POLYTECHNIK
Biomass Energy

# BIOMASS *TORREFACTION*

## What is torrefaction?

Torrefaction is a method of roasting biomass. It is a thermal treatment that eliminates volatile components from the biomass and increases its carbon content. Depending on the process temperature and duration, the torrefaction degree rises and the product becomes similar to biocoal.

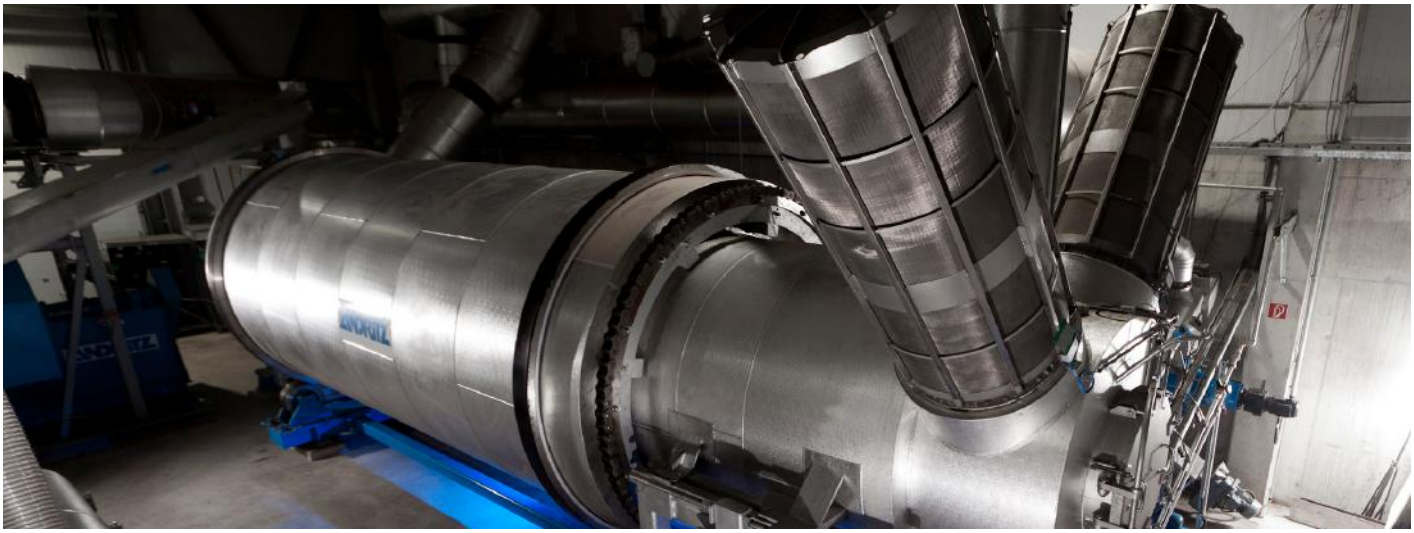
## How does torrefaction work?

The feedstock is heated in a reactor with flue gases until the volatile components are expelled. The gases produced in this process are redirected into a combustion chamber, where they are burnt. The resulting heat is used to heat the reactor. As the process is exothermic (ie. more heat is released than consumed), the excess heat is used in a waste heat boiler. Any heat transfer medium (hot water, steam, thermal oil) can be applied and used in subsequent processes.

The torrefied product has a higher carbon content than the feedstock. It is cooled and then compacted into briquettes. This process increases its energy density again. The result is a high-quality biomass product. This process typically results in a mass yield of around 66% and a product with an energy content of around 75%.

## Available plant configuration

| | |
|---|---|
| Annual output | 60,000 t |
| Possible applications of the torrefied material | e.g. coal substitute, steel production, carbon sequestration, filtration |
| Possible feedstock | Forest wood chips, agricultural residues, energy crops, briquettes/pellets |
| Boiler output | 12,000 kW |



## Reference plant in Finland under construction

| | |
|---|---|
| Annual output (torrefied material) | 60,000 t |
| Intended application | Alternative to fossil coal |
| Feedstock | Wood from the Finnish forest industry |
| Combustion capacity | 16,000 kW |
| Boiler parameters | 12,000 kW, 130°C 6 bar |
| Waste heat utilisation | District heating/process heat |
| Assignment | Q1/2023 |

## Why torrefaction?

The resulting product has very favourable fuel properties. For example, its energy density is much higher than raw biomass, meaning transport costs can be reduced. Furthermore, the existing infrastructure for loading and unloading of coal can be used. The product can be stored outside. This results in a product, which can be used as a carbon-neutral fuel substitute in power plants to create process heat or in industrial processes.

Polytechnik and its partners offer solutions for the entire torrefaction process, from biomass preparation (storage and drying) to reactors, combustion chambers and even waste heat utilisation.

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