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IEA BIOENERGY – TASK40
Sustainable International Bioenergy Trade Securing Supply and Demand
Country report Belgium

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The content of this report was gathered through intensive literature study and does not necessarily reflect the opinion of the IEA Bioenergy Implementing Agreement, or of Belgian policy makers (federal and regional level).

This report (2011) is an update of the previous report IEA BIOENERGY – TASK40 Sustainable International Bioenergy Trade Securing Supply and Demand Country report Belgium (2009)[1]. The report at hand discusses specifically altered policies and market changes vis-à-vis the 2009 report.

[1] See: http://www.bioenergytrade.org/downloads/belgiumcountryreport2009task40.pdf

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CHAPTER 1 GENERAL INTRODUCTION

1.1. COUNTRY CHARACTERISTICS

	Parameter	Data	Year
Population	Total area - km²	30528	2011
	Population at 1 January - Persons	10951665	2011
	Population density - Inhabitants per km²	356.0	2009
	Life expectancy at birth, by gender - Years - Males	77.3	2009
	Life expectancy at birth, by gender - Years - Females	82.8	2009
	Unemployment rate - %	8.3	2010
Economy	GDP per capita in €	32600	2010
	GDP in mio €	348109	2010
	Real GDP growth rate - volume - Percentage change on previous year	2.3	2010
	General government deficit/surplus – mio €	-14389	2010
	General government gross debt – mio €	340738	2010
	HICP - inflation rate - Annual average rate of change (%)	2.3	2010
Energy	Final energy consumption - Thousand toe	34517	2009
	Share of renewable energy in fuel consumption of transport - %	3.3	2009
	Electricity generated from renewable sources - % of gross electricity cons.	6.08	2009
	Energy intensity of the economy - Kg of oil equivalent per 1 000 EUR of GDP	205	2009
	Renewable energy primary production - 1 000 toe - Biomass and ren. wastes	1518	2009
	Renewable energy primary production - 1 000 toe - Geothermal Energy	4	2009
	Renewable energy primary production- 1 000 toe - Hydro power	28	2009
	Renewable energy primary production - 1 000 toe - Solar energy	25	2009
	Renewable energy primary production - 1 000 toe - Wind power	86	2009
	Electricity prices medium size households - Euro per kWh	0.1572	2011
	Gas prices medium size households - Euro per Gigajoule	12.6	2011

Table 1: Belgium country characteristics

1.2. DESCRIPTION OF MAIN INDUSTRIES

1.2.1. GENERAL[2]

Belgium has a very open economy, situated at the heart of a zone of intense economic activity. Exports of goods and services represented 92.1% of GDP in 2008 and imports 92.6%. This trade occurs in large measure with the European market. Half of Belgium's exports are sold to Germany, France and the Netherlands, and one fourth to other EU Member States. Imports follow more or less the same proportions. This situation reflects Belgium's role as the hub of the European Union.

The Belgian economy is currently dominated by the services sector. GDP at current prices in 2008 amounted to 344,206 billion EUR, i.e. per capita GDP 28,4% above the European Union average (27 countries) (22,5% above of EU 25). Since 2002, economic growth in Belgium is higher than the average for the euro area, although almost equally between 2005 and 2007. 2008 was marked by the beginning of the world economic crisis whose effects could have consequences, particularly on employment, until 2011-2012.

In the past, iron and steel, mechanical engineering, textiles and chemicals were the flagships of Belgian industry. Their output was exported to a large extent. Since 1960, however, in Belgium as in other parts of Europe, the profile of industry has changed significantly. Its importance in the economy has declined and its structures and spatial distribution have been transformed.

→ Metallurgy

This declining sector includes iron and steel and the processing of steel and non-ferrous metals. It is mainly made up of large firms situated at the heart of the former industrial regions of Wallonia but also in Flanders, where sites are more dispersed. In the 1970s, the crisis in the sector resulted in major restructuring plans. Following an extremely favourable economic situation in 2007 driven by demand from user sectors, which even led to a furnace being reopened, the bursting of the financial bubble and resulting crisis completely reversed the trend

→ Agri-foods

The agri-foods industry is Belgium's third most important industrial sector in terms of added value. It is also the second largest employer and is characterised by a very high number of SMEs. Exports account for half its turnover. The most important sectors are breweries, slaughterhouses and meat, and bread and pastries.

→ Textiles

For several centuries, textiles were an important and renowned activity in both the north and south of Belgium. In recent decades, this industry has contracted and is now limited mostly to the Flemish Region, which accounts for 90% of national production. The sector has suffered from the lower wage costs practiced outside of Europe. In 2008, textile production dropped by 12% and turnover decreased by 14.3% in the wake of a very adverse economic situation.

[2] Source: Belgium's fifth national communication on climate change.

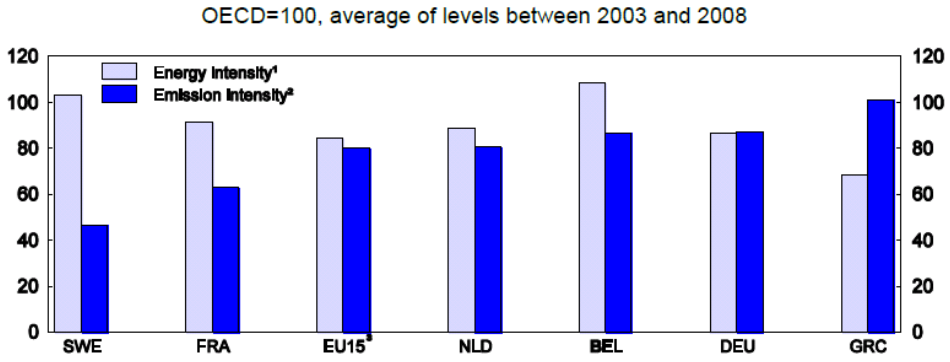
→ **Chemicals**

Chemicals represent more than one fifth of the turnover of Belgian industries and more than 20% of the country's total exports. Belgium ranks 10th globally in the chemical sector, accounting for around 4% of global trade. The Belgian chemical sector produces a wide range of products. The sector is one of the most specialised in the world and is the second biggest manufacturing sector in Belgium. Turnover exceeded 54 billion EUR in 2007 and accounted for 1/5 of the manufacturing industry's total turnover and 16% of total manufacturing industry employment. The chemicals and life sciences sector is very export orientated. Exports reached a level of 99.2 billion EUR in 2007 (including transit). In 2007, foreign trade of chemical and pharmaceutical products, plastics and rubber generated a positive balance of trade of over 18 billion EUR and contributed to the growth of the Belgian economy. Since 2005, the chemical and life sciences industry's balance of trade has exceeded Belgium's total balance of trade. Investment in the industry reached 1.96 billion EUR in 2007 accounting for over a quarter of total investment in Belgian industry. This figure encompasses both new investment and the expansion of production capacity. Almost half of this investment is carried out in base chemicals of which two-thirds in the Antwerp region.

→ **Mechanical engineering**

The automotive industry in Belgium is limited to assembly, which takes place mostly in large plants owned by multinationals. Railway construction has a strong presence in Belgium, as does the highly technological aviation sector. The entire automotive industry (assemblers, manufacturers and importers) has a considerable influence on the economy and employment. The automotive industry and related services (vehicle and fuel trades, maintenance and repairs etc) accounts for over 126,000 jobs.

Figure 1 shows that .the Belgian economy is energy and emission intensive in a European perspective.



1. Total primary energy supply expressed in tons of CO_2 equivalent divided by GDP in 2000 USD using PPPs.
2. GHG emissions (excluding land-use, land-use change and forestry) in thousand tons of CO_2 equivalent divided by GDP in 2000 USD using PPPs.
3. Unweighted average of 2003-2008 levels.

Source: OECD World Energy Balances Database and *United Framework Convention on Climate Change Database*.

Figure 1: Energy en emission intensity of Belgium in a European context (source: OECD)

1.3. CO_2 REDUCTION REQUIREMENT

1.3.1. KYOTO

The Kyoto Protocol was signed and ratified by Belgium respectively in April 1998 and in May 2002. It entered into force in February 2005. As a country included in Annex B to this Protocol, Belgium is committed to a specific greenhouse gas (GHG) emission reduction. Under the Kyoto Protocol, the European Community pledged to reduce its GHG emissions by 8% below 1990 levels by 2008-2012. This overall target has been redistributed among the then 15 Member States, including Belgium. This redistribution, commonly called the "EU burden sharing agreement" (BDS), is laid down by Decision 2002/358/EC6 and Decision 2006/944/EC7. These decisions define for each Member State its assigned amount of GHG emissions, equal to a percentage. According to this BDS, Belgium must reduce its GHG emissions by 7,5% by 2008-2012 compared to 1990 levels. This means a reduction from 146,9 million tonne (Mt) CO2-eq. to 135,9 Mt CO2-eq. by the period 2008-2012 (source: Egmont Paper 18, The Kyoto Policy of Belgium, Karel VAN HECKE & Tania ZGAJEWSKI).

