



Renewables....really?!

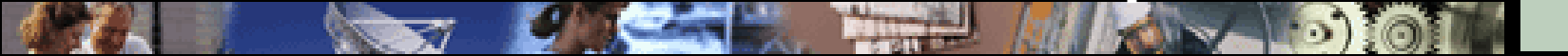
Dr Richard Wheal

Setting the scene



- Carbon and its importance
- Drivers for change
- Zero-carbon development
- Low to zero carbon technologies
- Potential solutions

Carbon and its importance

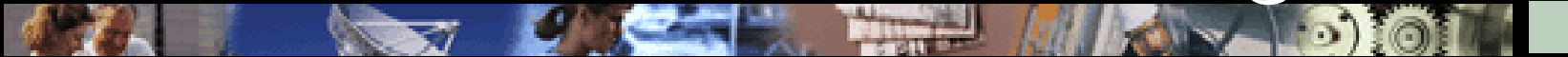


Drivers for change



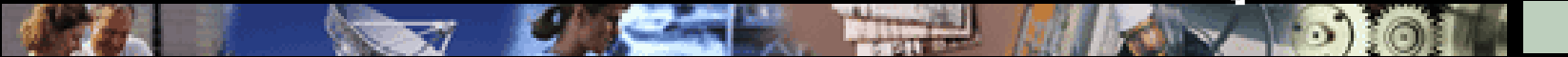
- The 'Brundtland' report, 1987: first suggestion of sustainable development
- Rio Earth Summit, 1992: UN conference on Environment and Development
- The Kyoto Protocol, 1997: an agreement between countries to reduce carbon dioxide and five other greenhouse gases (methane, nitrous oxide, sulphur hexafluoride, HFCs, and PFCs) or engage in emissions trading.
- Johannesburg World Summit on Sustainable Development in August/September 2002

Drivers for change



- Energy White Paper, 2003
- Planning Policy Statement 22, 2004
- Building Regulations, 2006
- EPBD, 2006
- Code for sustainable Homes, 2007
- PPS 1: Delivering Sustainable Development, 2007

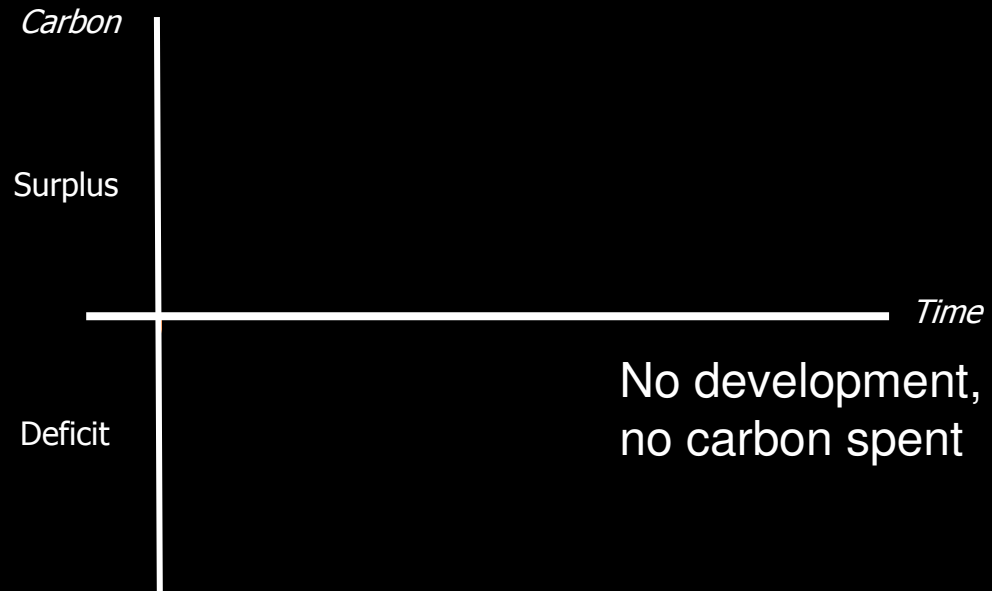
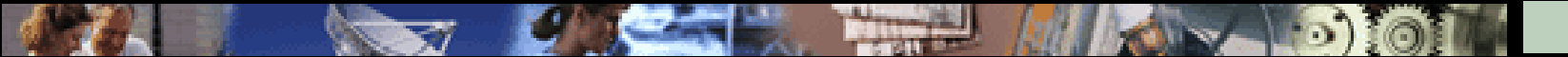
Zero carbon development

