

Using Less (Electricity)

Gary Pain

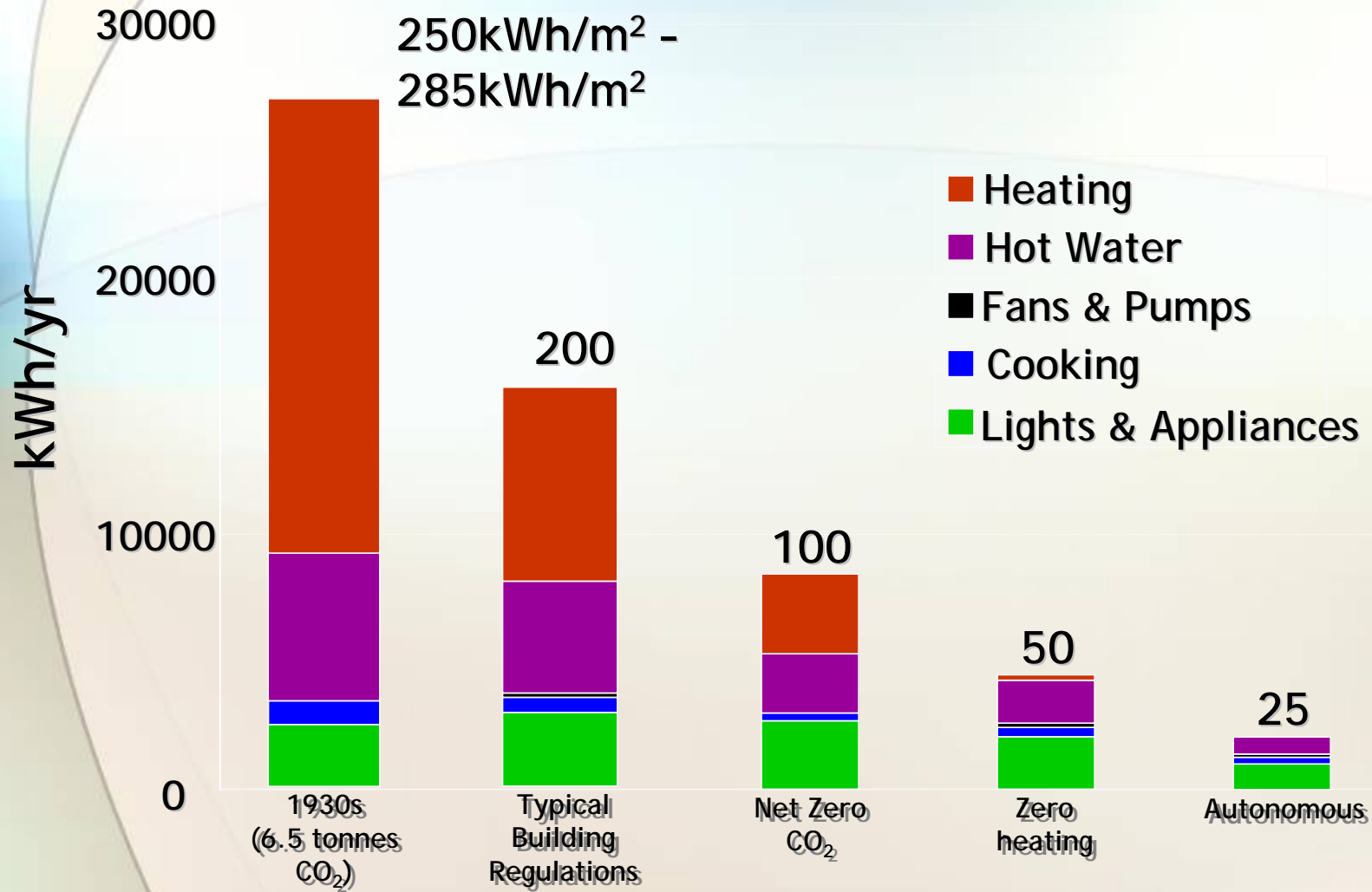
Merseyside Renewable Energy Initiative

Renewable Energy

Renewable energy can be used to produce electricity, generate heat and transport.

Type of Renewable	Output			
	Heat	Electricity	Heat and Electricity	Transport
Solar Water heating	✓			
Photo-voltaic (PV)		✓		
Ground Source Heat Pump (GSHP)	✓			
Micro-Hydro		✓		
Wind		✓		
Biomass Heating	✓			
Biomass CHP			✓	
Bio Fuel				✓

Annual energy requirements



Source: BRE

“Domestic electricity consumption has increased by 50% between 1990 and 2002. The increases in domestic energy consumption have been driven by an increase in the number of households, increasing average internal temperatures and increasing numbers of electrically powered appliances.” (Department for Trade and Industry 2003a)

Merseyside Renewable Energy Initiative

Despite more efficient appliances, and energy efficiency education electricity use is increasing each year rather than decreasing.