A burden-sharing agreement determined separate targets for each of the regions. The Flemish region and the Walloon region have to reduce their GHG emissions by respectively 5,2% and 7,5% while the Brussels-Capital region can increase its emissions by 3,475% compared to 1990 levels during the period 2008-2012. Taking into account this burden-sharing, Belgium assigned more emission rights to its regions than available under its Kyoto target. To compensate this deficit, it was agreed that the federal government would acquire emission allowances as a result of the use of flexible mechanisms under the Kyoto Protocol equivalent to 2,46 Mt CO2-eq. per year.

Total greenhouse gas emissions (without LULUCF) in Belgium amounted to 133,2 Mt CO_2 eq in 2008 (Table 2.1.), which constitutes a decrease by 7.1 % compared to GHG emissions in 1990. Emissions in 2008 are 8.6% under base year emissions[3] (Figure 2.1). Under the Kyoto Protocol and the EU 'burden sharing' agreement, Belgium is committed to reduce its GHG emissions by 7.5%. Assuming a linear target path from 1990 to 2010, total GHG emissions in 2008 were on target path, although an increase in emissions between 2007 and 2008 took place because of increasing emissions in the transport sector (road transport) and in the commercial and residential sectors (source: Belgium's greenhouse gas inventory (1990-2008), April 2010)

The major greenhouse gas in Belgium is carbon dioxide (CO_2), which accounted for 87.9% of total GHG emissions in 2008. Methane (CH_4) accounts for 4.9 %, nitrous oxide (N_2O) for 5.7%, and fluorinated gases for 1.5% (Figure 2.2). Emissions of CO_2 decreased by 1.3% during 1990-2008, while CH_4, N_2O and fluorinated gas emissions have dropped with respectively 35.0%, 30.5% and 59.3%[4] during the same period (source: Belgium's greenhouse gas inventory (1990-2008), April 2010).

[3] Base year is 1995 for fluorinated gases, 1990 for other gases
[4] compared to 1995 emissions

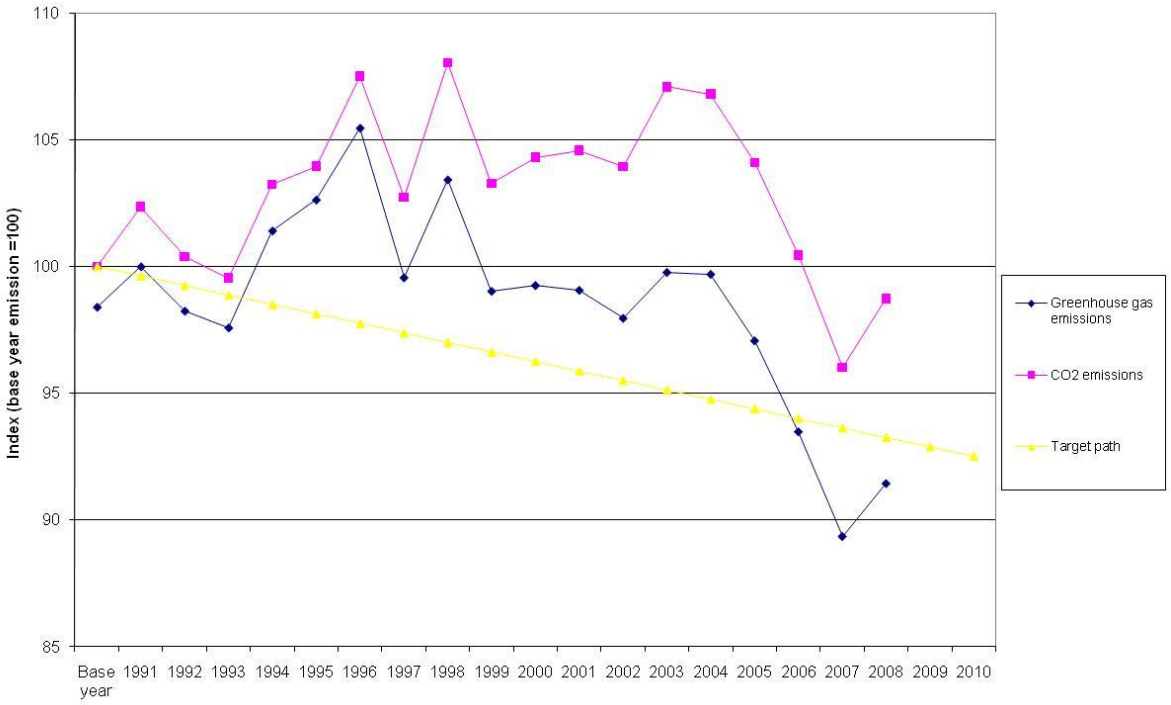


Figure 2: .Belgium GHG and CO2 emissions 1990-2008 (excl. LULUCF), compared with Kyoto target. Unit: Index point (base year emissions = 100).For the fluorinated gases, the base year is 1995 (source: Belgium's greenhouse gas inventory (1990-2008), April 2010)

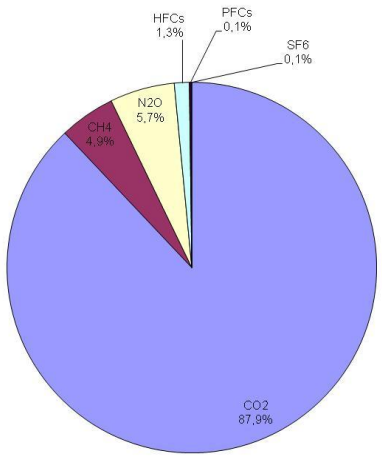


Figure 3: Share of greenhouse gases in Belgium (2008) (source: Belgium's greenhouse gas inventory (1990-2008), April 2010)

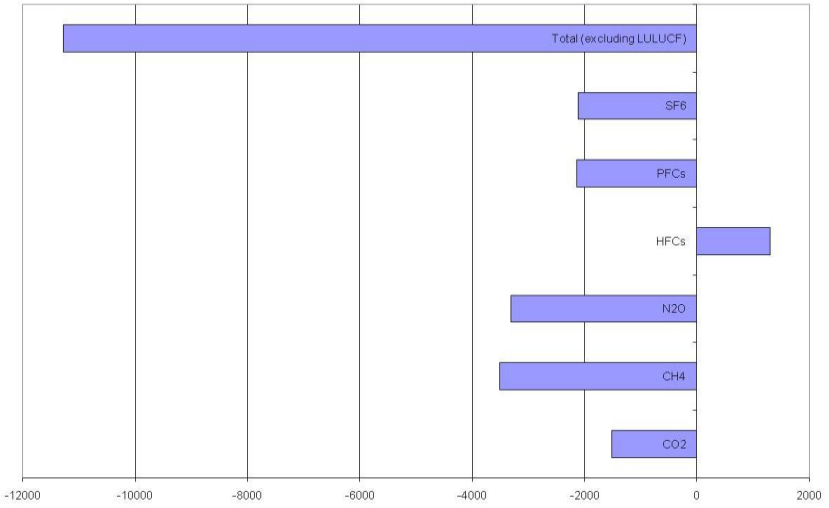


Figure 4: Changes compared to base year (1990 for CO2, CH4 and N2O; 1995 for F gases) (source: Belgium's greenhouse gas inventory (1990-2008), April 2010)

1.3.2. THE EU CLIMATE AND ENERGY PACKAGE

The so-called "Effort Sharing Decision" establishes annual binding greenhouse gas emission targets for Member States for the period 2013–2020. These targets concern the emissions from sectors not included in the EU Emissions Trading System (ETS)– such as transport, buildings, agriculture and waste. Each Member State will contribute to this effort according to its relative wealth. At the EU level, this will deliver an approximately 10% reduction of emissions from the covered sectors in 2020 compared with 2005 levels. For Belgium the 2020 GHG-reduction target for GHG-emissions outside the ETS is 15%. While sectors in the ETS are regulated at the Community level, it will be the responsibility of Member States to define and implement policies and measures to limit emissions of sectors under the Effort Sharing Decision. Together with the reduction of the ETS, it will accomplish the overall emission reduction goal of the EU Climate and Energy package (20% cut below 1990 levels by 2020).

