“Our Energy Future - Creating a Low Carbon Economy”

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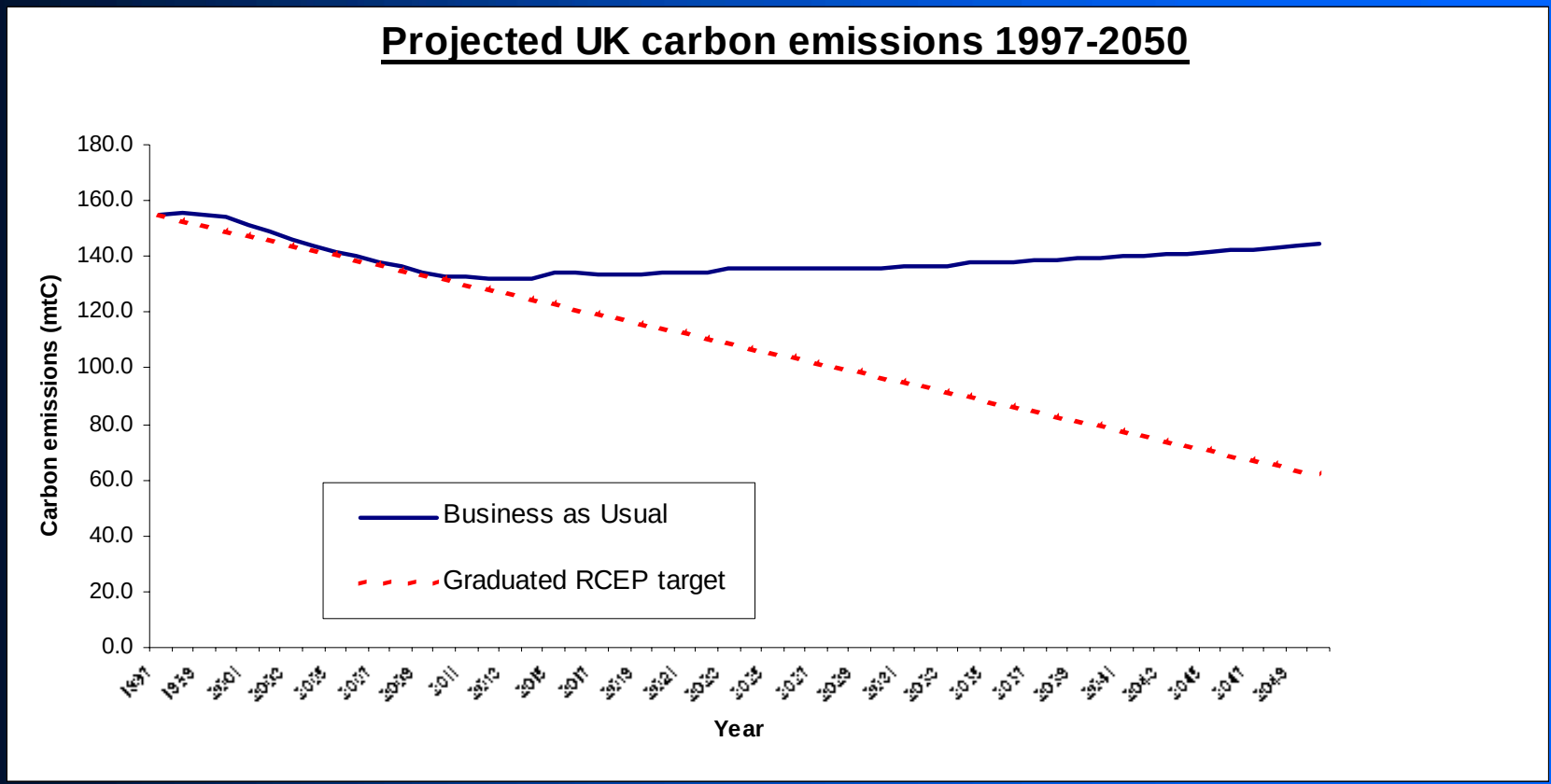
UK Trade & Investment

UK TRADE & INVESTMENT

The Carbon Challenge



The New Goals of UK Energy Policy

- putting ourselves on a path to 60% cuts in CO_2 by 2050
- maintaining reliability of energy supplies
- promoting competitive markets in the UK and beyond
- ensuring that every home is adequately and affordably heated

Aim to achieve these together

Costs of 60% CO2 reduction

- provided wider international engagement, costs of order of ½ - 2 % of GDP in 2050.

