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Science City Research Alliance: Energy Efficiency & Demand

Prof. Phil Mawby

11th December 2009

THE UNIVERSITY OF
WARWICK

HEALTH EDUCATION
FUNDING COUNCIL
FOR ENGLAND
hefce

UNIVERSITY OF
BIRMINGHAM

‘Science City’ is a visionary concept. The UK Government has designated 6 cities as ‘Science Cities’ but it is up to regional development agencies to invest and take forwards.

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Birmingham Science City
ideasforlife 

The logo for Birmingham Science City 'ideasforlife' features the text 'Birmingham Science City' above 'ideasforlife' in a bold, sans-serif font. To the right is a stylized atom logo with a yellow nucleus and blue orbits.

...the Science City concept is about putting science and technology to work for greater local and regional benefit....

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6 Science Cities



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Science City Research Alliance (SCRA)

- Major Investment in Research Infrastructure – AWM (and ERDF) - £57m to date
- £10m Investment in People – HEFCE
- Energy Efficiency
 - £9.5m capital; £1m revenue;
 - 1 research fellow (HEFCE)

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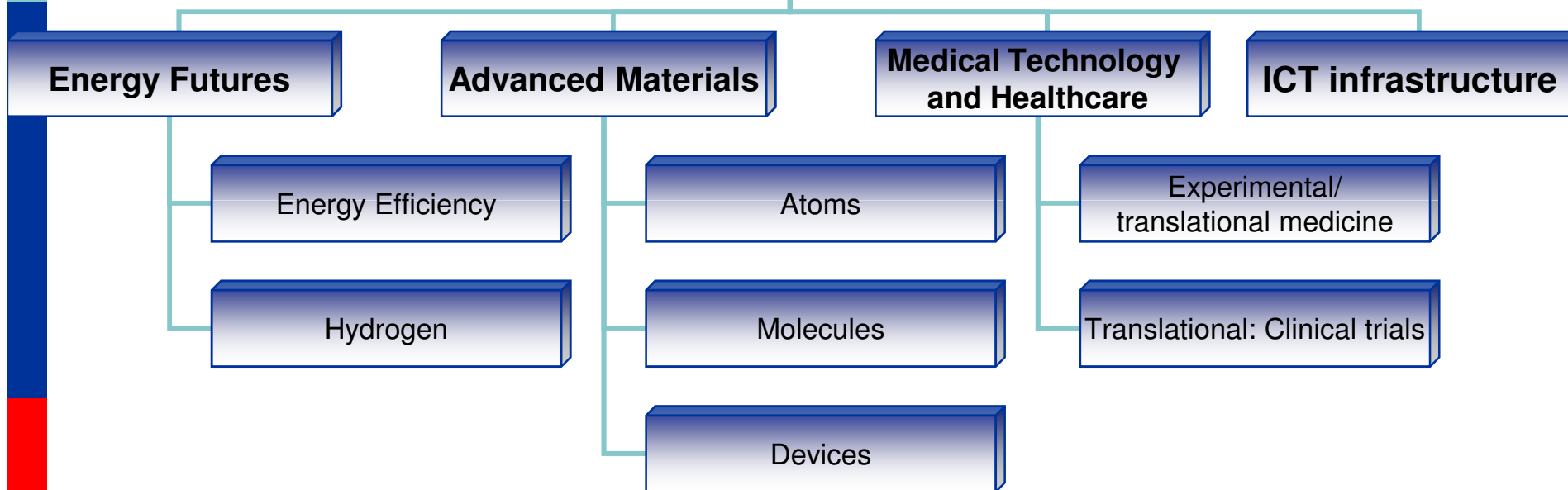
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SCRA thematic structure

Science City Research Alliance (SCRA) – UoB and UoW



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Project Purpose

- Development of **energy efficient technologies** and **IPR**
- **Addressing industry needs** through equipment and staff investment – concentration of excellence, synergies and sharing resources
- **Knowledge transfer** and **jobs creation**
- Create **higher public profile** of research themes, facilities, expertise available - especially to business
- Work with companies to form **new collaborations**
- Create **region of excellence** for energy efficiency products & processes

Project Themes

1. **Electricity, Efficiency of Energy Conversion and Power Distribution**
2. **Fuel Combustion for Transport, Heat and Power**
3. **Hybrid Electric Powertrain Technology**
4. **Sustainable Thermal Technology & Buildings**

