

# Technology Strategy Board

Driving Innovation

## Energy Materials “Meeting the Challenge”

MatUK Energy Materials Conference  
Loughborough University  
9<sup>th</sup>/10<sup>th</sup> October 2008

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## Key Areas

### Underpinning Technologies

- **Advanced Materials**
- Nano-scale Technologies
- High Value Manufacturing
- Bioscience
- Electronics, Photonics & Electrical Technologies
- Information and Communication Technologies

### Applications

- Environmental Sustainability
- **Energy Generation and Supply**
- Medicines & Healthcare
- Transport
- Modern Built Environment
- Creative Industries
- High Value Services

**... areas where UK has capacity to develop and exploit the technology and there is global market potential**

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[www.innovateuk.org](http://www.innovateuk.org)

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9<sup>th</sup>/10<sup>th</sup> October 2008

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## Scope

**Advanced Materials are defined here as materials, and their associated process technologies, with the potential to be exploited in high value products, and are considered within four broad major categories:**

- Structural materials
- Functional materials
- Multi-functional materials
- Biomaterials

**together with important cross-cutting areas including:**

- Nanomaterials [also included within TSB Nanotechnology Strategy]
- Modelling
- Design
- Metrology & Standards
- Manufacturing

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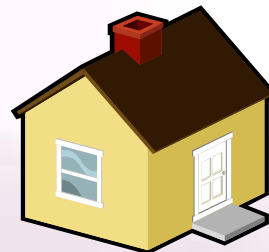
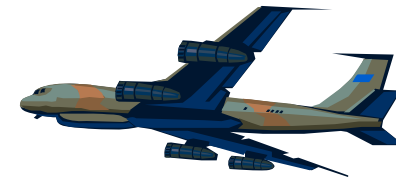
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## An Important and Broadly-based Sector

Businesses in the UK that produce, process, fabricate and recycle materials have an annual turnover of around £170 billion. They contribute about 15% of UK GDP and form an important element in the supply chain of many high value manufacturing businesses.

Key market sectors which rely on, or are strongly underpinned by, advanced materials technology include :

- Energy
- Aerospace
- Transport
- Healthcare
- Packaging
- Textiles
- Construction
- Defence & Security



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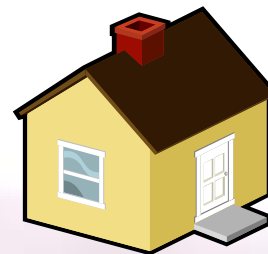
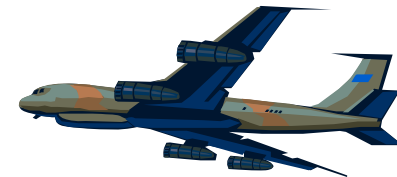
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## Technology Strategy Board Vision

- The UK's leading sectors and businesses maintain their position in the face of global competition
- Those sectors and businesses with the capacity to be among the best in the world fulfil their potential
- The emerging technologies of today become the growth sectors of tomorrow
- The UK becomes a centre for investment by world-leading companies

## Criteria for Investment

- **Can we do it?**
  - Does the UK have the capacity to develop and exploit the technology?
- **Will it sell enough?**
  - What is the size of the global market opportunity?
- **Is the idea “ripe”?**
  - Is the science developed enough to underpin the technology and its implementation in the market, and can the competitive activity be overcome?
- **Can we make a difference?**
  - Is there a clear Technology Strategy Board role?



## Underlying Strategy

**To challenge the materials community to ‘make a difference’ - by helping to develop innovative solutions to important societal problems and supporting UK economic growth and competitiveness.**

Prioritise based on:

- Previous strategies
- Analysis of sector [societal and economic] drivers, barriers etc...
- Community feedback
- Government policy [e.g. Sainsbury Report]
- Technology Strategy Board strategy and investment criteria