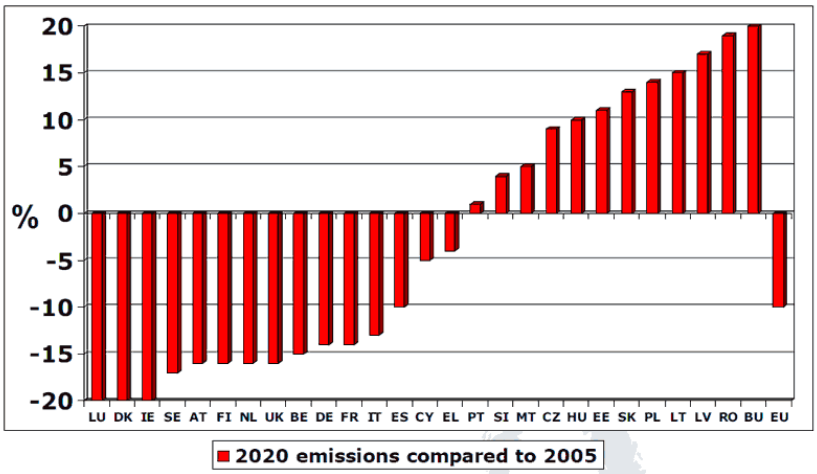


Figure 5: Effort sharing targets for 2020 compared to 2005 emission levels(source: European Commission Climate Action)

1.4. TOTAL DOMESTIC ENERGY PRODUCTION (BY SOURCE), TOTAL DOMESTIC ELECTRICITY PRODUCTION (BY SOURCE), TOTAL ENERGY CONSUMPTION (BY SECTOR, ESPECIALLY TRANSPORTATION)

Mtoe (unless otherwise specified)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production -1	12,99	12,86	12,61	11,99	11,51	11,83	12,24	13,28	12,99	13,78	13,61	13,2	13,37	13,57	13,62	13,71	13,58	14,19	14,73	15,64
Solid fuels	1,18	0,99	0,55	0,46	0,32	0,31	0,25	0,22	0,19	0,19	0,21	0,11	0,09	0,07	0,09	0,06	0,02	0		
of which hard coal	1,18	0,99	0,55	0,46	0,32	0,31	0,25	0,22	0,19	0,19	0,21	0,11	0,09	0,07	0,09	0,06	0,02	0		
Petroleum products -2																		0,01	0,88	1,09
of which Crude and NGL																				
Gases -3	0,01	0,01	0	0	0	0	0	0		0										
of which Natural Gas	0,01	0,01	0	0	0	0	0	0		0										
Nuclear	11,02	11,06	11,21	10,82	10,48	10,67	11,18	12,23	11,91	12,64	12,42	11,96	12,22	12,22	12,2	12,28	12,03	12,44	11,75	12,18
Renewables	0,48	0,49	0,48	0,34	0,33	0,44	0,42	0,43	0,49	0,5	0,53	0,6	0,58	0,71	0,76	0,87	0,93	1,11	1,45	1,66
Imports -4	60,57	63,97	65,14	62,38	66,6	66,51	71,66	71,27	74,28	72,62	75,53	75,28	74,14	77,82	80,23	80,53	78,75	77,49	82,04	73,61
Solid fuels	10,71	10,34	9,97	8,47	9,38	10,34	9,09	8,87	9,07	7,83	8,27	9,08	6,76	6,4	6,68	5,86	5,37	5,05	5,47	3,36
of which hard coal	10,06	9,74	9,48	7,97	8,44	9,43	8,59	8,46	8,32	7,16	7,46	8,34	6,52	6,21	6,44	5,7	5,24	4,82	4,82	3,19
Petroleum products -2	41,23	44,54	45,52	43,73	46,58	44,86	49,76	50,17	52,02	50,43	52,88	51,61	52,16	55,75	57,54	58,34	56,3	55,73	59,64	53,88
of which Crude and NGL	25,26	28,71	29,09	27,58	28,54	26,48	31,71	32,86	34,77	32,24	34,09	31,89	33,05	36,01	34,16	31,84	31,46	32,83	33,76	31,17
Gases -3	8,22	8,66	9,14	9,47	9,78	10,42	11,88	11,28	12,43	13,48	13,28	13,13	13,65	14,24	14,56	14,82	15,03	14,9	14,9	14,96
of which Natural Gas	8,22	8,66	9,14	9,47	9,78	10,42	11,88	11,28	12,43	13,48	13,28	13,13	13,65	14,24	14,56	14,82	15,03	14,9	14,9	14,96
Renewables	0,07	0,08	0,09	0,1	0,09	0,08	0,11	0,1	0,1	0,14	0,16	0,21	0,28	0,43	0,45	0,55	0,6			
Electricity	0,41	0,43	0,5	0,65	0,78	0,81	0,83	0,86	0,67	0,78	1	1,36	1,43	1,26	1,25	1,23	1,62	1,36	1,48	0,82
Exports -4	20,82	21,58	21,73	20,66	20,94	19,56	22,12	22,36	22,62	23,86	25,12	23,81	25,14	24,9	26,87	27,17	25,62	26,46	26,82	25,22
Solid fuels	1,1	1,15	0,97	0,98	1,1	0,92	1,01	1,2	0,97	0,9	1,11	1,33	1,37	0,66	0,86	0,77	0,79	0,98	0,82	0,89
of which hard coal	0,48	0,68	0,45	0,43	0,63	0,53	0,73	0,94	0,83	0,74	0,9	1,19	1,26	0,58	0,8	0,74	0,65	0,9	0,74	0,6
Petroleum products -2	18,99	19,84	20,26	19,23	19,4	18,19	20,64	20,59	21,1	22,26	23,38	21,9	22,99	23,53	25,42	25,71	24,09	24,66	25,26	23,36

of which Crude and NGL																				
Gases -3																				
of which Natural Gas																				
Renewables	0,04	0,17	0,01																	
Electricity	0,73	0,59	0,49	0,46	0,44	0,46	0,47	0,58	0,55	0,71	0,63	0,58	0,78	0,71	0,58	0,69	0,75	0,78	0,56	0,97
Net imports -5	39,75	42,39	43,41	41,72	45,66	46,95	49,54	48,9	51,66	48,76	50,41	51,48	49	52,91	53,36	53,36	53,12	51,04	55,22	48,38
Solid fuels	9,61	9,19	9	7,49	8,28	9,42	8,08	7,67	8,1	6,93	7,16	7,75	5,39	5,74	5,82	5,09	4,58	4,08	4,65	2,47
of which hard coal	9,58	9,06	9,02	7,55	7,81	8,9	7,86	7,52	7,5	6,42	6,56	7,14	5,26	5,63	5,64	4,95	4,59	3,93	4,08	2,58
Petroleum products -2	22,24	24,7	25,26	24,5	27,18	26,67	29,12	29,58	30,92	28,17	29,49	29,71	29,17	32,22	32,11	32,63	32,21	31,07	34,39	30,52
of which Crude and NGL	25,26	28,71	29,09	27,58	28,54	26,48	31,71	32,86	34,77	32,24	34,09	31,89	33,05	36,01	34,16	31,84	31,46	32,83	33,76	31,17
Gases -3	8,22	8,66	9,14	9,47	9,78	10,42	11,88	11,28	12,43	13,48	13,28	13,13	13,65	14,24	14,56	14,82	15,03	14,9	14,9	14,96
of which Natural Gas	8,22	8,66	9,14	9,47	9,78	10,42	11,88	11,28	12,43	13,48	13,28	13,13	13,65	14,24	14,56	14,82	15,03	14,9	14,9	14,96
Renewables	0,07	0,08	0,09	0,1	0,09	0,08	0,11	0,1	0,1	0,14	0,16	0,21	0,28	0,43	0,41	0,37	0,59			
Electricity	-0,32	-0,16	0,01	0,19	0,34	0,35	0,36	0,28	0,12	0,07	0,37	0,78	0,65	0,55	0,67	0,54	0,87	0,58	0,91	-0,16
Gross Inland Consumption	48,79	50,87	51,43	50,11	53,13	54,14	57,07	57,34	58,51	58,96	59,21	58,65	56,39	59,6	59,16	58,98	58,35	57	59,62	58,23
Solid fuels	10,6	10,06	9,21	8,49	8,97	8,65	8,26	7,98	8,05	7,06	7,86	7,25	6,27	5,89	5,73	5,02	4,78	4,24	4,36	3,02
of which hard coal	10,61	9,89	9,33	8,47	8,49	8,21	8,01	7,68	7,51	6,6	7,26	6,69	5,98	5,78	5,57	4,91	4,74	4,3	3,86	3,09
Petroleum products -2	18,54	20,37	21,1	20,42	22,87	22,92	24,54	24,66	24,99	24,8	24,11	24,24	22,68	25,09	24,46	24,75	23,7	22,67	25,29	25,12
of which Crude and NGL	25,36	28,72	28,92	27,79	28,37	26,53	31,74	32,8	34,76	32,25	34,02	31,98	33,12	36	34,17	32	31,36	32,83	33,66	31,27
Gases -3	8,17	8,73	9,05	9,41	9,67	10,61	11,82	11,26	12,47	13,33	13,37	13,18	13,38	14,4	14,57	14,73	15	14,93	14,84	15,11
of which Natural Gas	8,17	8,73	9,05	9,41	9,67	10,61	11,82	11,26	12,47	13,33	13,37	13,18	13,38	14,4	14,57	14,73	15	14,93	14,84	15,11
Nuclear	11,02	11,06	11,21	10,82	10,48	10,67	11,18	12,23	11,91	12,64	12,42	11,96	12,22	12,22	12,2	12,28	12,03	12,44	11,75	12,18
Renewables	0,48	0,49	0,48	0,41	0,41	0,53	0,53	0,52	0,57	0,61	0,64	0,7	0,71	0,87	0,97	1,16	1,36	1,52	1,82	2,24
Municipal wastes (non-res)	0,17	0,17	0,18	0,19	0,18	0,19	0,19	0,2	0,19	0,18	0,18	0,21	0,19	0,28	0,28	0,3	0,4	0,23	0,36	0,39
Electricity	-0,32	-0,16	0,01	0,19	0,34	0,35	0,36	0,28	0,12	0,07	0,37	0,78	0,65	0,55	0,67	0,54	0,87	0,58	0,91	-0,16
Transformation losses	12,02	11,98	11,93	11,67	11,6	11,84	12,18	12,5	12,6	12,71	12,25	11,69	11,97	12,6	12,29	12,58	12,95	13,38	11,85	13,52
Energy branch consumption	2,36	2,47	2,38	2,27	2,41	2,27	2,53	2,49	2,41	2,28	2,33	2,36	2,41	2,48	2,31	2,12	2,37	2,5	2,57	2,35

