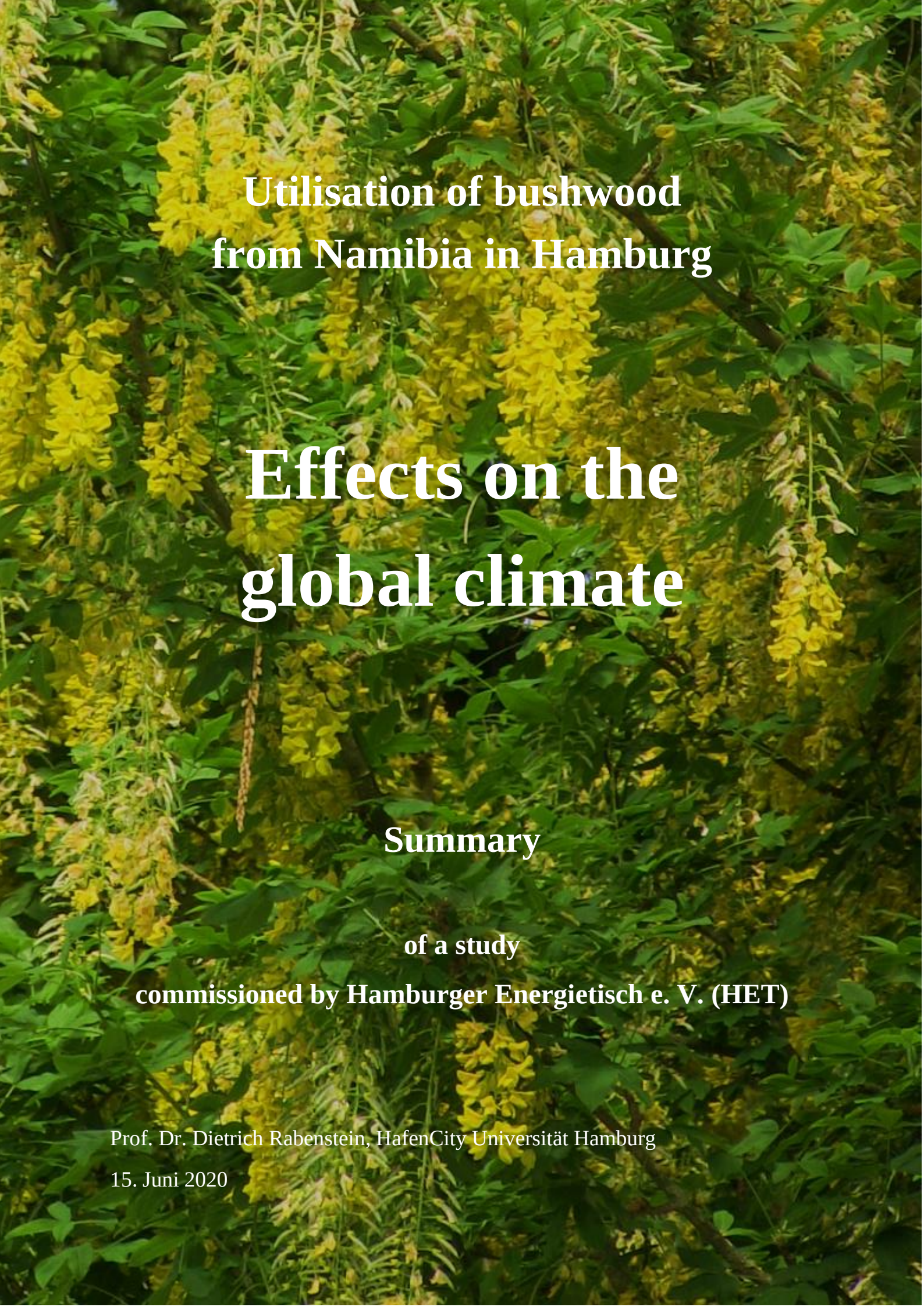

Utilisation of bushwood from Namibia in Hamburg

Effects on the global climate

Summary

of a study

commissioned by Hamburger Energietisch e. V. (HET)

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Hamburg's targets for the reduction of greenhouse gases

At the end of 2019, Hamburg sharpened its targets for the reduction of greenhouse gas emissions. According to the updated Hamburg Climate Plan and the expanded Hamburg Climate Protection Act, Hamburg's CO_2 emissions are to be reduced by 55 percent by 2030 compared to 1990. And by 2050 at the latest, Hamburg is to become climate neutral.

While until the middle of this decade about two thirds of the district heating supplied by the municipal district heating company Wärme Hamburg GmbH (WHH) is expected to be generated by burning imported hard coal, the use of coal will no longer be allowed from year-end 2030 at the latest. Moreover, it is to be ensured that by year-end 2029 at least 30 % of district heating is generated from renewable energies.

