



Demonstration of database of fuel and ash properties (BIODAT Database)

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-
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Why a database with biomass fuel properties?



- ◆ Database is a form of communication
- ◆ Biomass database fulfills demands
 - ECN's Phyllis database most popular webpage of ECN (except for home page)
- ◆ Objectives of any biomass database
 - Background information
 - Easy to contact on the internet
 - When possible: **free** information
 - **Reliable** information

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Phyllis history

- ◆ 1997 Database set-up (data from ECN, TU Wien and literature)
- ◆ 1998 Database available to third parties
- ◆ 1999 Internet access
- ◆ 2000 Statistics + option to reject extremes
- ◆ 2001 Addition of NEN 2001 classification
- ◆ 2003 Extended biochemical information

- ◆ after 2003 only extra records added from ECN

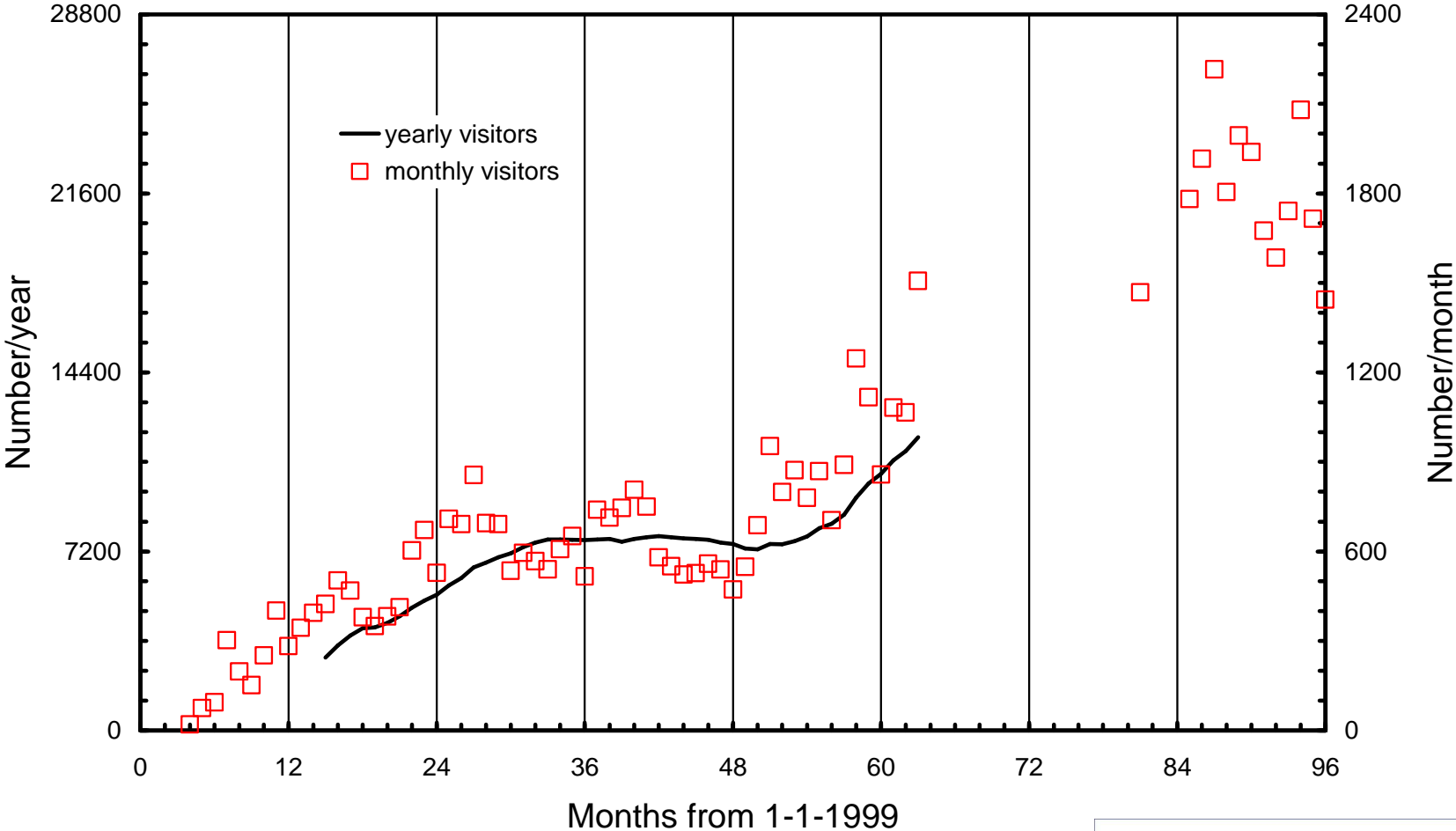
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Phyllis visitor numbers



Visitors in September 2008: 2800

Phyllis example (1)

PHYLLIS
the composition of biomass and waste

ECN

home | general information | how to use Phyllis | definitions used in Phyllis | preferences

composition of a single material | average composition of a group of materials | selection via NTA 8003 | search for materials

Composition of a single material.