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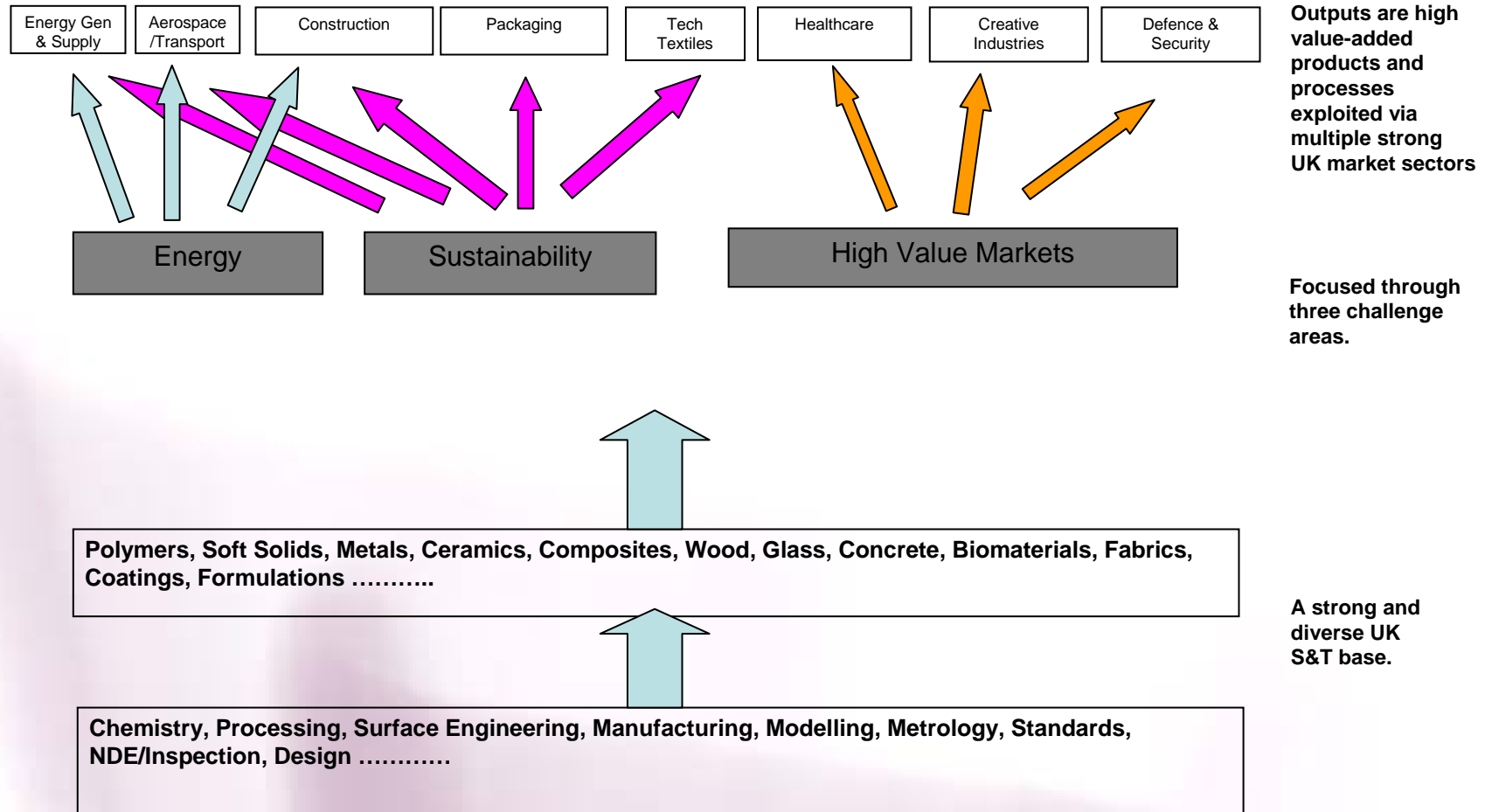
## Priorities for 2008-2011

- **Energy**
  - secure, clean and affordable energy supply, distribution and usage
- **Sustainability**
  - focused on transport, construction and the ‘reduce, reuse and recycle’ agenda, including packaging
- **High Value Markets**
  - including technologies for Healthcare, Creative Industries and Defence & Security

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*A technology-inspired strategy for Advanced Materials focused through key challenge areas.*

