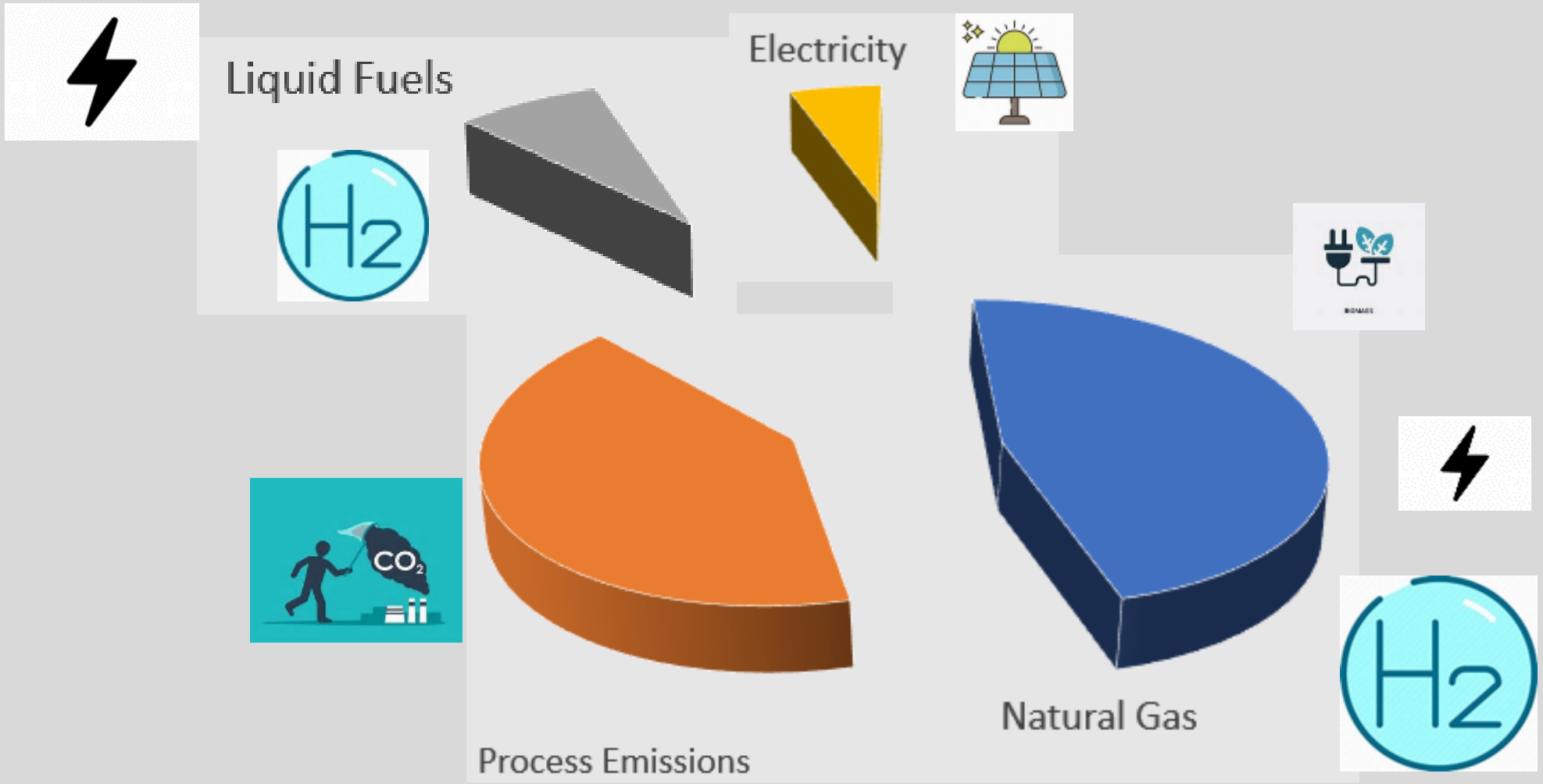
Product

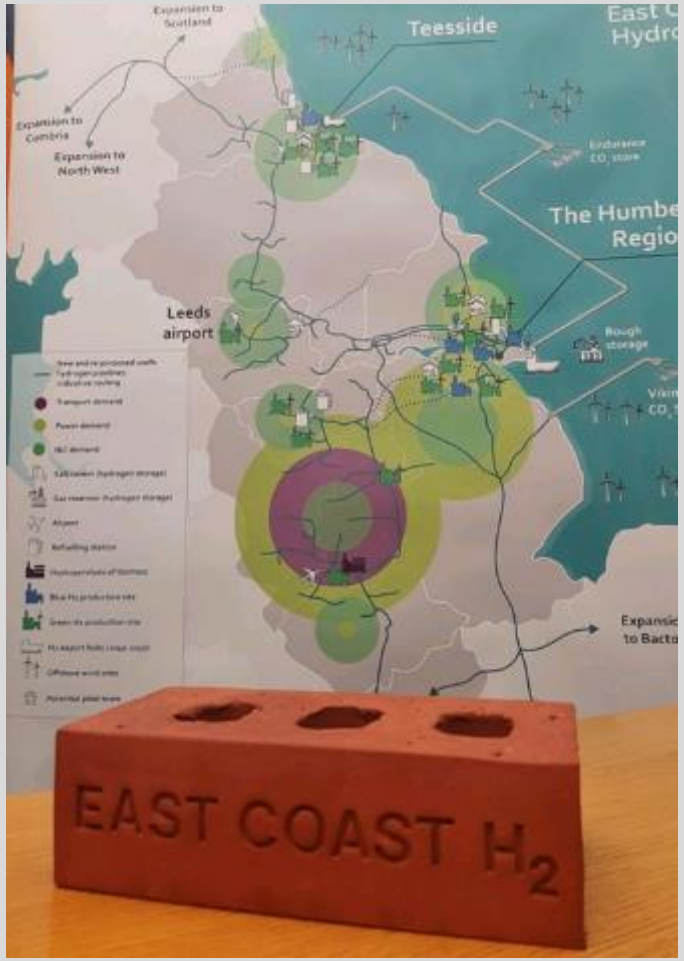
- Plastic packaging reduction of 50% by 2025 (from 2019 baseline)
- 10% of revenue from new and sustainable products by 2025
- Commitment to working with our suppliers to ensure they also adopt stretching reduction targets in line with our own carbon ambitions

