

How best to exploit alternative forms of energy on the Defence Estate

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Plan Design Enable

Purpose of the session

- **Discuss the opportunities for and barriers to exploiting alternative forms of energy on the Defence Estate**
- **Open discussion - I don't have all the answers!**
- **Introductions, interests and experience**

What are alternative energy forms?

- **Alternatives to traditional fossil fuels**
- **Alternatives to grid electricity**
- **Technologies that are significantly more efficient than traditional solutions**
- **Key attributes:**
 - ✓ Lower or zero carbon (LZC)
 - ✓ Lower lifetime costs (?)
 - ✓ Energy diversification and enhanced security
- **Renewables**
- **Other low carbon technologies**

Renewables

Active:

- Wind
- Biomass
- Solar thermal
- Solar photovoltaic
- Hydro
- Wave and tidal
- Geo-thermal

Passive:

- Natural ventilation
- Passive solar

Other low carbon technologies

- **Combined heat and power (CHP)**
- **District heating and cooling**
- **Absorption cooling, including tri-generation (CCHP)**
- **Heat pumps**
- **Ground source cooling**

Wind Power

Issues:

- Aviation interests (radar) – military and civil
- Grid connection
- Impact on operations
- Safety
- Impact on telecommunications (radio)
- Noise (residential)
- Visual impact and landscape designations
- Ecological impact

Opportunities:

- Well proven and economic technology (RO benefits)
- Large land-holding
- Partnership for Renewables (www.pfr.co.uk/pfr)

Biomass

- **Solid biomass** – wood fuels and energy crops (including willow, miscanthus and straw)
- **Liquid biomass** – methanol, ethanol and biodiesel
- **Biogas** – from landfill sites, sewage waste and anaerobic digesters

Issues:

- Resource availability, geographic concentration and logistics
- Energy crops vs. food crops

Opportunities:

- Increasingly accepted and proven technologies
- Renewables Obligation benefits
- Proposed Renewable Heat Incentive
- Diverse estate with large land-holding
- Opportunities for co-ordinating with others
- Waste management solutions - integration
- Partnership for Renewables (www.pfr.co.uk/pfr)

Solar

- **Solar thermal** – hot water provision
- **Photovoltaics** – electricity generation from semiconductor cells

Issues:

- Resource availability
- Positioning
- Circulating pumps needed for solar thermal
- Cost of photovoltaics

Opportunities:

- Solar thermal proven technology
- Renewables Obligation benefits
- New buildings / major refurbishments – part of an integrated solution
- Remote off-grid facilities
- Partnership for Renewables (www.pfr.co.uk/pfr)

Heat pumps

- **Ground source** – take up heat from the ground and release it at a higher temperature
- **Air source** – take up heat from the air and release it at a higher temperature

Issues:

- Heat 'quality' – low temperature heat emitters most suitable
- Coefficient of Performance (CoP)
- Space requirements for GSHPs
- Require electricity

Opportunities:

- New buildings / major refurbishments – part of an integrated solution

Combined Heat & Power (CHP)

Issues:

- Ideally need good heat loads for extended periods
- Maintenance requirements
- Economics depend on the spark spread

Opportunities:

- Housing concentrations
- Leisure facilities
- District heating systems
- Cooling via absorption chilling: tri-generation
- Climate Change Levy benefits
- Renewables Obligation benefits if biomass fuelled
- Proposed Renewable Heat Incentive

District heating and cooling

Issues:

- Infrastructure costs
- Integration of heat loads for retrofits
- Many older systems now disbanded in favour of distributed systems

Opportunities:

- Provides the backbone for linking in diverse technologies: renewable, CHP, absorption chilling and conventional
- Efficiencies of scale for larger facilities

Discussion

- **Drivers**
- **Barriers**
- **Opportunities particular to the defence estate**
- **Priority areas and technology**
- **The way forward**
- **Anything else.....**

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