Solid fuels	0,05	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01								
Petroleum products -2	1,36	1,55	1,45	1,39	1,56	1,41	1,67	1,68	1,62	1,55	1,56	1,57	1,6	1,66	1,39	1,18	1,26	1,29	1,56	1,51
Gases -3	0,52	0,44	0,45	0,42	0,39	0,38	0,37	0,32	0,3	0,23	0,27	0,28	0,27	0,26	0,28	0,3	0,26	0,38	0,21	0,11
Derived heat	0,21	0,21	0,19	0,16																
Renewables																				
Electricity	0,43	0,46	0,47	0,46	0,46	0,47	0,48	0,48	0,49	0,48	0,5	0,49	0,54	0,56	0,64	0,65	0,65	0,63	0,61	0,56
Gross Electricity Generation -Twh	70,92	71,94	72,23	70,83	72,18	74,41	76,1	78,83	83,18	84,51	84,01	79,82	82,07	84,63	85,64	87,03	85,62	88,82	84,93	91,23
Solid fuels	17,1	16,51	16,01	16,3	16,98	16,52	15,55	13,75	14,19	9,94	12,92	9,94	10,03	9,64	9,15	8,2	6,85	6,47	5,55	5,17
Petroleum products -2	1,31	1,83	1,54	1,48	1,62	1,31	1,29	1,42	2,58	1,04	0,8	1,66	0,97	1,01	1,68	1,74	1,38	0,81	0,41	0,28
Gases -3	8,17	8,94	9,18	9,23	10,88	12,94	13,67	14,07	17,74	21,82	19,09	18,61	20,5	23,58	23,81	25,14	25,39	27,24	26,33	30,29
of which Natural Gas	5,41	6,22	6,67	6,81	8,28	10,18	11,01	11,54	15,04	19,23	15,98	15,78	17,87	21,61	21,48	22,85	23,02	25,39	24,65	29,31
Nuclear	42,72	42,86	43,46	41,93	40,62	41,36	43,34	47,41	46,17	49,02	48,16	46,35	47,36	47,38	47,31	47,6	46,65	48,23	45,57	47,22
Renewables -4	0,56	0,54	0,62	0,51	0,6	0,67	0,56	0,59	0,76	0,85	1,04	1,08	1,14	1,19	1,5	2,11	2,95	3,49	4,42	5,44
Gross Heat Generation - PJ (GCV)	9,74	10,37	10,2	9,73	9,65	9,98	11,36	12,71	15,14	18,02	23,17	23,66	22,85	23,07	23,42	22,37	34,35	29,21	31,3	31,09
Solid fuels	1,51	1,66	1,57	0,58	1,53	1,81	1,7	1,1	0,7	0,03										
Petroleum products -2	2,76	3,78	5,52	4,44	5,3	3,23	1,26	2,78	0,38	0,17	0,09	0,15	0,06	0,07	0,01					
Gases -3	5,06	4,44	2,76	4,4	2,56	4,7	7,94	8,39	13,63	17,38	22,2	21,83	21,53	21,11	21,02	15,79	28,83	26,25	27,56	27,61
Nuclear																				
Renewables	0,16	0,19	0,11	0,12	0,13	0,12	0,23	0,22	0,21	0,23	0,44	0,71	0,69	0,86	0,97	1,49	1,15	0,23	0,7	1,62
Distribution losses	0,32	0,32	0,32	0,33	0,32	0,33	0,35	0,35	0,37	0,4	0,39	0,42	0,4	0,36	0,39	0,39	0,38	0,37	0,39	0,35
Available for final consumption	34,22	36,26	36,99	36,01	38,99	39,85	42,22	42,22	43,35	43,8	44,49	44,59	42,34	44,73	44,67	44,17	42,89	41,06	45,12	42,32
Final non energy consumption	3,13	3,37	3,58	3,51	5,57	5,82	5,97	6,03	5,95	6,36	6,74	6,72	6,56	6,58	6,95	7,52	7,1	7,19	8,14	7,26
Final Energy Consumption	31,43	33,11	33,32	32,74	33,73	34,35	36,56	36,24	37,13	37	37,36	37,9	36,13	38,28	37,72	36,59	36,12	34,64	37,5	34,52
by fuel/product																				
Solid fuels	4,24	4,27	3,68	3,28	3,7	3,33	3,26	3,33	3,25	3,19	3,34	3,46	2,36	2,29	2,22	1,96	1,9	1,72	1,98	1,04
Petroleum products -2	14,36	15,52	16,2	15,73	15,9	15,96	17,24	17,32	17,52	16,97	16,31	16,56	15,65	17,61	16,76	16,52	15,36	14,45	16,76	15,54
Gases -3	7,25	7,49	7,44	7,74	7,85	8,52	9,36	8,72	9,2	9,51	10,01	10,07	10,3	10,31	10,58	10,01	10,45	10,09	10,2	9,5
Renewables	0,33	0,33	0,32	0,25	0,25	0,35	0,36	0,34	0,38	0,41	0,41	0,46	0,46	0,55	0,57	0,64	0,7	0,75	0,87	1,11

Electricity	4,99	5,2	5,38	5,44	5,71	5,89	6,01	6,18	6,36	6,41	6,67	6,72	6,75	6,86	6,93	6,9	7,1	7,13	7,11	6,64
Derived heat	0,22	0,23	0,23	0,22	0,22	0,22	0,25	0,27	0,32	0,39	0,49	0,48	0,47	0,51	0,52	0,43	0,47	0,41	0,47	0,57
by sector																				
Industry	12,06	12,31	11,85	11,18	12,01	11,96	11,84	12,34	12,85	13,26	14,06	14,09	12,71	12,93	12,56	11,71	12,41	12,2	11,93	9,61
Transport	7,73	7,87	8,33	8,38	8,51	8,52	8,93	9,22	9,61	9,63	9,66	9,54	9,65	10,18	10,25	9,93	9,62	9,5	11,23	11,13
Households	8,28	9,14	9,14	9,07	8,92	9,3	10,6	9,86	9,89	9,49	9,47	9,87	9,33	9,87	10,02	9,92	8,91	8,11	8,78	8,3
Services	2,88	3,25	3,3	3,32	3,31	3,46	3,96	3,75	3,79	3,7	3,44	3,64	3,79	4,07	4,06	4,15	4,31	3,91	4,72	4,6
Agriculture	0,49	0,54	0,71	0,78	0,98	1,1	1,23	1,07	0,96	0,88	0,69	0,72	0,61	0,83	0,64	0,84	0,86	0,91	0,83	0,81
Fishing																				0,00

Notes: (1) includes recovered products (2) crude oil and other petroleum products (3) natural and derived gases (4) Intra/Extra-EU flow (5) Intra/Extra-EU net imports for MS, Extra-EU net imports for EU 27 (5) not including pumping

Table 2: Energy statistics for Belgium (source: Eurostat - June 2011 - COMEXT-Sirene energy data, 2011 revision of the period 1990-2009 and Targets data June 2010; EEA - June 2011 - CO2 emissions data; ECFIN - June 2011 - AMECO macro-economic data)

1.5. TOTAL RENEWABLE ENERGY PRODUCTION

Solid biomass represent 3.3 % of the power production in Belgium. In power production (power plants and CHP plants) different biomass feedstocks are used; wood pellets, olive by-products, liquid biofuels, biogas and substitution fuels. Imported wood pellets represent the major part of the supply. Wood is historically the first renewable energy source used to produce power in Belgium. It is currently the most important source but wind and solar energies are increasing (Figure 6)[5].