Forterra Carbon Footprint circa 260,000 tonnes (Scope 1 and 2)

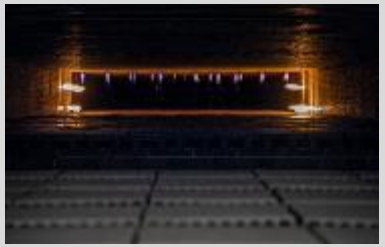


Opportunities for Reduction





Hydrogen gives us the biggest benefit over the next 10-15 years in a number of areas.



Kilns

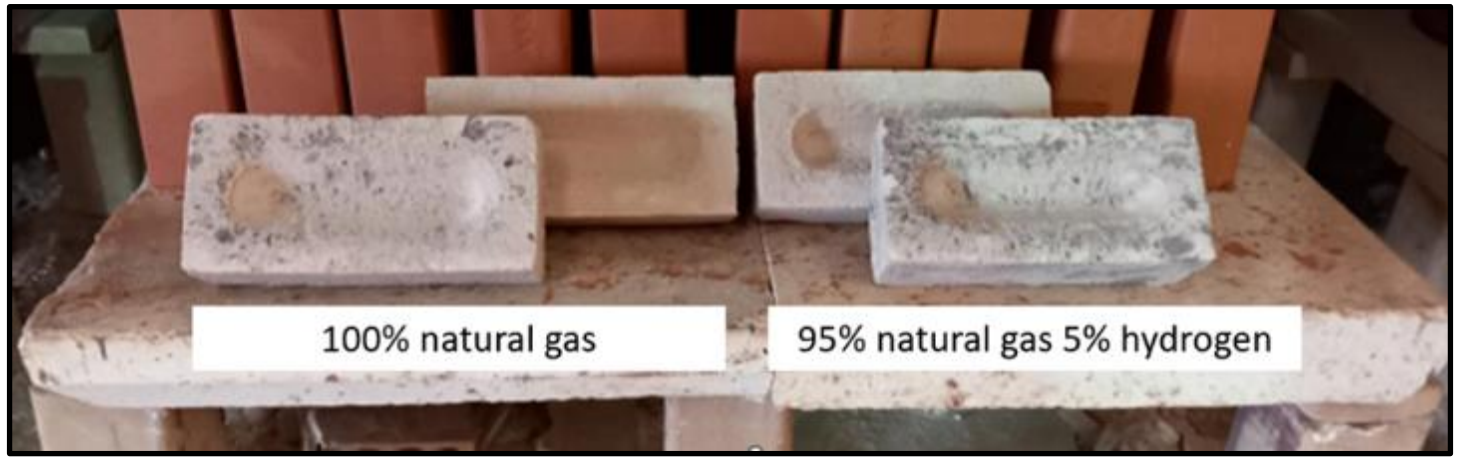
Mobile Plant

Distribution

20% Blending Trial

Approx. 6MW of storage - circa. 200kg hydrogen


Filled Kiln LTM9 – ready for fire


100% natural gas
95% natural gas 5% hydrogen

Challenges?

Infrastructure

- Long Investment Cycles
- No off the shelf solution
- Supply of Hydrogen
- Scale of trials

Product

- Colour change in product?
- Changes to compressive strength and frost resistance ?
- Different refractories required?
- Decreased setting density?
- Increased volume of gas required?

Next Steps

100% Hydrogen Trial

- New Control System
- New Burner

Thank You!

