Reuse, recycling and converting waste into energy are well known environmental principles, but quantitative data are needed to support their application. A recent study investigates the use of these strategies, taking the demolition of an end-of-life house as an example. It compares their effectiveness to straightforward disposal of materials.

Dealing with waste effectively is important, not only because it reduces greenhouse gas emissions, but also because it reduces the use of further resources. Every year, some 2 billion tonnes of waste are produced within the EU. Recycling and reuse of resources forms a large part of European waste policy.

The building sector is responsible for 10 per cent of GDP in western economies but uses more raw materials than any other industry. In addition, buildings leave behind a large amount of materials once they have reached the end of their life. It has therefore been highlighted as a sector with plenty of opportunities for smart waste management.

In order to compare standard waste disposal to alternative means of dealing with waste, the study used an objective tool to quantify the resource savings in a number of scenarios. Taking a typical Belgian terraced house as its subject, it split the materials used into six types: stony materials, such as tiles and bricks, wood, metals, glass, synthetic materials and any remaining materials.

The researchers then calculated the virgin natural resource savings for each of these materials when they were recovered using various strategies. The savings were quantified in terms of energy — through, for example, avoided energy use from avoiding transportation to landfill or gained energy via reuse of materials as fuel. Examples of recovery strategies include the re-use of materials, recycling materials, including recycling wood into wood chips to be used as a source of energy and incineration. The energy required for demolition and transport was included in the calculations.

The study identified the best possible scenarios for dealing with waste from the house. The best scenario consisted of: reusing tiles, bricks and wood, recycling metal and uncoated glass incinerating synthetic materials and disposing of the remaining waste. 258 Gigajoules (GJ, a billion joules) of exergy (available energy) or three times as many resources were saved from this scenario compared to standard disposal. Nearly three quarters of the savings are related to the stony materials, around 15 per cent related to wood and around 10 per cent related to synthetic materials.

The second best scenario consists of complete recycling of the stony materials into broken stone and recycling of wood into wood chips. Metals, glass, synthetic materials and any residual materials are disposed of as waste. This results in savings of 70 GJ when compared with full disposal, but 6942 Megajoules (MJ, a million joules) is necessary to dispose of the remaining waste.

The results show a clear environmental benefit of recovering materials from buildings rather than disposing of them. It also indicates which materials provide the most benefit. This could be useful when prioritising different waste strategies.


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