



LABORELEC

From R&D to operational assistance

Biomass sustainability certification in Belgium

Yves Ryckmans
yves.ryckmans@laborelec.com

EUBIONET-IEA
Workshop
Rotterdam
19 Feb 2007





©LABORELEC

Electrabel 

CONTENT

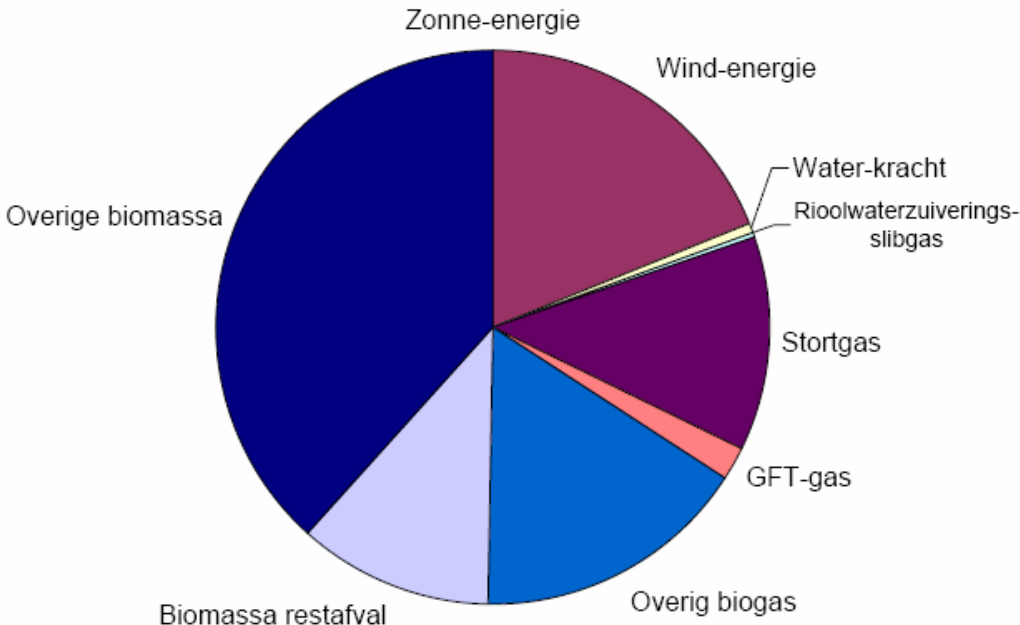
- Bio-energy activities of Electrabel
- Aspects that are included in sustainability certification in Belgium
- Experience of Laborelec/Electrabel with sustainability certification
- Costs for sustainability certification
- Suggestions for integrating sustainability certification in biomass policies

Capacity ELECTRABEL power plants in Belgium with biomass

ELECTRABEL BIOMASS POWER PLANTS					
SITE + % biomass	UNIT	Hardcoal MWe	Biomass products	CAPACITY ton/jaar	Green power MWe
RUIEN 9%	 UNIT 3	130	Olive cake	40.000	8
	UNIT 4	122	Wood dust	40.000	10
	UNIT 5	190	Wood chips	120.000	22
RODENHUIZE 30%	 UNIT 4	268	Olive cake	30.000	6
			Wood pellets	350.000	80
LANGERLO 8%	 UNIT 1	258	Sewage sludge	11.000	4
			Olive cake	50.000	10
	UNIT 2	258	Wood dust	100.000	28
AWIRS 100%	 UNIT 4	0	Wood pellets	350.000	80
TOTAL		1226	Biomass	1.091.000	248
			Essentially imported	920.000	212
			Essentially Belgian	171.000	36

2005 : 462 kt biomass (VL 300)
2006 : 786 kt biomass (VL 436)
2007 : 1050 kt biomass (VL 750)

Renewable power Belgium



Flanders 2006 :

3,75% x 50TWh= 1,875 TWh

1GC=125 €

green cert = green MWh

dry biomass = 50%

biogas = 30%

wind = 20%

Wallonia 2006 :