Think of all the new 'desirable items' for householders

- Plasma screens
- Advanced lighting
- Cooling units
- Extra kitchen appliances
- More need for refrigeration
- Chargers for portable equipment



Electric Heating

- Many properties use electric heating
 - Usually night storage or convector style
- Reasons for installation include:
 - Off gas grid
 - Low capital cost
 - simplicity of fitting
 - no combustion or dangerous gases
- Problems with electric heating include:
 - High indirect carbon emissions
 - High energy bills unless insulation is good



Benefits of electricity

- Very controllable – also with heating if one part breaks the whole system is not always affected
- Able to use energy management systems to control use 24hrs a day
- As the UK adopts national renewable sources for power provision, electric power becomes a green option
- Less maintenance needed on electrical systems
- Longer life on components compared to items that use combustion

Easy reductions

Behaviour

- Switch off things not in use!
- Watch out for items with high standby consumption
- Wash clothes on lower temperatures
- Use the microwave over the oven if practical
- Keep fridges and freezers fairly full and open as little as possible

Appliances

"British washing machines, tumble dryers and dishwashers consume £800 million of electricity a year, creating five million tonnes of carbon dioxide." Energy Saving Trust

Latest developments

- Super fast heat ovens with triple glazed doors
- Steam-use washing machines
- Dishwashers that sense when plates are clean
- Microwaves that weigh and cook food to perfection
- Induction cooking hobs

Appliances

The EU energy label

The EU energy label rates products from A, (the most efficient) to G (the least efficient).

For refrigeration the EU energy label goes up to A++.

By law, the label must be shown on all refrigeration and laundry appliances, dishwashers, electric ovens, air conditioners, lamps and light bulb packaging.

Only the most efficient products also carry the Energy Saving Recommended logo.



Energy		Fridge-Freezer
Manufacturer Model		
More efficient A B C D E F G Less efficient		A
Energy consumption kWh/year (Based on standard test results for 24h)		325
Actual consumption will depend on how the appliance is used and where it is located		
Fresh food volume l		190
Frozen food volume l		126
Noise (dB(A) re 1 pW)		***
Further information is contained in product brochures		
Norm EN 153 May 1990 Refrigerator Label Directive 94/2/EC		

Lighting

Energy-Efficient Lighting

Your lighting choices have an impact on more than your energy costs.

Lighting can actually influence the way people feel and perform.

Quality lighting has been shown to increase sales, improve student grades, and raise worker productivity.

The ultimate way to save energy on lighting is to make the most of the sunlight when it is daytime. Sun pipes can bring natural light into the heart of many buildings eliminating use of lights for most of normal office/daytime hours.



Lighting

In most commercial buildings, lighting accounts for more than half of the electricity used. It therefore makes sense to focus attention on how to provide energy efficient lighting.

In addition, Part L2A of the Building Regulations states a requirement for 'providing lighting systems that are energy efficient'

Remedy

- Occupancy sensors can switch lighting on or off leading to considerable energy savings. Taking this one step further, sensors can use a photocell that switches the lighting off if there is enough natural light.
- Systems are not expensive and are installed by electricians. Labour savings achieved installing such plug-and-play systems more than offset the capital cost of the equipment.
- Even higher tech digital lighting enables the light output to be altered in response to changing light levels. Energy savings of up to 70% are possible using such systems.

Ventilation

Increasingly buildings are using more energy in cooling during summer months than is used in heating through the winter.

There are a number of ways of reducing the amount of conventional air conditioning needed.

- Passive stack ventilation
- Mixed mode cooling
- Building high thermal mass into the design
- Incorporating clever use of shading techniques



The Queens Building, De Montfort University



Hockerton Housing project, Nottinghamshire

Ventilation

Preventing heat loss through ventilation: pointers for good practice

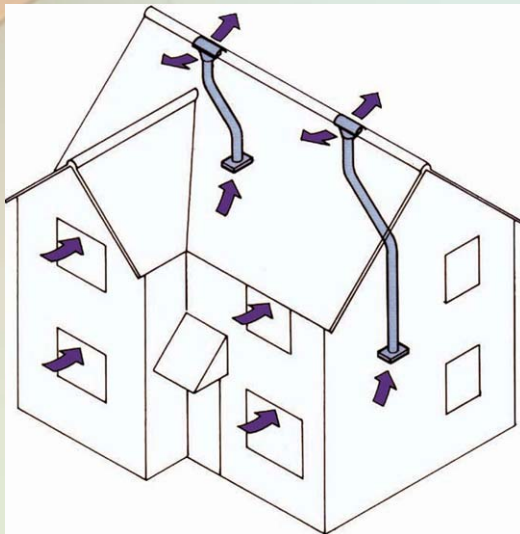
- Ensure adequate draughtproofing to all windows and doors
- Use timber frame construction for better air-tightness
- Pay attention to all jointing details and seal them
- Use loose blown fibre insulation rather than rolls or batts
- Use small heat recovery units where mechanical ventilation is required
- Use passive ventilation systems where possible

Passive stack ventilation



The environmental-friendly design of a former gas-holding area in Airdrie town centre into 2500 m² of lettable office space for business start-ups includes a sedum grass roof and passive stack ventilation.