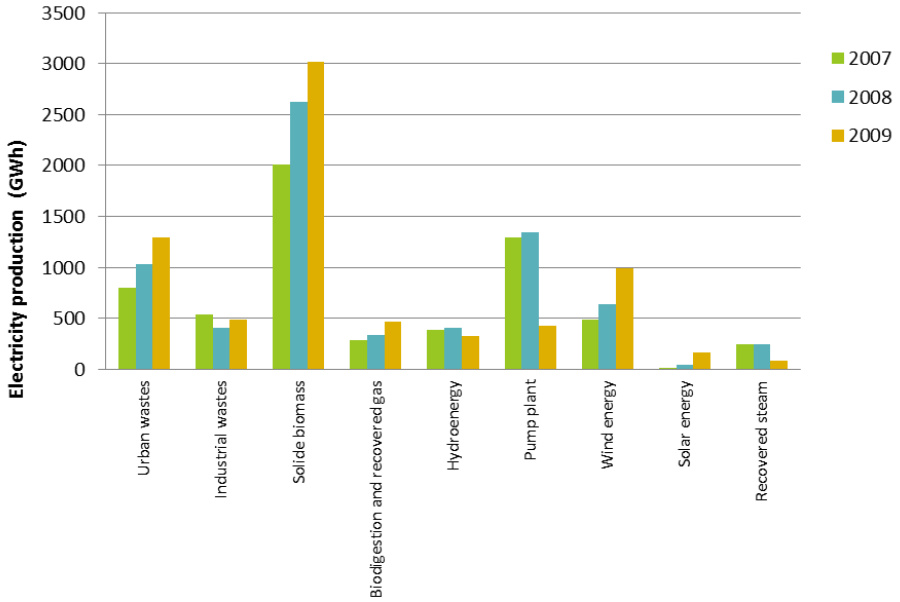


Figure 6: Renewable energy sources in electricity production (Source : Pellcert, Valbiom ; SPF Economie, PME, classes sociales et énergie).

The residential sector uses more and more renewable fuels but its use is still anecdotic in comparison with gas and oil (Figure 7). In Wallonia, heat production represents 80 % of the total energy consumption of the residential sector. To produce heat in residential houses people use electricity, heating fuels, natural gas, heat pumps, coal, woodlogs, wood chips or wood pellets. The fuel used to produce heat is linked to the level of urbanisation. In cities this is mostly heat fuel and natural gas, while in the countryside mostly heating fuels and wood fuels are being used. Wood fuels are more often used as a support to fossil fuel consumption rather than serving as the main heating fuel. Heating with wood logs is quite a tradition in Wallonia, as it is a woody region. Wallonia has a grant system in force to support investments in a full automatic biomass boiler. Contrary Flanders and Brussels regions don not support wood energy at the residential scale.

[5] Source: Pellcert country profile Belgium (http://www.enplus-pellets.eu/wp-content/uploads/2012/01/BE_pellet_report_Jan2012.pdf)

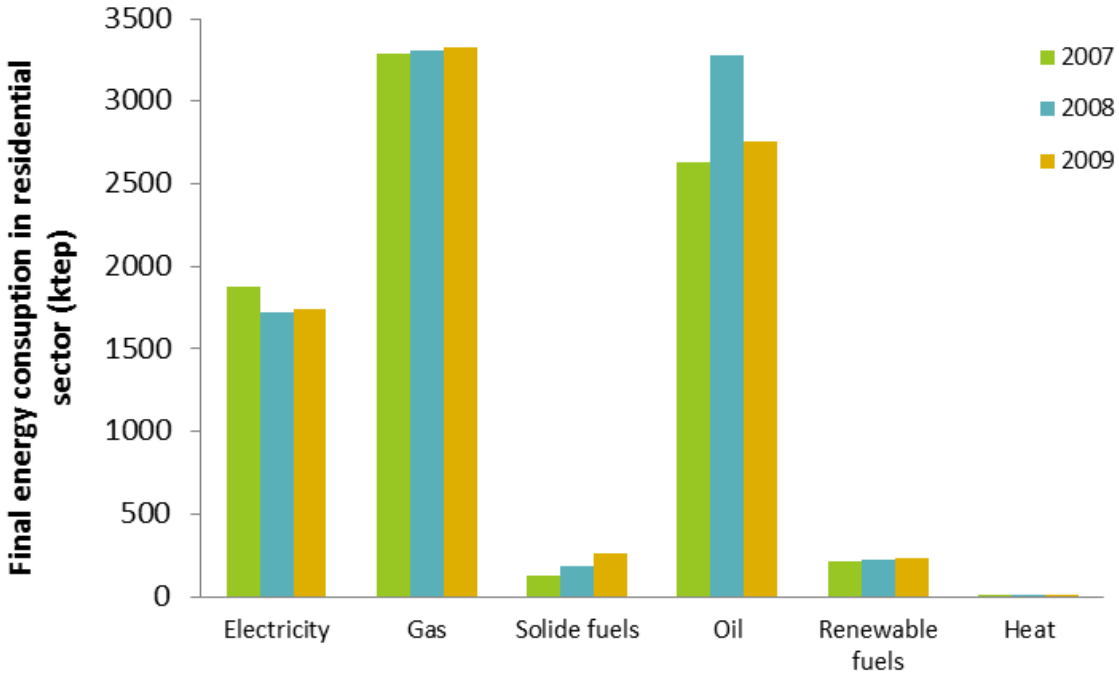


Figure 7: Final energy consumption in residential sector by energy source (Source : Pellcert, Valbiom; SPF Economie, PME, classes sociales et énergie).

CHAPTER 2 POLICY

2.1. GENERAL TARGETS FOR RENEWABLE ENERGY[6]

Share of energy from renewable sources in gross final consumption of energy in 2005	2,20%
Target of energy from renewable sources in gross final consumption of energy in 2020	13%
Expected total adjusted energy consumption in 2020 (ktoe)	41,301
Expected amount of energy from renewable sources corresponding to the 2020 target (ktoe)	5,369

2.2. SPECIFIC TARGETS FOR RENEWABLE ENERGY (HEATING & COOLING, ELECTRICITY & TRANSPORT)[7]

%	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES Heating & Cooling	2.3%	3.5%	4.2%	4.7%	5.1%	5.9%	6.6%	7.5%	8.5%	9.6%	10.7%	11.9%
RES Electricity	2.7%	4.8%	6.2%	7.8%	9.5%	11.3%	12.7%	14.8%	16.5%	18.2%	19.6%	20.9%
RES Transport	0.0%	3.8%	3.8%	4.8%	4.8%	5.7%	5.8%	6.3%	6.5%	7.9%	9.0%	10.14%
Overall RES share	2.2%	3.8%	4.4%	5.2%	5.8%	6.8%	7.5%	8.6%	9.5%	10.7%	11.9%	13.0%

	2011-2012	2013-2014	2015-2016	2017-2018	2020
RES minimum trajectory (%)	4.36	5.44	7.06	9.22	13
RES minimum trajectory (ktoe)	1,773	2,232	2,901	3,797	5,370

[6] Source: NREAP Belgium, November 2010
[7] Source: NREAP Belgium, November 2010

2.3. TOTAL CONTRIBUTION EXPECTED OF EACH RENEWABLE ENERGY TECHNOLOGY (INCL BIOMASS)[8]

2.3.1. ELECTRICITY

	2005		2010		2011		2012		2013		2014	
	MW	**GWh**	**MW**	**GWh**	**MW**	**GWh**	**MW**	**GWh**	**MW**	**GWh**	**MW**	**GWh**
Hydro	108.15	350.4	112.3	362.2	114.5	368.3	116.1	372.8	117.7	377.3	125.7	384.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solar	2.05	1.04	350.0	304.0	428.1	369.9	485.1	417.9	542.1	466.0	627.6	538.1
photovoltaic	2.05	1.04	350.0	304.0	428.1	369.9	485.1	417.9	542.1	466.0	627.6	538.1
concentrated solar power	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	190.2	319.6	733.2	990.5	1,016.2	1,745.5	1,222.7	2,866.2	1,429.7	4,171.9	1,738.9	5,281.5
Biomass	340.0	617.6	3,006.9	762.3	3,640.5	867.9	4,102.9	973.5	4,565.3	1,131.8	5,258.8	
solid	270.0	1,521.0	498.4	2,579.9	617.4	3,131.7	704.3	3,534.4	791.1	3,937.1	921.4	4,541.1
biogas	57.0	235.0	105.6	393.3	131.0	475.8	149.5	536.0	168.0	596.2	195.8	686.5
bioliquids	13.0	35.0	13.6	33.7	13.9	33.0	14.1	32.5	14.4	31.9	14.7	31.2
TOTAL	300.4	671.04	1,813.2	4,663.6	2,321.1	6,124.2	2,691.7	7,759.8	3,062.4	9,580.5	3,618.4	11,462.4

