GA no 282826

Production of Solid Sustainable Energy Carriers from Biomass by Means of Torrefaction

Deliverable No. D10.1

First data sets presented in BIODAT

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Nature		
R	Report	
O	Other	X

Deliverable Details		
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Description of deliverable no. D10.1

Deliverable 10.1 is an “other” deliverable aiming to have the first data sets of chemical and physical characteristics of torrefied material uploaded to the BIODAT/Phyllis2 on-line database. For this purpose an existing excel template was updated to improve data entry in the on-line database. The results of the round robin assessment, which was conducted within the SECTOR project and reported in Deliverable D8.1, were used to successfully test the updated template and subsequent data entry into the database. The worksheet will be distributed amongst project partners to gather and publish data sets from the analysis work of raw material, torrefied biomass and ash, within WP3, 4 ,5 ,6, 7, 8 and 9. The following screen shots display the entries of the round robin data set.

1 General information

Version: 20130502

SECTOR

Mandatory information

Sample name	Torrefied 6mm Pellets
Country of origin (select one)	Netherlands
Date of production (if not produced, date of sampling)	1-5-2012
Category (select one)	Solid_biofuels
Subcategories (select one)	Woody_biomass
	Wood_processing_industry
	Chemically_untreated_wood_residues
	With_bark

Voluntary information

Details of material:	
Common/alternative name	Torrefied woodchips and wood residues
Description of fuel/biomass	6mm pellets of torrefied woodchips and forest
Photograph (file specification)	
Sampling location	
Date of sampling	1-5-2012
Method(s)/standard(s) of sampling	
Lot size (ton, m^3)	
Latin name	
Producer of fuel/biomass information:	
Name	Topell
Adress	
Country (select one)	Netherlands
Logo of producer (file specification)	
Supplier of material (if not same as producer)	
Submitter of the data to BIODAT/Phyllis2	ofi
Date of input by submitter	21-5-2013
Information from submitter's records	
Literature references	
Links to ash analyses in BIODAT/Phyllis2	
Other information	SECTOR project Round Robin sample

2 Fuel properties

Fuel properties

Property	ref.	Unit	Value	RSD	Det. limit	Laboratory	Date of analysis	Method (standard for analysis)
Proximate Analysis								
Moisture content (a.r.)		wt% a.r.	8.00	0.64		RR Sector P	June-August 2012	EN 14774-2:2009 - Solid biofuels -
Ash content at 550°C		wt% (dry)	3.12	0.42		RR Sector P	June-August 2012	EN 14775:2009 - Solid biofuels - D
Ash content at 815°C		wt% (dry)	-	-				
Loss on Ignition: LOI_{550}		wt% (dry)	-	-				
Volatile matter		wt% (dry)	72.20	1.87		RR Sector P	June-August 2012	EN 15148:2009 - Solid biofuels - D
Ultimate Analysis								
Carbon		wt% (dry)	53.00	1.93		RR Sector P	June-August 2012	EN 15104:2011 - Solid biofuels - D
Hydrogen		wt% (dry)	5.52	0.32		RR Sector P	June-August 2012	EN 15104:2011 - Solid biofuels - D
Nitrogen		wt% (dry)	0.45	0.19		RR Sector P	June-August 2012	EN 15104:2011 - Solid biofuels - D
Sulphur		wt% (dry)	0.04	0.03		RR Sector P	June-August 2012	EN 15289:2011 - Solid biofuels - D
Oxygen		wt% (dry)	37.87					
Calorific Values								
Net. calorific value, dry		MJ/kg	19.60	0.48		RR Sector P	June-August 2012	EN 14918:2009 Solid biofuels - De
Gross calorific value, dry		MJ/kg						
Energy density		kWh/m^3 loose						