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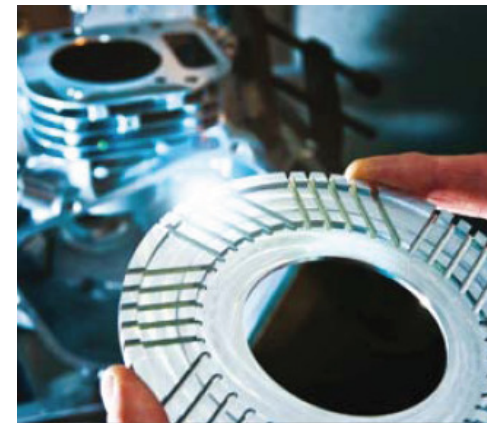
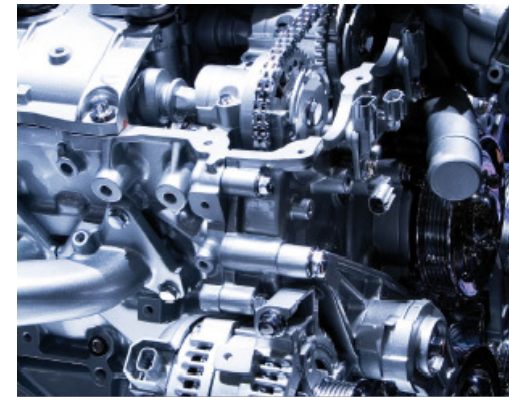
Electricity, Efficiency of Energy Conversion and Power Distribution

- **Silicon carbide devices for power gen & conversion applications, Prof. Phil Mawby, UoW**
 - High temperature furnace –up to 1800°C
 - A metal contact formation furnace capable of 1000°C
 - Inductively Coupled Plasma Dry Etcher
 - Low Pressure SiO₂ Deposition – TEOS based system
 - 1:1 stepper + coater - 0.75 micron lithography
 - Film thickness monitor & industrial quality ellipsometer
- **Development of smart power grid technology, Dr Xiao-Ping Zhang, UoB**
 - Real-time smart power grid simulator
 - Monitoring and control capability with real-time information integration - protection and closed-loop control functions.
- **Renewable power generation and energy storage technologies, Dr Jihong Wang, UoB**
 - Multi-purpose energy efficient pneumatic drive test rig.
 - Hybrid renewable power generation test system.
 - Real-time control development system.



Fuel Combustion for Transport, Heat and Power

- **Sustainable engine fuels research, Professor Mirosław Wyszynski, UoB**
 - Cold start (to -20°C) highly dynamic transients engine combustion test chamber.
 - Fuel, flows and combustion development laboratory.
- **Fuel combustion optimisation with optical diagnostics, Prof. Peter Bryanston-Cross**
 - A borescopic engine investigation system.
 - Measurement techniques: laser fluoresce and direct light emission; phase sensitive holographic camera; passive optical emission tomographic system.



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Hybrid Electric Powertrain Technology

- **Vehicle Energy Facility (VEF) for sustainable automotive power applications, Dr Paul Jennings, UoW**
 - Two high-dynamic dynamometers to cover a range of engine and electric motor ratings from small city cars to commercial vehicles.
 - A battery cycling and test station that is capable of sinking and sourcing 250kW of electrical power.
 - Hardware-in-the-loop simulation platforms.
- **Energy Systems Integration Laboratory (ESIL) applications, Dr Stuart Hillmansen & Dr Clive Roberts, UoB**
 - Energy storage device evaluation
 - Dynamometer: dynamic load simulation capability
 - Power electronic converter evaluation system
 - Hybrid energy system evaluation including duty cycle

Sustainable Thermal Technology & Buildings

□ Sustainable heating & cooling technologies, Prof. Bob Critoph, UoW.

- Environmental chamber
- Infra red camera
- Analytical equipment
- Large solar simulator
- Testing solar collector components/ assessing design performance



□ Sustainable buildings, Dr Mark Gaterell, UoB.

