



# 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

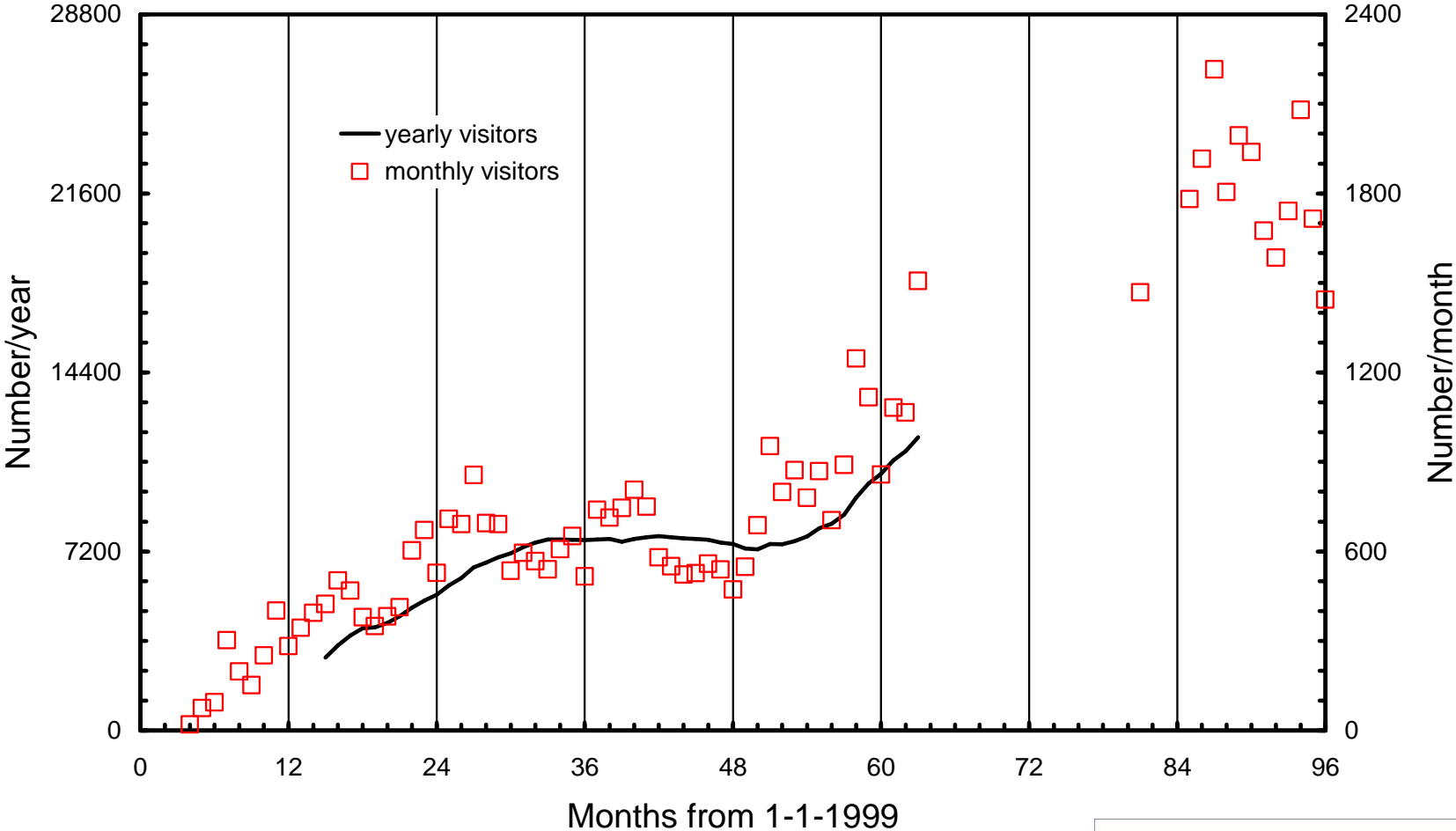
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# Phyllis visitor numbers



