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An overview of the state of microgeneration technologies in the UK

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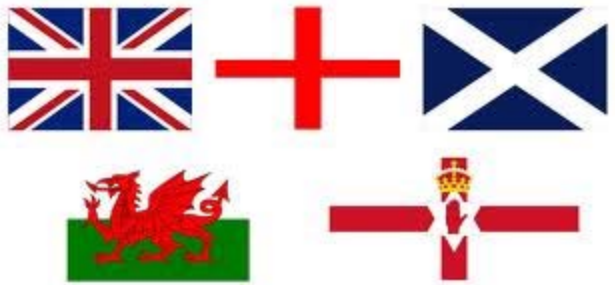
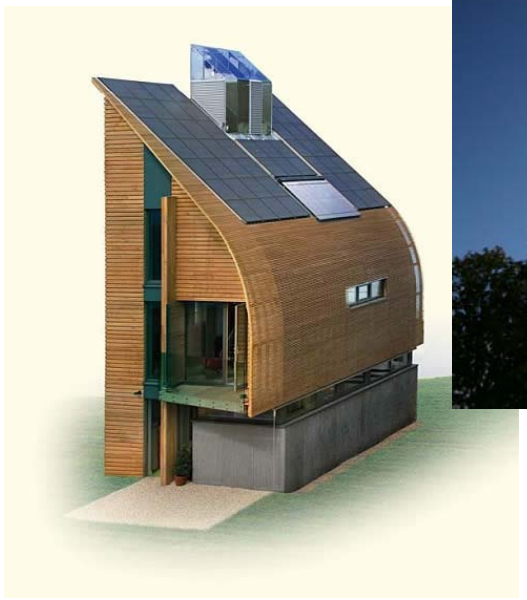
Drivers for Deployment

- the UK is a signatory to the Kyoto protocol committing the country to 12.5% cuts in GHG emissions
- EU 20-20-20
  - reduction in EU greenhouse gas emissions of at least 20% below 1990 levels; 20% of all energy consumption to come from renewable resources; 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.
- UK Climate Change Act 2008
  - self-imposed target “to ensure that the net UK carbon account for the year 2050 is at least **80%** lower than the 1990 baseline.”
  - 5-year ‘carbon budgets’ and caps, carbon trading scheme, renewable transport fuel obligation
- Energy Act 2008
  - enabling legislation for CCS investment, smart metering, offshore transmission, renewables obligation extended to 2037, **renewable heat incentive**, **feed-in-tariff**
- Energy Act 2010
  - further CCS legislation
- plus more legislation in the pipeline ..



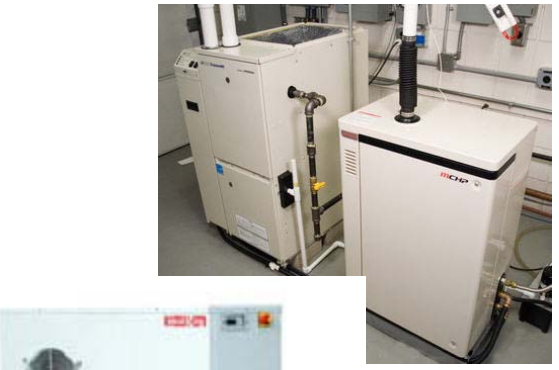
Where we are in 2010

- in the UK there is very significant growth in large-scale renewable generation
  - 8GW of capacity in 2009 (up 18% from 2008)
  - Scotland 31% of electricity from renewable sources 2010
- Microgeneration lags *far* behind
  - 120,000 solar thermal installations [600 GWh production]
  - 25,000 PV installations [26.5 Mwe capacity]
  - 28 MWe capacity of CHP (<100kWe)
  - 14,000 SWECS installations 28.7 MWe capacity of small wind systems
  - 8000 GSHP systems



Enabling Microgeneration [1]: Technology Deployments

- Carbon Trust ‘micro CHP accelerator programme’
  - deployment of 87 demonstration micro CHP units
  - disappointing carbon savings reported
  - final report never released
- Energy Savings Trust Heat Pump Trials
  - 29 ASHP and 54 GSHP systems installed and monitored
  - some disappointing COPs measured due to poor systems design
- Warwick wind trials
  - some catastrophically poor performance reported due to poor location of turbines (-ve electrical power production)



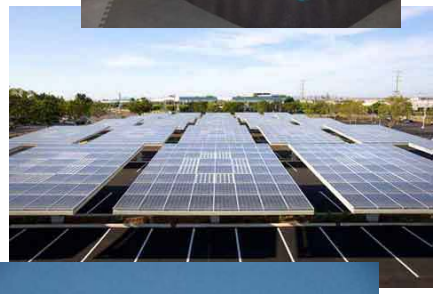
Enabling Microgeneration [2]: Research

- the UK Research Councils have invested ~£10m in microgeneration-specific research
  - impact of significant microgeneration penetration on the LV/MV/HV network to 2050
  - net-zero-energy-housing and microgeneration
  - co-ordination and control of microgeneration clusters
  - market and tariff structures for significant microgeneration penetration
  - ECBCS Annex42/Annex 54 participation
  - www.supergen-hidef.org

Enabling Microgeneration [3]: Legislation

- 15% of total energy provision from renewables by 2020
- … 2% in 2009
- in order to boost installation meet UK and EU legislative targets UK government introduced FIT (2009) and RHI (2011)
- Feed-in-Tariff (FIT) (replaced previous grants and tax allowances):

Technology	Scale	Tariff level (p/kWh)	Tariff lifetime (years)
Solar electricity (PV)	≤4 kW (retro fit)	41.3	25
Solar electricity (PV)	≤4 kW (new build)	36.1	25
Wind	≤1.5 kW	34.5	20
Wind	>1.5 - 15 kW	26.7	20
Micro CHP	≤2kW	10.0	10
Hydroelectricity	≤15 kW	19.9	20



Enabling Microgeneration [3]: Legislation

- Renewable Heat Incentive (RHI) qualifying technologies:
  - air, water and ground-source heat pumps
  - solar thermal
  - biomass boilers
  - renewable combined heat and power
  - use of biogas and bioliquids
  - injection of biomethane into the natural gas grid
- tariffs to be announced by the end of 2010
  - *proposed* levels

Solar thermal	**18p/kWh**
Biomass boiler	**9p/kWh**
ASHP	**7.5p/kWh**
GSHP	**7p/kWh**

- installations must be accompanied by energy efficiency improvements to dwelling

Conclusions

- radical change in UK energy mix at large scale due to very challenging GHG reduction targets [domestic and EU]
- huge growth in on/offshore wind, biomass combustion
- microgeneration lagging far behind, low numbers of installation in comparison to rest of Europe and North America
- technology field trials yielding poor results (mainly due to poor installation)
- FIT and RHI are strong drivers for growth BUT
  - installer skills base is lacking
  - industry and supply chain infrastructure relatively immature in the UK

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