



## Pyrolysis of Biomass from Agroforestry Systems as a Component for Regional Energy and Heat Solutions and Other Value Chains

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In addition to heat, electricity, pyrolysis gas and oil generation, the pyrolysis of woody biomass can also produce biochar. The latter fulfills a permanent carbon sink function, as a large amount of carbon is stably bound in it.



Compared to monocultures or large-scale plantations, agroforestry systems are characterized by a higher land productivity. Due to the more extensive production, the extremely low need for external resources, the low CO<sub>2</sub> abatement costs and an excellent eco-balance, the woody biomass produced in agroforestry systems can serve as bioenergy source, for instance. On unfertilized areas, greenhouse gas emissions are significantly lower compared to biogas production and the German electricity mix.

In addition to traditional combustion in biomass heating plants, pyrolysis can be considered for energy use as well. The latter option offers interesting alternatives due to its diverse utilization options. At temperatures of about 350 to 900 °C in a low-oxygen atmosphere, the biomass can be converted into (i) CO<sub>2</sub>-neutral heat, (ii) CO<sub>2</sub>-neutral electricity, (iii) carbonisate or biochar, (iv) pyrolysis gas, (v) pyrolysis oil and (vi) other liquid extracts with a stimulating effect for plant growth. In addition to the realization of regional energy and heat solution concepts, products for the bioeconomy, agriculture, forestry and horticulture as well as numerous bio-based industrial applications can also be obtained.

At the same time, additional revenues can also be generated through trading of CO<sub>2</sub> certificates, since pyrogenic carbon capture and storage (PyCCS) via pyrolysis is classified as a negative emissions technology due to its potential to generate permanent carbon sinks. In addition to batch operated systems, there are also modern technological solutions for continuous operation. The latter have the advantage of requiring less labour and can therefore be operated more effectively and economically.

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**Funded by  
the European Union**

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No GA 101086563. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.