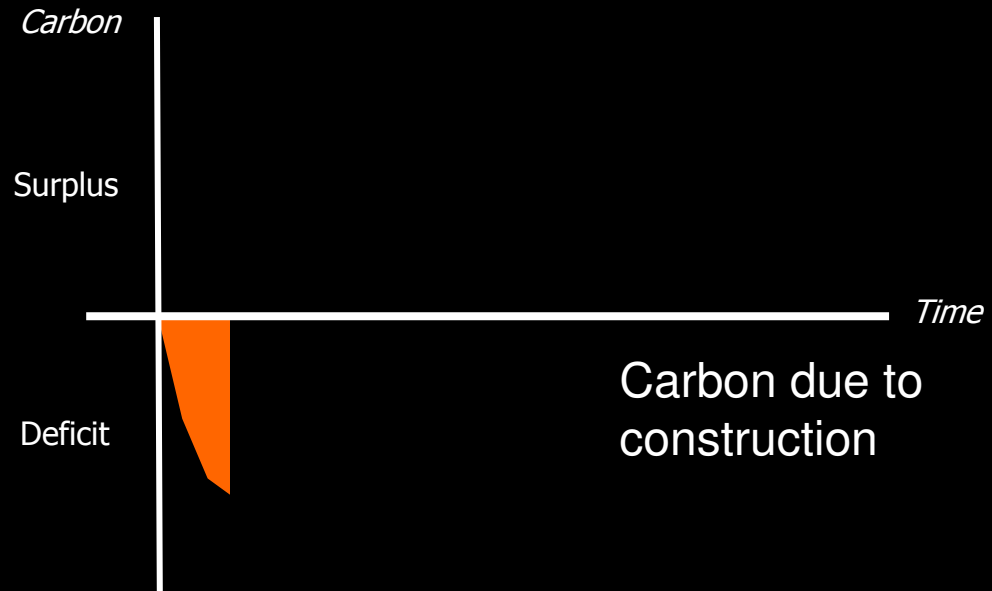
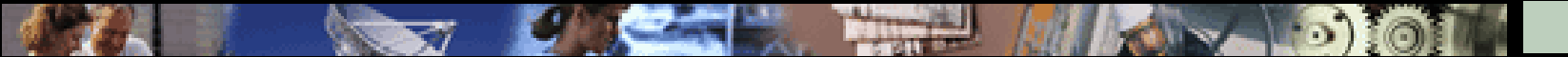


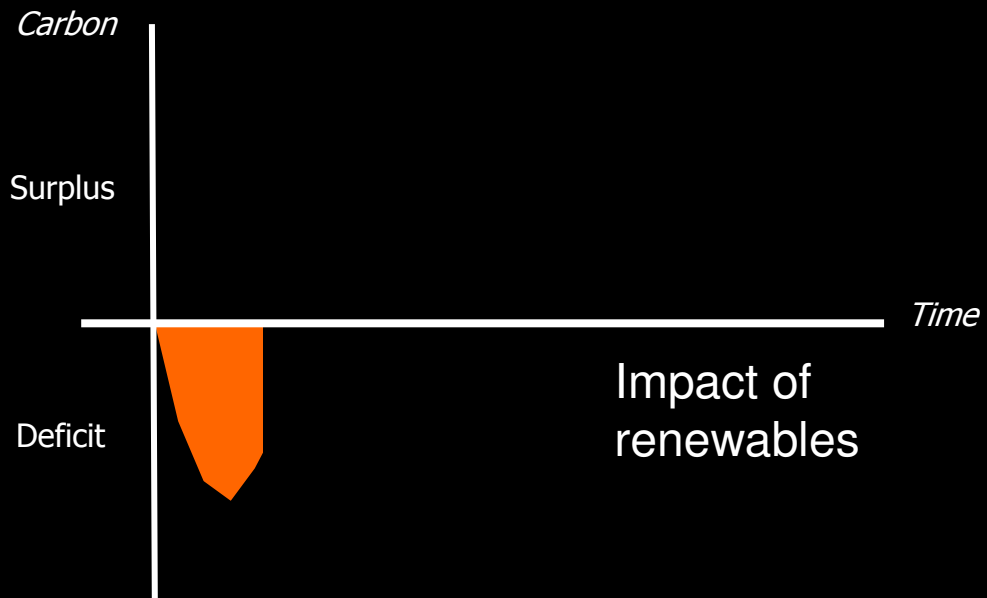
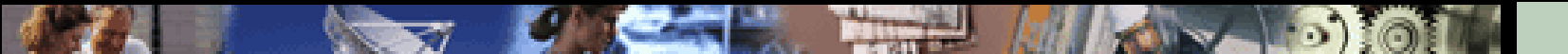
- The net CO₂ emissions due to operational energy are zero i.e. all energy from zero carbon technologies
- If a dwelling is zero carbon, gains highest rating in Code for sustainable homes and will be exempt from Stamp Duty

