



From innovation to operational assistance

Belgian approach
GHG and certification
scheme for biomass

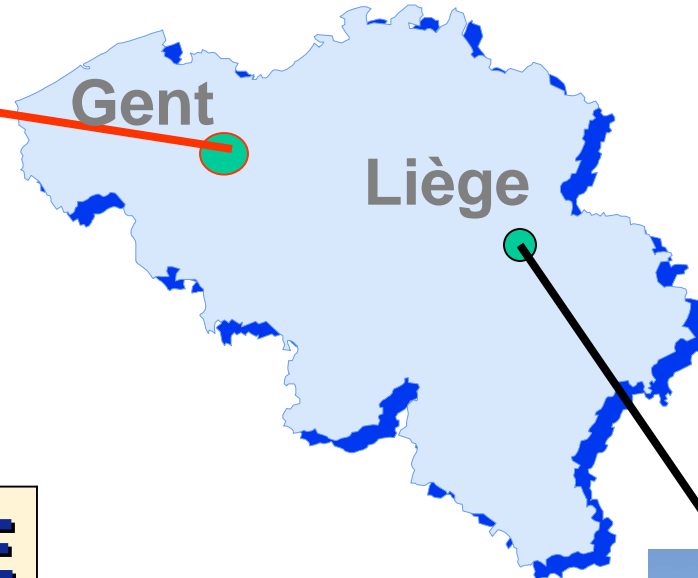
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Biomass & Waste
Competence
Centre



WOOD PELLETS
about 700 kt/y



LES AWIRS
80 MW
= 100%

RODENHUIIZE
80 MW
= 25%



Both plants commissioned in Aug 2005

Specifications

Wood pellets composition

The wood pellets are made of **saw dust** and **shavings**, being by-products of saw mills



4 – 10 mm 10 – 40 mm

Quality norms pellets		sept-04
Parameters	Units	Electrabel
Diameter	mm	4-10
Length		10-40 mm
Volatile matter		
Water content	% DM	< 10 %
Bulk (apparent) density	kg/m ³	> 600
Low heating value	GJ/ton ar	> 17
Ash content	% DM	< 1%
Bark content		< 5%
Initial melting temperature (red cond)	°C	> 1200°C
Cl	% DM	< 0,03 %
S	% DM	< 0,2%
F	ppm	< 30
Additives (past, vegetal oil)	%	FORBIDDEN
Waste wood	Qualitative	FORBIDDEN
Heavy metals		
As	mg/kg DM	< 2
Cd	mg/kg DM	< 1
Cr	mg/kg DM	< 15
Cu	mg/kg DM	< 20
Hg	mg/kg DM	< 1
Pb	mg/kg DM	< 20
Zn	mg/kg DM	
Benzo-a-pyrene	mg/kg DM	< 0,5
Pentachlorophenol	mg/kg DM	< 3
Particle size distribution		minimum
% < 3.0 mm (Durability)		100,0%
% < 2.0 mm		95,0%
% < 1.5 mm		75,0%
% < 1.0 mm		50,0%

Belgium: green certificates

Flanders : obligation 3,75% x 50TWh= 1,875 TWh, 1GC=125 €

- green certificates granted according to energy balance of supply chain and reference [STAG PP](#)

$$\# GC = net MWh_{el} - electricity use - fossil MWh_p * 55\%$$

Wallonia : obligation 7,00% x 23,5 TWh=1,65 TWh, 1GC=100€

- green certificates granted according to proven sustainability, CO₂ balance of supply chain and reference [STAG PP](#)
- All fuels have reference CO₂ emission according to LCA
 - Natural gas = 251 kgCO₂/MWhp
 - Coal = 396 kgCO₂/MWhp
 - Wood pellets = 55 kgCO₂/MWhp

$$\# GC = \left(1 - \frac{55}{251} * \frac{55\%}{34\%} = 65\% \right) * MWh_{el}$$

Specific rate of fossile GHG generation in kg CO₂eq/MWh primary energy (CWaPE-WAL)