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 (3)

Biochemical composition (wt.% dry)	
Method of analysis	Not Determined
<i>Total Ash + Biochemical</i>	2
Cellulose	- ND
Hemicellulose	- ND
Lignin	- ND
Lignin acid insoluble (AIL)	- ND
Lignin acid soluble (ASL)	- ND
Lipids	- ND
Protein	- ND
Extractives EtOH/toluene	- ND
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

Glossary	
<b>daf</b>	dry ash free
<b>ar</b>	as received
<b>Msr</b>	Measured
<b>Lim</b>	detection Limit
<b>Cal</b>	Calculated
<b>ND</b>	Not Determined
<b>Unk</b>	Unknown
<b>Avg</b>	Average
<b>Sst</b>	van Soest
<b>Sgr</b>	Sugar Analysis



## Phyllis example (4)

### Ash composition

Ash production method

-

Bulk density (kg ar/m3)

-

Ash composition (wt.% (ash))

CO<sub>2</sub> - P<sub>2</sub>O<sub>5</sub> - Al<sub>2</sub>O<sub>3</sub> - Na<sub>2</sub>O -

SO<sub>3</sub> - SiO<sub>2</sub> - CaO - K<sub>2</sub>O -

Cl - Fe<sub>2</sub>O<sub>3</sub> - MgO - TiO<sub>2</sub> -

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	pluimveemest
320	rundermest
330	varkensmest
340	paardenmest

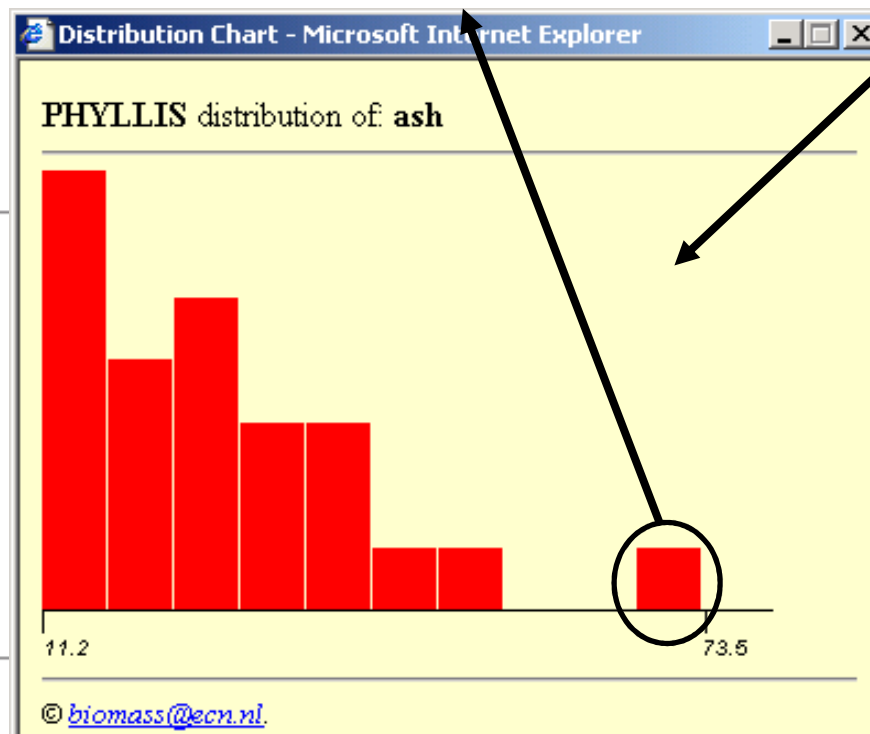
## Phyllis example (2b)