- approximately 0.01-0.02 percentage points reduction on assumed GDP growth rate of 2.25% a year

- GDP 3 times as large in 2050 as now.

How will we do it (1)
energy efficiency

- expect it to contribute 8-12MtC carbon cuts by 2020 (50-50 domestic/business)

- ambitious: doubling of improvements in energy intensity achieved over the last 30 years

- developing the energy efficiency commitments, EU product standards, building regulations, public sector performance

How will we do it (2)
renewable energy

- 10% electricity to come from renewable by 2010.
- renewable obligation and climate change levy exemption will provide £1bn support pa by 2010
- increasing existing £288m capital grants funding by further £60m to 2006
- research and innovation
- more supportive planning system, legislation for offshore wind

How will we do it (3)
emissions trading

- central delivery instrument
- expect it to contribute 2-4MtC carbon cuts by 2020
- from 2005 expect to cover generators, oil refineries and other sectors of industry in EU-wide scheme
- will encourage expanded opportunities for trading at international and EU levels

How will we do it (4)
transport

- transport can also contribute 2-4 MtC carbon cuts by 2020
- emission savings driven by further EU-based voluntary agreements (yet to be agreed)
- improved efficiency from hybrids and biofuels

Internationalising research and technology support

- International research collaboration
- Prizes for solving key technical puzzles
- Voluntary agreements
- Progressive supra-national regulatory standards
- Improved trade in environmental goods
- Beacon public procurement
- Guaranteed markets….etc

Emphasise:

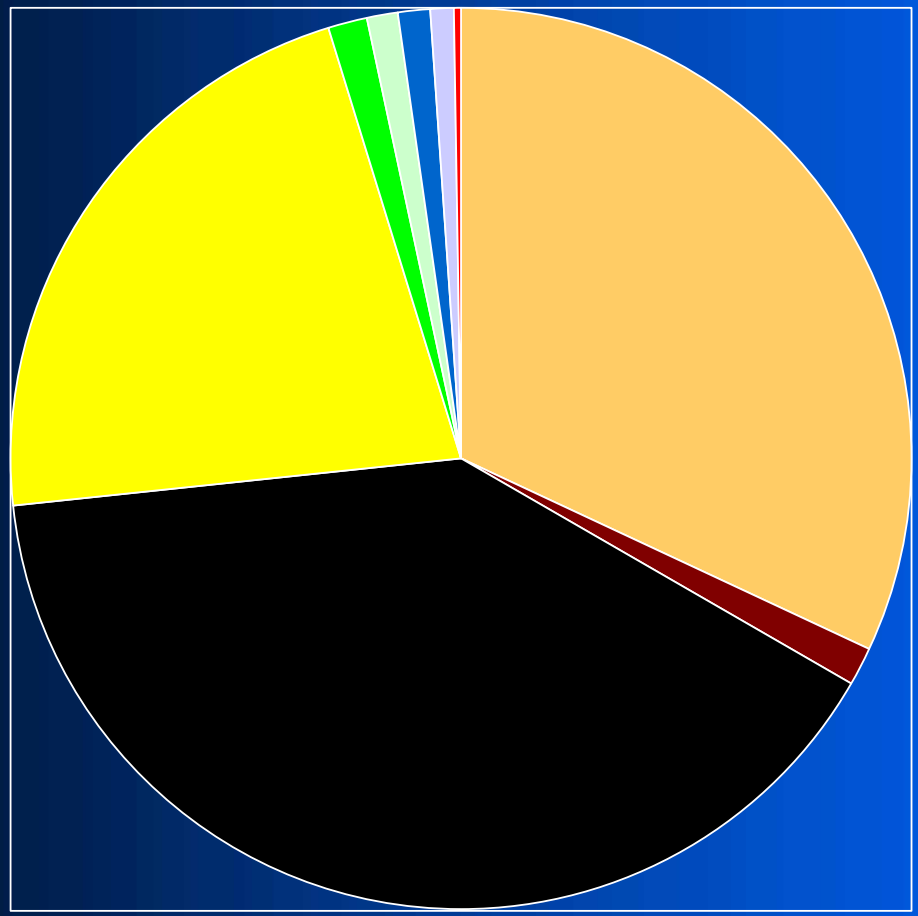
- Involving the private sector
- Technologies that are usable by developing countries
- Institutional approaches that fit with existing work by UNFCC (EGTT), IPCC and IEA and OECD

Conclusion

- UK putting itself on a path to 60% cuts in CO_2 by 2050- this does not happen by wishful thinking.
- Detailed economic modelling underpins goal
- Goal is product of cross Government effort and all departments buy-in
- Key policies identified to deliver – technology will play an important part