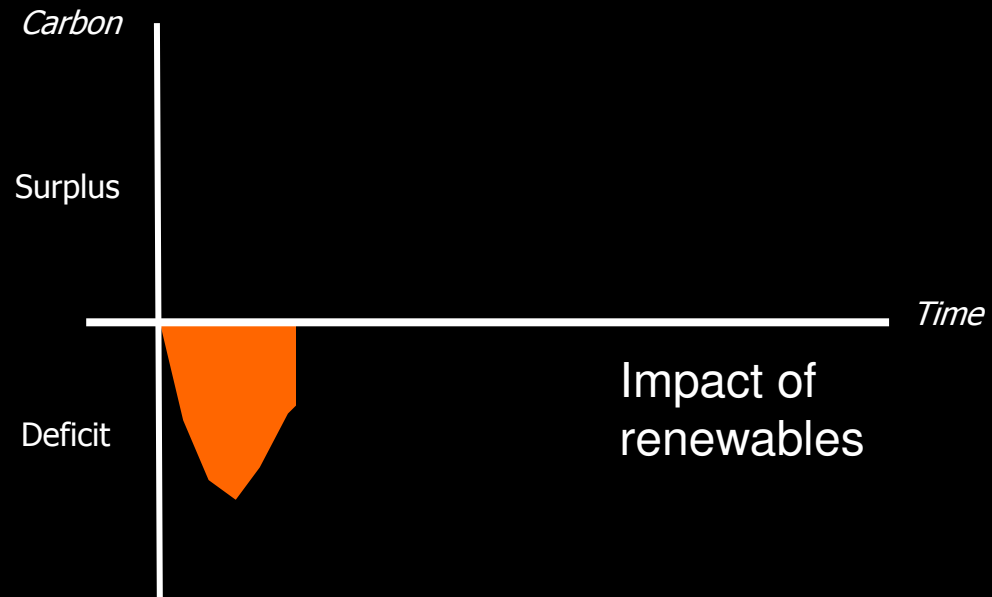
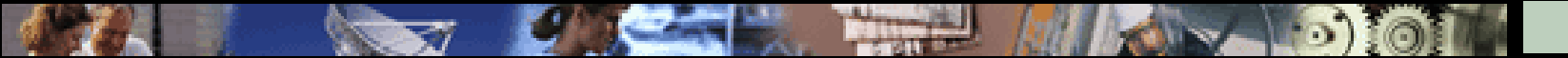
However...

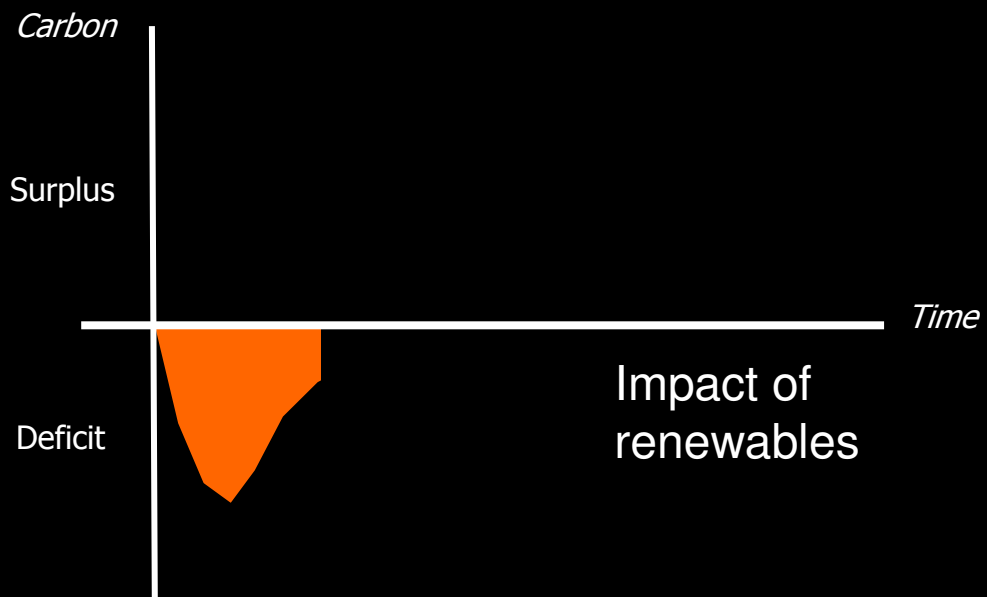
- Zero carbon does NOT include embodied energy
- Zero carbon is NOT a guarantee of increased saleability
- Will cost more to implement in the present market

