Spectrum

Energy principles worth building on

How much energy does it take to construct a building?

When the Research Institute of Innovative Technology for the Earth (RITE) in Japan asked this question, CSIRO's Division of Building, Construction and Engineering supplied some answers by measuring the efficiency of recycling building materials.

'We found generally that in housing construction a lot of material is recycled,' says the division's Dr Selwyn Tucker.

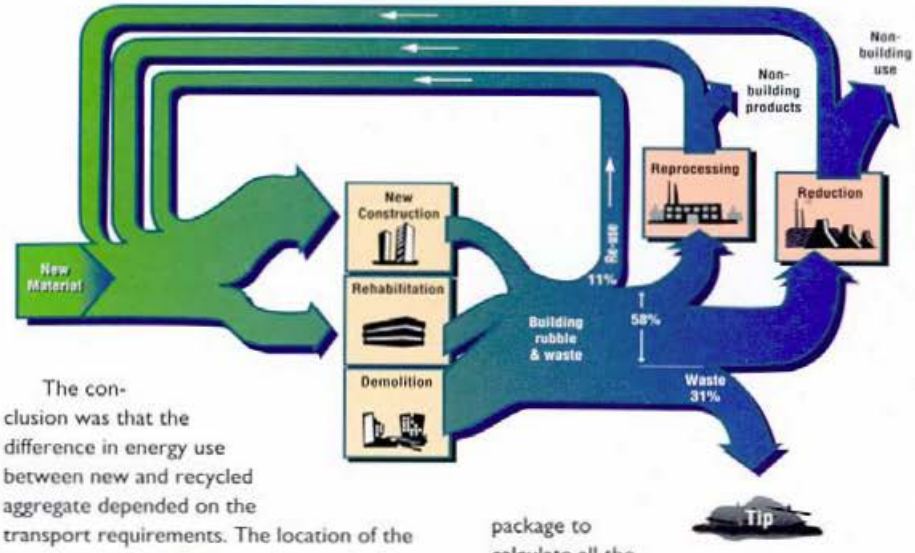
'We measured the efficiency of recycling, including how much energy it took to build the buildinge, what was left in demolished materials, and where they went to.

'Some materials are reused, some are reprocessed, some are reduced to a different type of product which can be used either in a building or for some other use, and some are dumped (see chart).

'We also studied a house relocation to see what energy it took to move a house. That turned out to be highly viable, from an energy and a cost point of view, although in moving a timber-framed house to the country, the big energy expenditure is on transport.'

The major recycled materials studied were concrete, steel, timber, bricks, glass and non-ferrous metals. New and recycled aggregate was studied in detail.

'First we looked at the energy required to make the equipment needed to quarry and process new aggregates, or recycle old concrete aggregates,' Tucker says. 'Then came the energy used at the quarry or recycling plant. Finally we looked at the energy used in the transport of both aggregate types to their point of use.'



The conclusion was that the difference in energy use between new and recycled aggregate depended on the transport requirements. The location of the crushing plant in relation to the supply of salvaged concrete is important. If old concrete has to be returned to a distant quarry for crushing, the energy cost is high. Tucker says the exercise has demonstrated a useful principle for ascertaining embodied energy in construction materials and techniques.

The study results have been handed to RITE, which invited Tucker to give a talk on the subject in Japan last year (1994). He and colleague Gustav Salmonsson have also presented papers in the UK and Florida, US.

As a follow-up to this research, the Energy Research and Development Corporation has given CSIRO, software developers CadSoft International, RMIT Department of Building and Construction Economics, and quantity surveyors Wilde and Wollard $85 000 to develop a prototype package to calculate all the embodied energy of the materials used in a design while the user is preparing a CAD drawing. 'This will enable designers to compare different designs and change them is necessary to get a better result' Tucker says. The project is due to be completed this year.

The source of this article is* Building Innovation and Construction Technology, *a new, bi-monthly magazine produced by the Division of Building, Construction and Engineering. A scan of the first issue reveals many articles with an environmental theme. They cover topics such as pollutant-free paints; city and urban planning; noise and energy costs in buildings; and extreme weather events.

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