



Residual biomass for activated carbon

Introduction

Each year, approx. 34 MT of residual biomass occur in urban and rural areas of North-West Europe (NWE). They are managed by harvesting, mulching or collection, and are often transported over longer distances. This consumes energy which is to a large extent produced from fossil fuels or nuclear power plants – thus contributing to the anthropogenic emission of climate gases and global warming. On the other hand, there is an increasing demand in the waste water sector for activated carbon that is currently imported from African or Asian countries.

RE-DIRECT aims to set up decentralised conversion units to convert residual biomass into activated carbon that will be used for clearing regional waste water. Not only will the project benefit global climate, but will also contribute to eliminating hazardous micro-pollutants from pharmaceutical substances.

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Regional Development and Integration of unused biomass wastes as Resources for Circular products and economic Transformation



IFBB with pyrolysis and activation

The Technology

Based on the proven technology named Integrated Generation of Solid Fuel and Biogas from Biomass (IFBB) RE-DIRECT will develop a novel technology chain to transform residual biomass into energy and activated carbon.

After the residual biomass is collected and ensiled, two major steps follow:

Step 1

The Integrated Generation of Solid Fuel and Biogas from Biomass (IFBB®)

- Cleaning with water to remove soil and other contaminations.
- Hydrothermal conditioning using warm water (40°C).
- Mechanical separation into a fluid and a solid fraction. The fluid fraction is containing the easily soluble minerals and organic fractions and is used as a substrate for anaerobic digestion to produce biogas.
- The solid fraction is further processed by drying, using the surplus heat from the biogas combustion

Step 2

Pyrolysis and activation

- The dried solid fraction is carbonised using a slow pyrolysis reaction. Surplus heat is produced by combustion of the pyrolysis gases.
- The produced biochar is directly activated using water vapour, produced with the surplus heat of the pyrolysis reaction.
- The final product, activated carbon, can be applied for example in waste water cleaning.

RE-DIRECT aims to:

- Increase the resource efficiency by transforming residual biomass into a high-quality product;
- Develop regional-specific biomass portfolios and integrated biomass concepts;
- Develop and test a technology to transform the available biomass into energy and activated carbon;
- Conduct scientific investigations to underline the sustainability of the developed technology both in ecological and economical aspects;
- Implement capacity building measures to ensure dissemination and application of the approach in the European regions;
- Involve regional stakeholders in further project activities;
- Establish the first world-wide industrial scale prototype of an IFBB plant incl. a pyrolysis and activation unit to produce activated carbon;
- Investigate opportunities for applying the technology decentrally in rural areas;
- Explore the effects on disadvantaged areas in terms of creating new green jobs.