❖NON FOSSILE	kgCO ₂ /MWhp	%green cert
❖ wind/solar/hydraulics	0	100
❖ organic biodegradable matters	0	100
❖ milling	4	98
❖ transport on max. 200 km	5	97
❖ drying	10	94
❖ corn crops	22	87
❖ wood	23	87
❖ cultivated wood (short rotation coppices)	45	74
❖ colesed oil	65	63
❖ bio-diesel	80	54
❖FOSSILE		
❖ natural gas	251	
❖ gasoil	306	
❖ light fuel oil	310	
❖ heavy fuel oil	320	
❖ coal	385	

the reference →

251

306

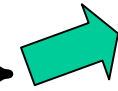
310

320

385

Sustainability principles implemented by Electrabel

- ❑ Certified or at least evidence for responsible management of the forests including afforestation plans
- ❑ Controlled impact on environment (soil, air, water)
- ❑ Enforcement of legislations



Independent reporting

**Track & trace system
Electrabel Fuel Logistics**

- ❑ Traceability
- ❑ Origin of raw material
 - primary product or residue
 - bio-fuel or waste
 - rely on international certification
 - FSC, PEFC, ...
- ❑ Energy/CO2 balance of supply chain
 - electricity use
 - fossil primary energy use
 - transport



Electrabel logo and other logos at the top of the document.

Wood Pellets Supplier Declaration
version 2006.3

This document only applies to biomass pellets originating from forestry and saw mill

Preface

Burning fossil fuels increases the CO2 concentration in the air. This is a cause of rapid heating of our planet: the so-called "greenhouse effect". The greenhouse effect results in changes in our climate which may have the most serious results, such as droughts and floods.

The government policy - also in the international domain such as the Kyoto Protocol - is focused on reducing more greenhouse gases for mitigating the global CO2 emissions, also for the generation of electricity and heating. To ensure the correct use of the certification programme with a quality which is necessary to give the evidence in a market of biomass forest fuels by biomass (solid recovered fuels) and other renewable gas and heat.

The quality system granting green certificates serves to the biomass pellets produced from (by) products (and its derivatives) to be sustainably produced. It also ensures the pollution risk of the product with respect to the environment and human health is excluded.

The proven sustainability of the biomass is realized by the following:

- the present declaration of the supplier which is checked by a certified independent body,
- a traceable chain management system at the supplier,
- forest certification proving sustainability of the biomass of the type "Forest Stewardship Council" or equivalent, or the presence of non-forestry wood, all public documents originating from the competent bodies (such as PEFC, GreenPeace, ...), making a review of the forest management and control in the considered country (see Annex II),
- chemical analysis of the material to confirm that it is compliant with the specifications established by Electrabel after shipment of the product from the energy plant (see Annex I).

Scope

In order for biomass to be accepted according to the Electrabel's standards, it must fit a number of the (by) products from agriculture and forestry and related company branches. The biomass (solid recovered fuels) shall consist of organic material which comes from well-managed forests, (public) areas of vegetation or agricultural grounds.

The following questionnaire is dedicated to the suppliers of the biomass products.

All questions mentioned as **MANDATORY** have to be answered. A number of additional questions indicated as **OPTIONAL** are provided for additional useful information which is purely informal and not absolutely necessary. If the answer is unknown, it can be left blank.

Any significant modification related to the delivered information in this document that would occur in the future must be immediately communicated to Electrabel within five working days after the date, possibly by filling a new declaration on by fax or by letter.