Hamburg considers an intercontinental biomass partnership with Namibia

Therefore, a proposal by the Deutsche Gesellschaft für internationale Zusammenarbeit GmbH (GIZ) to use sustainable biomass from Namibia for replacing hard coal in WHH´s Tiefstack combined heat and power plant seemed attractive. Intrusive bushwood, which is available in large quantities in Namibia, could be harvested and transported to Hamburg. In April 2019, the dossier of a project entitled "Transcontinental Biomass Partnership Namibia - Hamburg. Development of a Biomass Industrial Park (BIP) in Namibia" was presented by GIZ and the Institut für angewandtes Stoffstrommanagement (IfaS) at the University of Applied Sciences Trier. The project became known to a wider public after Hamburger Energietisch published this dossier on April 10, 2020.

A video "Biomass Industrial Parks - Namibia" provides an overview of GIZ's planning. Extensive information can also be found on the websites of the De-bushing Advisory Service Namibia and the Namibia Biomass Industry Group N-BIG.

On 12 May 2020 the Hamburg Environmental Ministry (BUE) announced in a press release that a Memorandum of Understanding (MoU) had been signed. Hamburg and Namibia would examine the sustainable utilisation of biomass from Namibia.

The investigation is to look at how a reliable and long-term supply chain for the off-take of biomass could be established and how it could benefit all parties involved. A large part of the added value should take place in Namibia and the participation of broad sections of the population should be ensured. In addition to the social aspects, the life cycle assessment of production, transport and use is to be considered. In Hamburg, this biomass could replace fossil fuels in energy production, industry or transport.

Assessment of the greenhouse gases released by the bushwood export

For several years, GIZ systematically laid the ground for the valorisation of bushwood for the global market. Recently, it was also considered expedient to commission an assessment of

greenhouse gas emissions attributable to the Bush Control and Biomass Utilisation Project (BCBU) in Namibia.

The forestry consultancy UNIQUE, Freiburg, Germany, was commissioned by GIZ to carry out a study, which exists in a long version and a short version. The study contains a comprehensive systematic assessment of the greenhouse gas emissions caused by the utilisation of Namibian bushwood. Six different scenarios for bushwood harvesting in Namibia were differentiated.

Climate impact of energy recovery from Namibian bushwood in Hamburg

Of the six scenarios examined by UNIQUE forestry consultants, two fit the delivery of bushwood from Namibia to Hamburg.

- In scenario 1b (Rangeland restoration), not all the bushwood is harvested in an area, but certain parts of the bush cover remain. The scenario focuses on the recovery of pasture land.
- Scenario 5 (Large-scale bush harvest for electricity production) involves more bushwood extraction than scenario 1b.

The UNIQUE study does not consider the greenhouse gas emissions resulting from an export to Hamburg, as the study only refers to processes within Namibia.

In the expert report commissioned by the Hamburger Energietisch, these two scenarios were evaluated including the burning of bushwood in Hamburg. For this, the approach of the UNIQUE study was supplemented and, in some places, modified in a well-founded manner.

The following Figures 1 and 2 show the greenhouse gases of the entire supply chain and the combustion in Hamburg in comparison to waste wood, natural gas and hard coal as energy sources. For these, the greenhouse gases produced before combustion were also taken into account.

It could be shown that in scenario 1b the greenhouse gas emissions are considerably higher than those of the hard coal to be replaced. In scenario 5, greenhouse gas emissions from bushwood use in Hamburg are significantly higher than those of natural gas.

The use of a time horizon of 100 years instead of 20 years does not considerably change these results. As Hamburg aims to achieve climate neutrality by 2050 at the latest, we strongly advise against the long-term use of Namibian bushwood for energy purposes. This is because the combined heat and power plants that are to be newly built to replace Hamburg's hard coal-fired cogeneration plants in the current decade are likely to be in operation beyond 2050.