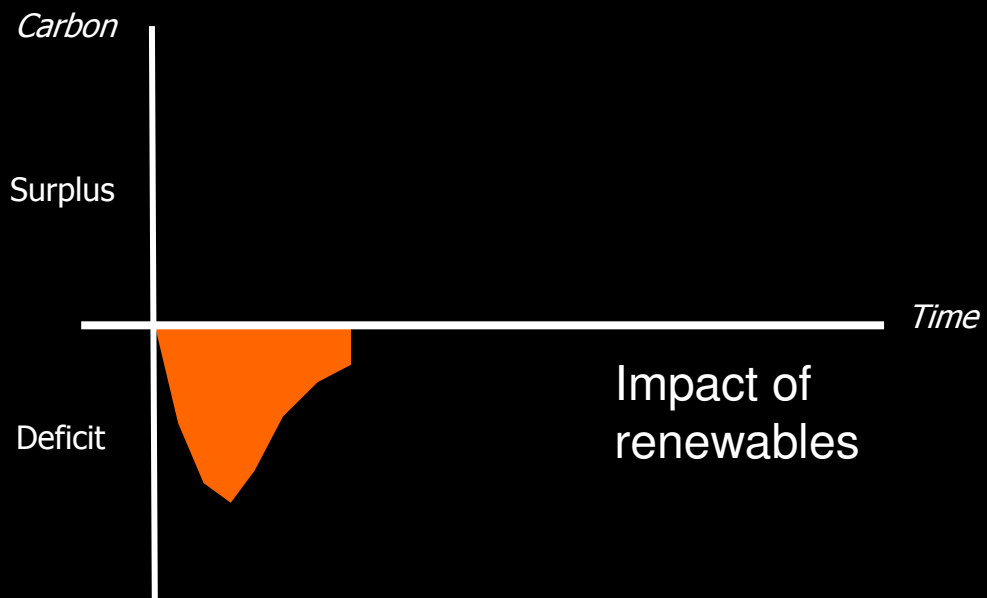


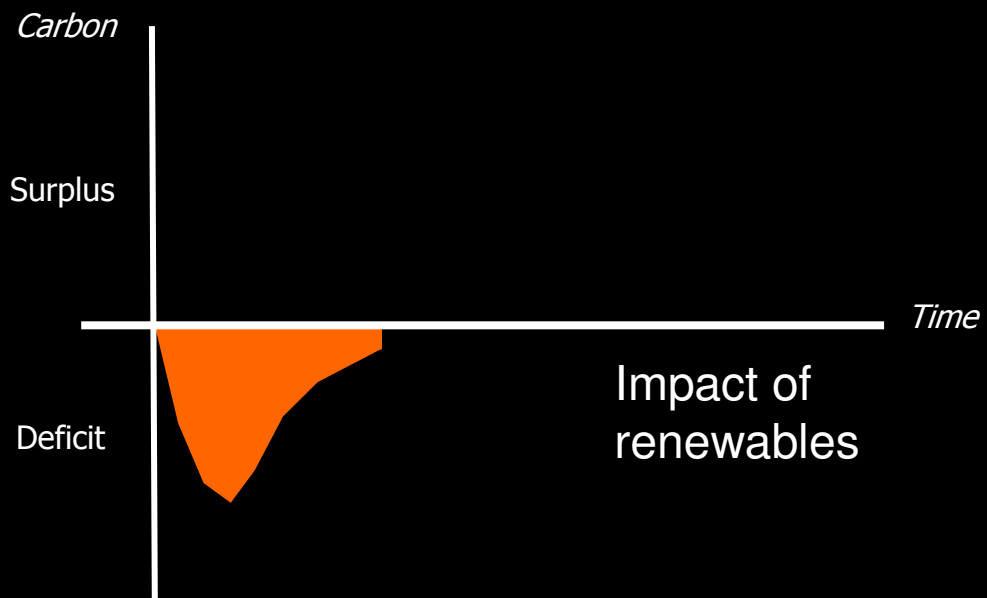


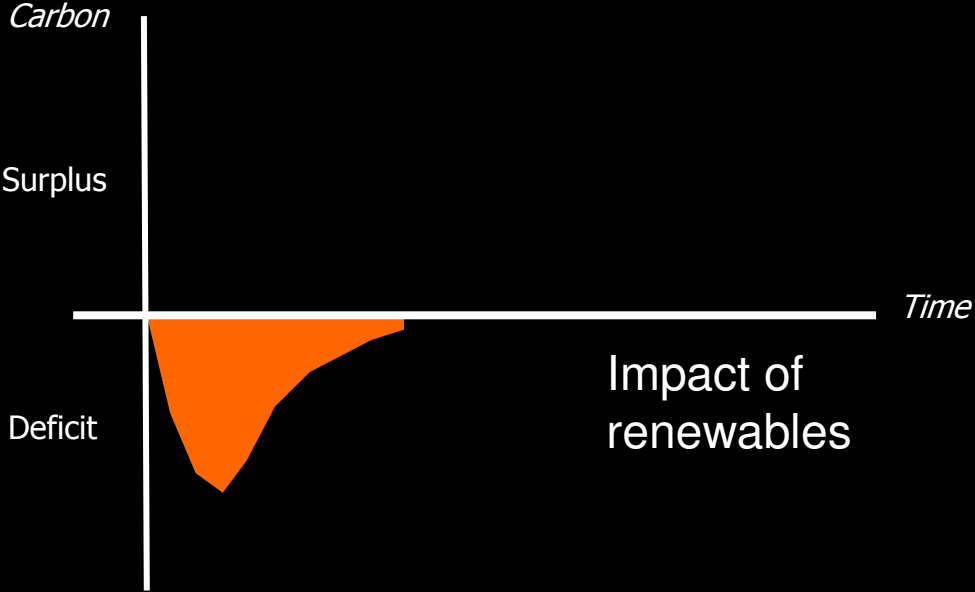


