



# Material Resources

Photo: Günther Hartmann

Which raw material is used most in the world today? The answer is sand. Sand is used to produce a range of different materials. Large amounts are used in the building industry to make concrete. However, not every type of sand is actually suitable. Desert sand, for instance, has grains that are too round and smooth. That is why the booming city of Dubai imports its sand from Australia, where it is removed from the seabed along the coast with devastating consequences for the local flora and fauna.

The demand for sand is high. Too high. The architect Werner Sobek illustrated this phenomenon in a presentation at the Munich Science Days

using an allegory of a wall along the equator: If the current population growth of 125 million persons per year is multiplied with 490 tonnes of mineral building materials, the average use per person in Germany, the result is a global demand for 60 billion tonnes of mineral building materials per year. If this quantity is converted into a 30-centimetre-thick wall, how high is a wall around the equator, a total length of 40,000 kilometres? The answer is two kilometres high!

We will face a severe shortage of resources if we continue in this way. The option is to either build less or switch to construction methods which significantly reduce the consumption of resources. The material use in so-called lightweight constructions is only a fraction of that used in conventional solid mineral constructions. This is, in fact, achieved by

**HA Schult's installation "Trash People" at the Tollwood Winter Festival 2015 in Munich took an artistic approach to our production of waste.**

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the load-bearing structure, which is reduced to a skeleton of slender posts with insulation placed in between – similar to the historic half-timber framed houses. The added benefit is a decrease in the heating energy demand. There are two possible materials for the posts and beams: metal and wood.

Metal and wood have a further advantage: they are easy to recycle. This is an important aspect since half of our disposed waste today stems from construction and demolition work. Mineral construction waste can be crushed and used as a road sub-base, but that is an extreme case of down-cycling with a definite loss of the energy originally invested in the building material. Metal is the best material in terms of recycling; how-

ever, the melting process consumes a particularly large amount of energy. Wood, on the other hand, can be re-used or turned into other wood-based materials with limited use of energy.

The increasing pressure from environmental scientists and organisations to bring about a transition in resource use is valid. The endeavours should not replace our climate protection programmes, but complement them in a meaningful way. Climate change is closely associated with the consumption of resources: the extraction, transportation and processing of raw materials always requires the use of energy. Generation of any of this energy by burning fossil fuels produces gaseous waste or, to be precise, the greenhouse gas CO<sub>2</sub>.

Avoidance of waste, whether in the form of gas or solid matter, is a core aspect of an environmentally sustainable economy. The main aim should therefore be to move from a linear to a circular economy. The construction industry plays a key role in this respect since it is not only one of the largest consumers of raw materials and energy but also one of the greatest producers of waste. That is why this issue should be tackled first if the aim is to ensure a successful transition to a sustainable use of raw materials.

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What we need is a three-pronged approach consisting of (1) a reduction of resource consumption, (2) an increase of resource efficiency and (3) a reduction of waste. If these measures were applied to the highly resource-intensive construction sector, (1) existing buildings would be upgraded, converted and extended, instead of demolished and replaced, (2) lightweight instead of solid heavy construction methods would be used and (3) reusable and recyclable building materials, in particular those deriving from renewable sources, would be applied. Constructions that would like to be labelled “sustainable”, should ideally meet all of these requirements.