7% x 23,5 TWh=1,65 TWh

1GC=100€

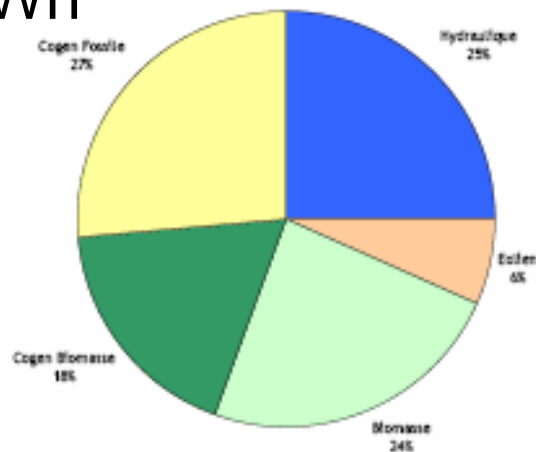
biomass = 40%

hydro = 33%

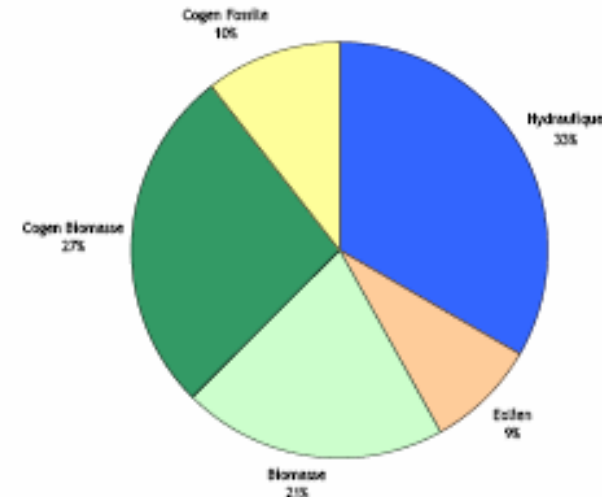
biogas = 15%

wind = 12%

1 093 GWh verts produits



Nombre de CV octroyés : 823 412



Green certificates Belgium

Flanders :

- green certificates granted according to energy balance of supply chain and reference STAG PP
- Electricity consumption subtracted
- Fossil energy for preparation x 55% subtracted
- Fossil energy for transport x 100% subtracted

Wallonia :

- green certificates granted according to 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

$$\# GC = \left(1 - \frac{55}{251} * \frac{55\%}{34\%} = 0,65\% \right) * MWhel$$

What is sustainable bio-energy?

□ FSC principles for raw material or RSPO criteria

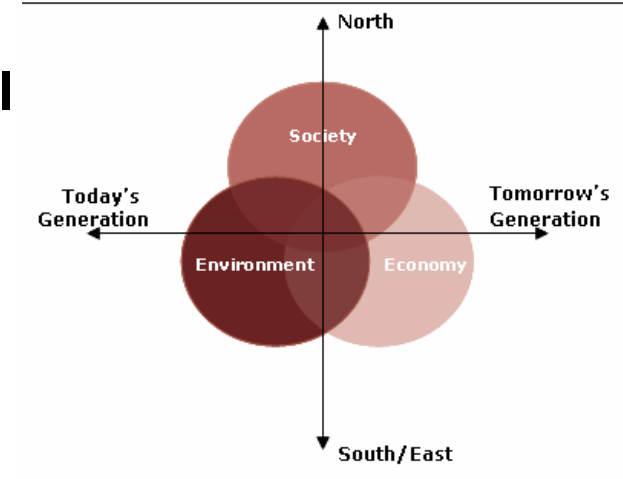
- Respect of legislation
- Respect of right en responsibility for soil
- Respect of rights of local people
- Respect of rights of workers
- Responsible management of the forests
- Controle impact on environment
- Management plan
- Evaluation
- Protection of primary forests with high value
- Afforestation

□ Origin of raw material:

- **primary product or residue**
- **bio-fuel or waste**

□ Energy/CO2 balance

- **electricity use**
- **fossil primary energy use**




- Residues originating from saw mills
 - saw dust
 - shavings
 - others
- Sanitary cuttings of forests
 - hard wood
 - soft wood
- Timber wood
- Short rotation coppices
- Others, specify