North Lanarkshire Council commissioned Barr Construction for the development. A scheme was devised using passive stack ventilation via 13 circular terminals.

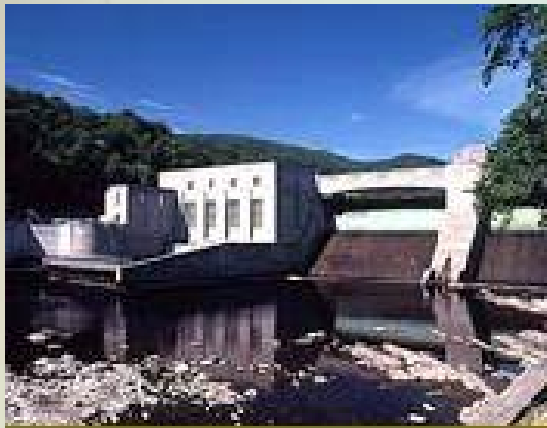


Passive stack ventilation relies on a combination of wind and buoyancy forces to extract warm used air from the occupied spaces. The used air is replaced by cooler fresh air drawn in through openable windows under direct control of the occupants.

Passive stack ventilation using high-capacity terminals is said to be capable of ventilating twice the depth inside the building compared with single-sided ventilation using only windows. It can also provide effective night cooling as there is a greater difference between internal and external temperatures at night, increasing buoyancy forces.

Water – Hydro Power

- If there is the rare opportunity to use water near a development then hydro power can make a significant and cost effective addition to onsite electricity generation
- Normally involves creating a holding area of water on the highest available ground that can release on demand



- Turbines are usually used to turn the falling water into electricity
- Specialist companies can be found through the LCBP



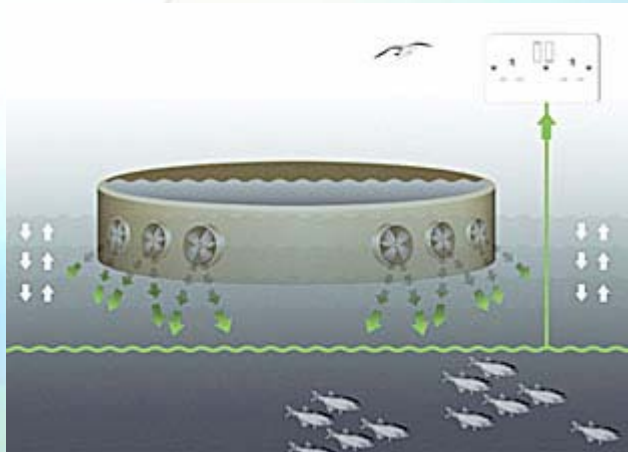
Wave Power

- The energy from the movement of waves can be captured to make electricity.
- Devices placed on the shoreline or out at sea can capture the energy of the waves and turn it into electricity



- Merseyside has the potential to have wave generated power taking place off its coastline in the future

Tidal



The energy in the movement of the tides can be captured by using turbines built into tidal barrages, which can be placed in estuary's or using tidal lagoons

New technology is being tested to get energy from shallow tidal areas and Merseyside has the potential to have a tidal lagoon off the coast with a potential capacity of 1500MW



Planning Issues

Planning issues regarding SHW and PV

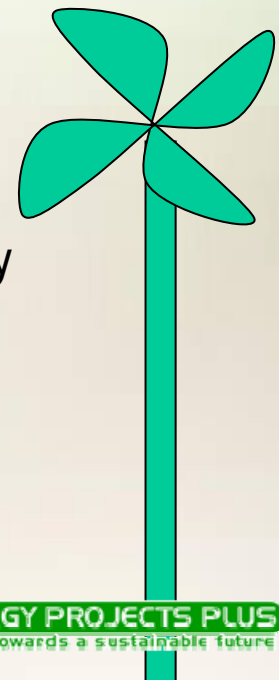
- May not need planning permission but need to consult Local Planning Authority
- Specific issues that may influence planning include:
 - Colour and appearance of systems on roofs
 - Specific system types and how they are fixed to roofs
 - Nature of the building itself (i.e. is it a listed building?)

Maximising on the energy captured from the sun dictates how dwellings should be orientated, which may bear upon layout criteria



Planning issues regarding Wind

- Planning permission is required for installations with a capacity of 50MW or less
- The Secretary of State for Energy will consider wind turbine schemes with larger capacity
- The planning process will review a number of potential environmental impacts of the wind turbine scheme;
 - Noise generated
 - Visual intrusion to the landscape
 - Safety – ensure that the turbine is soundly installed
 - Proximity to public transport routes and public rights of way
 - Impact on local ecology
 - Electromagnetic wave production
 - Interference with communications device



Thank you for listening

Any questions ?

- Energy Projects Plus – www.epplus.org.uk
- Energy Saving Trust – www.est.org.uk
- Low Carbon Buildings Programme – www.lcbp.org.uk
- www.modbs.co.uk – online searchable building journal detailing successful projects in all areas