TORRCOAL

Bio-Carbon Solutions

WE BELIEVE IN THE POWER OF BI●-CARB●N STREAMS

For a Fossil Free Future

TorrCoal
E info@torrcoal.nl
/torrcoal
www.torrcoal.com

E-version:

WE DO TORREFACTION

TorrCoal firmly believes in torrefaction (mild pyrolysis from 270°C to 350°C): a process to produce bio-carbon from bio-residuals like forest maintenance wood, demolition wood, SRF, etc. A process that we have perfected into our own TorrCoal technology C-Vertr.

C-Vertr can be used to generate bio-carbon streams to replace fossil carbons for various applications.

BIO-CARBON: For a Fossil Free Future

Carbon atoms are indispensable building blocks in every day life. To stop unwanted climate change, we need to replace the fossil carbon we currently use. Because bio-carbon is non-fossil, it is a solution for a sustainable future. With torrefaction, you can produce a bio-carbon to create an eco-friendly industry.
With our bio-carbon, you can help to meet global UN Sustainability Goal #9 (sustainable industrialization) and #13 (combat climate change). In addition, for Europe our bio-carbon can help to reduce the net EU greenhouse gas emissions to 55% below 1990 levels by 2030. This is in accordance with the EU Green Deal (Fit-For-55 package), as the first step towards EU-wide climate neutrality by 2050.

Our bio-carbon is an excellent alternative to provide the desired energy and carbon content, while becoming less exposed to ETS CO_2 pricing.

THE APPLICATIONS FOR BIO-CARBON

TorrCoal technology makes bio-carbon streams available to those who believe in renewable natural resources. To those who value maximizing profit just as much as minimizing carbon footprint. To those who believe in input of bio-residuals in industrial processes.

- **Heating industrial processes**
  To aid the energy transition, companies can use our bio-carbon or integrate our torrefaction technology into their existing production plant. This for the purpose to heat furnaces in production processes.

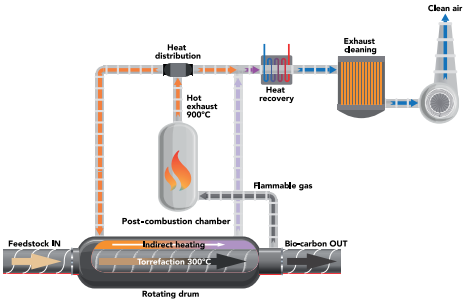
- **Carbon sink and products**
  Bio-carbon can be a ready-to-use material for applications to create renewable products. Bio-carbon improves the product properties and at the same time preserves carbon atoms (carbon sink). Known applications are for instance composites in construction, soil improvement in agriculture and the (bio-)plastic industry (fillers and fibers).

- **Raw material for chemical processes**
  Bio-carbon can provide sustainable carbon atoms as an alternative for fossil resources. Torrefaction enables the production of a highly homogeneous material of a constant quality, which is used as raw material for chemical processes, like bio-refinery, gasification and pyrolysis. In the steel industry it can also act as a fossil-free reducing agent.

THE TORREFACTION PROCESS

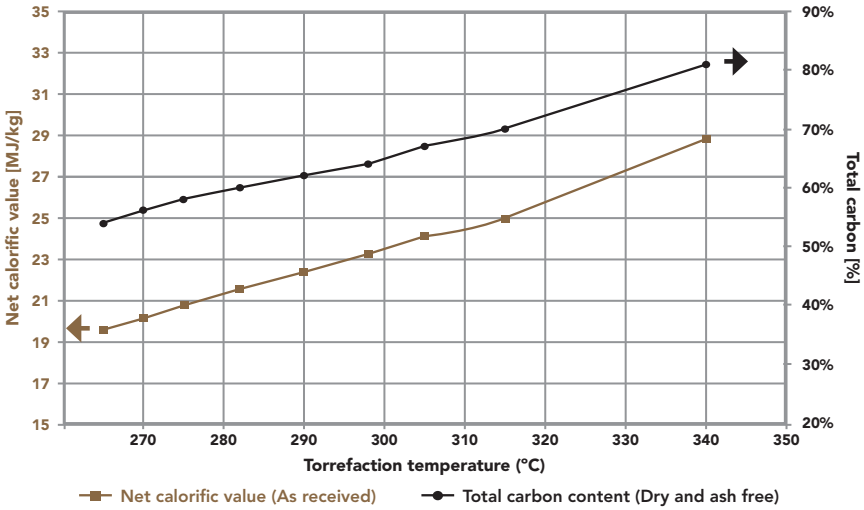
Torrefaction is the thermochemical conversion of biomass in an oxygen-free environment. It generates a solid material with increased energy density and carbon content.

TorrCoal's technology (C-Vertr) utilizes a rotary drum for torrefaction, where the feedstock is heated to temperatures between 270°C and 350°C (mild pyrolysis). The obtained product is a sustainable solid material (bio-carbon) that has similar properties to fossil carbon. See the graph below.



The gases produced during torrefaction are burned and the generated energy is used to heat a rotary drum. Therefore the system is self-sustaining.

Energy and carbon content as function of torrefaction temperatures



Average values collected from torrefaction of waste wood (forest maintenance waste streams) at industrial scale.

Features and benefits of our torrefaction technology

Features	Benefits
Reactor that is a rotating drum and is indirectly heated	Optimal heat transfer at maximum safety
Reactor with 4 separate heating zones	Optimal conversion, precisely controlling ratio of solids and gases
Post-combustion chamber to burn the process gas	Self-sustaining process, requiring no external energy sources
Exhaust cleaning system to secure safe emissions	Ability to process low grade recycled wood and SRF
Input of various grades and sizes of feedstock possible	Minimal risk on feedstock shortages and cost increases

OUR PRODUCTS AND SERVICES

C-NEWABLE **Bio-carbon supply**

C-Newable stands for our core product. TorrCoal supplies bio-carbon (in powder) at specific energy and carbon contents. Bio-carbon is made from bio-residuals (either recycled wood, SRF waste streams or woody biomass).

C-VERTR **Torrefaction technology & equipment**

C-Vertr is our core technology. It provides the process technology and actual supply of the reactor equipment. C-Vertr includes our services:

- General pre-feasibility studies, including general heat and mass balance simulations.
- Customized feasibility studies, taking into account client feedstocks, target capacities and specific requirements.
- Licensing the TorrCoal intellectual property, as part of a Basic Engineering Package (BEP).
- Supply of the entire C-Vertr equipment package, consisting of feeding hopper, reactor, post-combustion, hot gas distribution and bio-carbon cooling.

C-NOVATION **Knowledge development & sharing**

Bio-carbon is similar, but not the same as fossil carbon. Therefore TorrCoal provides support:

- To analyze and validate the usability of bio-carbon as an alternative for current fossil carbons.
- To assess the feasibility of the torrefaction process and to optimize it for making bio-carbons in solid, liquid or gas form.
- To educate stakeholders on the potential of torrefaction and bio-carbon by participating to joint research projects, publishing scientific and technical papers, presentations at seminars/exhibitions, etc.