Total Primary Energy Mix (2002)

KTOE



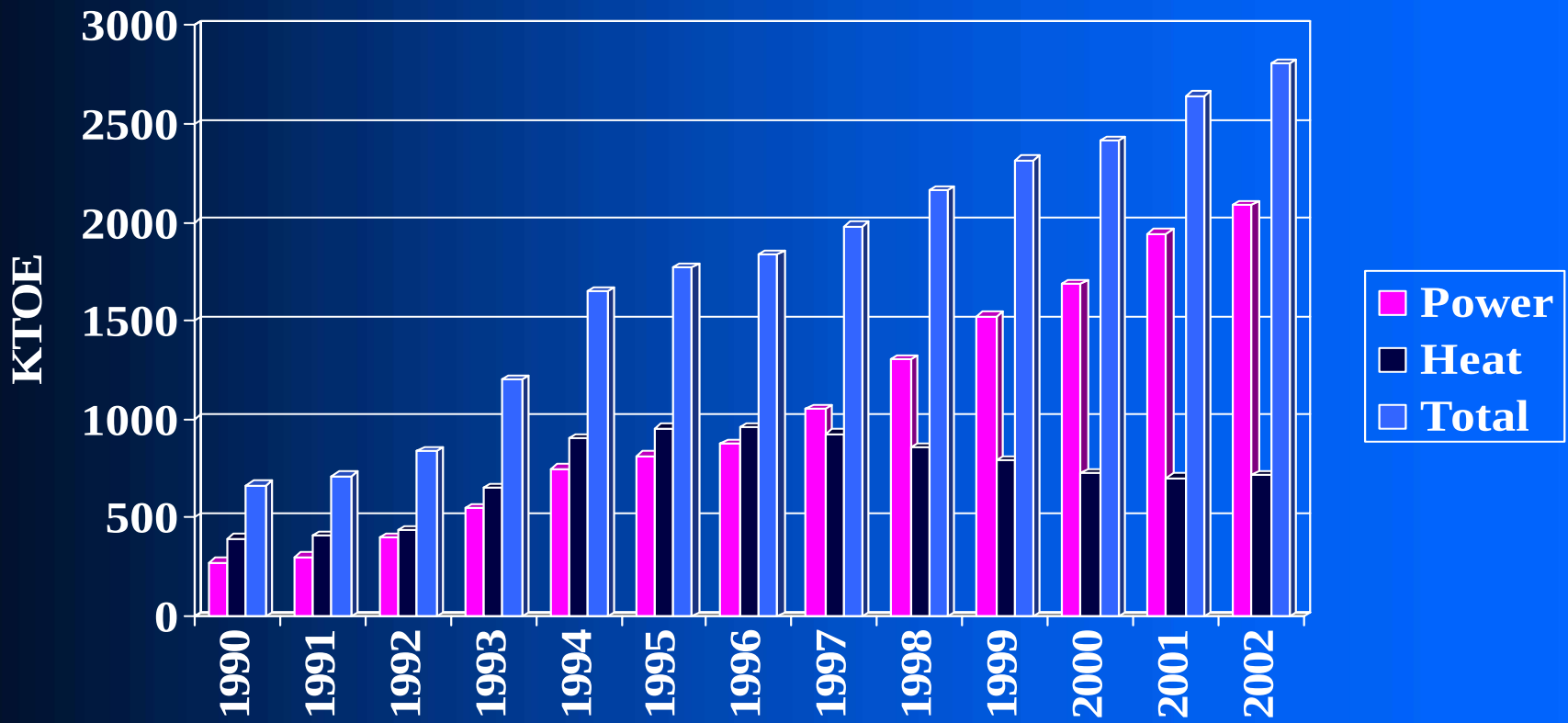
- Coal
- Oil
- Gas
- Nuclear
- Renewables
- Other
- Hydro-
- Hydro Storage
- Other

