Carbon Dioxide

Photo: Bayerische Staatsforsten AöR

Something in the German Energy Saving Ordinance (EnEV) is really strange. Despite stating in Article 1 that the aim is to attain a climate-neutral stock of buildings by 2050, all the following clauses revolve around energy – even though the emitted carbon dioxide (CO_2) is fundamental for climate protection. One could assume there is a connection between the two, which of course there is not. There are situations where very little energy is consumed, but large amounts of CO_2 are emitted and vice versa. The wrong reference criteria provide the wrong incentives and in turn, render the wrong decisions with the effect that the target CO_2 reduction becomes worthless: much action, but little impact.

A large amount of CO_2 is locked up in forests. The structural use of timber ensures that the CO_2 stays in the wood for further decades.

Heating with electricity, for example, has become extremely attractive due to the reduction of the primary energy factor for electricity. On 1 January 2016, the calculated primary energy demand dropped by, believe it or not, 25 per cent. The official explanation was that the share of renewable energies in power generation had risen. The fact is, however, that the total CO_2 emissions in power generation have remained almost the same because renewable energies have been replacing nuclear power and not coal. So despite the non-existence of a CO_2 reduction, there was an incentive to increase electric heating. If this leads to a rise in power consumption, the solution might be to simply build a new coal-fired power station.

Within the life cycle analysis of a building, heating is just one of many factors, but one with a long-term im-

pact. From short and medium-term perspectives, the production of building materials is of much greater importance. The amount of energy required in this case is often as high as the heating energy demand for several decades; however, there is a large difference between synthetic and natural building materials.

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The difference is even greater when it comes to the carbon footprint, since renewable natural resources not only release limited CO_2 during their extraction and processing, they also absorb large amounts of CO_2 during their growth. To be precise: plants bind and break down CO_2, release oxygen (O_2) and incorporate carbon (C) in their molecular structure. The amount of CO_2 absorbed during growth is the same as that released during decay or combustion. For climate protection purposes, it is important to keep the CO_2 contained for as long as possible. This is exactly what happens when a material is used in construction – not forever, of course, but for several decades. It is precisely this period of time that is crucial, since the aim is to slow down the increase of CO_2 in the Earth's atmosphere as quickly as possible.

The carbon abatement costs are surprisingly low for timber constructions. The Munich architect Holger König, a pioneer in the field of life cycle assessments, calculated the carbon abatement costs for five

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buildings in 2015. He summed up the construction costs and the carbon footprints for the completed timber structures and a fictional standard development. Then he compared the extra costs with the amounts of CO_2 saved. The worst result was €69 per tonne of CO_2 saved – much less than is the case for wind power or photovoltaics. Thus, building with timber is an extremely cost-efficient climate protection measure. Moreover, the CO_2 is saved immediately and not over a long period, as is the case when reducing the heating energy demand.

The Paris Agreement on climate change emphasises the importance of offsetting carbon emissions through carbon sequestration, or in other words, carbon storage. The potential of this method, however, is usually underestimated. A study published by Prof. Hubert Röder from the Science Centre Straubing in 2014 illustrates that in Bavaria approximately a third of the CO_2 emissions released by burning fossil fuels are currently being offset through forest growth and the use of timber as a construction material. If we succeed in doubling the use of timber in building construction and halve carbon emissions, our beautiful Bavaria could in fact be climate neutral!

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