

The 20th century saw a 23-fold increase in natural resources used for building

By [Heinz Schandl and Fridolin Krausmann](#)

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The volume of natural resources used in buildings and transport infrastructure increased 23-fold between 1900 and 2010, according to [our research](#). Globally, there are now 800 billion tonnes of natural resource “stock” tied up in these constructions, two-thirds of it in industrialised nations alone.



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This trend is set to continue. While industrialised countries have lost some momentum, emerging economies are growing rapidly, [China especially](#). If all countries were to catch up to the per capita level of the industrialised nations, this would quadruple the amount of natural resources tied up in the built environment.

In Australia, 70% of the buildings and infrastructure that will be used in 2050 have [not yet been built](#). Constructing all of this will require a huge amount of natural resources and will severely impact the environment.

To avoid this, we need work to build more efficiently and waste less of our resources. Our buildings need to last longer and become the inputs of future construction projects at the end of their lifetime.

The impact of the expansion

Continuing the massive expansion of natural resource consumption would not only require vast quantities of new raw materials, it would also result in considerable environmental impact. It would require massive changes in land use for quarrying sand and gravel, and more energy for extraction, transport and processing. And, if we do not change course, more raw material use now means more waste later.

All of this will be accompanied by a large rise in carbon dioxide emissions, making it much harder to achieve the climate goals agreed in [Paris](#). Cement production alone, for example, is responsible [for about 5%](#) of global carbon emissions.

Building sustainability

It is certainly possible to build more sustainably. This requires us to use natural resources more efficiently, reducing the amount of materials and emissions related to economic activities. One strategy for achieving this is to create a more [circular economy](#), which emphasises re-use and recycling. A circular economy turns consumption and production into a loop.

Currently, [only 12%](#) of materials used for buildings and infrastructure come from recycling. In part, this is due to the fact that globally, four times more materials are used in building than are released as demolition waste. This has, of course, to do with the [scale and speed](#) at which some countries are building.

Yet the potential for recycling is very large. Buildings and infrastructure are ageing and in the next 20 years alone there could be as much as 270 billion tonnes of demolished material globally. This is equivalent to the volume accrued over the previous one hundred years. This material will either have to be disposed in landfill, at very high cost, or it could be reused.

As we noted, [70%](#) of the buildings and infrastructure that will be used in Australia in 2050 have not yet been built. This signals massive investment in new materials but also very large amounts of demolition waste from today's infrastructure.

The opportunity

There is a window of opportunity for more sustainable building if we decouple economic growth from increased use of natural resources. We can do this by improving quality and use of existing infrastructure and buildings, extending lifespans, using better design, and planning for recycle and reuse.

Better quality building materials and better design can extend the lifetime of buildings, resulting in lower maintenance costs and saving primary materials, energy and waste. Eco-industrial parks and industrial clusters as well as sharing of information about waste flows can establish new relationships among industries where the waste of one production process can become the input of another process.

This doesn't just make environmental sense. There are potentially [large economic gains](#) to be had from more efficient use of resources. This includes increased employment, increased productivity and less need for government subsidies.

Achieving a transition to long lived buildings, infrastructure and products will require new business models and new skills. It depends on skilling and re-skilling existing and new workers in the construction and manufacturing industry. Some of these changes are not going to happen spontaneously but will benefit from well designed policy that rewards resource efficiency and sustainability.

But first, we need more information about stocks and flows of materials throughout the economy, to allow governments and business leaders to plan for the necessary innovation.

ABOUT THE AUTHOR

Heinz Schandl is senior science leader, CSIRO. Fridolin Krausmann is professor of sustainable resource use, Alpen-Adria University Klagenfurt.

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