## 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)

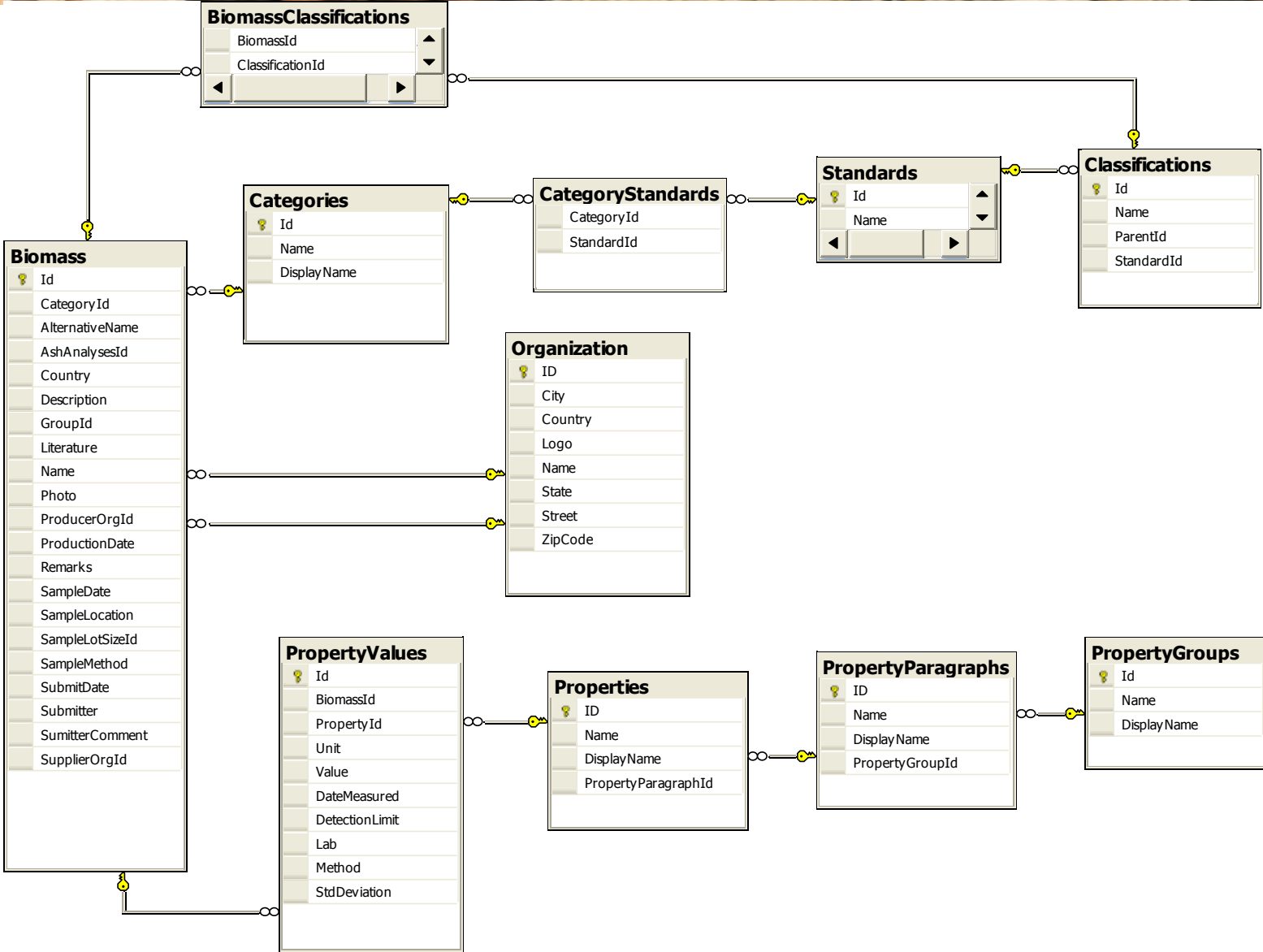
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# Structure of relational database



## 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?

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# 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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