

Gregor Sailer

**Strategies to Optimize the
Energetic and Material Utilization of
the Organic Fraction of Municipal
Solid Waste by Considering the
Entire Value Chain**



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Tropics and Subtropics Group

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Strategies to Optimize the Energetic and Material Utilization of the Organic Fraction of Municipal Solid Waste by Considering the Entire Value Chain

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General information

This thesis is submitted in accordance with the *University of Hohenheim Doctoral Regulations of Agricultural Sciences, Natural Sciences, and Business, Economics and Social Sciences* of the year 2019. Further, this thesis is a result of the cooperation between the University of Applied Forest Sciences Rottenburg and the University of Hohenheim. The following persons were members of the supervisor and mentor team.

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Preamble

Worldwide, the transformation towards an energy system based on renewable energies is in progress. Nevertheless, the current global energy demand is still covered by large shares of fossil fuels. Additionally, almost every economy worldwide depends on further resources such as metals or industrial minerals that have to be imported for implementation of high-tech applications (e.g., renewable energy technologies). In this context, recycling of available materials is especially important as it reduces the amount of imported resources and therefore contributes to resource and energy independency.

In general, the current resource consumption and linear economy also generate excessive amounts of waste that often lead to severe environmental damages, especially in the case of waste exports to countries without possibilities to control or regulate waste disposal. It can be retained that the human society currently damages the entire ecosystem earth in several respects. In a simplified representation, environmental damages are caused during the exploitation of natural and especially non-renewable resources in order to produce products which are simply disposed of after their useful life - which is often rather short - causing again environmental damages. At least, waste is more and more seen as a valuable source to cover the growing resource demand. Within a circular economy, which is characterized by recyclable material flows, negative impacts on the environment will be drastically reduced.

For future generations, we can no longer afford to just consume the still available reserves while ignoring necessary efforts to improve recycling strategies. Within this thesis, the utilization of municipal biowaste will be examined and discussed. The results can help to improve the overall recycling strategies in terms of energetic and material use.

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My doctoral thesis was then completed during my time at the State Institute of Agricultural Engineering and Bioenergy (University of Hohen-

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