Table 3: Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity 2010-2014

[8] Source: NREAP Belgium, November 2010

	2015		2016		2017		2018		2019		2020	
	MW	**GWh**	**MW**	**GWh**	**MW**	**GWh**	**MW**	**GWh**	**MW**	**GWh**	**MW**	**GWh**
Hydro	122.5	390.7	125.7	399.7	128.9	408.6	132.6	419.1	136.3	429.5	140.0	440.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	3.5	22.3	3.5	25.7	3.5	29.1
Solar	713.1	610.2	827.1	706.4	941.0	802.5	1,074.0	914.7	1,207.0	1,026.8	1,340.0	1,139.0
photovoltaic	713.1	610.2	827.1	706.4	941.0	802.5	1,074.0	914.7	1,207.0	1,026.8	1,340.0	1,139.0
conc. solar power	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	2,048.6	6,084.1	2,461.6	7,402.5	2,874.6	8,505.0	3,356.4	9,286.3	3,838.2	9,975.7	4,320.0	10,474.0
Biomass	1,290.2	5,952.4	1,501.3	6,877.1	1,712.5	7,801.9	1,958.8	8,880.8	2,205.2	9,959.6	2,451.5	11,'038.5
solid	1,051.7	5,145.1	1,225.4	5,950.5	1,399.1	6,755.8	1,601.7	7,695.4	1,804.4	8,635.0	2,007.0	9,574.6
biogas	223.5	776.8	260.5	897.3	297.5	1,017.7	340.7	1,158.1	383.8	1,298.6	427.0	1,439.1
bioliquids	15.0	30.4	15.5	29.4	15.9	28.4	16.5	27.2	17.0	26.0	17.5	24.8
TOTAL	4,174.3	13,037.4	4,915.6	15,385.7	5,656.9	17,518.0	6,525.3	19,523.1	7,390.1	21,417.4	8,255.0	23,120.6

Table 4: Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity 2015-2020

2.3.2. HEATING & COOLING

(ktoe)	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Geothermal	2.8	3.2	3.4	3.5	3.7	3.9	4.1	4.4	4.7	5.0	5.4	5.7
Solar	3.33	29.0	42.4	52.2	61.9	76.6	91.2	110.8	130.3	153.1	175.9	198.7
Biomass	477.4	682.1	788.7	866.6	944.4	1,061.1	1,177.9	1,333.5	1,489.2	1,670.8	1,852.4	2,034
solid	475.5	669.0	769.8	843.4	917.0	1,027.3	1,137.7	1,284.8	1,432.0	1,603.7	1,775.3	1,947
biogas	1.9	8.9	12.5	15.2	17.8	21.8	25.8	31.1	36.4	42.6	48.8	55
bioliquids	0	4.2	6.4	8.0	9.6	12.0	14.4	17.6	20.8	24.5	28.3	32
Renewable energy from heat pumps	7.09	52.2	75.7	92.8	110.0	135.7	161.4	195.7	230.0	270.0	310.0	350
of which aerothermal:	not available											
of which geothermal:	not available											
of which hydrothermal:	not available											
Total	490.6	766.4	910.2	1,015.1	1,120.0	1,277.3	1,434.6	1,644.4	1,854.2	2,098.9	2,343.7	2,588.4

Table 5: Estimation of total contribution (final energy consumption31) expected from each renewable energy technology in [Member State] to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in heating and cooling 2010- 2020

2.3.1. TRANSPORT (BIOFUELS)

(ktoe)	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bioethanol/bio-ETBE	37.18	35.86	43.47	41.82	49.34	47.42	55.38	64.51	76.29	83.76	91.23	
Of which biofuels	0	0	0	0	0	0	0	0	0	0	0	0
Of which imported	0	0	0	0	0	0	0	0	0	0	0	0
Biodiesel	291.87	293.52	368.61	370.67	447.27	449.33	466.18	460.99	556.56	628.22	697.91	
Of which biofuels	0	0.00	0.00	0.00	0.00	0.00	0.00	44.40	43.90	101.19	114.22	126.89
Of which imported	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen from renewables	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Renewable electricity	16.4	23.84	26.76	29.85	33.39	37.44	47.34	56.24	65.51	75.46	86.24	97.19
Of which road transport	0	0	0	0	0	0	5.62	11.79	18.43	25.61	33.37	41.50
Of which non-road transport	16.4	23.84	26.76	29.85	33.39	37.44	41.72	44.46	47.08	49.85	52.87	55.70
Others (as biogas, vegetable oils)	0	0	0	0	0	0	0	0	0	0	0	0
Of which biofuels	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	16.4	352.89	356.13	441.93	445.88	534.06	544.09	577.80	591.00	708.31	798.22	886.33

Table 6: Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector 2010-2020

2.4. SUBSIDIES/FEED-IN TARIFFS / TAX EXEMPTIONS / OTHER FINANCIAL SUPPORT MEASURES[9]

2.4.1. RENEWABLE ENERGY (INCL BIOMASS) (ELECTRICITY)

Support for production (tradable green certificates)

There are no technology-specific targets (e.g. biomass) but the support varies according to the additional costs of the various technologies**.**

Support for production (tradable green certificates). The tradable certificates schemes established by the Regions are based; in the case of the Flemish Region and the Walloon Region, on the combination of compulsory quotas imposed on suppliers and on minimum feed-in price guarantees imposed on the DSO (Flemish Region) or on the LTSO (Walloon Region); in the case of the Brussels Capital Region, on an obligation imposed on electricity suppliers to observe a certain quota of green certificates.

The Federal Authority and the Regions have set up systems of tradable certificates to promote the generation of electricity from renewable sources in line with the competences assigned to them. Although largely similar, in particular with regard to the underlying notions (systems of tradable certificates with varying support levels according to the applied technology), the systems developed by each of these entities present certain specific features.

The table below summarises the main characteristics of these mechanisms:

[9] Source: NREAP Belgium, November 2010. See also Eubionet III report "National incentives and other framework promoting the use of bioenergy", available at http://www.eubionet.net.

Characteristics	Federal Authority	Flemish Region	Walloon Region	BCR
Issuing body	CREG	VREG	CWAPE	Brugel
Eligible technologies	Offshore wind energy	All*	All*	All*
Accounting unit for green certificates	Produced MWh	Produced MWh	Avoided CO_2 emissions[9]	Avoided CO_2 emissions[10]
Period for which certificate is granted	Entire service life of installation	Entire service life of installation	15 years	10 years
Number of certificates granted	1 certificate/ produced MWh	1 certificate/ produced MWh	Number of certificates/variable saved TCO_2 according to technology	Number of certificates/variable saved TCO_2 according to technology
Duration of certificate life (banking)	5 years	5 years	5 years	5 years
Fine (EUR/lacking certificate)	/	125[11]	100	100
Who has to fulfil the quota obligation?	/	Suppliers	Suppliers and DSO	Suppliers
Guaranteed minimum prices	Variable according to technology	Variable according to technology	Identical	/
Duration of benefits under guaranteed minimum price scheme	20 years (offshore wind energy) or 10 years (other installations)	10 years (except photovoltaic, 20 years[12])	15 years	/
Recognition of certificates	Federal, Flemish, Walloon and Brussels certificates	Flemish certificates	Walloon certificates	Brussels and Walloon certificates

* Except offshore wind energy (federal competence) and with certain variants according to the Regions. By way of example, quality CHP units are eligible under the green certificate schemes organised by the Walloon Region and the Brussels Capital Region, while they benefit from a specific scheme in the Flemish Region.

9 By general principle, a green certificate corresponds to a quantity of 456 kg of avoided CO_2. However, for certain technologies multiplying factors are applied. Thus a green certificate is only granted if the electricity production chain generates a minimum carbon dioxide saving of 10% compared to carbon dioxide emissions, as defined and published annually by CWaPE, from conventional electricity generation by modern reference installations.

10 By general principle, a green certificate corresponds to a quantity of 217 kg of avoided CO_2. However, for certain technologies multiplying factors are applied.

11 EUR 100 per lacking certificate as of 2015.

12 15 years for installations established from 1 January 2013 onwards.

Table 7: Overview electricity support mechanisms Belgium

The support schemes are governed by the following legal instruments:

Federal Authority:

- Act of 29 April 1999 concerning the organisation of the electricity market;
- Royal Decree of 16 July 2002 concerning the establishment of mechanisms to promote electricity generated from renewable energy sources;
- Royal Decree of 30 March 2009 concerning deviations of production outputs for wind powered electricity production facilities in offshore areas.

Flemish Region:

- Decree of 17 July 2000 concerning the organisation of the electricity market (Electricity Decree);
- Decree of the Flemish Government dated 5 March 2004 on promoting electricity generation from renewable energy sources.