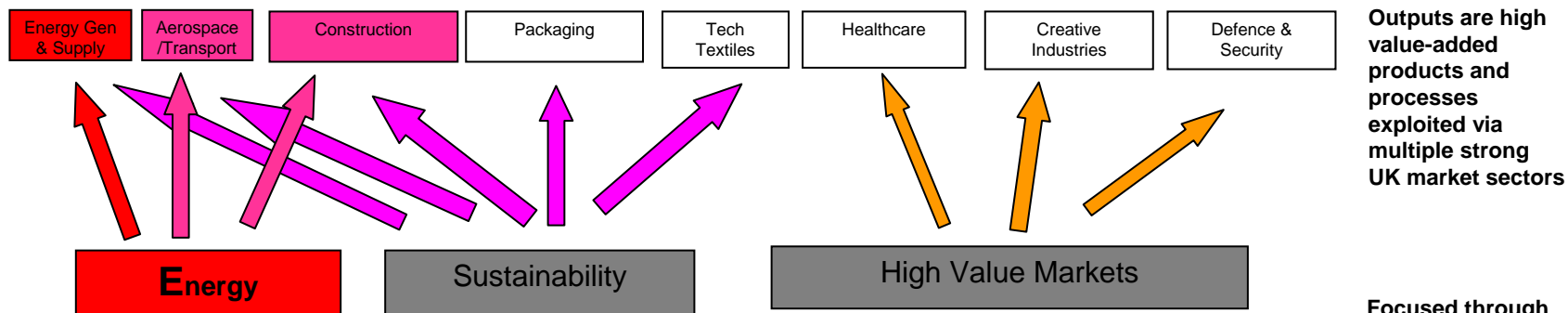


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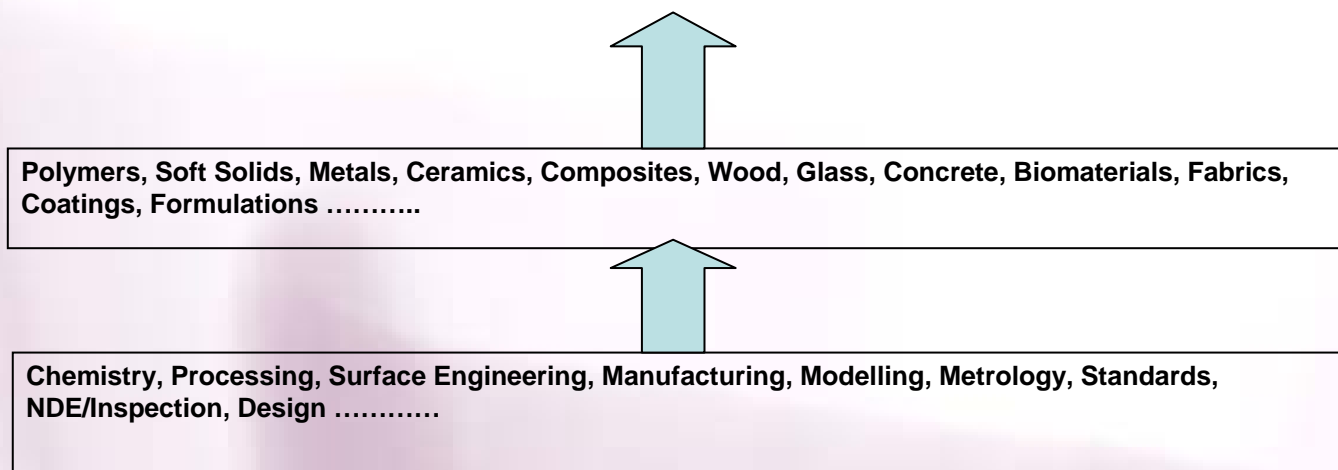
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*A technology-inspired strategy for Advanced Materials focused through key challenge areas.*



Outputs are high value-added products and processes exploited via multiple strong UK market sectors

Focused through three challenge areas.



A strong and diverse UK S&T base.