- Advanced mobile sensing equipment for assessment of UOB buildings.
- Comparing buildings' actual performance with original spec
- Decision support making tools
- Training: lifecycle buildings performance



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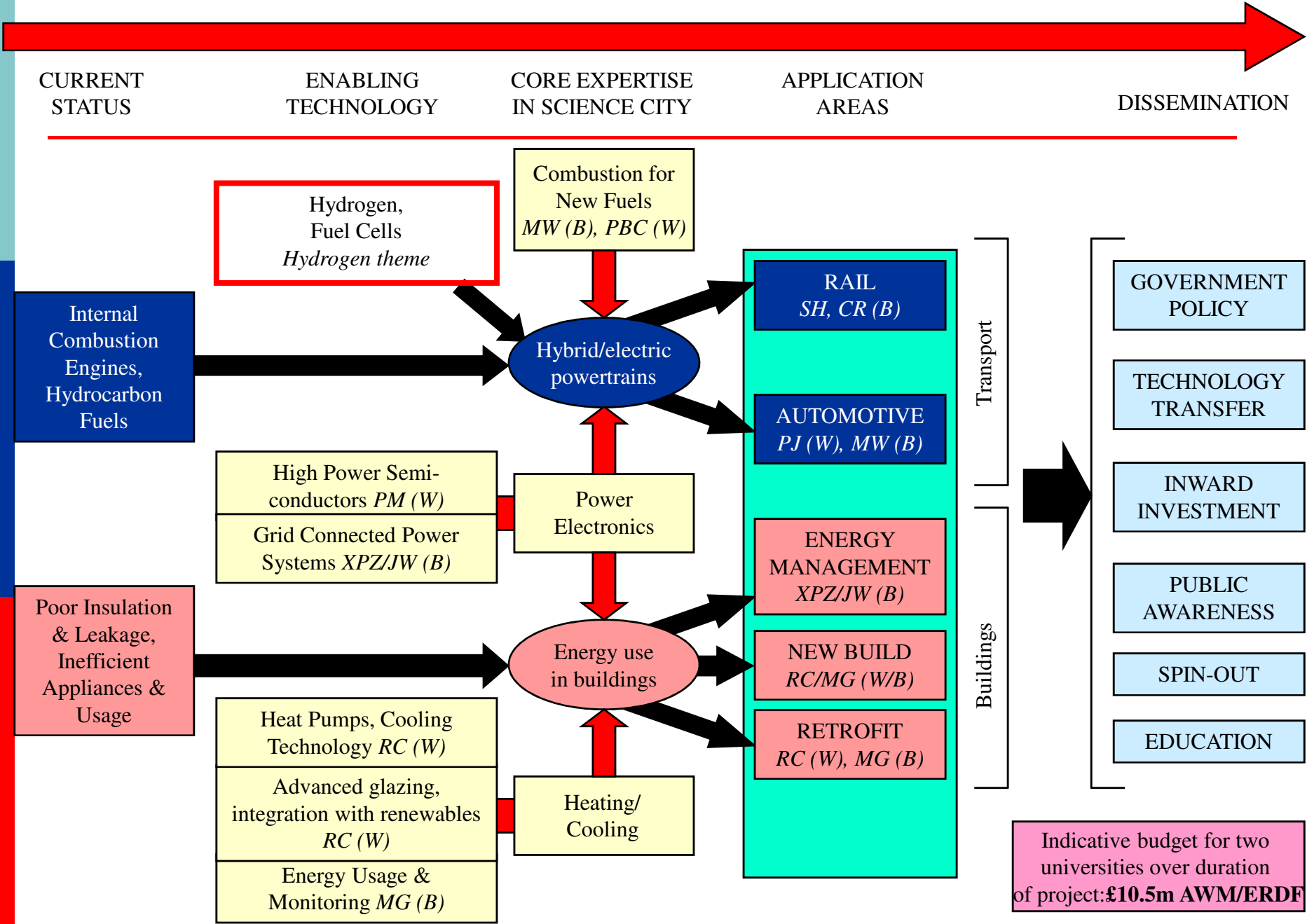
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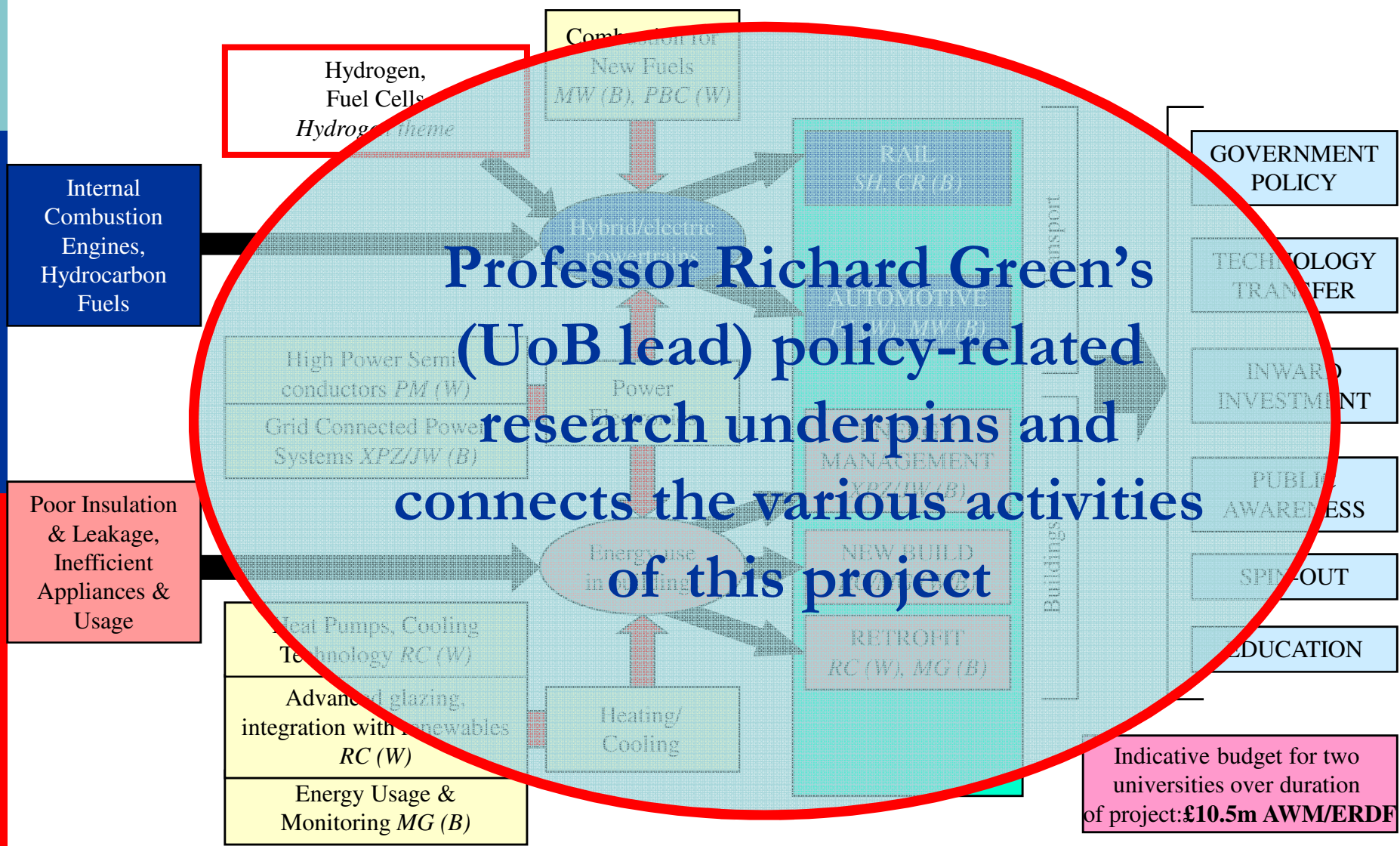
Energy Efficiency Roadmap



Energy Efficiency Roadmap



CURRENT STATUS ENABLING TECHNOLOGY CORE EXPERTISE IN SCIENCE CITY APPLICATION AREAS DISSEMINATION



Output targets

- 50 Jobs Created
- 3 Businesses Created
- 50 Businesses Supported to Improve Performance
- 50 Businesses engaged in New Collaborations with the Knowledge Base
- 20 Graduates into Employment
- 225 People Assisted to Improve their Skills
- £20 Million Levered Revenue
- 3 Patents/Licences
- 20 Workshops
- 205 Peer Reviewed Publications
- 120 Conference Presentations

Facilities are available for your use

- ❑ UoW and UoB research groups are ‘guardians’ of equipment/facilities
- ❑ The investment is mainly capital and therefore seed funding
- ❑ Key objective is to provide regional businesses with R&D support and strengthen regional academic expertise
- ❑ Considerable demonstrator and collaboration potential – as initiator or contributor
- ❑ Most equipment/facilities available from Easter 2010. Vehicle Energy Facility (UoW) from August 2010 and the Transients Engine Facility (UoB) from end 2010.
- ❑ For further info – talk to academic leads in exhibition!

Contacts

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