Walloon Region:

- Decree of 12 April 2001 concerning the organisation of the electricity market;
- Decree of the Walloon Government dated 30 November 2006 on promoting electricity from renewable energy sources or CHP.

Brussels Capital Region:

- Ordinance of 19 July 2001 concerning the organisation of the electricity market in the Brussels Capital Region;
- Decree of 29 March 2007 fixing the quotas for green certificates for 2008 and the following years.

The regional regulatory bodies (VREG, CWAPE, BRUGEL) are essentially responsible for verifying compliance with the quota obligation imposed on suppliers in line with the modalities defined by regional legislation. CREG is also responsible for the follow-up on the federal mechanism of green certificates.

Financial support for investment

Flemish Region:
Support for ecological investments (ecologiesteun):
Companies can benefit from a premium for investments in the production of energy from renewable energy sources. For small and medium-sized enterprises, the subsidy is at most 40% of the admissible additional costs, and at most 20% for large enterprises. The admissible additional costs vary according to technology:

- 50% for biomass, biogas and CHP generation plants;

Walloon Region:
Investment premium (and exemption from property tax): Companies benefit from a premium for investments in the production of energy from renewable energy sources. For small and medium-sized enterprises, the subsidy is at most 50% of the admissible additional costs, and at most 20-30% for large enterprises (depending on their geographic location). The admissible additional costs vary according to technology:

Brussels Capital Region:
The 'energy premiums' support project promoters in acquiring installations for the production of energy from renewable energy sources. For renewable energy production systems other than PV that generate electricity, the scheme grants — only to companies of the service and industrial sectors — premiums equivalent to 30% of the invoice. Only installations exploiting energy from renewable energies sources intended primarily to provide energy for the building or the company's operations are affected. As regards collective housing, services and the industrial sector, 'energy premiums' for feasibility studies on installations using renewable energy sources can also be granted. The premium amounts to 50% of their costs.

Obligated share of electricity produced from renewable sources in the total supply

The following quotas of green certificates must be observed by the suppliers:

	Federal Authority	Flemish Region	Walloon Region*	BCR*
2010	/	5.25%	11.25%	2.75%
2011	/	6%	13.5%	3%
2012	/	7%	15.75%	3.25%
2013	/	8%	To be determined	To be determined
2014	/	9%	To be determined	To be determined
2015	/	10%	To be determined	To be determined
2016	/	10.5%	To be determined	To be determined
2017	/	11%	To be determined	To be determined
2018	/	11.5%	To be determined	To be determined
2019	/	12%	To be determined	To be determined
2020	/	12.5%	To be determined	To be determined
2021	/	13%	To be determined	To be determined

*: The green certification schemes organised by the Walloon Region and the Brussels Capital Region, based on CO_2 emission savings, include the production of electricity from quality CHP units.

Table 8: Quotas of green certificates

Green certificates: Floor bottom price

The Federal Authority and the **Flemish and Walloon Regions** have linked a system of guaranteed minimum prices to their green certificate schemes. The table below illustrates the features of the different guaranteed minimum price schemes.

	Federal Authority	Flemish Region	Walloon Region	BCR
Unit	EUR/MWh	EUR/green certificate	EUR/green certificate	/
Offshore wind energy (<216 MW)	107	/	/	/
Offshore wind energy (>216 MW)	90	/	/	/
Onshore wind energy	50	90	65	/
Photovoltaic	150	350[25]	65	/
Hydro power	50	95	65	/
Biomass	20	90	65	/
Biogas (biomass waste)	20	90	65	/
Geothermal energy	50	90	65	/
Energy from waves and tides	20	90	/	/
Landfill gas	20	60	65	/
Biogas (wastewater treatment)	20	60	65	/
Others	/	/	65	/

25 This amount is reduced by EUR 20 for installations established as of 2013, and by EUR 40 for installations established as of 2014.

Table 9: Guaranteed minimum prices for green certificates

2.4.2. BIOMASS (HEATING & COOLING)

Support for production (CHP and tradable certificates)[10]

Green certificates In the **Flemish Region**, the system of green certificates for CHP has some significant differences:
- A CHP certificate is granted for 1000 kWh in saved energy compared to separate production.
- There is no partial reduction for large-scale consumers.
- The market value is around EUR 40, and the fine is EUR 45 for the absence of a certificate.
- The CHP certificates decrease in value: They have a maximum value during the first 4 years, with a linear reduction to 0 after approximately 10 years.
- The minimum support is EUR 27 for installations connected to the distribution system.
- The quota increases up to 5.23% in 2012 and remains constant thereafter.

In the **Walloon Region**, the green certificate mechanism — established to support the production of renewable electricity — is intended to support CHP (on the basis of natural gas or renewable sources). For CHP installations on the basis of renewable sources, the recovery of useful heat (drying processes, heat networks) is calculated into the rate for the granting of green certificates. In the **Brussels Capital Region**, green certificates (GC) may be granted for CHP energy after certification of the installation by BRUGEL and for installations that are not older than 10 years. The granting of GCs is spread over a period of 10 years, and the GCs remain valid for 5 years. For every tranche of 217 kg in avoided CO2 (compared to the reference installations), 1 green certificate is

[10] Source: NREAP Belgium, November 2010

issued. The financial measures in support of the operation of heating or cooling installations fuelled by renewable energy sources are limited to green certificates issued for quality biomass CHP installations. No green certificates are issued for the production of green heat. These installations obtain green certificates because they produce green electricity.

Support for production (dedicated renewable heat)

In the Flemish Region a draft decree has been published. The decree is still a draft and under revision. It has been commented on by the Flemish socio-economic council and the environment and nature council. Installations with a power of >1 MWth can apply for support within a call-system. The total budget for each call will be defined by the responsible minister. A call will be launched each 6 months. The support will be no higher than 6 €/MWh. Installations that are issued green electricity certificates and/or CHP certificates cannot profit from green heat support. An indicative budget of 4.4 million euro will be available for green heating projects. Projects will be receiving support for a duration of 10 years. The system is set until 2014 when there will be new Flemish elections.

In the Walloon Region, a support programme for heating is under consideration. There is at this stage (end of the year 2011) no regulation providing any target or obligation regarding the use of energy produced from renewable sources in heating and cooling.

Financial support for investment

Tax reduction for individuals for biomass boilers, interest rate subsidies and tax reductions for the residual interest on loans for the exclusive financing of such investments (Economic Recovery Act of 27 February 2009) have been cancelled by the federal government for the year 2012.

Companies can benefit from tax deductions for heat and electricity generating installations based on renewable sources.

Companies may also benefit from a tax deduction for certain investments in renewable energies for generation of energy from waste). The tax deduction rate is between 13.5% and 20.5% depending on the average development of the consumer price index.

In the **Walloon Region**[11] a premium is granted at the time of the installation for small scale biomass boilers that operate with automatic feed only and that comply with the requirements of NBN EN 303-5, with an efficiency of more than 85% calculated according to this standard. If the boiler runs on 2 fuels, only natural gas is permitted. The amount of the premium is calculated on the basis of the boiler capacity and is limited to 50% of the invoiced amount, however, limited to EUR 15000 per installation. When several boilers are connected to the same heating cycle, only one premium is granted. The amount of the premium is calculated according to their combined capacity.
When the biomass boiler is considered to generate heat for a central district heating system, the amount of the premium is increased by EUR 100 by meter of hot water main. This increase is limited to 50% of the invoiced amount, however, limited to a maximum of EUR 100 000 per district heating system.

[11] Source: http://energie.wallonie.be (last accessed 12.02.2012)

2.4.3. BIOMASS (TRANSPORT BIOFUEL)[12]

Biofuels are supported by means of a tax-exempt quota and mandatory incorporation. The legal basis is the Act on the mandatory blending of biofuels in fossil fuels for consumption. This act was published on 22 July 2009.

The Act states that any registered oil company offering petrol and/or diesel products for consumption must also — in the same calendar year — offer a quantity of 4% v/v of sustainable biofuels for consumption;

- FAME (fatty acid methyl ester) at a rate of at least 4% v/v of the quantity of diesel products offered for consumption
- Bioethanol, pure or in the form of bio-ETBE, at a rate of at least 4% v/v of the quantity of petrol products offered for consumption.

Any registered oil company that does not observe the fixed percentage will be subject to an administrative fine of EUR 900 per 1000 l at 15°C of biofuel that was not mixed into the annual quantity of petrol or diesel products offered for consumption.

The act entered into force on 1 July 2009 and will cease to be in force on 30 June 2013[13]. It can be extended and modified by Royal Decree deliberated in the Council of Ministers.