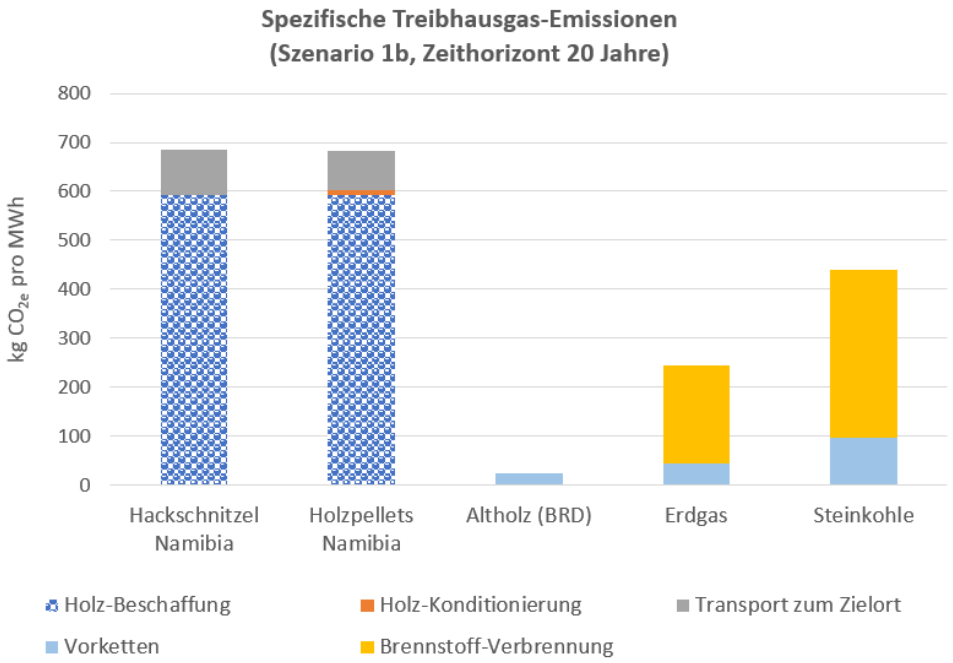

Figure 1: Cumulated specific greenhouse gas emissions from energy sources over 20 years for scenario 1b. The greenhouse gas emissions per energy content of the fuels are shown in kg CO_{2e} / MWh.

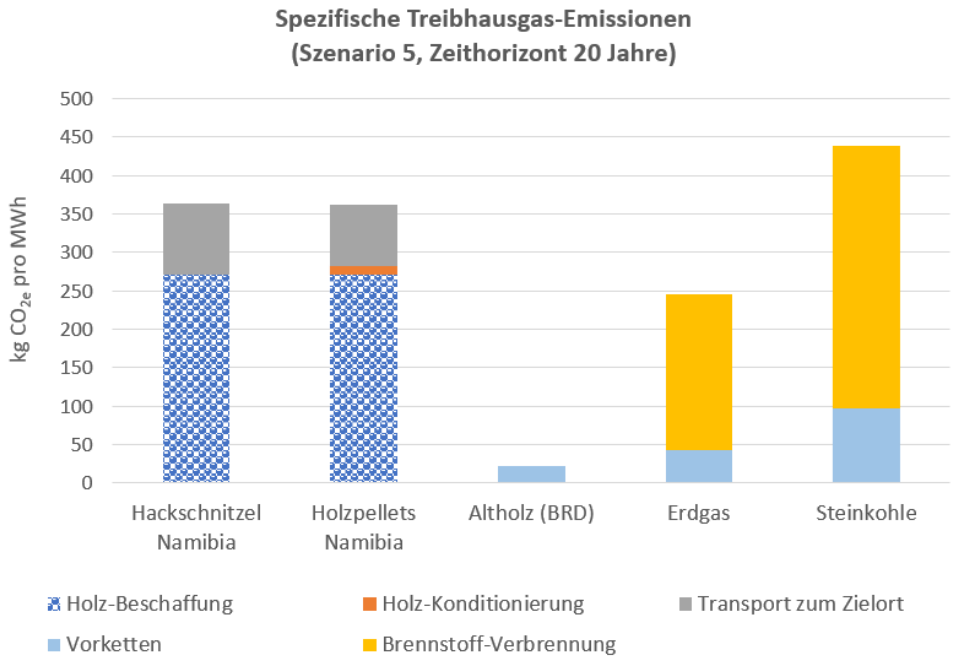

Figure 2: Cumulated specific greenhouse gas emissions from energy sources over 20 years for scenario 5, showing greenhouse gas emissions per energy content of fuels in kg CO_{2e} / MWh

Reasons for the high greenhouse gas emissions from the energetic utilisation of bushwood

The reasons for the high greenhouse gas emissions from bushwood use are similar for the two scenarios evaluated. A particularly important factor is that the changes in land use following the bush harvest strongly impact on the climate balance:

1. the soil under the scrublands stores considerably more organic carbon than the soil under a typical subtropical dry grassland (savannah). A large number of studies in the last two decades have convincingly confirmed this finding. They could also explain how this happens. When encroaching bushes are removed with the intention of producing grassland for cattle grazing, organic carbon stored in the soil is gradually released into the atmosphere in the form of CO_2. This change in land use therefore creates a source of CO_2.