Energy Efficiency

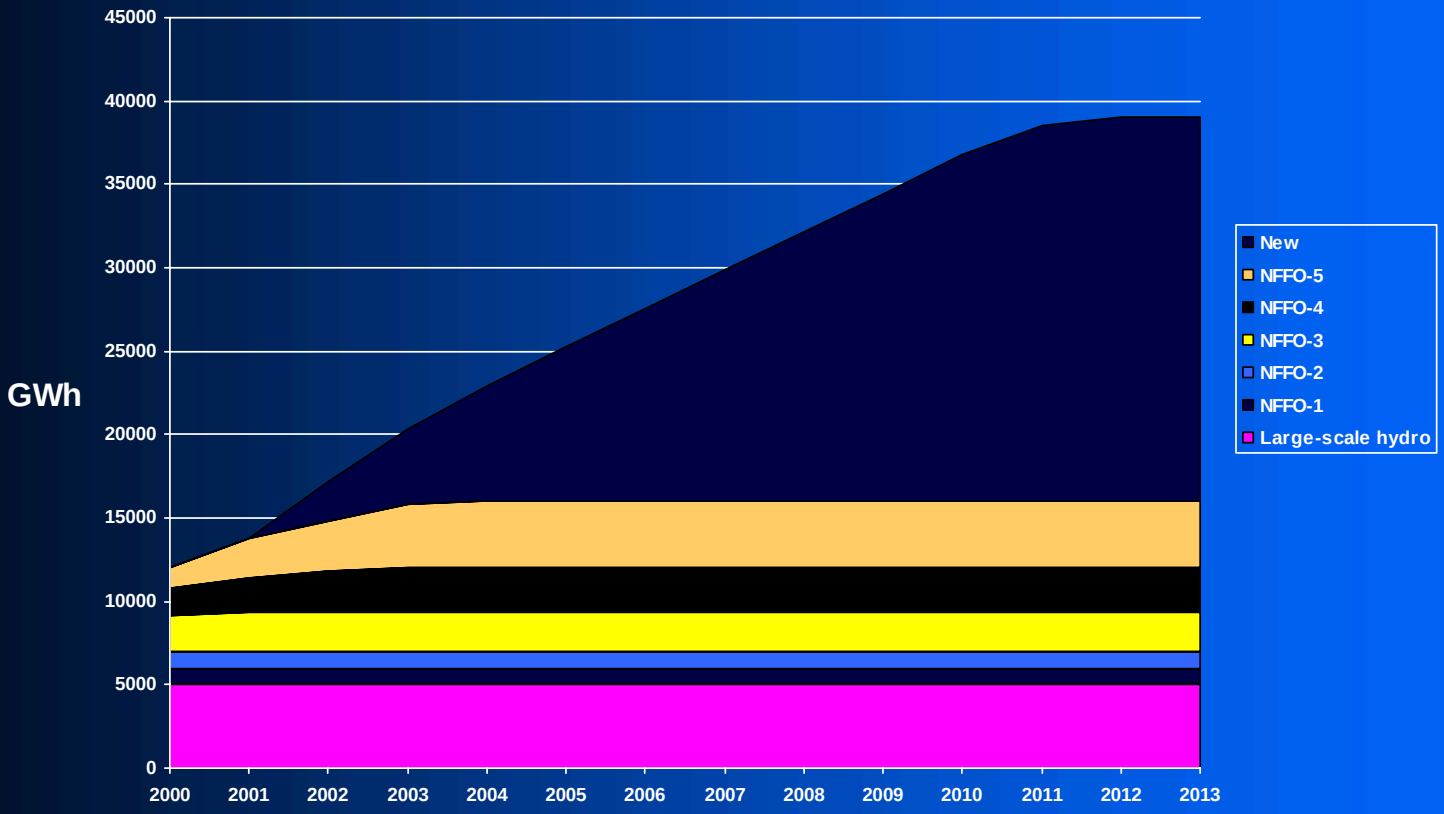
- Defra - £268M for EE and fuel poverty programmes in 2003/04.
  - £50M Community Energy Programme
- Review of building regulations 2005
- Improving EE in the Government estate and wider public sector
- 10GW ‘Good Quality’ CHP 2010
- Sustainable Energy Bill (July 2003)
- Emissions Trading

Renewable Energy Use in UK

(Excluding large Hydro)



The Market for Electricity from Renewable Energy



Prospects in UK? £8-10 bn by 2010

Possible Deployment Pattern, MW

	2000	*2010*	*2020*
Biomass	200	1500	4000
Wind – onshore	500	3500	5500
- offshore		3500	7500
Landfill gas	400	1000	1000
Photovoltaic	3	100	500
Small hydro	100	100	100
Other technologies	1	50	1000
TOTAL	1200	9750	19600

Renewable Obligation

- Obligation on Suppliers
  - percent of energy supplied
  - growing from 3% in 2001 to 10% in 2010
  - 25 year scheme
  - supplier to contract with generator.
- Renewables Obligation Certificates (ROC's)
  - 1MWh supplied = 1 ROC
  - Penalty Buyout - £30/MWh (4.5 US Cents/kWh)
  - re-cycled to successful suppliers
- No levy - but customers pay

more info - www.dti.gov.uk/renewable/...