FORTERRA

LONDON
ECOSTOCK
BUTTERLEY
CRADLEY
RED BANK
THERMALITE
CONBLOC
BISON PRECAST
JETFLOOR
FORMPAVE

forterra.co.uk

Forterra
5 Grange Park Court
Roman Way
Northampton
NN4 5EA

01604 707600

TOGETHER WE ARE FORTERRA

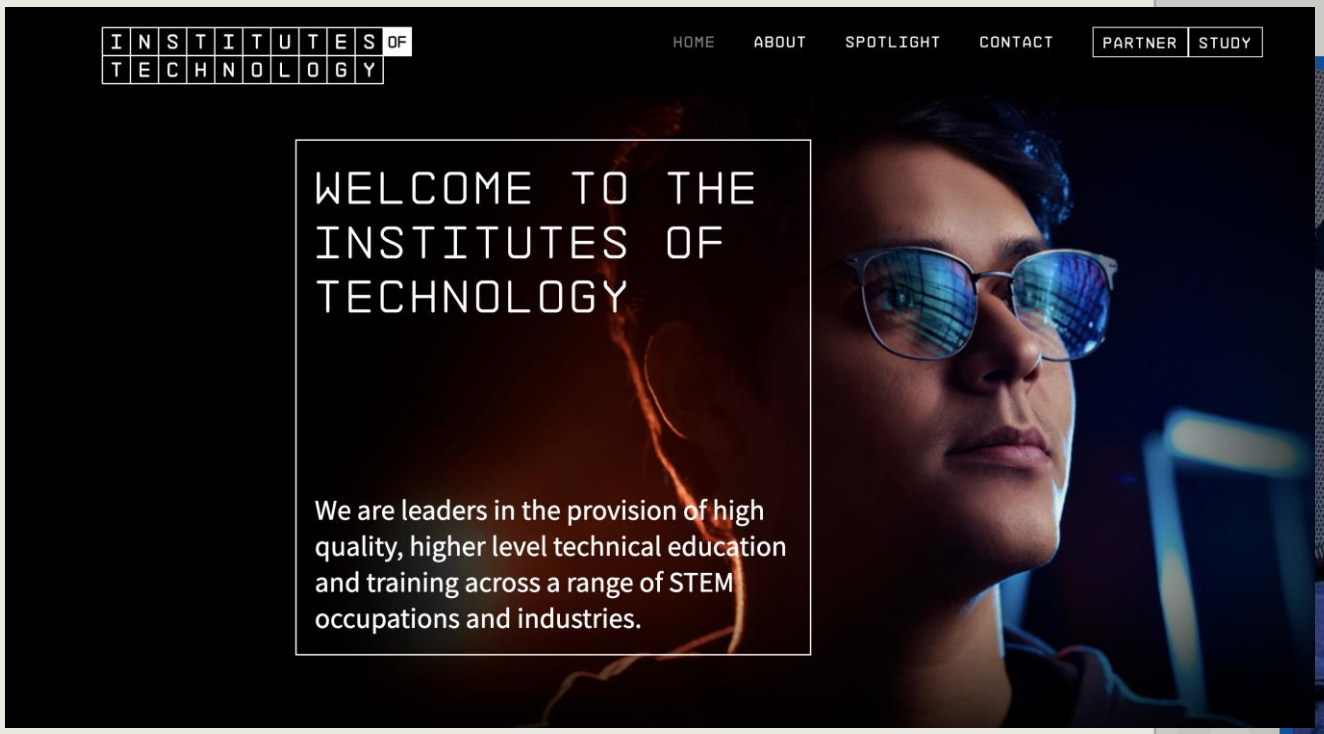
FORTERRA

EAST MIDLANDS INSTITUTE OF TECHNOLOGY

TECHNICAL SKILLS FOR GREEN GROWTH

Introduction

Rachel Quinn
Executive Director
EMIoT



Government backed flagship educational entities that bring together further education, higher education and industry to deliver skills training and qualifications directly in line with the regional economic need.

https://www.institutesoftechnology.org.uk

EAST MIDLANDS INSTITUTE OF TECHNOLOGY

A regional collaboration assuring a future-fit workforce for digital and low carbon economies across the East Midlands

bloc digital

Derby College Group

Loughborough College & University

University of Derby

ROLLS ROYCE

TOYOTA MANUFACTURING UK

ALSTOM · mobility by nature ·

ESO

FUJITSU

uniper

UNIVERSITY OF DERBY

DCG

Loughborough University

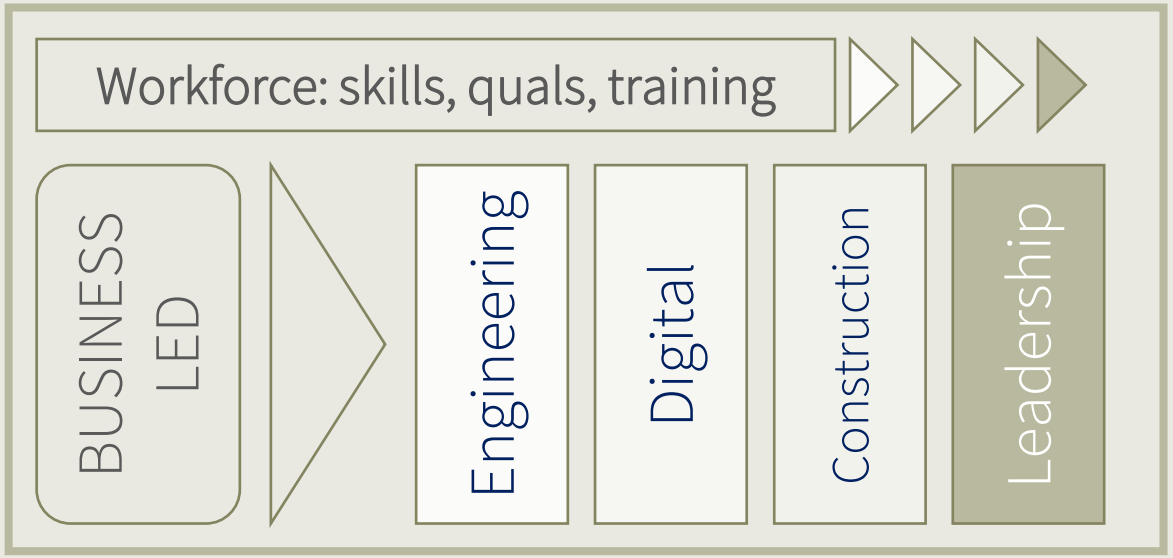
Loughborough COLLEGE est. 1909

DELIVERY

EM-IoT is going to have:

- 1,200 learners on the books by Y5…2028/29
- a focus on digital and low carbon economies
- 4 curriculum ‘swim-lanes’ informed by industry need & requirements
- Offer programmes from L3 through to L7

Ultimately, the objective of the EM-IoT is to deliver future-fit workforce in digital and low carbon economies



