### **btg bioliquids**

## BTG Bioliquids Pyrolysis technology

Waste2Road seminar

Gerhard Muggen April 20<sup>th</sup>, 2021



## Agenda

- 1. BTG Bioliquids company introduction
- 2. Fast pyrolysis technology
- 3. Bio oil applications
- 4. Conclusions

## BTG Bioliquids – We replace fossil fuels

### **Company introduction**

- As a **technology provider** and **product leader** we are committed to the commercial deployment of our fast pyrolysis technology.
- Explicitly made from biomass residues which is known as **second generation** (2G) or advanced biofuel which means that it does not compete with the food chain.





## Our company milestones



1987

BTG starts as a spin-off from the University of Twente



2008

BTG Bioliquids established by BTG



2015

Start up of Empyro in the Netherlands



2016

Cooperation agreement with TechnipFMC

> Starting BTG Bioliquids webshop

2019

Empyro sold to Twence, the Netherlands

Green Fuel Nordic, Finland

Pyrocell, Sweden



2020

Start up of Green Fuel Nordic plant in Finland

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## Fast pyrolysis technology

- Thermochemical decomposition of biomass residues through rapid heating (450-600 °C) in absence of oxygen.
- Different types of biomass residues can be converted into homogeneous energy carrier: **Fast Pyrolysis Bio Oil** (FPBO).
- By products are heat (steam) and power (electricity)

## Our process from biomass to FPBO



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## Empyro The Netherlands

#### In 24/7 operation since 2015

First commercial FPBO plant in the world at Twence/Empyro in the Netherlands, in 24/7 operation since 2015. Empyro is sold to Twence at the beginning of 2019.

- Biomass feedstock wood residue
- Biomass input 36.000 ton/year
- FPBO output 24.000 ton/year
- Steam output 80.000 ton/year
- Electricity output 2.200 MWh/year





## Empyro energy balance (MW) overall efficiency 85%

- All FPBO sold and used by off-take customer since 2015
- FPBO used to replace natural gas
- Switch from natural gas to FPBO give 93% GHG reduction
- Steam is sold to neighbouring salt production facility
- Excess power is sold to the grid



## Indicative dimentions FPBO plant

#### Fast pyrolysis production plant

- Length (A) x Width (B) = 45 x 45m
- Height = 24m

#### Fast pyrolysis bio oil storage of 250 m<sup>3</sup>

- Length (C) x Width (D) = 18 x 20m
- Height = 11m



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## GreenFuel Nordic project (Finland)



- Mechanical complete October 2020
- First oil produced December 2020
- Small plant optimizations December 2020 and January 2021
- Continue production January 2021







## Pyrocell project (Sweden) from sawdust to tank

- Cooperation of Setra and Preem
- Production of bio-oil from sawdust startup 2021
- Fast pyrolysis technology annual bio-oil production 25,000 tonnes – GHG reduction vs fossil oil 80-90%
- Equivalent of 15,000 family cars can be powered per year
- Comply with the European RED II directive



# Why pyrolysis?

- Works with a variety of biomass feedstocks
- GHG savings well above other biofuels
- Versatile application e.g. heat, transportation fuels and bio chemicals
- Utilize existing fossil fuel infrastructure
- Viable link agriculture and (petro-) chemical industry
- Renewable feedstock for second generation bio fuels



## Fast Pyrolysis in the Bio-Based Economy



## Fast pyrolysis bio oil applications

- Commodity link between agriculture and (petro-) chemical industry
- Current applications:
  - Heat at FrieslandCampina and heating customers in Finland.
  - Co-refining at the Preem refinery in Sweden
- Future markets:
  - High value applications like chemicals and additives
  - Bulk markets like jet and marine fuels
  - Production of Hydrogen



# Co-refining of FPBO, how does it work?



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# Summary and perspectives

- Fast pyrolysis is proven at commercial scale, worldwide capacity is expanding
- Current FPBO application is as renewable heating oil (e.g. replacing natural gas)
- High interest in co-processing crude FPBO in FCC units as this is a low CAPEX option to comply with RED II in Europe
- First co-processing refinery customer starting 2021
- More applications of pyrolysis oil under development, pyrolysis as starting point of bio liquids refinery

## **btc bioliquids**

## Thank you

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