RO – First Year's Results

- Success!
  - 02/03 Target – 3.0% of GB sales = 9.4 TWh
  - ROC's Supplied (end Mar 2003) – 1.6% = 4.4 TWh
- 193 MW capacity commissioned (excl. co-firing)
  - Largest amount of capacity in last 5 years
  - Wind – 1586MW awaiting construction
- ROC Trading Value
  - £42 - £47/MWh (recent)
  - Good incentive for Developers
  - Issues on Market Price
- Modification and Review

Capital Grant Schemes

Off-shore Wind

- £119 awarded over 3 rounds to xx projects

Bioenergy Capital Grants Scheme

- £66 million (DTI/NOF) - Heat, Power & CHP
- £18 million – 5 schemes April 2003.

Major PV Demonstration Programme

- £20m first phase – over 3 years.
- average 50% grants to individuals and organisations

Clear Skies Scheme

- £10 million grants and advice
  - Homeowners between £500 to £5000
  - Community organisations up to £100,000

UK Resources & Technologies

Some Examples

- Biomass/Waste to Energy
  - Wastes and Crops
  - Combustion, gasification, pyrolysis, anaerobic digestion and Hydrogen
- Wind
  - onshore and offshore, small and hybrids
- Small Scale Hydro
  - Pico,micro, mini, small, run-of-river, refurbish.
- Solar
  - Passive solar design, Active solar heating, Photovoltaic
- Marine/Ocean
  - Wave, Tidal, Current

Cleaner Fossil Fuels

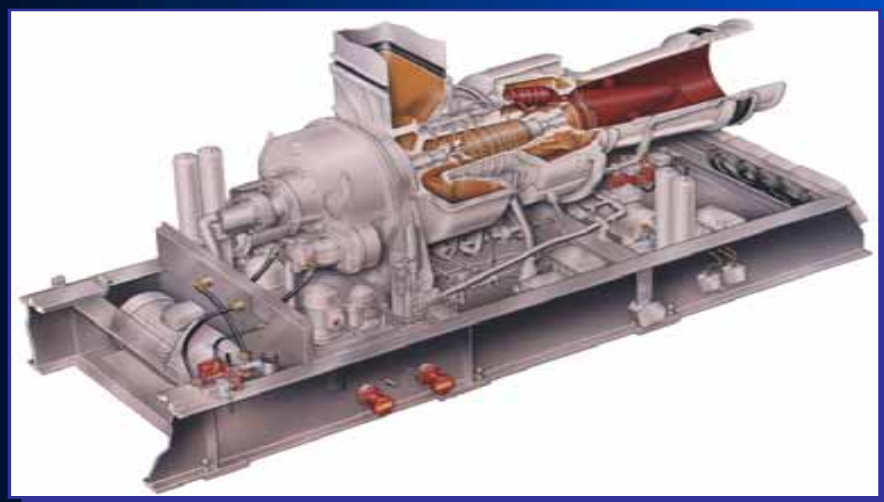
- Cleaner Coal Technology programme 1999-2005
- £17 million over life of the programme.
  - £8m on R&D
  - £9m on Technology Transfer and Exports Promotion.
- CO_2 Separation and Storage
  - International Cooperation

"Siemens" Power Turbines, Lincoln

Gas Turbines adapted for Biomass Fuels

- **Broad Industrial Range - 4 to 13MW**
- **Dry Low Emissions Technology**
- **Multi-fuel capability**
- **High Efficiency**
- **Steam Injection**
- **Long Life**

