SecureChain
sustainable biomass energy

Pilot Project Factsheet

Funded by the European Commission Horizon 2020 grant agreement no. 646457
01/04/2015 – 31/07/2018

Improved wood recovery from green wastes

Project partners

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A communal waste management company improved the process of green waste sorting to make the inadequately utilised wooden fraction of municipal biowaste accessible for thermal utilisation in local incineration plants. The project included a cost-benefit study and a life cycle assessment (LCA) of the enhanced bioenergy chain. The analysis helped to optimise the biowaste sorting logistics, valorise a larger share of the wooden fraction and enhance the biowaste handling capacity from currently 8.000 t/a to a maximum 10.000 t/a by 2018. The pilot project demonstrates how an improved technological process can lead to simultaneous economic and ecological benefits for the company and an increase of biomass mobilisation.

Partners

AVEA is a waste management company and the BAV is a public regional waste association in the Bergisches Land region in NRW, Germany. AVEA's services include collection, transport, treatment and disposal of waste within the area of two counties with an area of 1,300 km² and a population of 550,000 inhabitants. The BAV operates the MSW landfill site Leppe and an innovative educational and research centre, the :metabolon project, to raise public awareness for circular economy, resource efficiency and environmental technology.

Background and objectives

In Germany, circa 50 kg of green waste per inhabitant are collected annually (in NRW circa 44 kg). With further technical optimisation of the green waste collection in the future, circa 75 kg per inhabitant and year is likely to be collected. Under current conditions, this expected volume cannot be composted, because the biomass yards are short of sufficient space. More efficient sorting of the wooden biomass fraction (20-250 mm) is needed. This could increase the volume of recovered wood from green waste to circa 2 million tons per year in Germany, which corresponds to an estimated 24.8 PJ (6.89 TWh) per year equivalent to circa 10% of energy demand in German households.

The novel Circular Economy Act of NRW aims to improve the collection and use of waste, which will result in an increase of biomass streams, including green wastes. The AVEA company planned to enlarge and reorganise the Leppe biomass yard. The objectives were to increase the capacity for the processing of municipal green waste and improve the recovery of wooden biomass, (i) to reduce the external disposal due to capacity shortages, (ii) to improve the sorting of different green waste fractions, and (iii) to recover a calorific valuable fraction as combustible for industrial heating plants.

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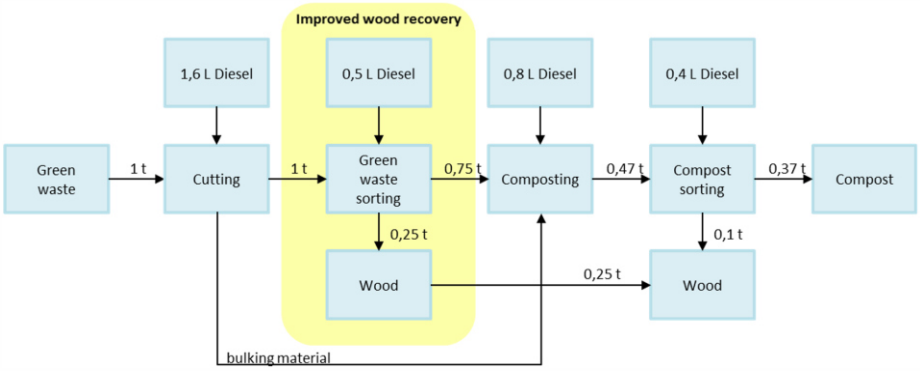
Green waste, compost heaps and the final compost product

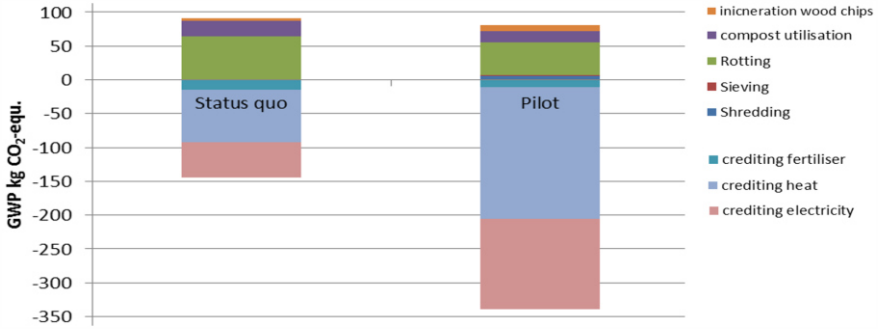
Actions and results

The consultations allowed to steer the process to the best result. The exchange with the experts helped essentially to focus the pilot on the main question: How can we optimise the output of solid biomass through an improved sieving process? Following this impulse, AVEA initiated specific sieving tests and carried out detailed cost comparisons of different potential equipment in view of performance, fuel consumption and durability. This allowed to identify a special equipment best suited for the process, a so-called three-fraction sieving machine.

Two scenarios of the sorting process were compared: The first describes the initial setup in which the wooden fraction is extracted after the composting. Here only 0.14 tons of wood or 1.69 GJ/t (0.47 MWh/t) can be retrieved per 1 ton of green waste. In the second scenario (see figure), a larger volume of wood is extracted with improved equipment before the composting. **0.35 tons** of wood or **4.36 GJ/t** (1.21 MWh/t) can be gained per 1 ton of green waste. Note that a smaller amount of compost is produced here, because more wood is recovered. The cost analysis proved the viability of the new process: Although revenues from compost sales decrease, the revenues from recovered wood increase and the external disposal costs can be saved. As a result, the annual processing capacity of the biomass yard can be increased by **+2,000 tons** and the expected total annual revenues can be more than doubled.



Researchers from BOKU carried out a life cycle assessment (LCA) of the two scenarios. Both scenarios result in effective greenhouse gas savings (negative balance), because considerable heat and electricity can be produced from the biomass. However, a significantly larger saving effect is achieved through the new process: the greenhouse gas emissions could be reduced by **203 kg CO_2-equivalents** per ton of green waste (difference status quo-pilot).



State of implementation (May 2018)

The construction works at the site have been almost completed. An additional investment of 100,000 EUR into a new sieve unit and a modernised sieving machine is being realised. The optimised process ensures the continuity of the important contribution of the biomass yard to regional resource efficiency and climate protection.

SecureChain partners

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