Certification

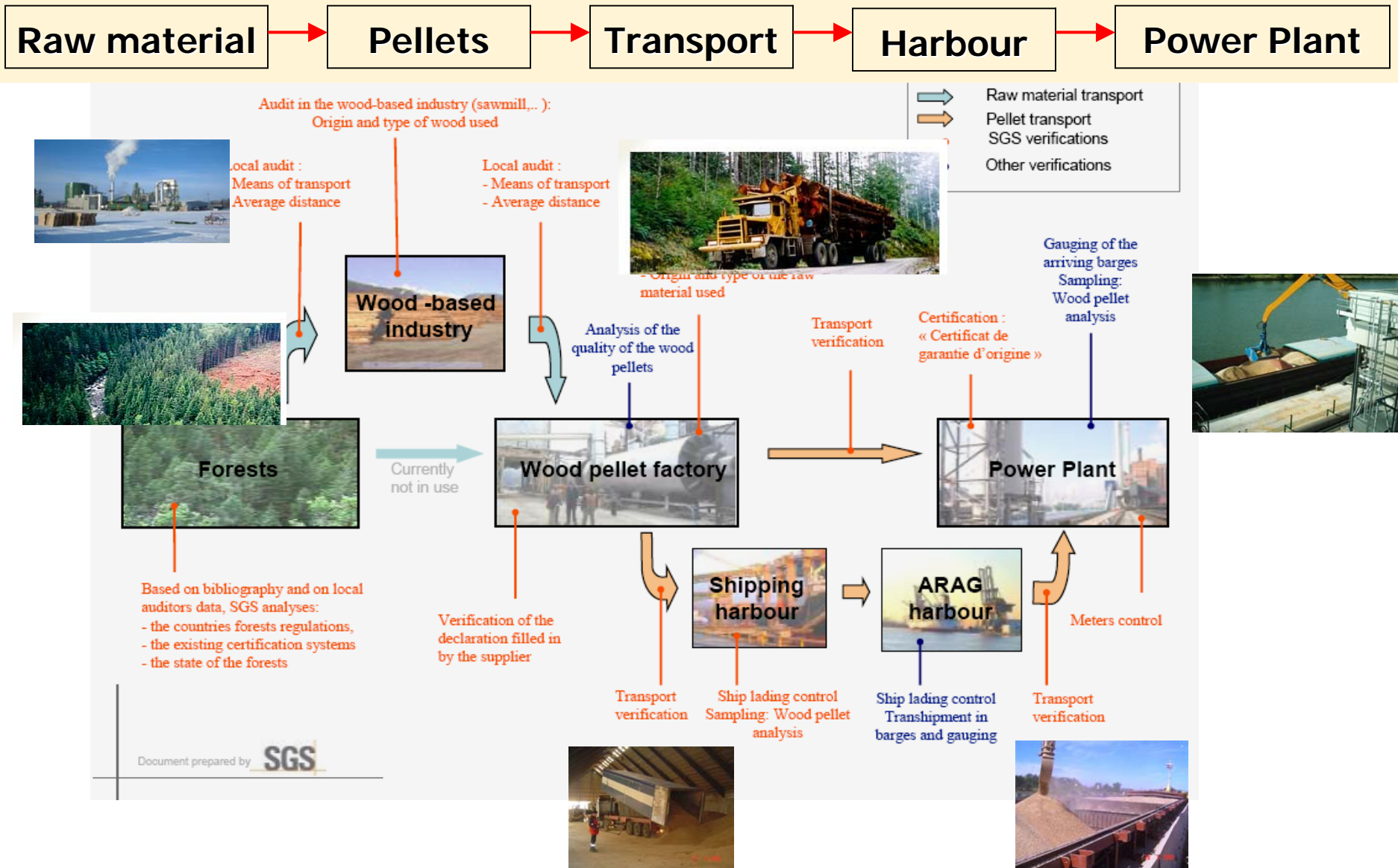
The standard consists of 3 functional parts (principles):

- Sourcing and forest management,
- Production phase, including energy balance,
- Transport and storage.

Flowchart showing the process: Source → Production (Biomass) → Pellets (Granul) → Pellets (pellets). Includes logos for BUREAU VERITAS and SGS.