Step 1 of 3: Select a group

Group
<input type="radio"/> algae
<input type="radio"/> char
<input type="radio"/> fossil fuel
<input type="radio"/> grass/plant
<input type="radio"/> husk/shell/pit
<input type="radio"/> manure
<input type="radio"/> non-organic residue
<input type="radio"/> organic residue/product
<input type="radio"/> others
<input type="radio"/> RDF and MSW
<input type="radio"/> sludge
<input type="radio"/> straw (stalk/cob/ear)
<input type="radio"/> treated wood
<input checked="" type="radio"/> untreated wood

Step 2 of 3: Select a subgroup


Subgroup
<input type="radio"/> bark
<input type="radio"/> beech
<input type="radio"/> birch
<input type="radio"/> cork
<input checked="" type="radio"/> fir/pine/spruce
<input type="radio"/> leaves
<input type="radio"/> needles
<input type="radio"/> oak
<input type="radio"/> other hard wood
<input type="radio"/> other soft wood
<input type="radio"/> others
<input type="radio"/> park waste wood
<input type="radio"/> poplar
<input type="radio"/> tropical hard wood

Step 3 of 3: Select a material

Biomass
<input type="radio"/> Japanese red pine, akamatsu
<input type="radio"/> pine cone
<input type="radio"/> pine sawdust briquettes
<input type="radio"/> radiata pine
<input type="radio"/> wood + bark, pine chips
<input type="radio"/> wood, balsam fir
<input type="radio"/> wood, douglas fir
<input type="radio"/> wood, douglas fir hog fuel
<input type="radio"/> wood, fir
<input type="radio"/> wood, fir mill waste
<input type="radio"/> wood, fir, hemlock (western)
<input type="radio"/> wood, fir, western hemlock
<input type="radio"/> wood, Jack pine softwood
<input type="radio"/> wood, Jack pine waste (USA)

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Energy research Centre of the Netherlands (ECN) P.O. Box 1, 1755 ZG Petten, tel. +31 224 56 49 49

Phyllis example (2)


P H Y L L I S
the composition of biomass and waste

[home](#) | [general information](#) | [how to use Phyllis](#) | [definitions used in Phyllis](#) | [preferences](#)

[composition of a single material](#) | [average composition of a group of materials](#) | [selection via NTA 8003](#) | [search for materials](#)

General information

Sample information

Group	untreated wood
Subgroup	fir/pine/spruce
Material	pine sawdust briquettes
ID-number	2291
Reference:	A.B. Ross, J.M. Jones, S. Chaiklangmuang, M. Pourkashanian, A. Williams, K. Kubica, J.T. Andersson et al.: Measurement and prediction of the emission of pollutants from the combustion of coal and biomass in a fixed bed furnace. Fuel 81 (2002) 571-582.
Remarks:	

Material composition

Proximate analysis (wt. %)				Ultimate analysis (wt. %)			Elemental analysis (mg/kg sample (dry))						
	dry	daf	ar	dry	daf	ar	Al	- ND	Fe	1500 Msr	Pb	3.3 Msr	
Ash	2		1.8 C	46.4	47.4	41.9 Msr	As	1 Lim	Hg	0 Msr	Sb	1 Lim	
Water			9.8 H	5.1	5.2	4.6 Msr	B	- ND	K	- ND	Se	0.5 Lim	
Volatiles	57.5	58.7	51.9 O	46.2	47.2	41.7 Cal	Ba	- ND	Mg	- ND	Si	- ND	
			N	0.03	0.03	0.03 Msr	Ca	- ND	Mn	83 Msr	Sn	0.8 Lim	
Calorific value (kJ/kg)				S	0.1	0.1	0.09 Msr	Cd	0.8 Msr	Mo	- ND	Sr	- ND
			Cl	0.059	0.06	0.053 Msr	Co	0.5 Msr	Na	- ND	Te	- ND	
HHV	16982	17332	15318 F	-	-	- ND	Cr	1.2 Msr	Ni	2.7 Msr	Ti	- ND	
LHV	15868	16195	14074 Br	-	-	- ND	Cu	3.7 Msr	P	- ND	V	1 Lim	
HHV _{Milne}	17009	17359	15342 Total:	100	100	100					Zn	30 Msr	