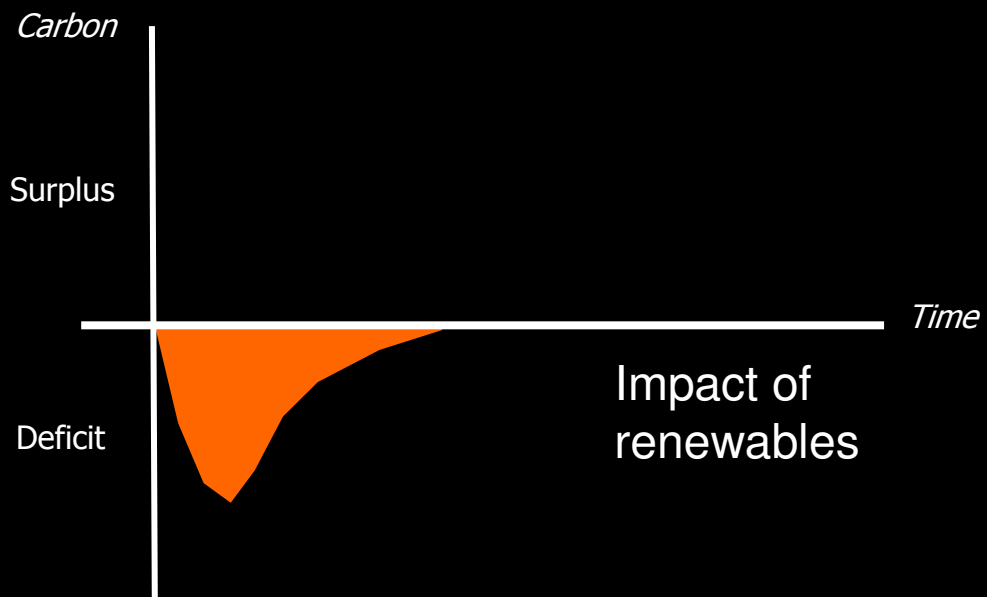


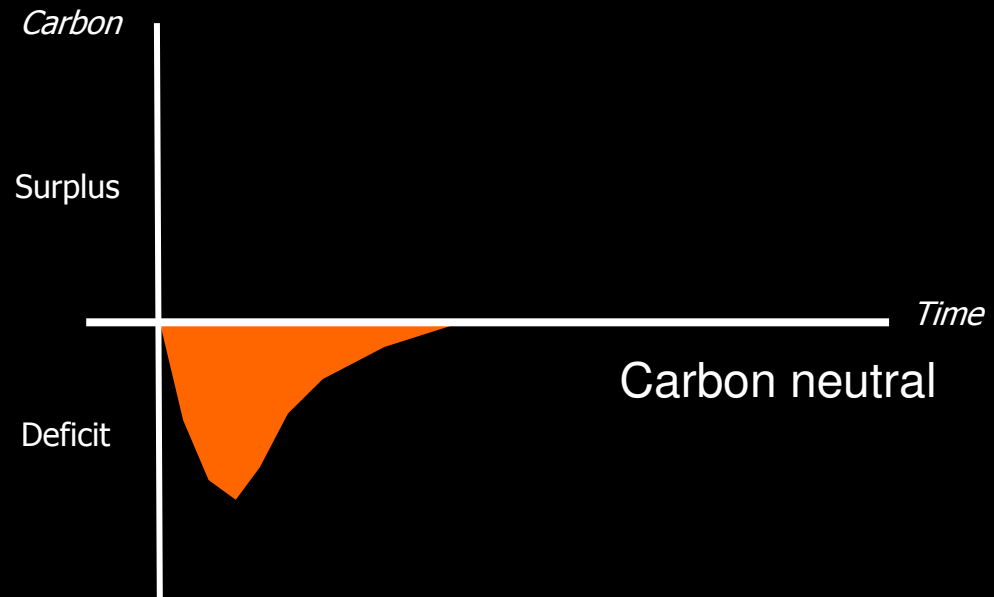
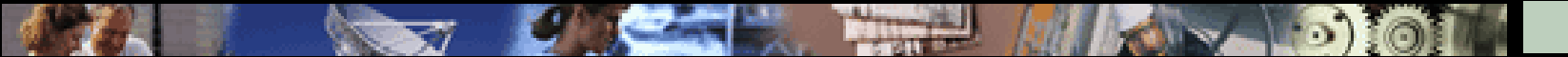