2. the recovered grassland is to be used preferentially for an expansion of livestock farming. During their digestive process, ruminants release methane, a climate gas that has an almost one hundred times stronger effect than CO_2 over an assessment period of about 20 years. The planned expansion of livestock farming therefore represents a second source of greenhouse gas.

If the cleared land is not used for cattle breeding but for tourism, animal observation or hunting, the greenhouse gas emissions for air travel and for the physical comfort to be offered to tourists will probably increase to a similar extent.

3. in Hamburg, bushwood supplied in the form of wood chips or wood pellets will be burned to generate district heating and electricity. The carbon stored in the wood will be converted into CO_2 and released. The combustion process thus constitutes a third source of greenhouse gases.

The combustion of wood is often considered to be climate-neutral, namely when the wood taken from a forest can regrow again. However, the re-growth of bushwood in Namibia is supposed to be prevented. It can of course be argued that after the bushwood has been removed, more bushwood grows again in other areas of Namibia. This argumentation is not valid. Especially so, as according to GIZ plans, twice as much bushwood is to be harvested by 2030 as is allegedly growing back concurrently with the removal (18 million tonnes against 9 million tonnes per year). Until Hamburg has built a new combined heat and power plant in Tiefstack and is ready to burn bushwood in it, there will be no further re-growth in Namibia for this burned wood. And besides, any climate compensation for bushwood use from regrowth would first have to be reserved for Namibia itself.

Of course, the harvesting process, the processing into wood chips or wood pellets and the transport to Hamburg are also associated with the release of greenhouse gases.

The sources of greenhouse gases listed above are offset by certain greenhouse gas sinks, which, however, by no means outweigh the effect of the sources of emissions. In the savannah grass that is meant to regrow, CO_2 is stored provided the restoration of a savannah really succeeds on a large scale. Under prevailing local conditions this can, however, not be taken for granted.

An additional problem for the utilisation of bushwood from Namibia in Hamburg arises from the time difference between wood combustion and the continuing effect of greenhouse gas sources from land use change. The release of methane by the additional ruminants continues for many years after combustion. Similarly, the decline in organic carbon originally stored under the bushes continues. This means that, with a continuous supply of bushwood to Hamburg, greenhouse gas emissions from once cleared and converted land will continue to operate. This effect does not fit in at all with the German climate plans, according to which greenhouse gas emissions are to be successively reduced and should end by 2050.

Compensation for the climate damage caused by the energetic use of Namibian bushwood?

For Namibia, the scrub encroachment on large areas of land presents a major problem. Areas are being taken away from agriculture, so that farms can even get into economic difficulties. Because it rains too little, much of the water needed has to be pumped up from the ground water. However, the groundwater level is sinking because the bushes catch a lot of rain with their leaves and can suck up and evaporate water with their deep roots.

It is possible to estimate how much CO_2 would have to be stored by reforestation in Namibia to compensate to some extent for the climate damage caused by the transport of bushwood to Hamburg. A rough estimate shows: At least 50 million trees would have to be planted in Namibia to compensate for the climate change, over an area of about 500 square kilometres, in order to compensate for the amount of bushwood needed to replace coal in the Hamburg heat and power plant Tiefstack. Such reforestation would have to begin years before the bushwood is transported to Hamburg, so that a factual compensation could take place.

The bushwood transported away removes minerals from the harvested areas which are necessary for plant growth and which would be lacking on the barren Namibian land. This would also have to be compensated for.

Climate-friendly utilisation of Namibian bushwood in Southern Africa?

GIZ has been working for years on the valorisation of bushwood, using millions of euros from the development cooperation budget, with the aim of entering the world market and generating income for the Namibian state. Of course, this also entails promising opportunities for the industrialised countries to sell their machinery and know-how to Namibia profitably. Finland is similarly active in Namibia with the planning of a large factory for the production of charcoal for recreational barbecuing in Europe and in Arab States.

Perhaps Namibia would be better served if the focus were not so much on wood combustion and on the very climate-damaging production of charcoal, but on the material use of bushwood in wood products. In wood products the carbon can be stored in a climate-friendly way for many years. Since not only tropical wood, but also subtropical wood is very hard, its use in suitable

building elements poses technical problems. Except for cement, Namibia has to import a large part of required building materials. Therefore, the production of wood-containing building elements for use in southern Africa would be a more climate-friendly alternative to bushwood exports. Undoubtedly, this will require technical development. However, the same applies to the proposition on hand, where the hardness of the wood and the high admixture of sand will cause difficulties in the crushing of wood and in the production of wood pellets. It would therefore be desirable for GIZ to become more involved in the material use of bushwood.