

### What if we were to build skyscrapers from wood?

*Can new technologies contribute to a revival of wood as a source for biomass and construction material, and play a leading role in the fight against climate change?*

Wood has been part of human civilisation for many thousands of years, playing a key role as fuel or construction material, as well as a material for the manufacture of furniture, machinery, means of transport and everyday objects.

The pressure to put more and more land into agricultural use, as well as centuries of using wood for shipbuilding and as a fuel, have drastically reduced the earth's forest cover, even before climate change became an issue. At the same time, wood has largely been replaced, over the last couple of centuries and in most parts of the world – as a building material, by concrete and steel, and as a fuel, by fossil hydrocarbon sources.



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The recent discussions about climate change triggered by rising levels of CO<sub>2</sub> and other greenhouse gases in the atmosphere have, however, rekindled interest in wood as a basic material for the production of biomass for renewable energy production, and as a construction material, since this would have a positive effect on the CO<sub>2</sub> balance of the atmosphere.

#### Potential impacts and developments

While the transport sector is gradually moving from combustion engines to electrical power, especially for short-distance transport, we can expect that there will always be transport sectors where hydrocarbon-based propulsion systems remain the most advantageous option, e.g. maritime transport or aviation.

In the current effort to promote the transition towards renewable energy sources, wood can play an important role, not only as a substitute for coal in power plants, but also as a basic material for the production of liquid or gaseous fuels for transport.

In the construction sector, the replacement of steel and concrete by wood could have a significant impact on the carbon balance. While the production of steel and concrete currently results in large quantities of CO<sub>2</sub> being emitted into the atmosphere, the shift to a wood-based construction industry would result in large-scale capture of atmospheric carbon by trees and the subsequent storage of this carbon in our building structures. Wood is increasingly being re-discovered as a building material even for tall residential buildings or industrial construction. Studies indicate that more widespread use of wood could have a net carbon-capturing effect that would offset half of the current transport-based CO<sub>2</sub> emissions. Wood as a building material also has many interesting properties, such as heat and sound insulation and moisture regulation, which would have a positive impact on occupants of these buildings.

In the last couple of years, the promotion of renewable energies for electricity production has triggered the construction of many large-scale wood-burning power plants. In order to be efficient, these plants

have to be big. In a number of cases, however, they run into difficulties in finding enough wood in the immediate vicinity to keep the plants operating. If wood has to be transported over long distances to these power plants, the environmental impact of such wood-burning facilities becomes much less positive.

At the same time, the rising costs of fossil fuels have led to renewed interest in using wood for domestic heating purposes. However, using insufficiently dried wood in ill-adapted open fireplaces can be a massive source of indoor and outdoor air pollution. If we want wood to make a positive contribution to the environmental impact of electricity and heat production, we need to optimise the way in which we collect and use the wood in decentralised power plants and/or distribute the heat through district-heating schemes, rather than a multitude of domestic fireplaces.

Renewed interest in wood as a primary material and renewable energy source will likely produce pressure to transform less productive agricultural land back into forests. This would then have to be compensated by increasing productivity on the remaining land, or reducing waste in food consumption.

While northern Europe already has relatively dense forest cover, renewed interest in wood and an accompanying reforestation drive could have the biggest impact in southern Europe and northern Africa, where the historic tree vegetation has dwindled away drastically since the start of human civilisation. Many treeless areas in these regions are actually fit to support reforestation, but, in contrast to northern Europe, the historic tree vegetation cannot regenerate itself spontaneously.

Numerous reforestation projects in recent decades have demonstrated that the areas around the Sahara desert can be successfully reforested. These initiatives have so far, however, been limited regionally. A new, massive, coordinated campaign throughout southern Europe and northern Africa to reforest all available land could have a significant impact on the levels of CO<sub>2</sub> in the atmosphere. At the same time, it could potentially lead to a change in the region's climate, from dry and hot conditions to the more humid and moderate conditions found in those latitudes in other parts of the world. For a relatively moderate cost, in the range of tens of billions of euros, it could create millions of jobs in its wake and provide the spark for the development of a new wood-based sustainable economy in the wider Mediterranean region.

## **Anticipatory policy making**

Wider use of wood as biomass for renewable energy production could benefit from a more efficient system of collecting waste wood, preventing it from rotting uselessly in backyards and at the same time discouraging households from burning it for heating or cooking purposes. Public research programmes could optimise tree species for growth in more arid areas, and satellite technology could help monitor the reforestation programmes and help optimise their impact on the regional and global climate.

Wider use of wood as a building material in the construction industry requires that building codes be swiftly updated as wood technology evolves.

In contrast to agricultural crops, however, growing trees and forest require a much longer-term vision and approach. Furthermore, reforestation campaigns will only be successful in the long run if we build up a new wood-based economic sector in parallel. Policy-making could play a crucial role at several levels. A reforestation campaign would initially require public money to be made available, and information and communication campaigns to ensure the participation of local populations in the wider effort. Support by local populations could be further fostered by organising a systematic transfer of technology that would allow them to make better use of the growing forests.

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This 'What if ...?' publication is a product of the Scientific Foresight Unit (STOA) of EPRS. More information on the unit's activities can be found at <http://www.europarl.europa.eu/stoa/> and <http://eprthinktank.eu/author/stoablogger/>

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