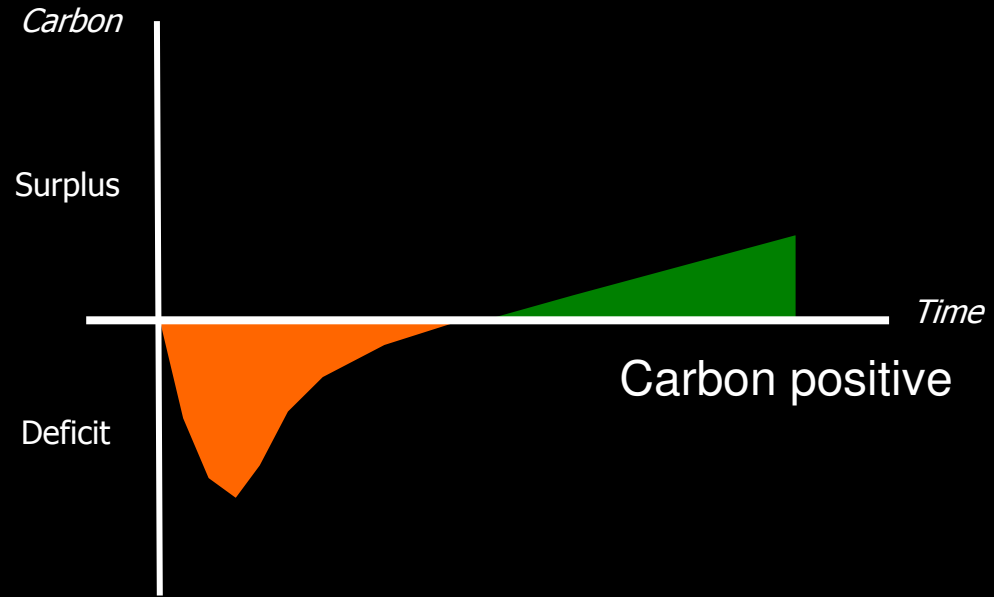
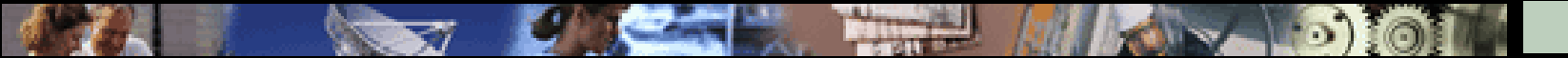










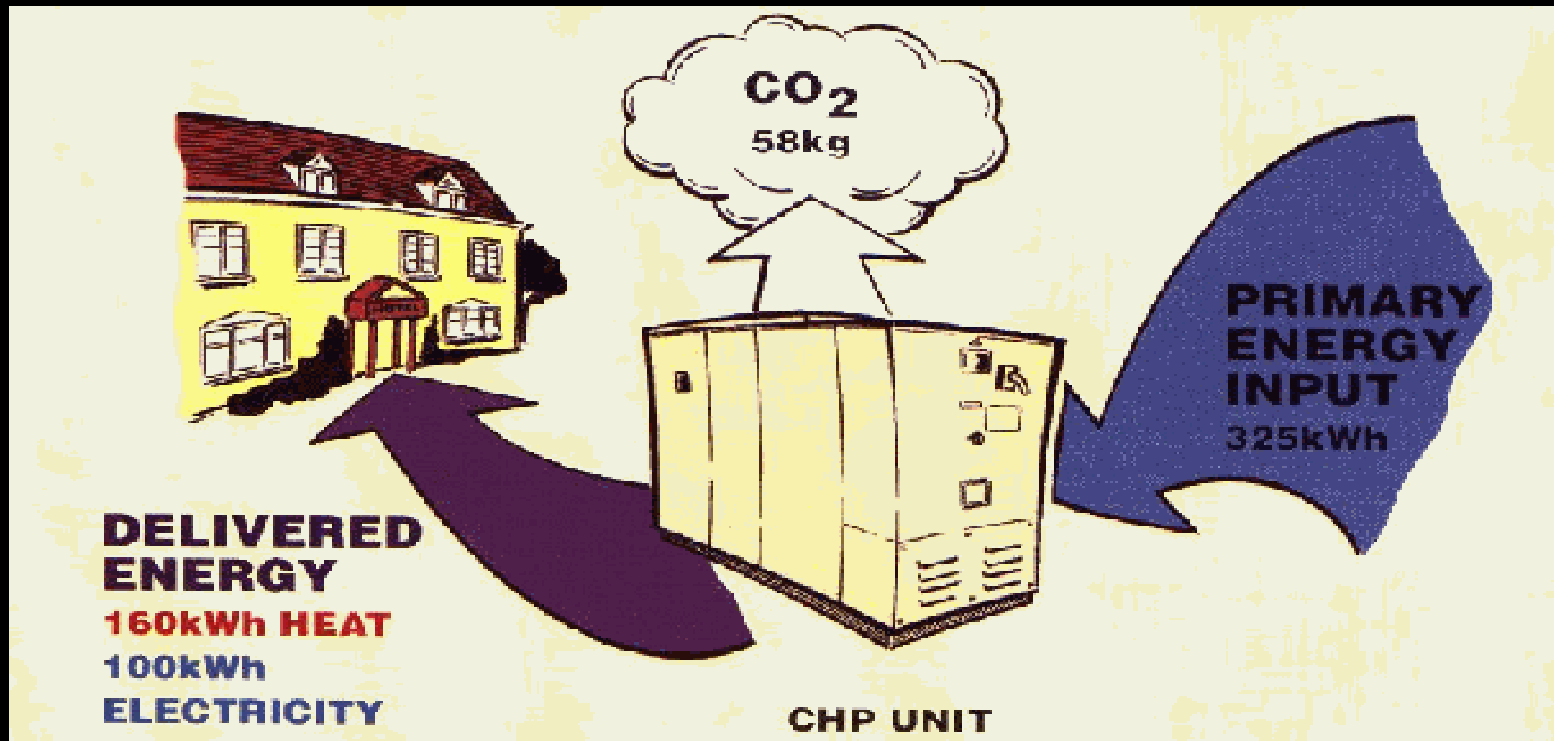
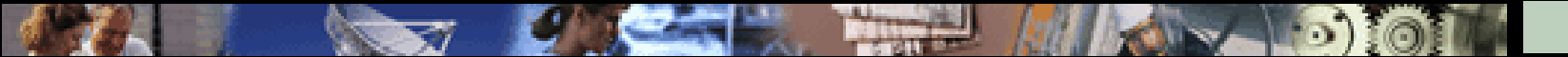