FUTURE ENERGY SKILLS HUB

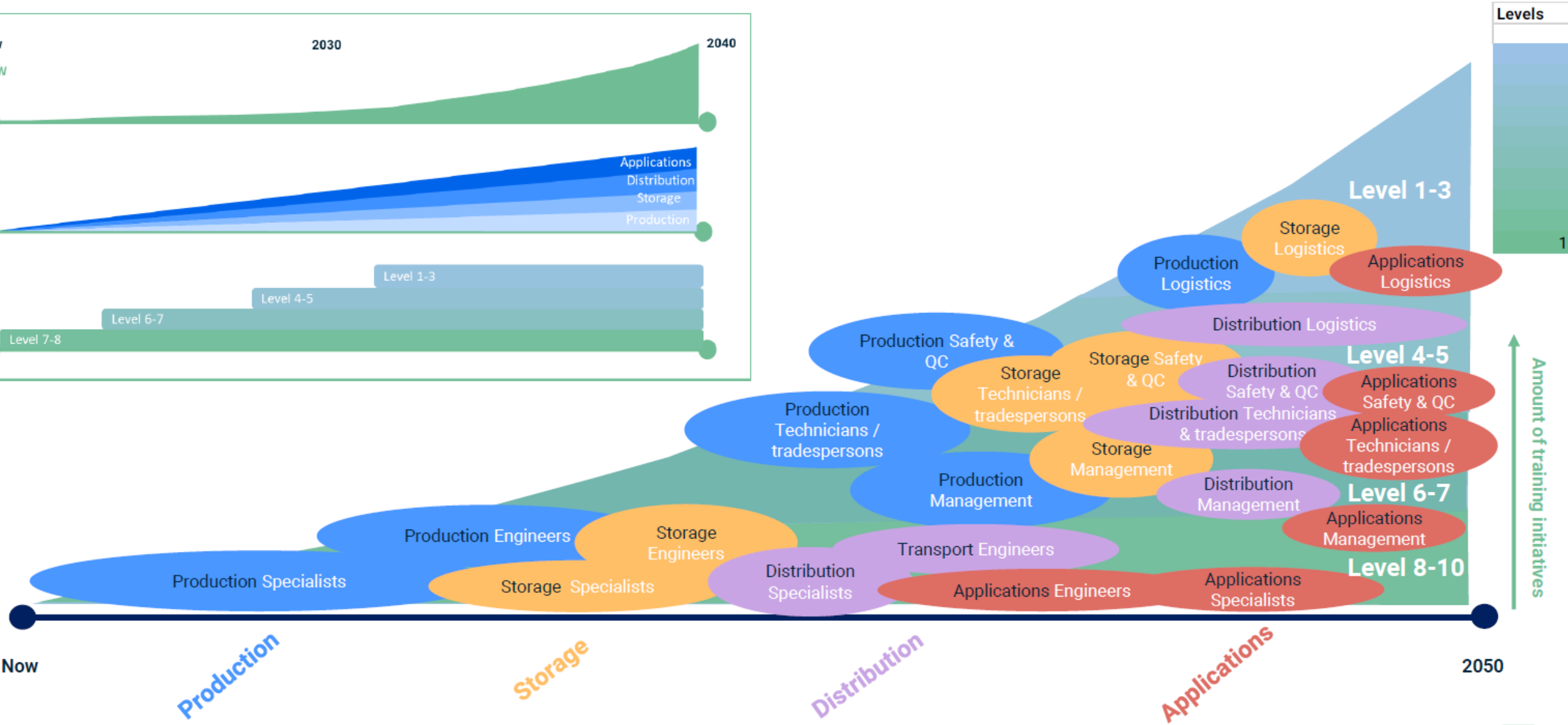
Key Features

- L3 to L6/7+ (HyDex)
- Adapting existing provision and creating new
- Initial focus on Hydrogen
- Aligned to coordinated place-based marketing
- Developed in line with economic need and pace

Phases:

1. Detailed feasibility & market research (Year 1 – 6-12 months)
2. Delivery: Procurement – linked to revenue-funded activity (Years 2 & 3)
   a) Pilot phase – tutor upskilling and demand raising
   b) Validation and full course delivery
3. Evaluation (+6m)

