Energy Materials – SRA

Energy Transmission, Distribution & Storage

Distribution

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Presentation draws upon a study performed during 2007 and reported in:

Materials UK Energy Review 2007
Report 5: Energy Transmission, Distribution and Storage
Summary

1. Today’s landscape
2. Opportunities and challenges for tomorrow
3. Specific issues
Today’s Landscape

- UK’s energy distribution networks are considered mature and essentially take energy from the transmission system and provide it to customers, i.e. one-way flow
  - UK generates 40 GW of power, with peak of ~ 60 GW
  - Transmission network: 25,000 km of overhead cables
  - Distribution network: ~ 800,000 km of lower voltage cabling
  - Transmission & Distribution losses ~ 2% and ~6%, respectively
  - Main losses are in energy transformation and in cable/line heating
  - Losses equate to 3.2 GW of base load - i.e. equivalent to about 8 million tonnes of CO₂
Today’s Landscape

- Globalisation of the energy supply equipment market
- Effect of globalisation on UK knowledge profile
- Effect of age profile on sustainability of UK knowledge
1. Power Quality
2. Reliability
3. Affordability
4. Impact on the Environment (e.g. carbon footprint and Eco design)
5. Sustainability
• **Smart Grid Technologies**
  
  – Information Technology led
  – User centric approach
  – Provides opportunity for higher levels of control
  – Provides opportunity for real-time pricing, leading to reduction in peak and smoothing of demand.
  – Potential delay need for investment in networks to cope with increasing demand
  – Supports growth of distributed and micro generation
  – Manages two-way flow in distribution system and islanding
  – Possible route for affordable and valued introduction of energy storage in the electricity network
• Energy Transformation
  – Development and application of amorphous core steels
  – Advanced power converters

UNIFLEX-PM: Power converter, with high frequency transformer component
Reducing Energy Losses

• Power supply
  – Lower / zero loss cables
Management of Fault Currents

- Superconductivity

SLIM FORMER: Innovative, hybrid device with fault current limitation function
Performance enhancement and life extension

- Multi/nano scale technology
Eco design

- Environmental friendliness
- Economic development
- Social understanding

Making the UK the best place to do business in materials
Affordable sensors
Knowledge & training
International partnership & sustainability of action
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