Phyllis example (3)

Biochemical composition (wt.% dry)		Glossary
Method of analysis	Not Determined	daf dry ash free
<i>Total Ash + Biochemical</i>	2	ar as received
Cellulose	- ND	Msr Measured
Hemicellulose	- ND	Lim detection Limit
Lignin	- ND	Cal Calculated
Lignin acid insoluble (AIL)	- ND	ND Not Determined
Lignin acid soluble (ASL)	- ND	Unk Unknown
Lipids	- ND	Avg Average
Protein	- ND	Sst van Soest
Extractives EtOH/toluene	- ND	Sgr Sugar Analysis
Extractives 95% EtOH	- ND	
Extractives hot water	- ND	
Starch	- ND	
Pectin	- ND	
<i>SUM C5</i>	0	
Arabinan	-	
Xylan	-	
<i>SUM C6</i>	0	
Mannan	-	
Galactan	-	
Glucan	-	
Rhamnan	-	
Total non-structural carbo-hydrates (TNC)	- ND	

Phyllis example (4)

Ash composition

Ash production method

-

Bulk density (kg ar/m3)

-

Ash composition (wt.% (ash))

CO₂ - P₂O₅ - Al₂O₃ - Na₂O -

SO₃ - SiO₂ - CaO - K₂O -

Cl - Fe₂O₃ - MgO - TiO₂ -

Ash composition (mg/kg (ash))

Pb - Hg -

Cd - Mn -

Cu - Cr -

Remarks:

Database Version: Tue Mar 23 15:18:10 UTC+0100 2004

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Webdesign and implementation by [ECN-TSC](#)

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Missing in Phyllis database

- ◆ What is reliable and what is junk?
- ◆ Most analyses from before standardisation
 - no established procedures
 - no CEN classification
 - only about 200 records (of 2500) analysed with standardized analyses
- ◆ Most data are “okay”
 - but we cannot guarantee it
 - errors eliminated using statistics
 - simple tool

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Selection





















Group #	Group name
300	mest
301	mengsel mest
309	overige mestsoorten
310	pluinveemest
320	rundermest
330	varkensmest
340	paardenmest

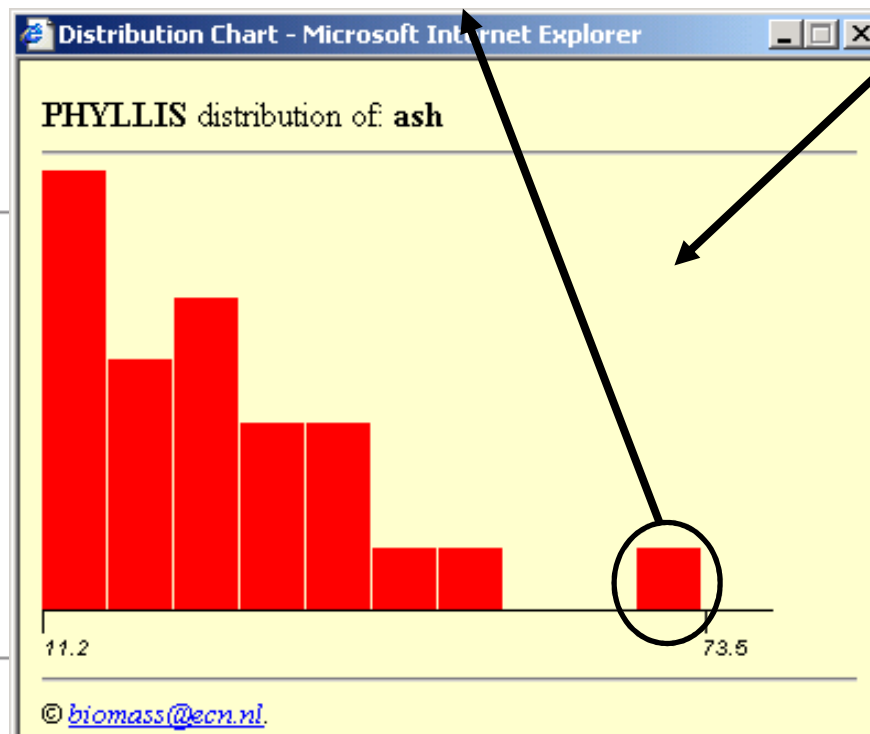
Phyllis example (2b)

