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Science for Environment Policy

Environmental performance of construction and demolition waste management

The EU Waste Framework Directive[1] aims to recycle or recover materially 70% of non-hazardous construction and demolition waste by 2020. This study evaluated the performance of the Finnish waste management system against this target. The results showed that the system generates environmental benefits and is profitable, but has not reached the 70% target. The researchers suggest ways the target could be met and recommend region-specific recycling objectives in the EU.

Europe produces a considerable amount of construction and demolition waste (C&DW). It is one of the largest — and heaviest — waste streams generated in the EU, accounting for approximately 30% of all waste. In 2006 alone, around 970 million tonnes were produced. There is high potential for recycling of this waste, as its constituents include concrete, bricks, wood, glass and plastics, many of which have high resource value. C&DW has thus become an important target of waste policy in Europe.

Properly recycling this waste is environmentally and economically important and clearly an important policy goal, but is hampered by the availability and affordability of raw materials, and the ease of using landfills.

To assess the feasibility of the 70% target, this study assessed the performance of the Finnish C&DW management system. Although landfilling of organic waste will be restricted by 2016 in Finland, it remains unclear whether this will help Finland to reach recycling targets or whether there is a need for reform of the system.

The researchers used a combination of tools to assess the system: material flow analysis to assess material and energy recovery; life cycle assessment to evaluate climate change impacts; environmental life cycle costing to measure financial costs; and the best available technologies approach to evaluate overall efficiency.

In terms of environmental performance, the authors found that the majority of the climate change impacts generated by the system originated from the recovery of metals, energy recovery of solid recovered fuel, the recycling of metals and landfilling. Potentially avoided climate change impacts were between 350 and 360 kg CO_2 equivalents per tonne of waste.

Wood and mineral materials currently dominate C&DW in Finland, but this may change as old buildings are replaced. The researchers therefore assessed two different scenarios for composition, based on estimates of future development. The first assumes increasing rehabilitation, which generates waste with higher shares of wood and metals, while the second was based on demolition of large buildings from the 1960s and 70s, which would increase the mineral composition of waste. While Scenario 1 reduced climate change impacts, it also reduced profits due to the increased volume and energy recovery of wood. Although Scenario 2 came closer to the 70% recycling target, climate change impacts increased and economic performance did not improve.

Overall, the Finnish system generates environmental benefits and is profitable. However, it is far off meeting the 70% recycling and recovery target, even if predicted changes to waste composition take place.

To achieve the Waste Framework Directive target, the authors say major changes are needed to sorting, separation and recovery. The results showed that energy recovered from wood generated environmental and economic benefits, but recycling rates were poor. There is a need to increase material recovery from wood, yet finding ways to recycle waste wood, which often contains contaminants like nails and paint, is challenging. Future development should also focus on miscellaneous and mixed waste. Mixed waste had the greatest climate change impacts and costs, and miscellaneous waste showed potential for increasing recycling and reducing costs and emissions. By contrast, metal treatment performed well in all assessments, so improvements to it may not markedly benefit the system.

Finally, the authors point out regional differences in operations and waste composition, and suggest that there should be different recycling targets in different regions of Europe.

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Contact:
helena.dahlbo@ymparisto.fi

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1.Directive 2008/98/EC. See: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32008L0098