The recommendations of the Task Groups have been distilled down into 3 key common themes where UK materials R&D should focus and have impact:

• Reducing time to market and life cycle costs (eg. solar, fuel cells, marine)
• Higher performance in harsher environments (eg. Carbon capture, co-firing, nuclear)
• Improved life management and reliability (eg offshore wind, nuclear)

The individual reports give more detail of the required R&D
Common underpinning themes have emerged;

- Design/materials integration
- Modelling (materials and process)
- Life time prediction methodologies
- Condition monitoring, sensors, NDE
- Repair, joining
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Energy Materials

Cost - prioritising areas for R&D

- Biowaste
- Solar photovoltaic
- Tide and wave
- Medium-scale CHP plant
- Solar thermal
- Geothermal
- Wind offshore
- Wind onshore
- Co-firing

Source: IEA 2006

Dollars (2005) per kW

- < significantly lower costs through growth and innovation starting at high level
- < potential cost reduction through growth
- < mature technology
- < considerably higher costs than onshore
- < moderate costs, but limited capacity factor
- < lowest costs, but currently lack of incentives

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Prioritising R&D based on cost alone

Mapping the SRA priority themes against cost

<table>
<thead>
<tr>
<th>Improved Life Management and Reliability</th>
<th>Natural gas CC</th>
<th>Coal-fired</th>
<th>Nuclear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher performance in harsher environments</td>
<td>O &amp; M costs</td>
<td>Fuel costs</td>
<td>Capital costs</td>
</tr>
<tr>
<td></td>
<td>12 %</td>
<td>76 %</td>
<td>12 %</td>
</tr>
<tr>
<td></td>
<td>27 %</td>
<td>41 %</td>
<td>32 %</td>
</tr>
<tr>
<td></td>
<td>34 %</td>
<td>16 %</td>
<td>50 %</td>
</tr>
</tbody>
</table>

100 % Cost of electricity
## Mapping the priority areas against policy

### Energy Materials

<table>
<thead>
<tr>
<th>Energy Policy</th>
<th>Reduced electricity costs</th>
<th>Reduced environmental impact</th>
<th>Security of Supply</th>
<th>Comments</th>
<th>Materials Technologies required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials Challenge</strong></td>
<td><strong>Reduced Time to market and Life Cycle Costs</strong></td>
<td><strong>Higher Performance in Harsher Environments</strong></td>
<td><strong>Improved Life Management and Reliability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Fossil</td>
<td></td>
<td></td>
<td>Extending life of existing plant</td>
<td>NDE, lifing, modelling</td>
<td></td>
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<tr>
<td>Fossil with Carbon capture</td>
<td></td>
<td></td>
<td>New aggressive environments</td>
<td>high T materials &amp; coatings</td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td></td>
<td></td>
<td>Reliability and safety</td>
<td>NDE, lifing, modelling, remote condition monitoring</td>
<td></td>
</tr>
<tr>
<td>Offshore wind</td>
<td></td>
<td></td>
<td>Reliability, remote monitoring</td>
<td>NDE, lifing, modelling, remote condition monitoring</td>
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</tr>
<tr>
<td>Marine</td>
<td></td>
<td></td>
<td>Reliability, remote monitoring</td>
<td>NDE, lifing, modelling, remote condition monitoring</td>
<td></td>
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<tr>
<td>Fuel Cells</td>
<td></td>
<td></td>
<td>Reduce Cost as barrier to market</td>
<td>New materials or processes</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td></td>
<td></td>
<td>Reduce Cost as barrier to market</td>
<td>New materials or processes</td>
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<tr>
<td>Solar pv</td>
<td></td>
<td></td>
<td>Reduce Cost as barrier to market</td>
<td>New materials or processes</td>
<td></td>
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<tr>
<td>Biomass</td>
<td></td>
<td></td>
<td>Aggressive environments</td>
<td>high T materials &amp; coatings</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Key Areas for R&amp;D</td>
<td></td>
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<tr>
<td>----------</td>
<td>----------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Now</td>
<td><strong>Ongoing incremental R&amp;D</strong> (support existing fossil/nuclear life extension &amp; grid infrastructure/networks)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>0-5</td>
<td><strong>Near term-applied R&amp;D</strong> to assist rapid, cost effective deployment (clean fossil, offshore wind, marine, networks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td><strong>Medium term applied R&amp;D</strong> (remove barriers to large scale deployment — <em>costs &amp; reliability</em> for, fuel cells, solar pv)</td>
<td></td>
<td></td>
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<tr>
<td>5-10+</td>
<td><strong>Longer term — fundamental R&amp;D</strong> (hydrogen, superconductors)</td>
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</tbody>
</table>
Key findings

• The UK Materials community has a number of world class strengths (particularly R&D) and is well positioned to take advantage of the growing national and global opportunities in the Energy sector.

• UK must maintain a portfolio approach to its energy materials R&D to support policy—there is no one single winning technology

• The SRA summarises the key areas in each part of the sector where UK Energy materials R&D should concentrate to maximise impact

• The SRA prioritises short, medium and long term materials R&D
7 key recommendations to support delivery

• Communication
• Establish Coordination & Delivery Body
• Stable/Sustainable funding
• Energy Materials Knowledge Management
• Innovative Technology Transfer and consortia building
• International Engagement
• Development of Skills and Resources
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Energy Materials

Progress to Date

- Worked with the Technology Strategy Board to help develop the Autumn Call on Energy Materials (£12m)

- Through chairmanship of EuMat have worked within FP 7 to deliver a call on Energy Materials in December 2007
Conclusions

- Developed an industry led Strategic Research Agenda for energy materials
- Key R&D areas defined to support UK policy
- Agenda for action proposed
- Series of recommendations made for implementation
- Worked with Technology Strategy Board and EPSRC to produce £12m call on Energy Materials
- Worked with the EC through UK chairmanship of EuMat to produce a joint call between the Directorates of Energy and Materials to introduce an Energy materials call
Thank you to all those who were:-

• involved in developing this SRA
• contributed to the consultation
• task group members
• advisory board
• MatUK
PANEL DISCUSSION

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