Results multiple selection

Component		Mean value	Min value		Max value	Std dev in %	References
Water content	wt% wet	43.1	1.9	<input type="checkbox"/>	95.7	<input type="checkbox"/>	72 32  
Volatiles	wt% daf	80.4	47	<input type="checkbox"/>	92.1	<input type="checkbox"/>	12 16  
Ash	wt% dry	28.5	11.2	<input type="checkbox"/>	73.5	<input type="checkbox"/>	51 25  
HHV	kJ/kg daf	20251	15937	<input type="checkbox"/>	25890	<input type="checkbox"/>	12 15  
LHV calc	kJ/kg daf	18845	14742	<input type="checkbox"/>	24059	<input type="checkbox"/>	13 15  
C	wt% daf	46.4	20	<input type="checkbox"/>	56.4	<input type="checkbox"/>	18 22  
H	wt% daf	6.44	2.67	<input type="checkbox"/>	8.39	<input type="checkbox"/>	21 17  
O	wt% daf	36.1	16.7	<input type="checkbox"/>	44.8	<input type="checkbox"/>	18 16  
N	wt% daf	5.3	1.14	<input type="checkbox"/>	14	<input type="checkbox"/>	47 30  
S	wt% daf	0.76	0	<input type="checkbox"/>	1.49	<input type="checkbox"/>	58 14  

Phyllis example (2c)

	Mean value	Min value		Max value	Std dev in %	References
wt% wet	43.1	1.9	<input type="checkbox"/>	95.7	<input type="checkbox"/>	72 32  
wt% daf	80.4	47	<input type="checkbox"/>	92.1	<input type="checkbox"/>	 
wt% dry	28.5	11.2	<input type="checkbox"/>	73.5	<input checked="" type="checkbox"/>	 
kJ/kg daf	20251	15937				 
kJ/kg daf	18845	14742				 
wt% daf	46.4	20				 
wt% daf	6.44	2.67				 
wt% daf	36.1	16.7				 
wt% daf	5.3	1.14				 
wt% daf	0.76	0				 



NEW database BIODAT

- ◆ New database BIODAT
 - to improve Phyllis
 - with data from ECN, VTT, OFI, SLU, EC-BREC, etc.
 - available for free
 - until at least 2014
 - ash compositions included
- ◆ PHYLLIS stays
 - no updates
 - for strange biomass
 - until it is no longer used



BIODAT
Biomass Database

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Improvements with BIODAT

- ◆ Classification according to CEN standards
 - for solid biomass fuels and for RDF
- ◆ Reliability
 - known origin of data – **name of producer**
 - only records that have one or more data measured according to CEN standards / protocols
 - now with:
 - error margins and detection limits
 - name of lab that produced the data
- ◆ Analyses of ashes included
 - whenever possible linked to installation and fuel (difficult because of confidentiality)