- **Cyclone**



- **Typhoon**

Peterbrotherhood – Steam Turbine Manufacture

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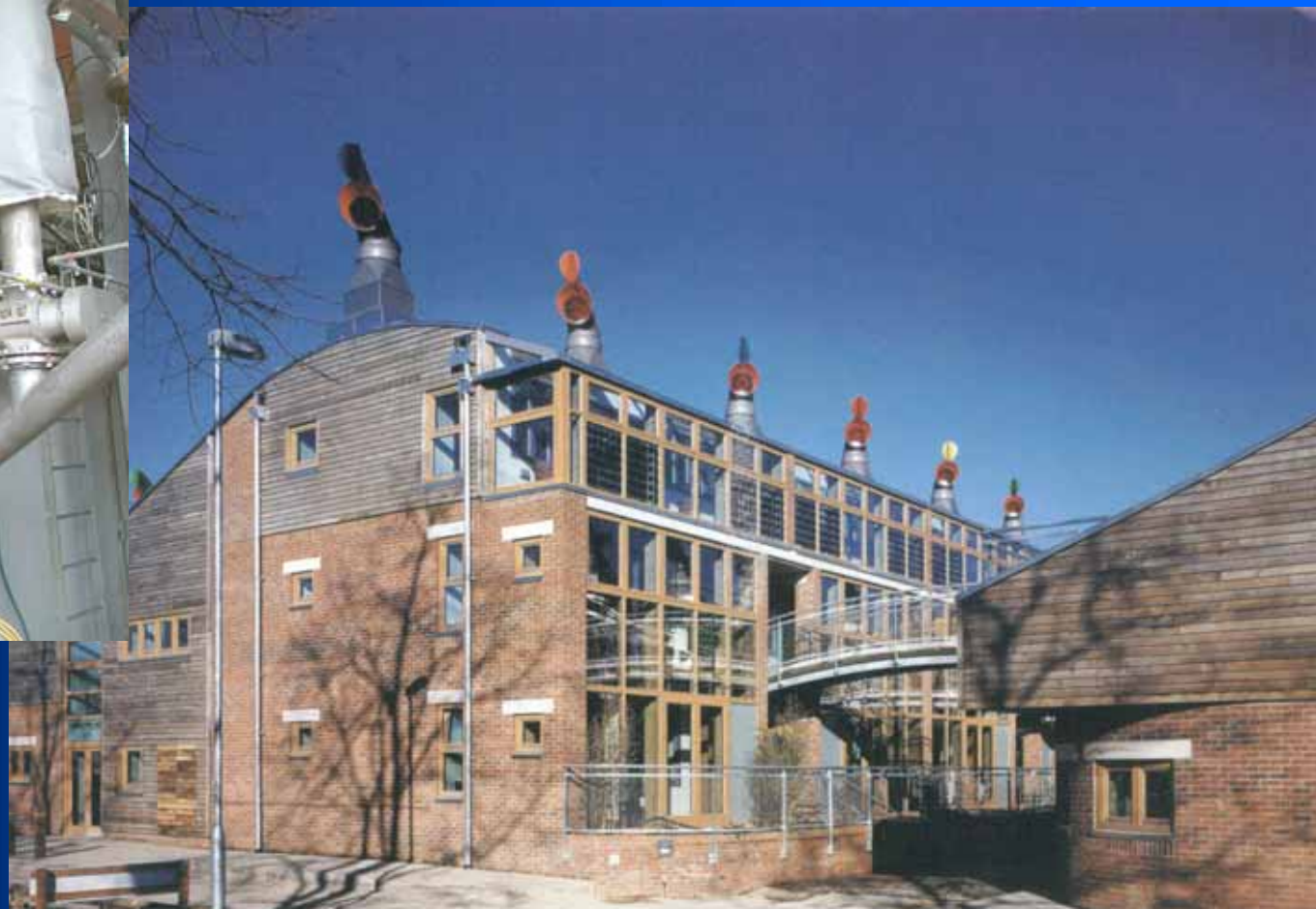
Energy Coppice

3 Months Old

Biomass: Straw Burning Power Station

Ely Straw Burning Power Station
31 MW Steam Cycle: EPRL

B9 Energy; 125 kW Gasification CHP in Beddington Zedbed



Landfill Gas to Electricity

Fibrowatt - Thetford Plant 38.5 MW, 500,000 Tonnes/Annum

Waste to Energy
Larger Solutions

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Some Wind Capabilities

- Consultancy
  - Garrad Hassan
- Manufacture
  - FKI Energy Technology/DeWind
  - Vestas (Scotland)
  - NEG Micon/Aerolaminates
- Developers
  - RES, National Wind Power, AMEC
- Operators
  - Scottish Power, Innogy