Laborelec Sustainability Certificate

Procedure : Laborelec and SGS only

1) Supplier and Transport Declarations

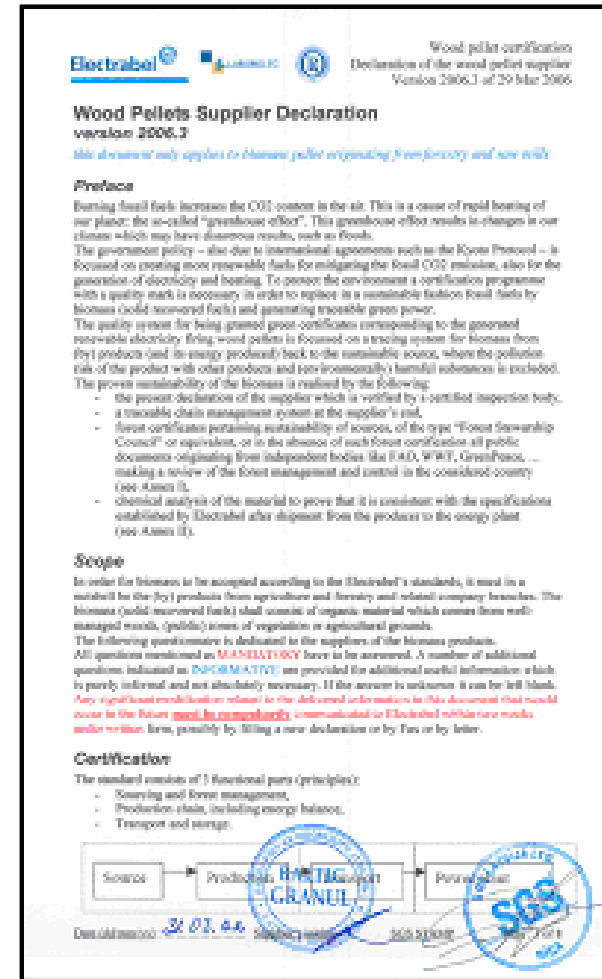
2) Check of the Declaration by 

- obligation to go on site
- list of critical points to check
- suggested methodologies for evaluation of internal energy use

3)  prepares an audit report:

- check of origin of raw materials
- check of energy consumptions
- check the technical specifications

4) **Valid for all types of bio-fuels:**
wood pellets, wood dust, olive cake,
liquid bio-fuels

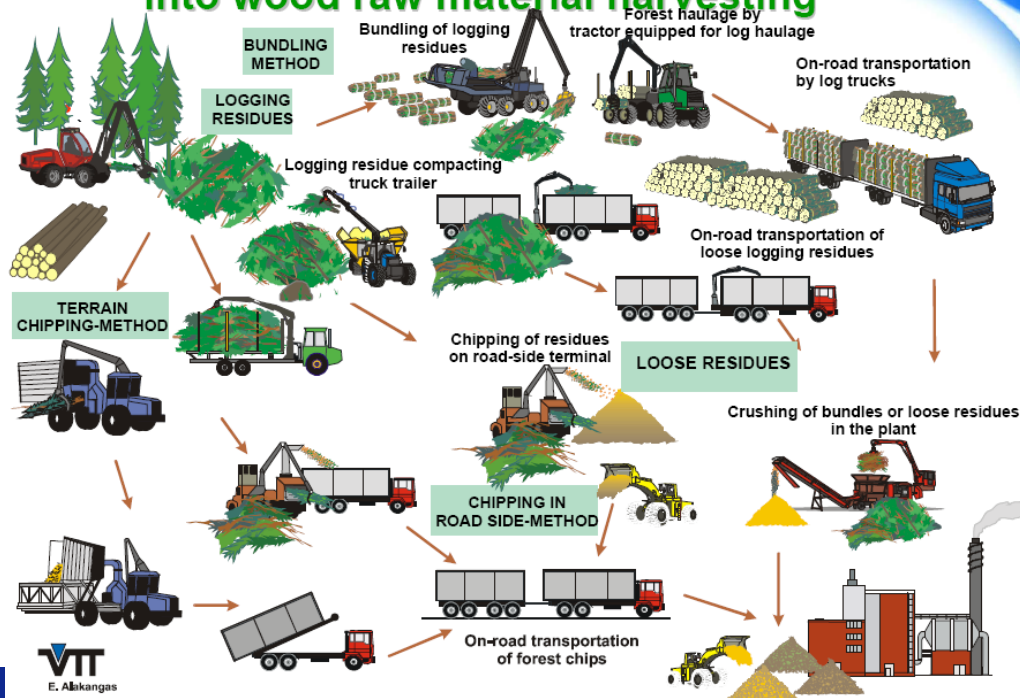


Sustainable management of biomass resources



- Residues originating from saw mills
 - saw dust
 - shavings
 - others
- Sanitary cuttings of forests
 - hard wood
 - soft wood
- Timber wood
- Short rotation coppices
- Others, specify