SKILLS TIMELINE



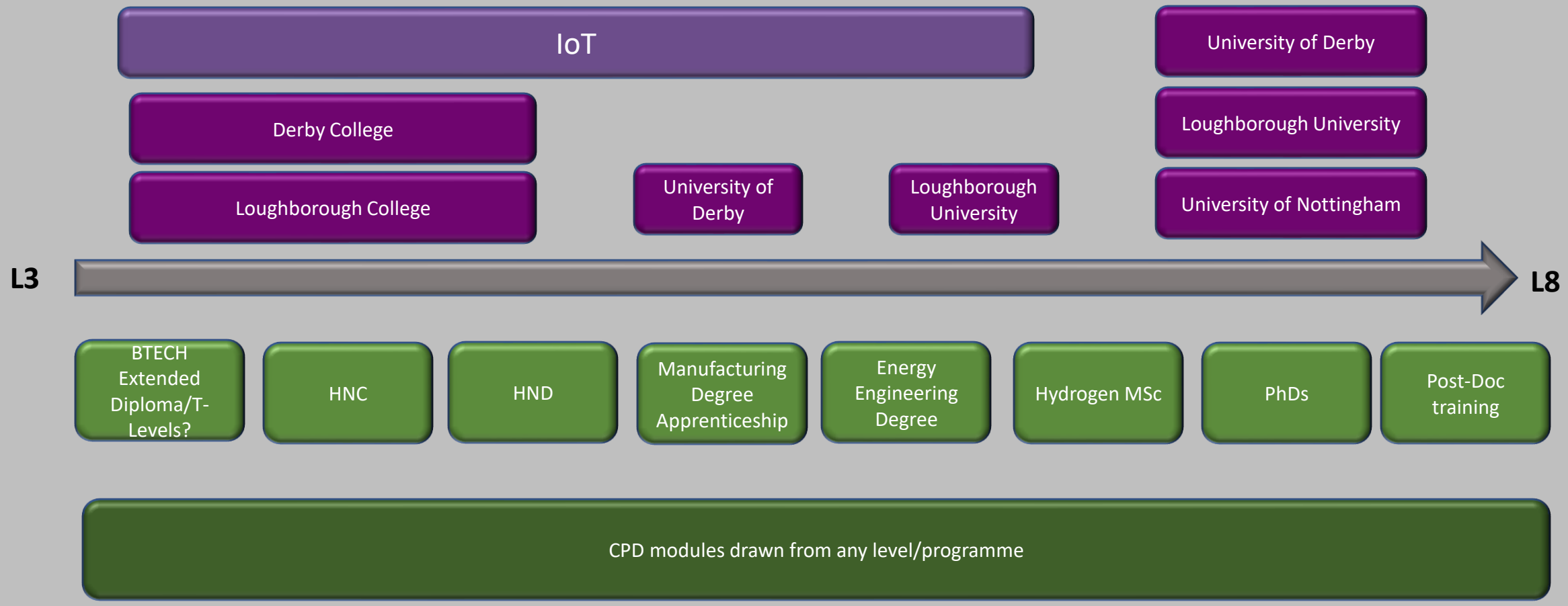
EQUANS EMPOWERING TRANSITIONS

LIVERPOOL CITY REGION COMBINED AUTHORITY

SKILLS DEMAND

Production, Storage & Distribution	Applications: transition	Applications: operations
Digital – systems management, analytics and integration	Equipment specification and installation	Compressed gas management
Infrastructure design and planning	Leadership	Equipment operation, repair and maintenance
Leadership, public engagement and advocacy	Financial and business planning	Digital – system security
Regulatory Compliance		
National context of technical undersupply		

Future Energy Skills Hub – Curriculum Offer



Any Questions?

rachel.quinn@emiot.ac.uk
www.emiot.ac.uk

MIRA Technology Institute

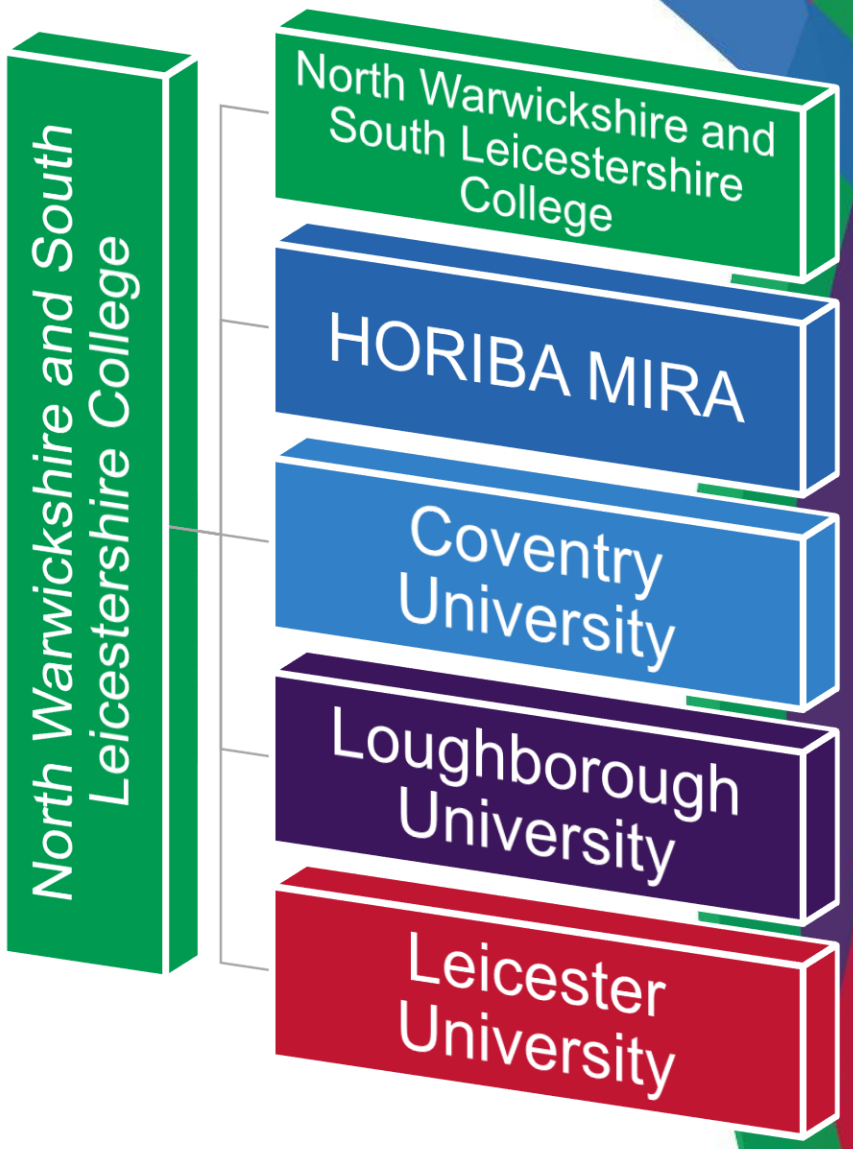
Lisa Bingley Operations Director

MIRA TECHNOLOGY INSTITUTE
Specialist Skills for the Global Automotive Industry

NWSLC NORTH WARWICKSHIRE & SOUTH LEICESTERSHIRE COLLEGE
A HORIBA COMPANY MIRA
Coventry University
Loughborough University
UNIVERSITY OF LEICESTER

What is the MTI?