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## Key technology thrust areas

	<b>E</b>	<b>S</b>	<b>HVM</b>
<b>Lightweight materials and structures, including composites and hybrids</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Materials to withstand more aggressive environments [e.g. high temperature, corrosive, erosive]</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Electronic and optical functional materials</b>	<b>x</b>		<b>x</b>
<b>Smart and multifunctional materials, devices and structures</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Surface engineering and coating technologies</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Particulate engineering / near-net shape manufacturing</b>	<b>x</b>	<b>x</b>	
<b>Fibre and textile-based technologies</b>	<b>x</b>		<b>x</b>
Bioresorbable, bioactive and biocompatible materials			<b>x</b>
Natural and bio-based materials		<b>x</b>	<b>x</b>
<b>Joining technologies</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Materials for portable power sources [batteries/fuel cells]</b>	<b>x</b>		<b>x</b>
<b>Nanomaterials</b>	<b>x</b>	<b>x</b>	<b>x</b>
Materials with reduced environmental impact through life		<b>x</b>	
Materials designed for reuse/recycle/remanufacture		<b>x</b>	
<b>NDE/SHM/condition monitoring</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Predictive modelling through the full life cycle, including lifetime prediction</b>	<b>x</b>	<b>x</b>	<b>x</b>

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## Autumn '07 Materials for Energy Competition

- 1<sup>st</sup> step in implementation of MatUK SRA – generic Call
- **16** successful proposals
- Value of **£20.5M** - £10.3M grant [Technology Strategy Board/EPSRC]
- 1 in 4 success rate
- Broad range of topics:
  - Gas turbines [2]
  - Fuel cells [2]
  - Batteries [1]
  - Insulation materials [2]
  - Solar energy [3]
  - Tidal power [1]
  - Energy generation [2]
  - Energy transmission/distribution [3]

## Future plans...

### Autumn '08 CR&D Competition

#### – ‘Fuel Cells & Hydrogen Technologies’

- Fuel Cells
  - Novel materials, components and manufacturing processes
    - Improved durability, reliability and quality
    - Cost competitive
    - End-of-life
- Hydrogen Technologies
  - Novel materials and systems for H<sub>2</sub> storage and transportation
    - Low cost and high energy efficiency
    - Integration with automotive fuel cells

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## Future plans...

### Autumn '08 CR&D Competition

#### – ‘Sustainable Materials & Products’

- Scope does not encompass the ‘sustainable’ low carbon agenda within the Energy Sector, directly related to the generation, supply and storage of energy, which was addressed in the Autumn '07 Competition.
- Proposals must address one or more of three high level generic challenges:
  - The substitution of materials which are scarce, difficult to source, expensive or deleterious to health and the environment.
  - The development of less polluting, wasteful and energy intensive processes, including for recycling.
  - The design of products with extended life or which are easier to repair, reuse or recycle.



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## Future plans...

- **A 'stakeholders workshop', sponsored by MatUK – early 2009**
  - quantitatively define the benefits & priorities (for the UK) of each of the technologies covered in the 2007 Energy Materials SRA.
  - review UK & global energy markets and opportunities for UK business over the next 5-20 years.
  - alignment with the Technology Strategy Board funding criteria.
- **A programme building event, sponsored by the Technology Strategy Board – Spring 2009**
  - identifying best mechanisms for future R&D support (e.g. CR&D competition, pre-formed consortia) and, potentially, optimum consortia to take forward the previously identified priorities.
  - this meeting may take the form of a 'sand-pit' - a technique for forming consortia successfully used by EPSRC.
- **A 2<sup>nd</sup> Technology Strategy Board Call in Materials for Energy - 2009**
  - based on the output of these two events and with potential engagement from other funding agencies (e.g. RDAs, Research Councils, Government Depts, ETI .....

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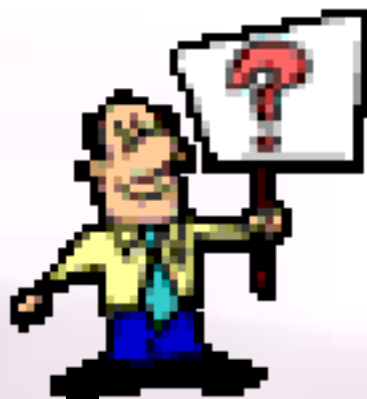
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## In Summary...

**There are significant opportunities for the energy and materials communities to provide solutions to the key energy and sustainability challenges embodied within the Technology Strategy Board's Advanced Materials strategy and, thereby, to contribute to the creation of wealth and improved competitiveness within the UK, together with an improved quality of life.**

**Programmes are in place and plans are in hand to identify market-led priorities and optimum mechanisms for future investment.**



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