Wind Park
Development and Operation

Wind – Offshore

FKI Energy Technology/DeWind

Assembly Plant

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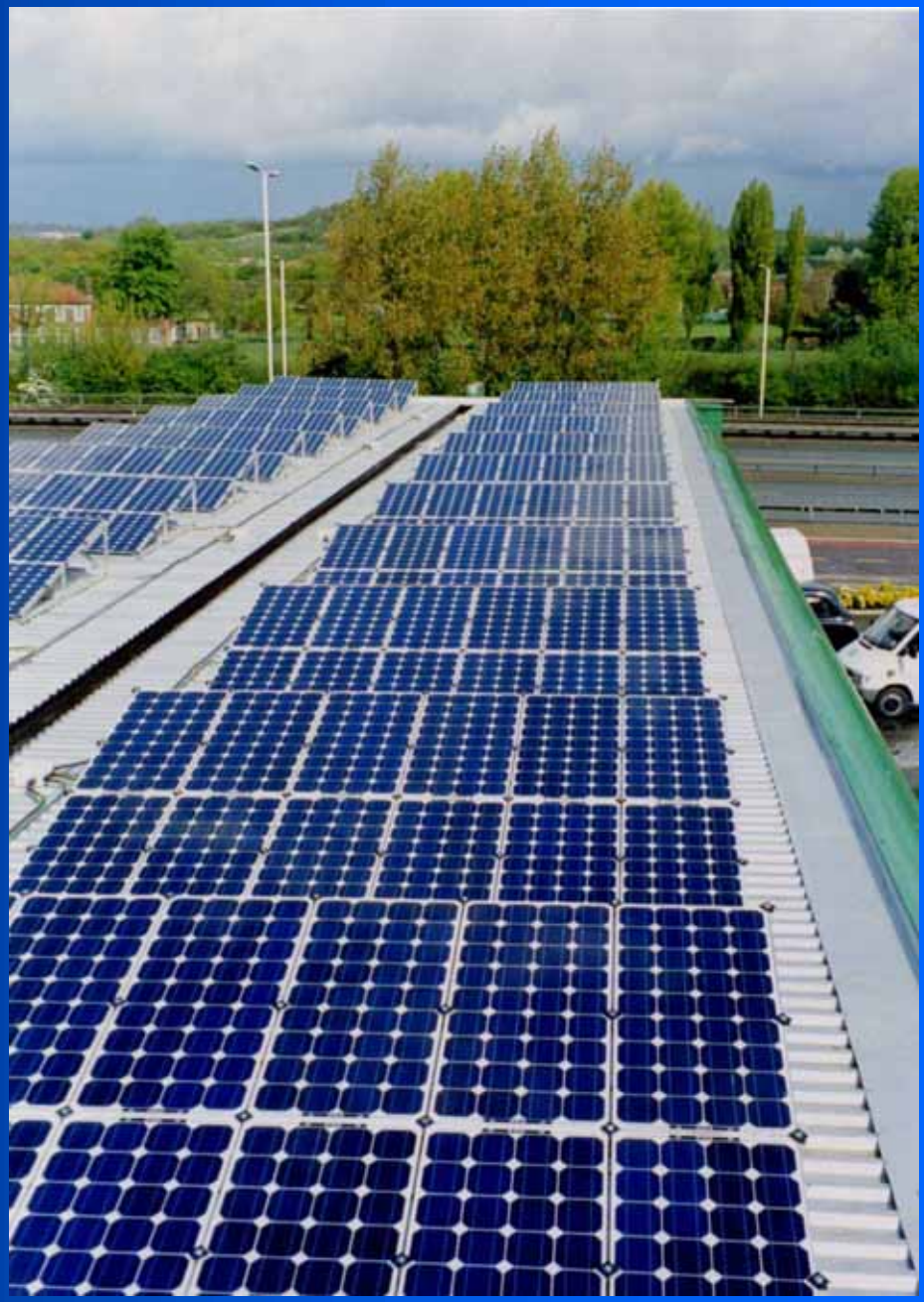
Thermomax Solar Collectors

Thermomax Heat Tubes

BP Solar; PV



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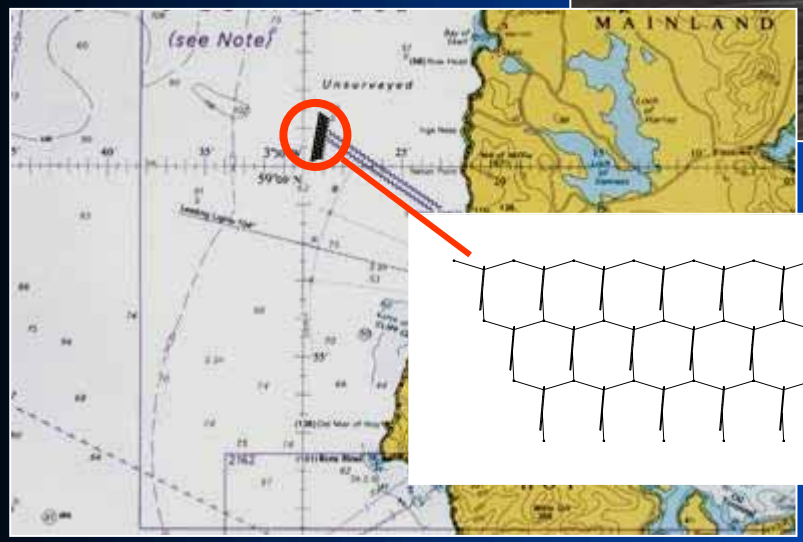
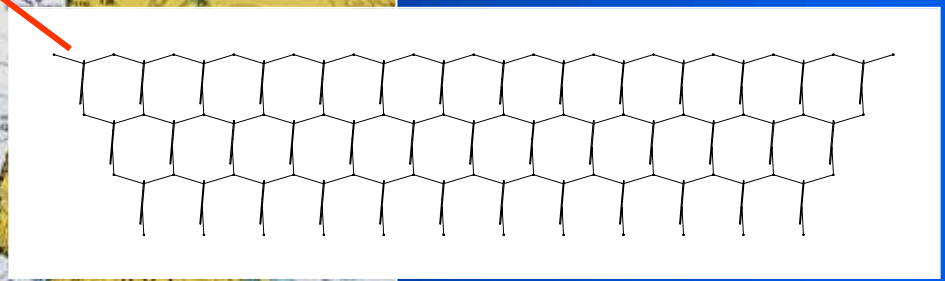
WAVE FARMS (2005 onwards)