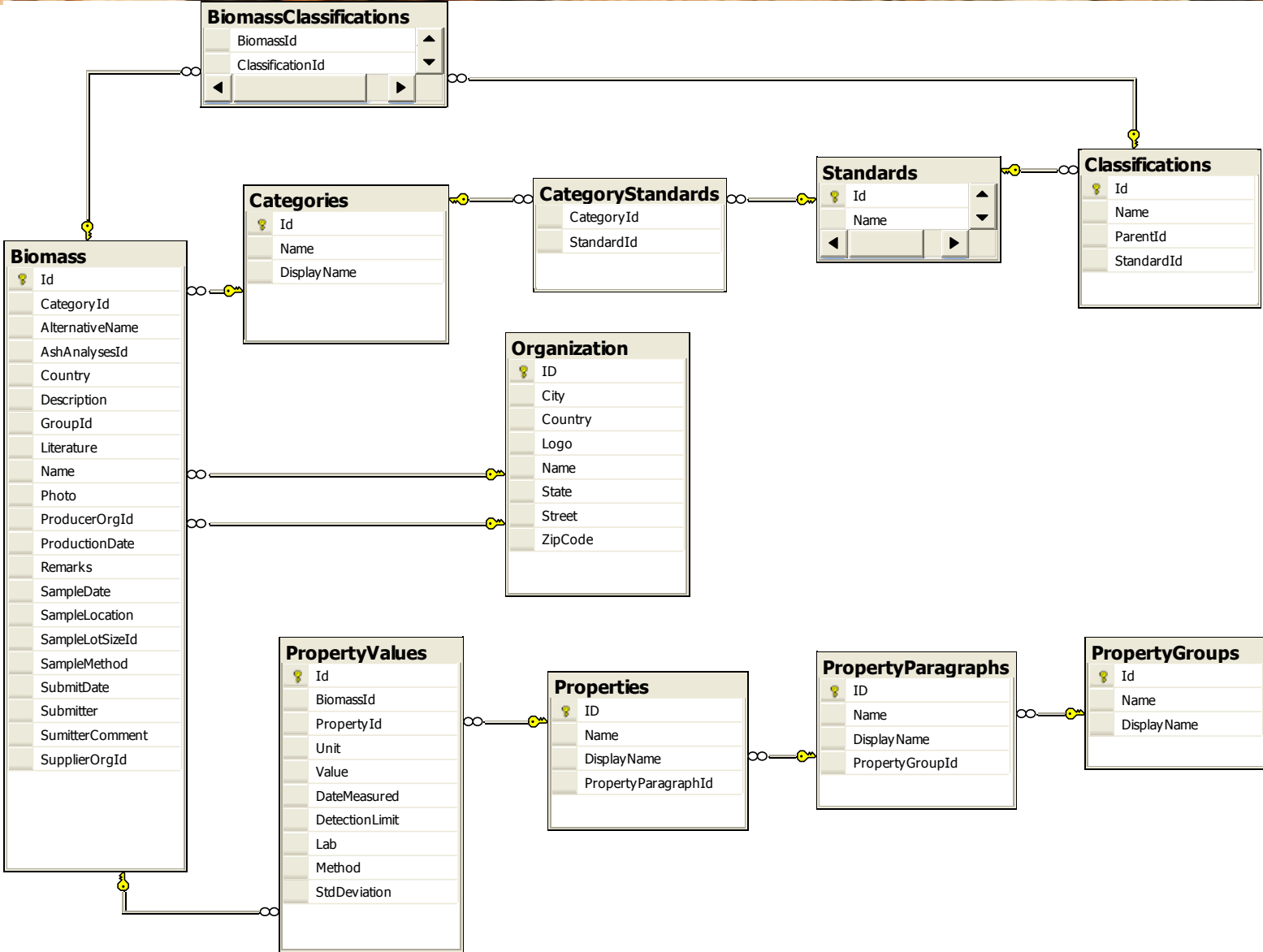
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Structure of relational database



Who are the BIODAT users?

The same as the Phyllis user: **everybody**

- ◆ Biomass producers
- ◆ Biomass traders
- ◆ Biomass buyers
- ◆ Equipment manufacturers
- ◆ Analysis Laboratories
- ◆ Legislators
- ◆ Scientists and teachers
- ◆ Students
- ◆ Interested public



BIODAT
Biomass Database

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Benefits for contributing to database



- ◆ For biomass producers and traders
 - what do you have for sale? Free advertisement!
 - what do my clients expect?
 - what should I produce to be competitive?
 - is my fuel better than the average fuel?
 - I have a new source? Is this comparable to what is normal and expected?
- ◆ For biomass users
 - what fuels are for sale?
 - how does an offer I have compare to the rest?
 - who is producing this biomass?
 - fill in missing parts of analyses?

Benefits for contributing to database

- ◆ For analysis laboratories
 - What are the ranges that I can expect?
 - What are normal detection limits/error margins?
 - Who is offering analyses as well?
- ◆ For legislators
 - E.g., a company wants a permit for a certain kind of biomass fuel.
 - How does this fuel compare to what is normal?
 - Where and how can I get reliable analyses?
- ◆ For scientists and students
 - Free and reliable information

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Included in BIODAT

◆ Included

- biomass fuels (solid, liquid, gaseous)
- fossil fuels for comparison
- biomass ashes
- link to PHYDADES Action
- links to analysis laboratories
- links to relevant biomass sites
- links to normalisation institutes

◆ Not included

- copies of standards (because of copyright)
- translations in other languages than English



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BIODAT Demonstration



Time for on-line demonstration

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Current status of BIODAT in 2008

- ◆ March
 - 40 test records
 - accessible for PHYDADES partners
- ◆ April
 - **demonstration version at Tallinn workshop**
- ◆ Sept.
 - first public version on-line
- ◆ Dec.
 - database on-line with 200+ records
 - improved public access
 - some basic tools
 - **public announcements**
- ◆ Advanced tools follow in 2009



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Contact information

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Biomass Database

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