Global Challenges in Energy
India & UK

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Outline

- Current Energy Scenarios
- Key Energy Issues
- Proposals for Improving Energy Supply in India and the UK
- Regional Case Study: Assam, India
- Regional Case Study: Greater London, UK
Current Energy Scenario

**India**
- Coal: 54%
- Hydro: 22%
- Renewable: 11%
- Gas: 10%
- Nuclear: 2%
- Oil: 1%

**UK**
- Gas: 45%
- Coal: 28%
- Nuclear: 17%
- Hydro & Wind Imports Other: 5%
# Key Energy Issues Nationally

<table>
<thead>
<tr>
<th>India</th>
<th>UK</th>
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<tbody>
<tr>
<td>Demand Exceeds Supply</td>
<td>De-commissioning of Old Power Plant</td>
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<td>‘Power for All by 2012’</td>
<td>CO(_2) emissions targets</td>
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<td>Lack of Provision</td>
<td>Political Pressure for Energy Generation from Renewable Sources</td>
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<td>57% without access to electricity</td>
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<tr>
<td>Inefficient Industrial Processes</td>
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<td>High CO(_2) Emissions</td>
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<td>Rapidly Developing Economy</td>
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<td>High Population growth</td>
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<td>Affordability of energy</td>
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<td>Energy Security</td>
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<td>Energy Poverty</td>
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Proposals for India

- Current generating capacity for India is insufficient to meet the demand
- Widening gap between supply and demand
- Government Target of 78,000 MW of additional capacity to provide ‘Power for All by 2012’ is very unlikely to be met
Proposals for India

- Improvement of the centralised electricity generation system
  - More efficient coal power plants
  - Carbon Capture & Storage
  - More extensive network

- Increasing the use of alternative fuel sources
  - Renewables
  - Nuclear

- De-centralisation of generation for rural areas
  - Biomass Gasification
  - Solar-Thermal
  - Solar Photovoltaic
  - Hybrid Systems

- Increase in public awareness
Proposals for India

<table>
<thead>
<tr>
<th>Renewable Source</th>
<th>Potential Generating Capacity (MWs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>19,500</td>
</tr>
<tr>
<td>Solar</td>
<td>20,000</td>
</tr>
<tr>
<td>Wind</td>
<td>47,000</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>15,000</td>
</tr>
<tr>
<td>Ocean Energy</td>
<td>50,000</td>
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</tbody>
</table>

- India has a huge potential for electricity generation from renewable sources
- Total potential of 152,000 MW far greater than the current supply capability.
Meeting India Energy gap

- 57% of Indian homes have no access to electricity
- 2.07 GW of energy gap currently
- It is estimated that an additional 3.4 GW gap of energy is expected by 2030.
- Therefore India needs a total capacity increase of 5.47GW
- If the electricity supply to rural areas is improved via this increase in supply we will see economic growth all across India
## Proposals for India

<table>
<thead>
<tr>
<th>Short term solution (&lt;5yrs)</th>
<th>Long term solution (2030)</th>
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<tbody>
<tr>
<td>Solar</td>
<td>Nuclear Plant</td>
</tr>
<tr>
<td>Natural gas</td>
<td>Coal Plant with Carbon Capture &amp; Storage</td>
</tr>
<tr>
<td>Biomass</td>
<td>Renewables</td>
</tr>
<tr>
<td>Small hydro plant</td>
<td>Large hydro plant</td>
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</table>
Loss of generating capacity through coal and nuclear plant decommissioning leaves a predicted shortfall in capacity of approximately 16 GW in 2030.

Alternative energy sources are required:
- Coal Power Plant with developed CCS
- Combined Cycle Gas Plant (CCGT) – improved efficiency
- New Nuclear builds
- Renewable – biomass co-firing, wind, hydro

Further development of technology is required in some cases.
Proposals for UK

- In rural areas intermittent energy supply and lack of gas supply create problems

- De-centralisation of energy supply in these areas could help
  - Biomass gasification
  - Solar for heat and power
  - Combined Heat and Power (CHP)
Regional Case Study: Assam, India

- Population: 31,169,272
- The gross domestic product of Assam was estimated at Rs. $5.78 \times 10^7$ in 2010.
- Average temperature is 30°C.
- Total installation capacity of power is 423.5 MW (31.03.2011).
- Deterioration of ecology due to deforestation to build mega hydro power plants.
- Elevated pollution with the increase in population and transportation.
Regional Case Study: Assam, India
Regional Case Study: Assam, India – Proposals

- Installation of
  - Micro hydral power plants
  - Solar power plants
  - Solar thermal–biomass hybrid power plants
  - Biomass gasification plants for combined heat and power
- Increase in the number of CNG powered vehicles
Regional Case Study: Greater London, UK

- Densely populated city with an approximate population of 7.8 million in 2009
- CO₂ emissions were recorded at 46,400 kilo tonnes in 2009
- Total electricity demand in 2009 was 41,814 GWh
- Increasing development and population growth is likely to lead to greater demand for electricity and further carbon dioxide emissions
- Large emissions from public transport
- Location creates problems for obtaining electricity supply locally
Regional Case Study: Greater London, UK – Proposals

- Additional supply network to cater for increased future demand
  - Import energy from other regions of the UK
  - Renewable sources where possible

- Encourage public transport to “go green” via utilisation of biofuels and electric vehicles

- Self-sufficient supply for London-based companies
  - Solar panels
  - Combined Heat and Power

- General increase in public awareness of energy savings
  - Decreasing the demand through education
  - Smart Grids
Summary

- Both India and the UK face significant energy challenges

- The scale of the energy challenges differ dramatically
  - Power for all in India
  - De-carbonisation of the energy sector for UK

- To ensure security of supply in the long-term future, renewable energies will play an important role – we must start now!