3 Physical characteristics

Physical characteristics

Property	ref.	Unit	Value	RSD	Det. limit	Laboratory	Date of analysis	Method (standard for analysis)
Commonly used properties								
Dimension, D		mm						
Dimension, D2		mm						
Dimension, L		mm						
Dimension, L2		mm						
Dimension, L3		mm						
Mechanic durability		wt%	95.3	1.63		RR Sector P	June-August 2012	EN 15210-1:2009 - Solid biofuels -
Amount of fines		wt%						
Particle density		kg/m^3						
Bulk density		kg/m^3	705	49		RR Sector P	June-August 2012	EN 15103:2009 - Solid biofuels - D
Additives, type		kg/ton (dry/dry)						
Additives, amount		wt% of pressing mass						
Particle size distribution								
>400 mm		wt%						
200-400 mm		wt%						
100-200		wt%						
63-100 mm		wt%						
45-63 mm		wt%						
16-45 mm		wt%						
8-16 mm		wt%						
3.15-8 mm		wt%						
2.8-3.15 mm		wt%						
2.0-2.8 mm		wt%						
1.4-2.0 mm		wt%						
1.0-1.4 mm		wt%						
0.5-1.0 mm		wt%						
0.25-0.5 mm		wt%						
<0.25 mm		wt%						
Specific properties								
Proportion split		vol%						
Cut-off surface (smooth or uneven)								
Mould and decay		wt%						
Traded volume		m^3						
Shredded								
Oversized particles		wt% of single load						
Maximum dimension of oversized particles		mm						
Ash melting behaviour								
T(sh)		°C						
T(def)		°C						
T(he)		°C						
T(fl)		°C						

4 Chemical analysis

Chemical analysis

Property	ref.	Unit	Value	RSD	Det. limit	Laboratory	Date of analysis	Method (standard for analysis)
Halogenides								
Fluorine (F)		mg/kg (dry)						
Chlorine (Cl)		mg/kg (dry)	218	104		RR Sector P	June-August 2012	EN 15289:2011 Solid biofuels - De
Bromine (Br)		mg/kg (dry)						
Iodine (I)		mg/kg (dry)						
Major elements								
Aluminium (Al)		mg/kg (dry)	224	86		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Silicon (Si)		mg/kg (dry)	2389	982		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Potassium (K)		mg/kg (dry)	3541	883		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Sodium (Na)		mg/kg (dry)	267	81		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Calcium (Ca)		mg/kg (dry)	6835	1593		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Magnesium (Mg)		mg/kg (dry)	806	165		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Iron (Fe)		mg/kg (dry)	431	138		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Phosphorus (P)		mg/kg (dry)	757	223		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Titanium (Ti)		mg/kg (dry)	12.8	10.7		RR Sector P	June-August 2012	EN 15290:2011 - Solid biofuels - D
Minor elements								
Arsenic (As)		mg/kg (dry)	0.29	0.22		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Barium (Ba)		mg/kg (dry)						
Beryllium (Be)		mg/kg (dry)						
Cadmium (Cd)		mg/kg (dry)	0.41	0.09		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Cobalt (Co)		mg/kg (dry)	0.19	0.07		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Chromium (Cr)		mg/kg (dry)	3.48	2.35		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Copper (Cu)		mg/kg (dry)	5.03	2.13		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Mercury (Hg)		mg/kg (dry)						
Molybdenium (Mo)		mg/kg (dry)	0.27	0.09		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Manganese (Mn)		mg/kg (dry)	67.7	10.4		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Nickel (Ni)		mg/kg (dry)	1.53	0.88		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Lead (Pb)		mg/kg (dry)	1.75	0.55		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Selenium (Se)		mg/kg (dry)						
Tellurium (Te)		mg/kg (dry)						
Vanadium (V)		mg/kg (dry)	0.57	0.33		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Zinc (Zn)		mg/kg (dry)	50.6	26.5		RR Sector P	June-August 2012	EN 15297:2011 - Solid biofuels - D
Other elements								
Boron (B)		mg/kg (dry)						
Thallium (Tl)		mg/kg (dry)						
Antimony (Sb)		mg/kg (dry)						
Tin (Sn)		mg/kg (dry)						
Strontium (Sr)		mg/kg (dry)						
Special components								
PCB		mg/kg (dry)						
Metallic Al		wt% (dry)						
Fluorine (F)		wt% (daf)						

5 Data set appearance in on-line database

woodchips and wood residues, torrefied at 250 - 290 °C (#3503)

ID-number	#3503
Material	woodchips and wood residues, torrefied at 250 - 290 °C
Alternative name	Torrefied woodchips and wood residues
Description	6mm pellets of torrefied woodchips and forest residues containing usual mineral contamination
Classification	CEN/TS 14961 classification ▸ Solid biofuels ▸ Woody biomass
	ECN Phyllis classification ▸ torrefied material ▸ mixed wood
	NTA 8003 classification ▸ [800] samengestelde stromen ▸ [803] brandstof na torrefactie
Sample date	2012-05-01
Country	Netherlands
Producer organisation	Topell (Netherlands)
Production date	2012-05-01
Submitter	ofi
Submission date	2013-05-21
Remarks	SECTOR project Round Robin sample analyses (with standard deviation of the reproducibility) (analysis date: June-August 2012)