- Unique collaboration between North Warwickshire and South Leicestershire College, and our partners, HORIBA MIRA, the University of Leicester, Loughborough University and Coventry University.
- Built with £9.5m investment from the UK Government's Growth Fund via the LLEP, it's a specialist facility to train the next generation of automotive engineers
- We provide specialist skills training in some of the emerging technology areas including electrification and driverless cars, ensuring a sustainable supply of future technical specialists and engineers.



Why do we need the MTI?

- The automotive and transport sector faces an electric future
- Autonomous, connected, electric and shared vehicle technology
- Electrification, cyber security and the latest emissions technology.
- Coventry is a hub for Connected Autonomous Vehicle development
- Technology role-out threatens to outstrip the pace of skills development

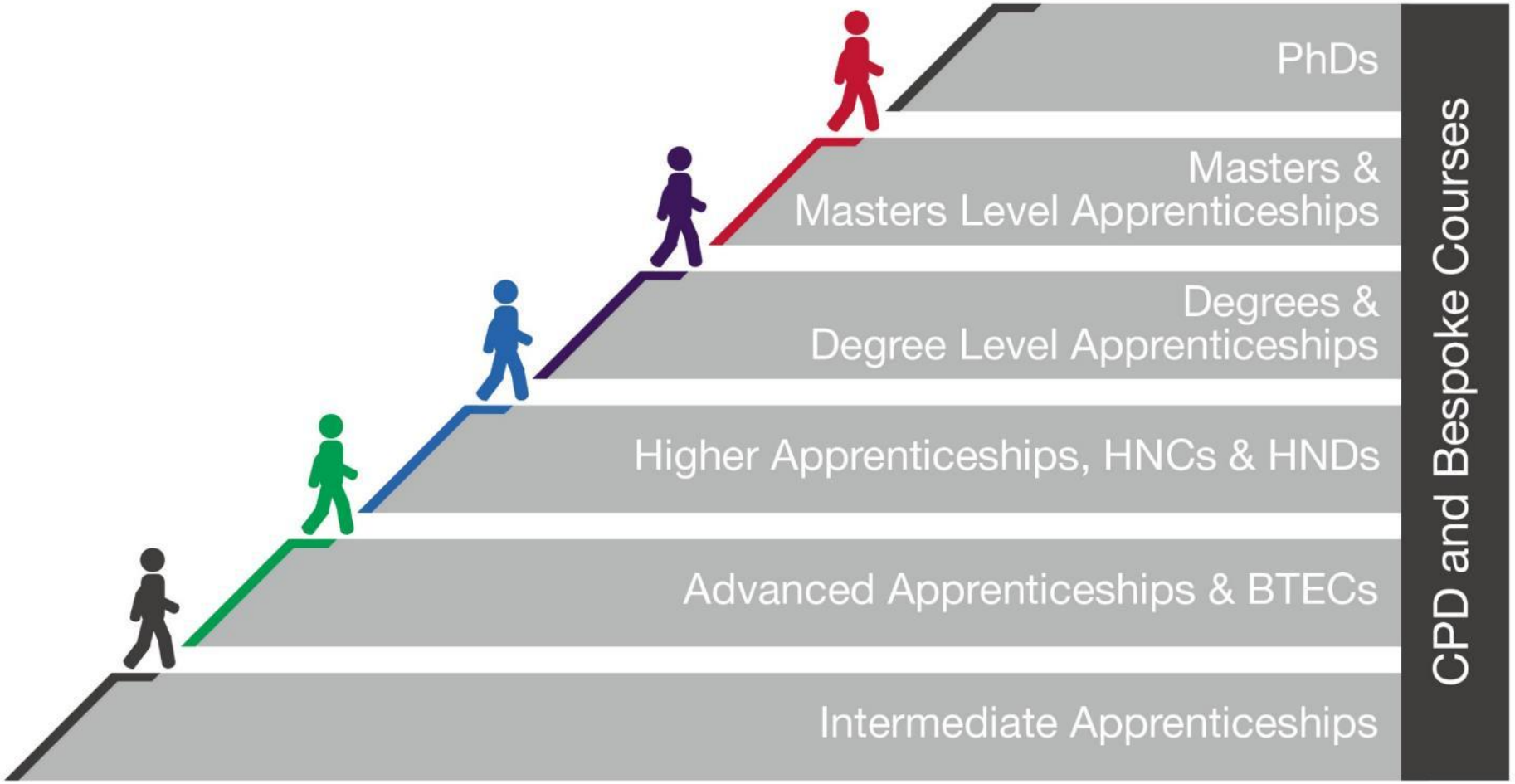
Our Mission and Vision

- To be the national and international centre of excellence for training in the automotive sector and beyond
- Working in partnership with industry and education to develop critical skills to support the development of sustainable transport infrastructures
- To create bespoke and relevant training for emerging technologies

All contributing to the achievement of net carbon zero targets.

- We have welcomed 50,000 students and delegates in 5 years, over 18,000 of those being professionals in professional development activities.

Skills Escalator



What do we offer?