Forest chips harvesting methods integrated into wood raw material harvesting



Location of forests

Identification of suppliers for raw material

- Certificate type **FSC** or
- Reporting on local forest management

Traceability

Raw material

Pellets

Transport

Harbour

Power Plant

Electrabel Wood pellet supply chain : independant verifications



Audit in the wood-based industry (sawmill,...):
Origin and type of wood used

Local audit :
- Means of transport
- Average distance

Local audit :
- Means of transport
- Average distance



- > Raw material transport
- > Pellet transport
- > SGS verifications
- > Other verifications



Wood -based industry

Audit in pellet factory:
- Production process
- Energy consumption
- Origin and type of the raw material used

Analysis of the quality of the wood pellets

Transport verification

Certification :
« Certificat de garantie d'origine »

Gauging of the arriving barges
Sampling:
Wood pellet analysis



Forests

Currently not in use

Wood pellet factory

Power Plant

Based on bibliography and on local auditors data, SGS analyses:
- the countries forests regulations,
- the existing certification systems
- the state of the forests

Verification of the declaration filled in by the supplier



Shipping harbour



ARAG harbour

Meters control

Transport verification

Ship lading control
Sampling: Wood pellet analysis

Ship lading control
Transhipment in barges and gauging

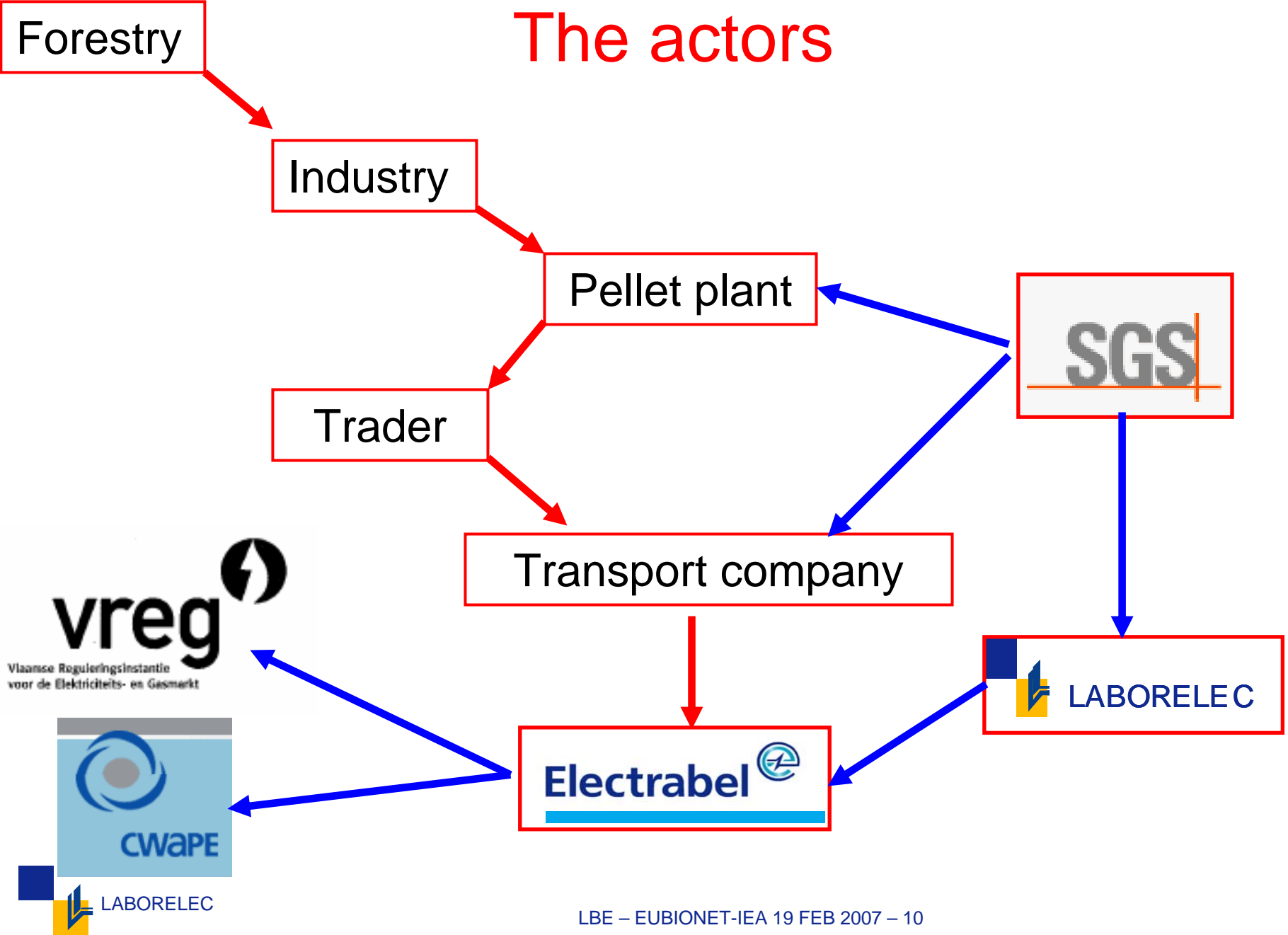
Transport verification

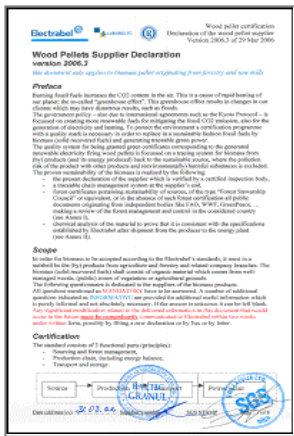


Document prepared by



The actors





✓ Technical OK
 ✓ Legal OK

Approval Sustainability certificate



Data collection



Calculation green certificates OK



Grant green certificates OK



Energy need for making wood pellets

- 1) Electricity used for making the pellets is subtracted from the green power generated:
 → according to type of residues: 50 to 300 kWh/ton
- 2) Wood pellets must be dried with biomass otherwise green support is reduced

DRYING		MOISTURE CONTENT OF RAW MATERIAL				
RAW MATERIAL	reference	LOW	NORMAL	HIGH	VERY HIGH	
moisture		20%	50%	100%	125%	ton water/ton dry wood
