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Dissemination (Please cross-tick the correct type and level)

Type: R R - Report
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Executive summary

Numerous FPBO samples will be send around between the partners over the course of the four-year Residue2Heat project. Sample delivery is a joint task, partners VTT and BTG will supply the consortium with (conditioned) FPBO samples. The sample delivery will be described throughout the project in seven deliverables (D2.2 – D2.8) and is connected to Task 2.1. To have a full overview, each deliverable report will be an updated version of the previous one, rather than a new report describing only the delivery in the relevant reporting period. A detailed analysis on the production of FPBO from different biomass and processing conditions will be documented in D2.1 (due in M26). Details on the analysis results of the various samples send to the project partners will be performed in T3.1 and its related deliverables (D3.1-D3.8) which will provide feedback for WP2, and will be employed in WP4 and WP5 in modelling and utilization.

Both D2.2 and D3.1 are primarily used for Residue2Heat internal documentation although they are marked as public. For the project partners it was essential to receive a documented pyrolysis sample as soon as possible. The follow up deliverables will include more details and analysis concerning benchmarking of processes, comparison of data between VTT and BTG, the performance of measures to lower the water content (related to T2.1) and phase stability, aqueous effluents

All partners were contacted individually by email with the question if they would like to receive FPBO samples, and if so, the required quantity. All partners responded, only two partners required FPBO in this stage of the project. MEKU indicated they will use FPBO from the 'OWI' batch if needed. The following samples were send around:

- 20 litre wood derived FPBO from BTG to VTT
- 20 litre wood derived FPBO from BTG to OWI

In addition BTG is using the same wood derived FPBO for their own research in WP2.

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1 Introduction

Deliverable reports D2.2 to D2.8 will supply a continuously updated table of samples send around in the project. A short description on the production of the samples which are used in the project is included after the table in section 3. Details on the analysis results of the various samples will become available from WP3, and will be reported in D3.1 to D3.8.

2 Sample delivery

Sample numbering is made according to the following format: **R2H.Supplier.Sample#**. If multiple samples from the same batch are used a letter will follow the number. (*i.e. R2H.BTG.001a is FPBO sample number 001, and is similar to R2H.BTG.001b.*)

2.1 Sample delivery list

Residue2Heat code	Date	Biomass Feedstock	Producer	Conditioning	Receiver	Quantity
R2H.BTG.001a	25-2-2016	Clean Wood	BTG (Pilot Plant)	Water removal & solids filtration	OWI	20 litre
R2H.BTG.001b	25-2-2016	Clean Wood	BTG (Pilot Plant)	Water removal & solids filtration	VTT	20 litre
R2H.BTG.001c	25-2-2016	Clean Wood	BTG (Pilot Plant)	Water removal & solids filtration	BTG	~200 litre

2.2 Sample description

2.2.1 R2H.BTG.001

This sample is produced from a clean woody feedstock; the fine particle stream which is obtained from the wood pellet industry as a by-product. The material is composed of softwood (primarily pine wood) and is the same feedstock as used in the 'Empyro' commercial scale fast pyrolysis factory located in Hengelo, the Netherlands. In Table 1 the ultimate analysis results for the biomass feedstock is presented.

The biomass is converted in BTG's fast pyrolysis pilot plant (Figure 1), based on rotating cone technology, operated around 150 kg/h biomass input with average pyrolysis temperature of around 500 °C.

Table 1: Ultimate analysis of the clean woody feedstock used for the production of FPBO 'R2H.BTG.001'.

Element	Concentration (dry basis)
C [g/kg]	514.5
H [g/kg]	63.0
N [g/kg]	< 10
O [g/kg] (by diff)	420.2
Ni [mg/kg]	1
Cr [mg/kg]	2
Pb [mg/kg]	1
Mn [mg/kg]	96
Se [mg/kg]	4
Ca [mg/kg]	1143
Mg [mg/kg]	222
Fe [mg/kg]	149
Sr [mg/kg]	6
Na [mg/kg]	18
Al [mg/kg]	117
K [mg/kg]	465
Zn [mg/kg]	11
P [mg/kg]	59
S [mg/kg]	62
Cu, Sb, As, Cd, Co,	<1
V, Li, Sn [mg/kg]	



Figure 1: Photograph of BTG's fast pyrolysis pilot plant in Enschede, The Netherlands.

During production a small part of the moisture is removed from the pyrolysis oil using a flash evaporator. The pyrolysis oil product was filtered after production to remove most of the solid particles which were entrained during the production process from the pyrolysis oil. Figure 2 shows a photograph of the pyrolysis oil sample as received by OWI. Figure 3 shows a photograph of FPBO from woody biomass in a glass beaker.



Figure 2: FBPO sample as received by OWI. About 20 litres of FPBO from woody biomass delivered in a 30 litre can.



Figure 3: Photograph of a typical FPBO from woody biomass.

3 Conclusion

FPBO samples were supplied according to the desire of the project partners.