CPD Short Courses

Vehicle Safety and Security
- ISO 26262 Engineer Contents
- Introduction to Cybersecurity
- SOTIF – Safety of the Intended Functionality - Principles and Practice
- ISO26262 Safety Analysis Techniques
- Functional Safety / ISO 26262 Awareness Course
- ISO 26262 Process Auditing
- Independent Safety Assessment
- Automotive Safety Case Development

Electric and Hybrid Vehicles
- IMI Electric and Hybrid Vehicle Awareness
- IMI Electric and Hybrid Vehicle System Repair and Replacement
- L4 Award in the Diagnosis, Testing and Repair of Electric/Hybrid Vehicles and Components
- Advanced Hybrid Electric Vehicle Awareness
- xEV Control Systems Architecture
- Basic Hybrid and Electric Vehicle Safety Awareness
- Battery System and Technologies
- Basic and Advanced Hybrid Electric Vehicle Awareness
- Electromobility Awareness
- EV Thermal Awareness
- General EV Architecture Awareness

Automotive Engineering
- IMI Air Conditioning Accreditation
- IMI Pre MOT Tester
- IMI CPD MOT Tester
- IMI CPD MOT Manager
- Introduction to Vehicle Dynamics
- Measurement Uncertainty

Business and Leadership
- Essentials Engineering Project Management
- Lean Six Sigma
- Lego Serious Play
- Manual Handling
- Fire Marshal

Emissions
- Hydrogen Fuel Cells and Their Applications

Apprenticeships, Under-graduate Post-graduate Courses

Level 2
- Autocare Technician
- Engineering Operative (Maintenance)

Level 3
- Engineering Technician (Product Design and Development Technician)
- Engineering Technician (Technical Support Technician)
- Motor Vehicle Service and Maintenance Technician

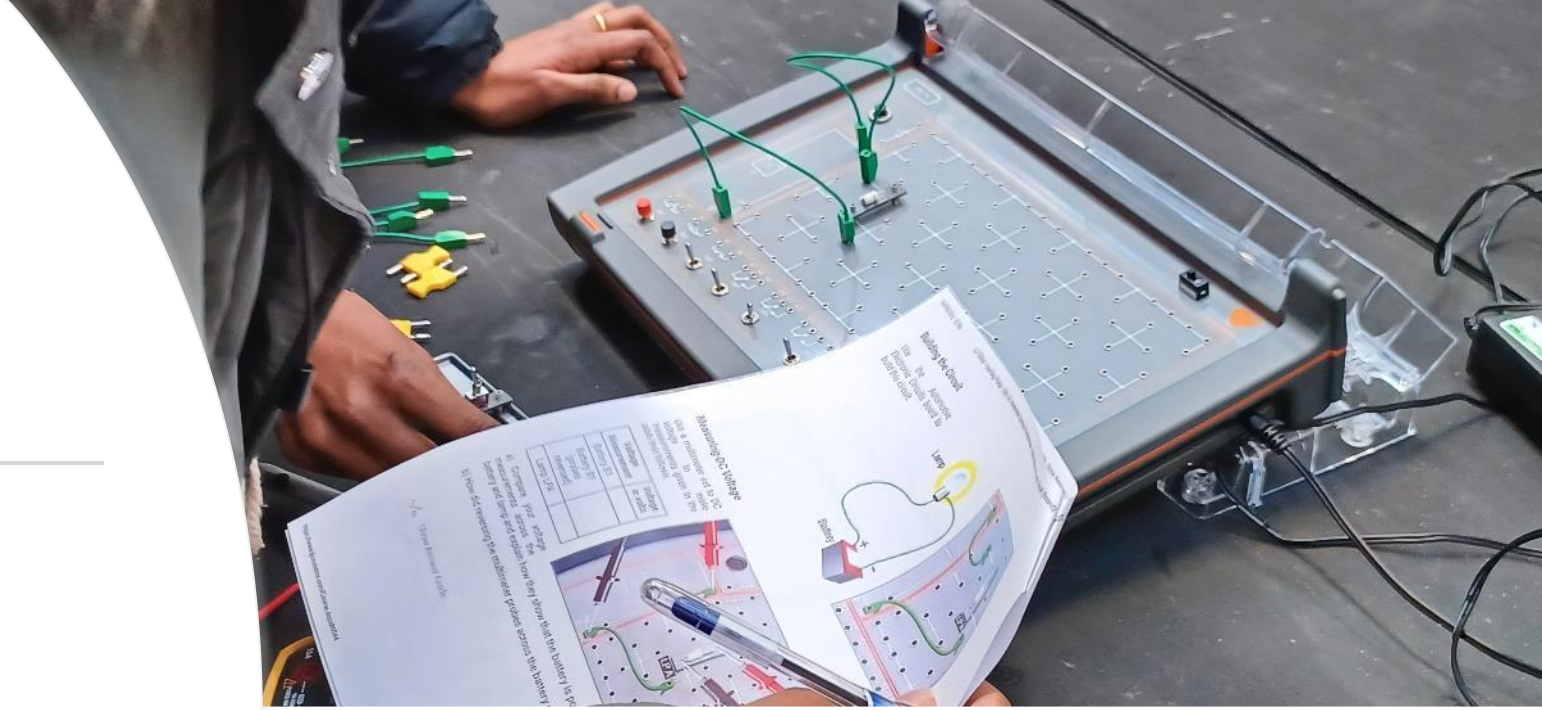
Level 4
- HNC General Engineering
- Propulsion Technician
- Engineering Manufacturing Technician

Level 6
- BEng (Hons) Automotive Engineering
- MEng (Hons) Automotive Engineering
- Product Design and Development Engineer Degree Apprenticeship
- Manufacturing Engineering Degree Apprenticeship

Level 7
- Postgraduate Certificate Intelligent Vehicle Systems
- MSc in Connected and Autonomous Vehicle Systems
- Postgraduate Engineer: Product Design and Development Apprenticeship

Case study - JLR

- Bespoke course created by both education and industry partners
- Practical course to convert mechanical engineers to electrical engineers
- Over 600 delegates on the fundamentals course to date



