

Update #5

September 2005

The Eco-Region NW project sets a new standard for analysis of waste and material flows at the regional scale. It provides a 'joined up' information system which measures environmental performance for the region, for industrial sectors and products, and for lifestyle options.

The Eco-Region NW has now been linked to the larger national project '**Eco-Budget UK**'. This is developing new methods for material flow and eco-footprinting, including both direct and indirect effects. It is also building a comprehensive material flow database/model '**REAP**' for the UK regions.

The Eco-Region NW has also shifted its focus from the level of basic data, towards adding value to the Eco-Budget UK database / scenario model. This includes:

- Focus on the NW as a pilot region, with applications to economic, spatial & environmental strategies.
- Business applications, especially in benchmarking for sustainable production & consumption.
- Focus on construction, as the largest material-intensive industry, and also the outcome of the regional spatial strategy for housing and urban development .

The construction theme is the focus of this update, which reports on the Sustainable Construction workshop of Sept 05.

We would like to thank the Centre for Construction Innovation NW for hosting this event, and the speakers for their contributions.



Issues & questions

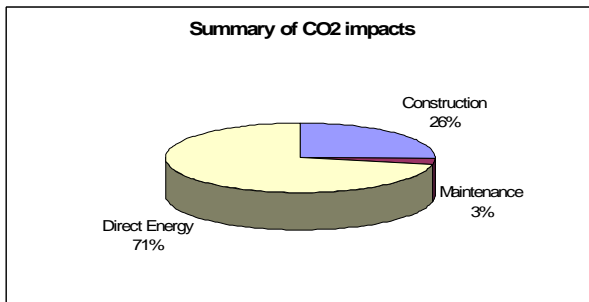
The Sustainable Construction strategy workshop raised a host of issues – economic, political, technological, industrial and so on. The workshop discussion is further down and the project results are to be found in the briefing papers. Here, we take a little space to flag up some of the more challenging questions.

First we show the baseline picture. The average house in the NW region contains:

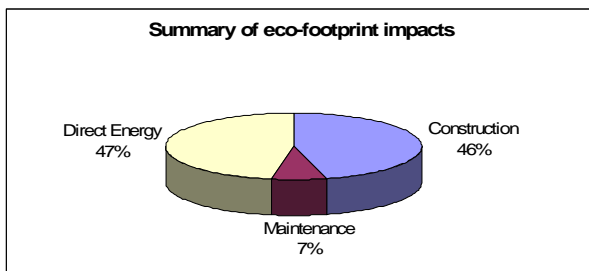
- 2.35 people, 0.4 cats and 0.3 dogs.
- It weighs about 150 tonnes with another 137 tonnes for the foundations
- It requires 0.50 tonnes of materials each year for maintenance and repair
- It consumes 9,127 KWh of energy, producing 5.18 tonnes of CO₂.
- Most of the energy is derived from natural gas (66%) and electricity (24%)

Which measures?

A recurring question for builders, architects, procurers etc, is **which measure** to use, to best represent the total environmental impact of construction. At the moment we have data on material flow (MFA), on climate change emissions (CO₂), and eco-footprint (EF), coming through the Eco-region NW system.

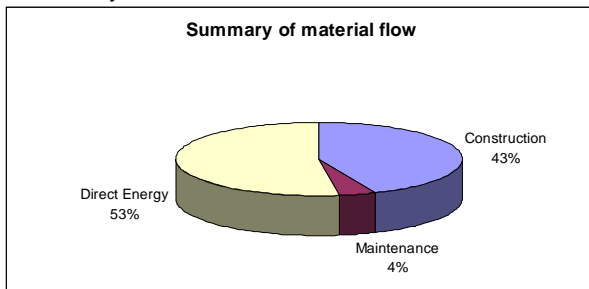


The summary charts here show the broad picture (further details in the Construction workshop briefing paper). In terms of CO₂ (climate change) emissions, energy use in the average dwelling accounts for over 2/3 of the total.