requested drying	10%	10%	40%	90%	115%	ton water/ton dry wood
enthalpy water vapour		0,226	0,904	2,034	2,599	GJ/tonDS
primary energy	85%	0,266	1,064	2,393	3,058	GJ/tonDS
primary energy		74	295	665	849	kWh/ton
electricity eqv	55%	41	162	366	467	kWhe/ton
share of electricity	1800	2,3%	9,0%	20,3%	26,0%	%

- 3) Transport: truck + train + sea vessels + flatboat

Energy balance in MWh eqv electricity

Legal reference Flanders = STAG PP with $\eta = 55\%$ efficiency

Phase	Germany NL	Baltic	Sweden	Russia	Canada
Pelletising	150	130	170	200	120
Local transport	4	10	5	30	30
Sea-River transport	11	90	110	110	230
TOTAL	165	230	285	340	380
GROSS (38%)	1800	1800	1800	1800	1800
Granted GC	91%	87%	84%	81%	79%

CO₂ balance in kgCO₂/MWh primary energy

Legal reference Wallonia imported wood pellets: 55 GC=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%

Net CO₂ balance AWIRS 4 power plant with imported wood pellets



- ❑ All suppliers have a CO₂ coefficient < 55 kgCO₂/MWhp
- ❑ This delivers 0,65 GC/Mwhe if no NG is used
- ❑ One ton pellets = 1,6 MWhe/ton i.e. = 1,04 GC/ton pellets
- ❑ 1 GC = 456 kg CO₂ avoided vs NGCC power plant ($\eta=55\%$)
= 895 kg CO₂ avoided vs coal power plant ($\eta=43\%$)
- ❑ 350 000 ton pellets/y = 159 600 tons CO₂ avoided vs NGCC
= 313 250 tons CO₂ avoided vs coal

CONCLUSIONS

- Certification scheme is applied by Electrabel for about 1 000 000 ton imported biomass
- Laborelec and SGS manage the certification process
- Cost < 50 €/ton of imported biomass
- Procedure is based upon LCA of supply chain and is continuously improved
- Procedure is recognised in Flanders and Wallonia even though legislation is different
- Objective: recognition in the Netherlands & Poland

Laborelec delivers services to Electrabel as well as third-parties

Five reasons for you to choose Laborelec :

- You have one-stop shopping for your energy needs
- You get access to more than 40 years of experience
- You get rapid service with reliable solutions
- You increase the profitability of your installations
- You benefit from independent and confidential advice



QUESTIONS ?

The technical Competence Center
in energy processes and energy use.
From R&D to operational assistance