Sustainability Certificate

Independent inspection of supply chain

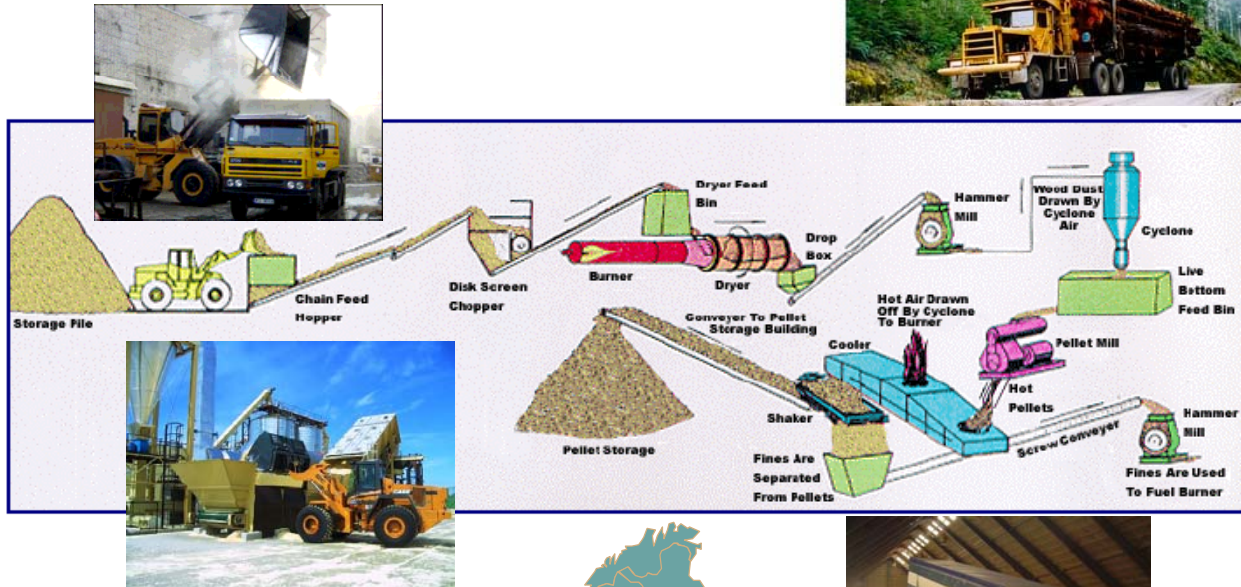


Energy use of biomass supply



Transport of raw material:

- ❖ Avg. distance
- ❖ Max. distance



Pelleting:

- ❖ Electricity/ton pellets (and origin)
- ❖ Fossile/ton pellets
- ❖ Biomass/ton pellets

Transport of pellets:

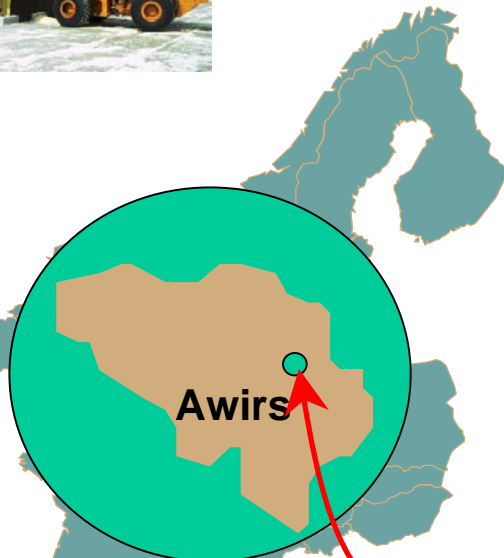
- ❖ Distance to harbour
- ❖ Truck or train

Sea transport:

- ❖ Capacity in tons
- ❖ Distance in miles
- ❖ Number of days of sea
- ❖ Consumption/sea day

Flatboat from ARAG:

- ❖ Avg. diesel use



Energy balance in MWh eqv electricity

- Electricity use always subtracted x 100% from net green power
- Fossil fuel for production and transported subtracted x 55% with respect to ref. STAG power plant with $\eta = 55\%$ efficiency

Phase	Germany NL	Baltic	Sweden	Russia	Canada
Pelletising	150	130	170	200	120
Local transport	2	5	3	17	17
Sea-River transport	6	50	60	60	125
TOTAL	158	185	233	277	262
GROSS (38%)	1800	1800	1800	1800	1800
Granted GC	91%	90%	87%	85%	85%

CO₂ balance in kgCO₂/MWh primary energy

- Green certificates are calculated on the base of avoided CO₂ with respect to ref. STAG power plant and ref. CO₂ for biomass
- Legal reference Wallonia for imported wood pellets: 55= 65% 

Phase	Germany	Baltic	Sweden	Russia	Canada
Pelletising	11	13	15	20	13
Local transport	1	1	2	2	2
Sea/River transport	4	6	5	7	15
River transport	2	2	2	2	2
TOTAL	18	22	24	31	32
Granted GC	89%	86%	84%	80%	79%

Conclusions

- **A certification scheme for imported biomass is needed and must avoid non sense:**
 - ❖ it is not expensive (< 0,5 €/ton)
 - ❖ can be fast (< 2 weeks)
- **Do not try to make the whole world perfect when certifying:**
 - ❖ implement first a scheme that works in practice and is affordable
 - ❖ then improve the certification scheme in time
- **Care at least for:**
 - ❖ energy balance or CO2 balance for the supply chain
 - ❖ overall traceability of the primary resources
 - ❖ independent report over local resource management and respect of local and international legislations



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- You get access to more than 40 years of experience
- You get rapid service with reliable solutions
- You increase the profitability of your installations
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Biomass & Waste
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The technical Competence Center
in energy processes and energy use.
From R&D to operational assistance.