If we look at the eco-footprint results, then construction is a much larger component, mainly as the land area from material production is greater.

The material flow picture is not so different to the CO₂ breakdown, where the energy supplies in this case are just over half the total.



What payback period?

Another question is how to balance the impacts of construction with the impacts of the building in operation, (mainly from energy use). When we build, although the components may be designed for a notional 60 year life, we have little idea whether the building will be there in 30 or 300 years time. One logic would argue that we should take an 'accountancy' approach, as the future is uncertain, the costs of maintenance increase over time, and depreciation is continuous.

We ran a series of 'what-if' calculations, and selected the mid point on the range for lifetime and discount rates. For the pie charts here the one-off impacts of construction are discounted over a 60 year lifetime with an assumed 6% interest rate – equating to a **33 year** payback period.

How to 'consume' a building?

There is also an interesting breakdown of consumption types, with some linkage to depreciation types:

- Metabolic consumption e.g. food, with a residence of less than 24 hours (hopefully!)
- Consumables with residence of less than 1 year e.g. household stuff
- Durables with lifetimes of 3-10 years – e.g. electronic equipment
- Infrastructure with indefinite residence i.e. buildings, roads etc

The houses we live in, and their maintenance and operation, involve a range of consumption types. For instance the workshop discussed the point that finishes, fittings and appliances may cause greater impact than the building structure, due to their rapid turnover. Recent work on the Building Schools for the Future programme showed that school meals and staff travel were on a par with building energy and construction. This kind of result is very interesting, in setting new priorities for sustainable construction projects.

Construction initiatives

Positive changes are afoot in the construction sector, but measuring performance is still inhibited by overlapping objectives and suitable metrics.

Drivers for more sustainable construction abound, and include many initiatives and high profile reports and strategy papers:

Rethinking Construction	Egan 1998
Achieving Excellence	Treasury 1999
Building a Better Quality of Life	DETR 2000
Better Public Buildings	CABE/PM 2000
Modernising Construction	NAO 2001
Accelerating Change	Strategic Forum 2002
National Procurement Strategy	ODPM 2003

Egan Skills for Sustainable Communities	ODPM 2004
Constructing the Team	Latham 1994
Gershon Efficiency review	Treasury 2004
Sustainability in Constructing Excellence	Constructing Excellence 2004

However in reality the construction / property sector is notoriously resistant to change, not necessarily in the larger firms, but certainly in the thousands of SMEs, subcontractors and suppliers. There is a real issue in managing professional boundaries, incentives and barriers, which together seem to conspire to produce inefficient high impact buildings.

Construction workshop

The workshop on September 6th aimed at urban development professionals, analysts and policy-makers. Workshop papers and presentations can be viewed on the [project website](#).

Joe Ravetz (CURE) introduced the workshop scope and method, which aimed at a practical outcome – the Eco-Benchmark prototype scheme. Alastair Moore and Rachel Birch (SEI) reviewed the results of the Eco-Region NW and REAP model on the construction sector – as in the ‘average house’ above.

Andrew Thomas, Director of the Centre for Construction Innovation NW, put into perspective ‘unsustainable construction’ –

- **13 million tonnes** of construction and demolition waste is material delivered to sites but **never used**.
- Generating 90 million tonnes of construction and demolition waste every year - **3 times the waste produced by all UK households** combined.
- **Consuming 10% of national energy** in the production and transport of construction products and materials
- Building services accounts for **50% of the UK’s emissions of carbon dioxide**.

Even the Kingsmead School in Cheshire, held up as a model of low-impact building, involved a travel

mileage of nearly ¼ million miles for construction workers.

Sukumar Natarajan (MACE) showed the method behind the recent ‘40% house’ project. This achieved media coverage as an in-depth analysis of what would be needed to meet the UK climate change targets – i.e. demolition of 1/3 of existing dwelling & replacement with high efficiency construction.

Buddy Williams, having designed advanced eco-buildings in California, showed inspirational examples of zero-waste resource management.