EXAMPLE

- 39 x P-750 machines
- 30MW
- ~£30m installed cost
- **2.0km x 0.5km**
- **30 MW/km²**
- **110 GWh/year (~20,000 homes)**



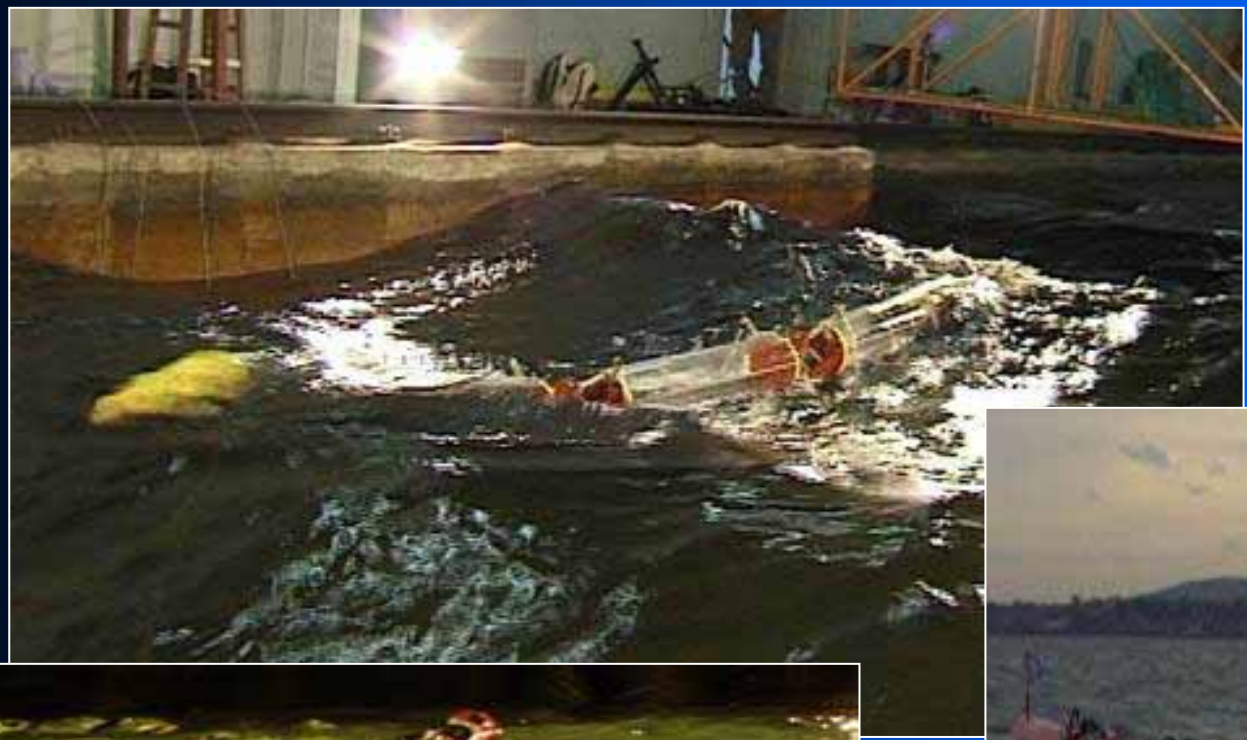


OCEAN POWER DELIVERY LTD.

www.oceanpd.com

Wave Power

Ocean Power Delivery - Pelamis



Marine Current Turbines

First Contacts

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