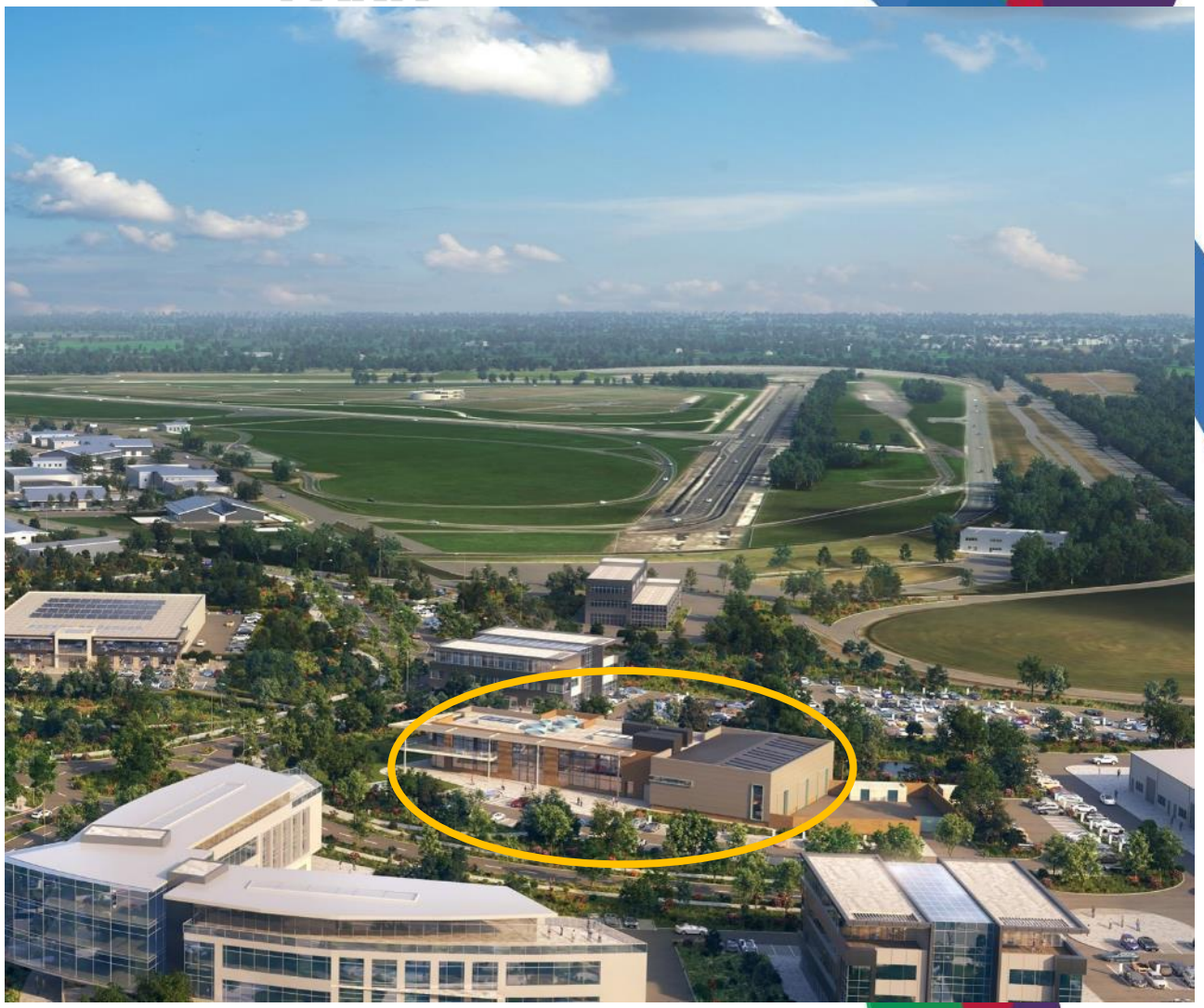
Hydrogen Courses

- The Impact of Hydrogen HGV to the World of Logistics and Automotive Level 3 (3 days) due Q4
- Understanding Hydrogen HGV – Awareness and Behaviours Level 1 (1 day) due Q2
- Hydrogen Fuel Cells and their Applications (1 day) available
- IMI Hydrogen Vehicle Awareness Level 1 (1 day) available
- New Toyota MIRAI Rig and training rigs to demonstrate on

Our Location

- Based on the front of MIRA Technology Park along with HORIBA MIRA and over 40 other companies

- Outside secure area – open to the public



World Class Facility

- Classrooms
- Workshops
- Public working space
- Canteen - costa
- Conference room 100+
- Hospitality
- Charge points

Why choose MTI?

MIRA TECHNOLOGY INSTITUTE

Specialist Skills for the Global Automotive Industry

- No quick fix to the skills gap developing talent takes time. MTI students will have access to automotive training at all levels
- Single collaborative organisation
- Transforming skills locally, regionally and globally – particularly at high levels locally regionally and globally
- MTI represents the future of technical training - but it relies on the support of all employers to take advantage of our offer

NWSLC NORTH WARWICKSHIRE & SOUTH LEICESTERSHIRE COLLEGE

A HORIBA COMPANY MIRA

Coventry University

Loughborough University

UNIVERSITY OF LEICESTER

Questions?

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MIRA Technology Insitute

HyDEX
Hydrogen Development and Knowledge Exchange

www.hydex.ac.uk

- Industry Skills Survey
- Hydrogen 101 e-learning
- Course directory
- Green and hydrogen jobs in the Midlands
- HyDEX online skills webinars
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Lead academic partners ERA ENERGY RESEARCH ACCELERATOR, Keele UNIVERSITY, MIDLANDS INNOVATION

Panel open for questions

Chair: Dennis Hayter, Intelligent Energy
Will Morlidge, East Midlands Hydrogen Partnership
Sarah Windrum, MIRA Technology Park
David Manley, Forterra
Rachel Quinn, East Midlands Institute of Technology
Lisa Bingley, MIRA Technology Institute
Kathryn North, HYDEX
Craig Line, NWSLC