Low to Zero carbon technologies

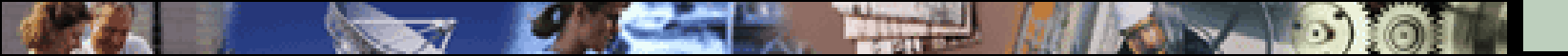


- Combined Heat and Power (CHP)
- Solar thermal – both water and air
- Solar electric – photovoltaics
- Wind
- Biomass / biofuels
- Heat Pump, ground source / water source
- Hydrogen
- Micro hydro, tidal, wave

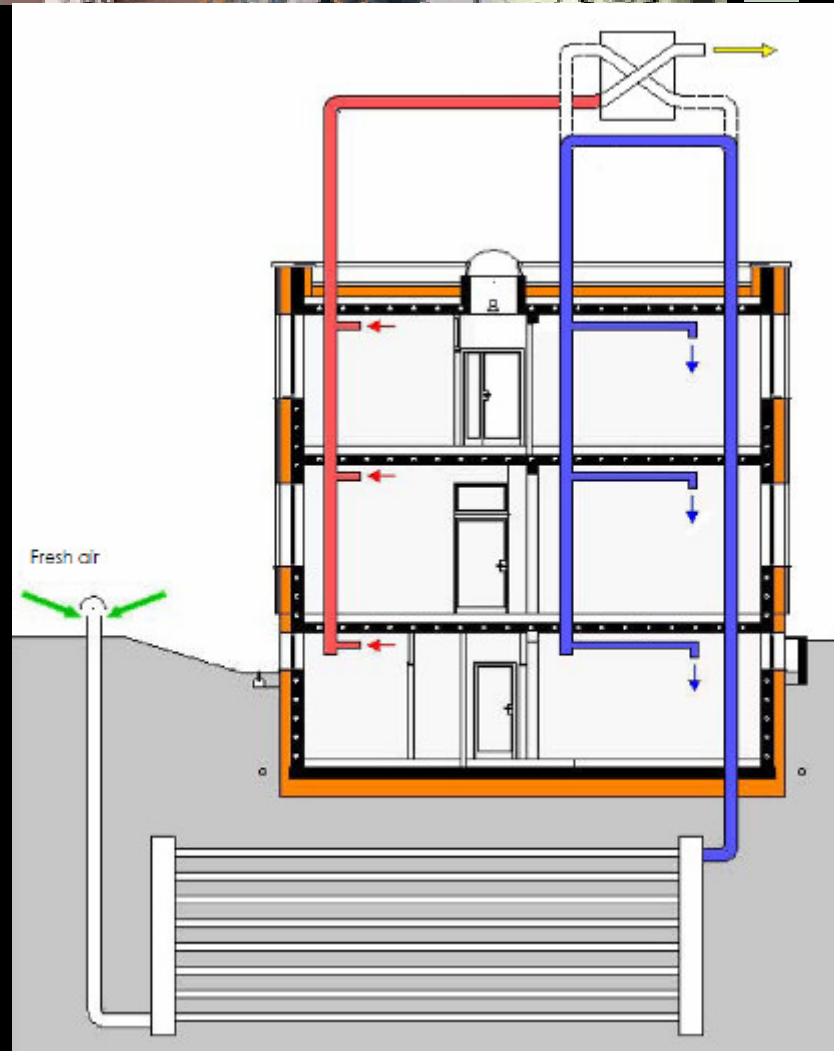
CHP



Solar thermal - water



Solar thermal - air



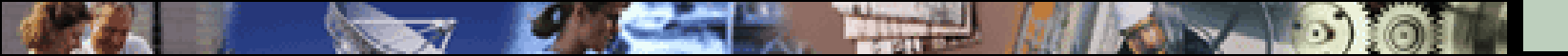
Solar electric – photovoltaics (PV)



