T172

Tutorial 3

Environmental Impacts

Energy Use	CO2 emissions – global warming Resource depletion
Waste	Pollution (land, water, air) Land use CO2 emissions – global warming
Transportation	CO2 emissions – global warming Noise
Consumption of goods and services	Resource depletion Pollution (over life cycle) Ozone depletion

Managing Our Impacts

- Assessing impacts
  - Need to know
    - what our impacts are
    - which are most significant
- Reducing impacts
  - we can only really decide on what we should do if we have assessed impacts first

Assessing impacts

- Environmental indicators
  - e.g. Environmental Footprint
- Environmental modelling
  - e.g. Ecocal , NHER*
- What are the
  - Limitations of modelling
  - Benefits of using models?

•Ecocal and NHER both use environmental indicators

Ecocal

- Transport
- Energy
- Resource use
  - Water
  - Shopping
  - House and garden
- Waste

NHER
National Home Energy Rating

- Models energy use and loss from dwellings
- Gives
  - NHER rating (0 to 10)
  - SAP rating (1 to 100)
  - Estimated CO_2 emissions
- Suggests improvements
  - Updates NHER and SAP ratings

Minimising Our Impact on the Environment

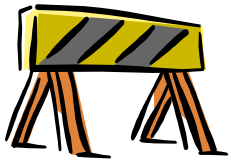
- Prevention
- Technical measures
- Administrative measures

Making Changes

- What factors work against making changes which would benefit the environment?

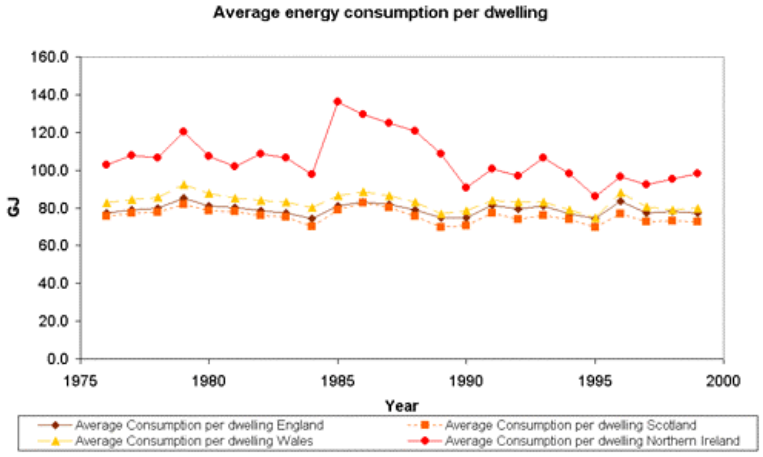
Barriers to Change

- Cost
  - Investment required
  - Payback period
- Practicability
- Lack of facilities
- Inconvenience
- Others?

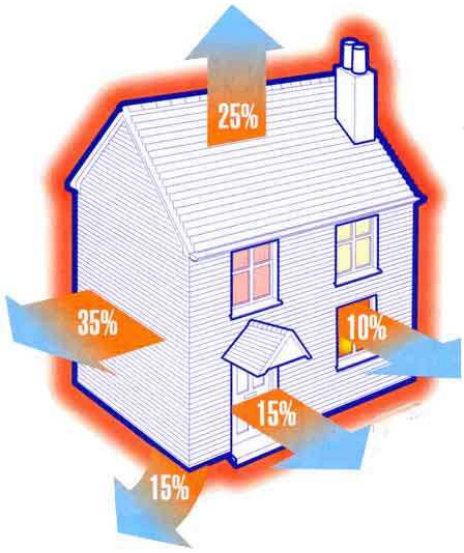


Minimising Impacts from Energy Use

- Prevention
  - Energy source
  - Use less
- Technical measures
  - More efficient appliances
  - Minimise losses
  - Install controls (e.g. thermostats)
- Administrative measures
  - Purchasing decisions
  - Control use



Source : DEFRA, Domestic energy fact file:England, Scotland, Wales and Northern Ireland
http://www.defra.gov.uk/environment/energy/research/domestic/index.htm
Accessed 26/3/04



Source: http://www.nationalenergysaver.co.uk/user_pages/energy_saving/heat_loss.htm

Energy Losses

- Fabric losses
- Ventilation losses

Calculating Fabric Loss

- U values
  - Assigned for different structural elements
  - W m^2 $^0C^{-1}$
  - Heat flow in watts for every square metre and every degree of temperature difference

Question 1

A brick wall has the dimensions 6m x 4m and it contains two windows each 1m x 1.5m. *Calculate:*

(i) the total rate of flow of heat through the wall and the windows;

(ii)the percentage of the total heat flow which passes through the windows.

Assume: Internal temperature = 20°C, outside temperature = 5°C,

U-values: Brick wall = 2.0 $Wm^{-2}°C^{-1}$, Windows = 4.3 $Wm^{-2}°C^{-1}$.

Answer

Temp difference = 15 C

For windows:
U value = 4.3 $Wm^{-2}°C^{-1}$, area = 2 x (1m x 1.5m) = $3m^2$
So heat flow = 4.3 x 15 x 3
= 193.5 W

For wall:
U value = 2.0 $Wm^{-2}°C^{-1}$, area = (6m x 4m) – $3m^2$ = $21m^2$
So heat flow = 2 x 15 x 21
= 630 W

Answer

Total heat flow = 193.5W + 630W
= 823.5 W

Percentage lost through windows = $\frac{193.5}{823.5}$ x 100

= 23.5 %

Transport

- What are the environmental impacts of the different forms of transport you use?
- What can you do to reduce them?

Resources

- Renewable
- Non-renewable

List different resources which fall into above categories

Resources

- What are the environmental impacts of resource use?
- How can we minimise these impacts?

Waste Hierarchy

Reduction

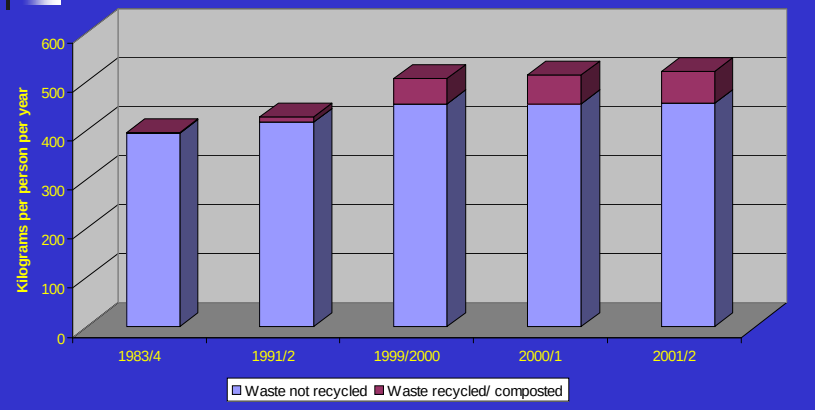
Re-use

Recovery

- recycling
- composting
- energy

Disposal

Household waste and recycling (England and Wales)



Source: DEFRA