Values

Property	Unit	Value ar	Value dry	Value daf	Std dev	Det lim	Lab	Date	Method	Remarks
Fuel Properties										
Proximate Analysis										
Moisture content	wt%	8.00	← Edit		0.64		RR Sector Project	2012-08-01	EN 14774-2 or 3	
Volatile matter	wt%	66.42	72.20	74.53	1.87		RR Sector Project	2012-08-01		
Ash content at 550 °C	wt%	2.87	3.12		0.42		RR Sector Project	2012-08-01	EN 14775	
Fixed carbon	wt%	22.71	24.68	25.47					Calculated	
Ultimate Analysis										
Carbon	wt%	48.76	53.00	54.71	1.93		RR Sector Project	2012-08-01	EN 15104	
Hydrogen	wt%	5.08	5.52	5.70	0.32		RR Sector Project	2012-08-01	EN 15104	
Nitrogen	wt%	0.41	0.45	0.46	0.19		RR Sector Project	2012-08-01	EN 15104	
Sulphur	wt%	0.03	0.04	0.04	0.03		RR Sector Project	2012-08-01	EN 15289	
Oxygen	wt%	34.84	37.87	39.09					Calculated	
Total (with halides)	wt%	100.02	100.02	100.02					Calculated	
Calorific Values										
Net calorific value (LHV)	MJ/kg	17.84	19.60	20.23	0.48		RR Sector Project	2012-08-01	EN 14918	
HHV_{stoic}	MJ/kg	19.07	20.73	21.40					Calculated	
Chemical Analyses										
Halides										
Chlorine (Cl)	mg/kg	200.6	218.0	225.0	104.0		RR Sector Project	2012-08-01	EN 15289	
Major elements										
Aluminium (Al)	mg/kg (dry)			224.0	86.0		RR Sector Project	2012-08-01	EN 15290	
Potassium (K)	mg/kg (dry)			3 541.0	883.0		RR Sector Project	2012-08-01	EN 15290	
Sodium (Na)	mg/kg (dry)			267.0	81.0		RR Sector Project	2012-08-01	EN 15290	
Calcium (Ca)	mg/kg (dry)			6 835.0	1 593.0		RR Sector Project	2012-08-01	EN 15290	
Silicon (Si)	mg/kg (dry)			2 389.0	982.0		RR Sector Project	2012-08-01	EN 15290	
Magnesium (Mg)	mg/kg (dry)			806.0	165.0		RR Sector Project	2012-08-01	EN 15290	
Iron (Fe)	mg/kg (dry)			431.0	138.0		RR Sector Project	2012-08-01	EN 15290	
Phosphorus (P)	mg/kg (dry)			757.0	223.0		RR Sector Project	2012-08-01	EN 15290	
Titanium (Ti)	mg/kg (dry)			12.8	10.7		RR Sector Project	2012-08-01	EN 15290	
Minor elements										
Arsenic (As)	mg/kg (dry)			0.3	0.2		RR Sector Project	2012-08-01	EN 15297	
Cadmium (Cd)	mg/kg (dry)			0.4	0.1		RR Sector Project	2012-08-01	EN 15297	
Cobalt (Co)	mg/kg (dry)			0.2	0.1		RR Sector Project	2012-08-01	EN 15297	
Chromium (Cr)	mg/kg (dry)			3.5	2.4		RR Sector Project	2012-08-01	EN 15297	
Copper (Cu)	mg/kg (dry)			5.0	2.1		RR Sector Project	2012-08-01	EN 15297	
Manganese (Mn)	mg/kg (dry)			67.7	10.4		RR Sector Project	2012-08-01	EN 15297	
Nickel (Ni)	mg/kg (dry)			1.5	0.9		RR Sector Project	2012-08-01	EN 15297	
Lead (Pb)	mg/kg (dry)			1.8	0.6		RR Sector Project	2012-08-01	EN 15297	
Vanadium (V)	mg/kg (dry)			0.6	0.3		RR Sector Project	2012-08-01	EN 15297	
Zinc (Zn)	mg/kg (dry)			50.6	26.5		RR Sector Project	2012-08-01	EN 15297	
Molybdenium (Mo)	mg/kg (dry)			0.3	0.1		RR Sector Project	2012-08-01	EN 15297	
Physical Properties										
Commonly used properties										
Mechanic durability	wt%			95.30					EN 15210-1,2	
Bulk density (ar)	kg/m³ (ar)			705					EN 15103	