Roger Burton of JM Architects compared UK and West Coast experience. For instance, in regions supplied by hydropower, energy may be less of an issue than the materials, and particularly the sustainability of forest management.

Greg Keefe of the Manchester School of Architecture looked at the human resource and training implications, and the various incentives / barriers for architects, engineers, surveyors and others.

Ian Cooper of Eclipse Research Consultants demonstrated the KPI system from Constructing Excellence, and posed challenging questions - their applications, appropriate scale, and rate of change needed for national targets.

The panel discussion was chaired by Prof. Steve Curwell of Salford University.

- The ‘40% house’ challenge was seen as dependent on property prices, and housing market renewal, which would need stronger powers than exist currently.
- Building regulations could be the key to strengthening environmental targets, but even now they are often not enforced.
- There is confusion in engineering terms on the most important design factors – windows? Ventilation? The BREEAM system is well regarded but is too loose - allows wasteful buildings to score highly.
- Sustainable construction is too big an agenda for planners - it needs exemplars: e.g. East Midlands have an Eco-Homes Excellent design competition and regional research programme: in London each Borough has a target for sustainable construction projects.
- However, experience of exemplars is not always positive – e.g. many low energy schemes from the 1970’s were never

followed up.

- The problem of split responsibility of developers & users – need new financial frameworks to overcome this. This should start with the government which at present is as short sighted as anyone else.
- There are examples such as in Zurich where mortgage companies take running costs into the calculation. In the UK too many buildings are designed by the QS!
- The chances of sustainable construction through the Eco-Homes framework depend on pulling all the levers at once – Housing Corporation, Planning Guidance & S106, ESCOs for utilities:
- To implement this needs a series of demonstration building types & specs, using material flow / CO2 / footprint metrics. Then coordinate with NHER / SAP etc.
- Ultimately the psychology of the market (domestic / commercial) and the institutional finance / liability / incentives side will drive or stop change.
- Generally the prospect of construction taking a leading role in meeting regional sustainability targets seemed quite distant – i.e. reducing total material / energy needs by 75% was off the radar for the majority of the industry. The problem is that other sectors also take the same view (transport, food, etc..)
- What is the total impact of the Regional Spatial Strategy? the Eco-Region NW will report on this as a matter of priority.

The project

Personnel

Researchers Alastair Moore and Dominica Babicki have returned their native British Columbia, and will continue to supply Eco-Region NW and other CURE projects with an international perspective.

The Eco-Region NW will be supported by Sandra Alker, with experience of waste management / environmental planning: and Nick Green, with experience of regional development policy.

Website

Interim reports and working papers are available on the CURE website. Due to the merger of UMIST and Manchester this is on a temporary address

<http://www.art.man.ac.uk/PLANNING/cure/Eco.htm>

A full project website is in development, to be launched shortly.

Steering group

The first two steering groups met prior to the approval of the project. Following the setting up of the Eco-Budget UK collaboration, steering group meetings are now at approx 4 month intervals. The next provisional dates include:

The full Steering Group includes each of the project partners and sponsors, plus other regional bodies, other statutory agencies, and other information providers.

The following dates are provisional to be confirmed; (check website for updates).

Steering group 6: Thurs January 26th: 10.30

Steering group 7: Thurs April 27th: 10.30

Project launch: Thurs 25th May: 2.00 – 5.00

With thanks to...

Biffaward for their commitment to research on the physical metabolism of the UK and its regions. Also, to other sponsors including the Merseyside Waste Disposal Authority, Environment Agency, McGrath Environmental Consultants, and Research Methods Consultancy.

Further information:

Alastair Moore / Joe Ravetz
Centre for Urban & Regional Ecology,
School of Environment & Development,
Manchester University, Oxford Rd, M13 9PL, UK
t.+44 (0)161 275 6904 / 6879: f. 275 6893
alastair.moore@manchester.ac.uk /
joe.ravetz@manchester.ac.uk
<http://www.art.man.ac.uk/PLANNING/cure/>