

# Science for Environment Policy

## Up to 30% of aluminium and steel could be reused

**Globally, up to 27% of all steel** and 33% of all aluminium could potentially be reused, according to research. Significant barriers to reuse, such as component incompatibility between products and metal corrosion, must first be addressed if these reuse figures are to be achieved.

**Aluminium or steel can be recycled** by melting it down and recasting into new products. Currently, 60% of steel 39% of aluminium is recycled worldwide. However, while recycling is a greener alternative to manufacturing new materials, it has high energy costs which could be avoided if the metals were reused in their original form.

In this extensive analysis, the researchers gathered information on steel and aluminium reuse from academic and industry literature, drawing on 200 sources, and conducted 17 interviews with industry experts. They identified which products use these materials, the key design requirements for components, and the fraction of end-of-life components that could be technically reused, considering available strategies and the physical barriers to the reuse of the remaining components.

From this, they concluded that up to 27% of steel and 33% of aluminium 'end-of-life' components could potentially be reused. At present, there is little reuse of either material.

Information from the interviews revealed that two key factors determine the type of steel or aluminium component that can be reused and the way in which it is reused: *condition* and *market demand*. If the condition is good and demand is high, components can be simply 'relocated', i.e. transferred to similar product, with little need for amendment. For example, aluminium car wheels can be transferred to another vehicle.

If the condition is poor and demand is low, the component can be 'cascaded' to a different type of product with less demanding use, for example, metals once used to clad buildings can be reused on agricultural sheds. Alternatively, they can be 'reformed' (or reshaped), as when ship plates are reformed to a reinforcing bar. High demand but poor quality calls for 'remanufacturing', which involves further disassembly and refurbishment.

For steel, the main areas for reuse are the relocation of building components and the reforming of ship plates and line pipes. For aluminium, the main areas of reuse are in buildings and car wheels. These areas of opportunity, if carried out to their full potential, could allow reuse of 180 megatonnes (Mt) of steel (18% of all steel) and 5.5 Mt of aluminium (12% of all aluminium) per year.

Policymakers seeking to maximise aluminium and steel reuse should prioritise opportunities to relocate metal, according to the researchers. Their analysis indicates that the greatest barrier to reuse is component incompatibility, i.e. different models of domestic appliances and car parts using different components, followed by degradation, i.e. metal corrosion. Approximately one-fifth of all global steel is used to reinforce concrete (210 Mt in 2008), which also presents a major challenge for reuse, as it is difficult to recover the steel bars without damaging them.

Economic and behavioural barriers also limit reuse, such as concerns over increased labour costs, logistical challenges of returning and sorting components and the lack of an established supply chain.



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