- Convert solar radiation into electricity
- Ideal for urban environment
- Last in excess of 30 years

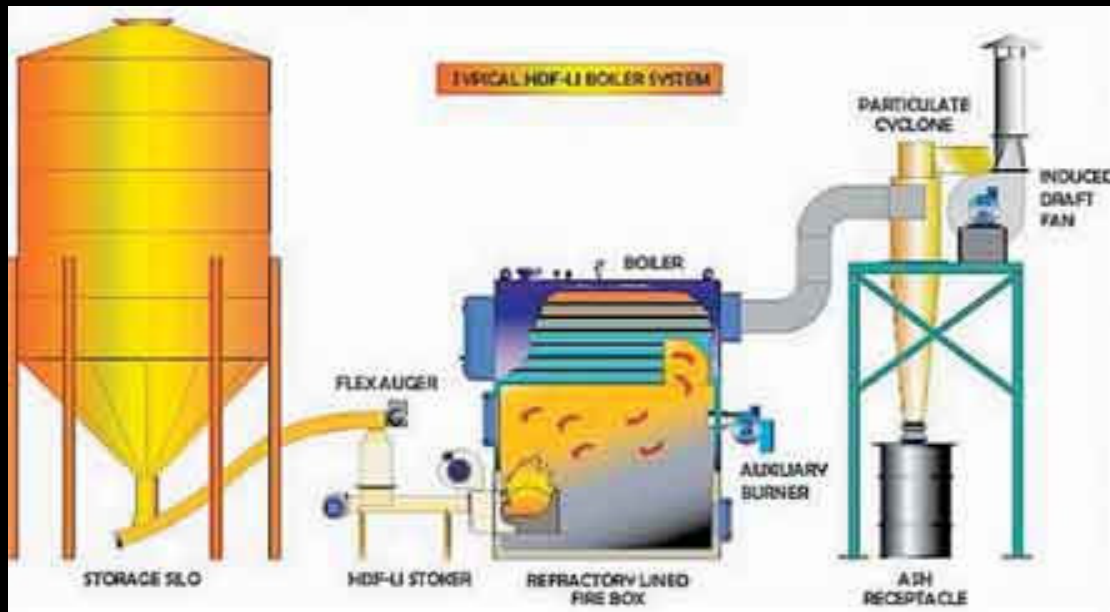


Wind turbines



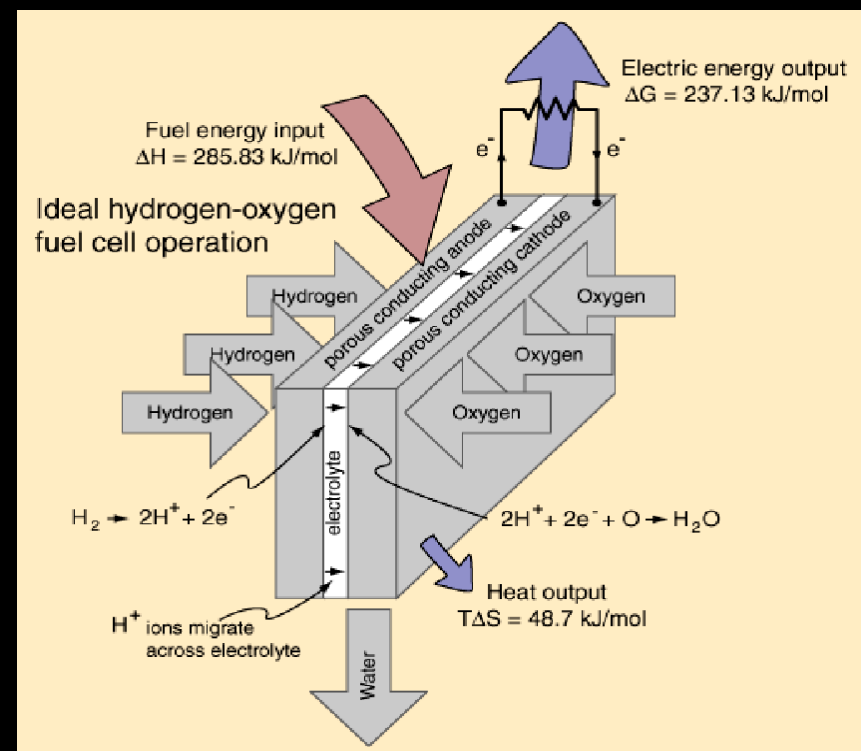
Biomass / Biofuels / Biodigestion

- Fuels which are considered “Carbon Neutral”
- Derived from crops, coppicing, waste wood
- Landfill gas



Hydrogen

- Fuel of the future?
- Fuel cells
- CHP



Potential solutions



- What can you site do for you?
- Building orientation and fabric
- Centralised “Energy Centres”
- Cost-benefits of good design vs renewables
- Carbon calculator



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