Tax exemptions for biofuels is a scheme of state aid leading to a reduced rate of excise duty for petrol containing at least 7% v/v of bioethanol (pure or in the form of ETBE) and diesel containing at least 5% v/v of FAME. These excise duty rates are applied if the biofuels originate from a production unit approved by the Belgian state. Due to an increase of the excise duty on fossil fuel, it is a 'budget neutral' measure. A tender procedure for approval of the biofuel volumes specified in the quota was launched in 2006.Biofuel production is ensured by seven approved units and for the volume of the tax-exempt quotas.

[12] Source: NREAP Belgium, November 2010

[13] Source:http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=nl&la=N&table_name=wet&cn=2011062303

CHAPTER 3 BIOMASS RESOURCES

3.1. CURRENT ECONOMIC POTENTIAL OF ALL MAJOR (>10% OF TOTAL) DOMESTIC BIOMASS RESOURCES

3.1.1. BELGIUM[14]

Sector of origin	Amount of domestic resource (ktonnes)	Imported (ktonnes)		Exported EU/Non-EU (ktonnes)	Net amount (ktonnes)	Primary energy production (ktoe)
		EU	Non-EU			
A) Biomass from forestry, of which:	**1,166.68**	**904.58**	**49.48**	**0,00**	**2,120.31**	**818.07**
1. direct supply of wood biomass from forests and other wooded land for energy generation	532.17	0.00	0.00	0.00	532.17	211.54
2. indirect supply of wood biomass for energy production	633.98	904.58	49.48	0.00	1'588.14	602.83
B) Biomass from agriculture and fisheries	**1,835.35**	**74.40**	**33.26**	**0.00**	**1,913.01**	**87.39**
1. Agricultural crops and fishery products	30.00	0,00	33.26	0.00	33.26	29.42
2. By-products and residues	1'805.35	74.40	0.00	0.00	1,879.75	57.88
C) Biomass from waste	**2,125.34**	**152.90**	**0.00**	**0.00**	**2,010.14**	**473.79**
1. Biodegradable fraction of municipal solid waste	1,528.50	152.90	0.00	0.00	1,681.30	311.33
2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)	248.66	0,00	0,00	0.00	248.66	46.38
3. Sewage sludge	80.17	0.00	0,00	0.00	80.17	10.09

Table 10: Estimated domestic biomass supply and import 2006

3.1.2. FLEMISH REGION[15]

In 2009 the Flemish Energy Agency (VEA) developed an inventory of regionally available biomass for energy production together with the waste, forestry and agriculture administrations. Main conclusion was that biomass will play a crucial role in fulfilling the 2020 renewable energy target. In order to realize this role, biomass will need to be imported. However also local biomass resources also need to be deployed intensively. Only biomass available for energy production was addressed taking into account other current uses of biomass resources.

The table below illustrates the fraction of the different biomass resources in the Flemish Region also indicating the import needs in 2008 en the estimations for 2020.

[14] Source: NREAP Belgium, November 2010
[15] Source: Newsletter Flemish Energy Agency

Sector of origin:	PJ (2008)	% fraction	PJ (2020)	% fraction
Direct supply of wood (forestry)	5	22%	5	10%
Indirect supply of wood (wood waste)	7	30%	7	13%
Energy crops	0	0%	12	23%
Biomass from waste (residential/industrial)	7	30%	9	17%
Biomass (rest streams)	4	17%	19	37%
Total domestic	23	100% or 69% (incl import)	52	100% or 42% (incl import)
Import	10	31%)	70	58%
Total domestic + import	33		122	

Table 11: Biomass resources for energy production Flemish Region (2008-2020) (PJ)

It can be concluded that the Flemish Region has some surplus potential available. The domestic supply can double up to 52 PJ by 2020. Energy crops and an improved use of waste streams are crucial in such a scenario. However for the calculation of the potential for energy crops a surface of 50.000 ha was assumed. The NREAP of Belgium (November 2010) indicates however that the agricultural land use for production of dedicated energy crops equal is to zero (0 ha).

In a prognosis study VITO calculated a need of 122 PJ for Flanders in a PRO-scenario (i.e. scenario with additional policy support). This means a 7-fold increase of biomass import from 10 PJ (2008) to 70 PJ (2020), the equivalent of 58% of the biomass needs. Belgium, together with the Netherlands and Luxembourg has urged the European Council (7/12/2009) to, next to biofuels and –liquids, develop binding criteria for solid biomass.

3.1.3. WALLOON REGION

At the present time, there is no recent inventory dedicated to regionally available biomass for energy production in Wallonia.

3.2. THE BELGIAN PELLET SECTOR[16]

The information below is fully adopted from the Belgian national pellet report, published by Valbiom (N. Pieret, 2011) and accomplished under the Pellcert project (IEE/10/463/512.592427)

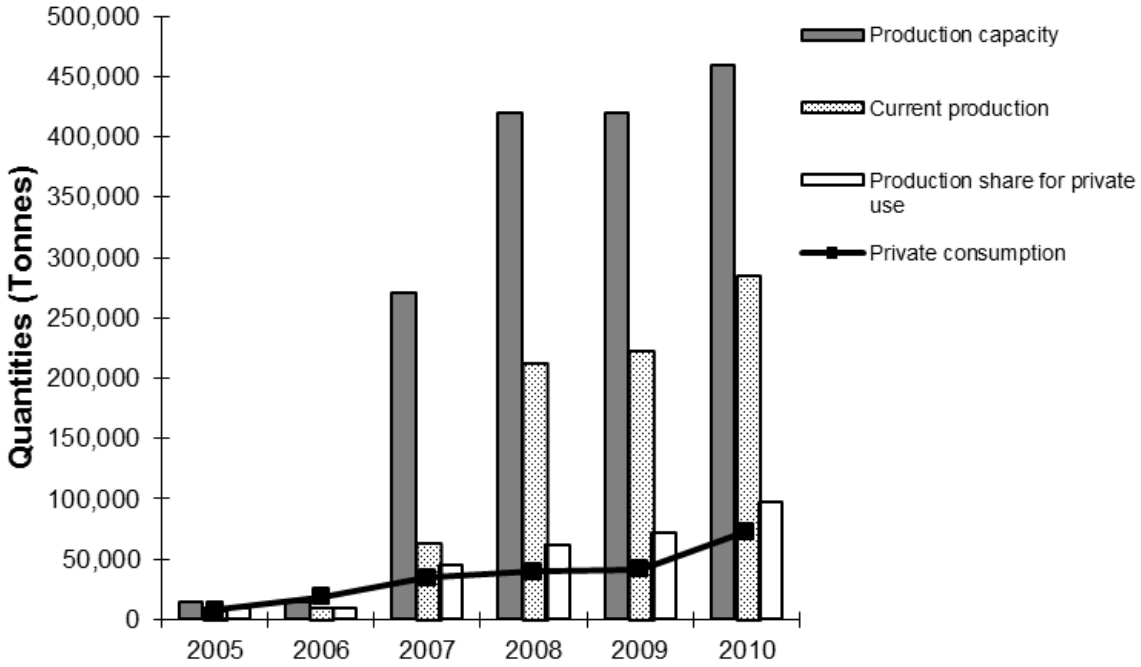
[16] Source: Pieret N. (2011) National pellet report – Belgium (website : http://www.enplus-pellets.eu/wp-content/uploads/2012/01/BE_pellet_report_Jan2012.pdf)

3.2.1. PELLETS PRODUCTION

The production of wood pellets started in Wallonia in 2005. In Flanders the production started a few years later. During these early years, there were no dedicated installers for small scale biomass installations. Occasionally installers were coming from abroad to install stoves. Consequently, pellet stoves and boilers were considered to be a green, new and interesting way of heating in the residential sector, but not yet accepted as a proven technology. Detailed statistics on pellet production are difficult to assess. Quite detailed figures are available in Wallonia, less in Flanders.

→ **Wallonia**

In 2010, Wallonia counted 7 pellet producers for a total production capacity of 460 kt/y. Actual production levels in 2010 increased to 286 kt. Of these 97 kt were dedicated to residential market; the remainder was mainly used in one power plant. Wallonia counts indeed one power plant in les Awirs with an output of 80 MWe using 100 % of pellets.



It is difficult to collect data on pellet import and export. Based on a ValBiom enquiry, it was estimated that imports reached 10 kt and export 2 kt in 2010 for pellets use in residential sector. However, imports are mainly organised to supply the power plant 'les Awirs' (380 kt/a).
In general, storage capacity is quite small. In 2009 there were no significant problems related to storage capacity due to a very cold winter. Since, producers organize themselves to optimize the storage. Wallonia counts close to 150 stakeholders like manufacturers, importers, traders and installers.

→ **Flanders**

Flanders counts 4 producers with a combined production of 50 kt/y and approximately 50 stakeholders.

3.2.2. CONSUMPTION MARKET

→ Wallonia

In Wallonia, pellets are mainly supplied through a network of local entrepreneurs, in bagged packaging. However the delivery in bulk is growing. Currently about seven supply trucks are distributing pellets in Wallonia. Each of these traders deliver less than 10 000 t/y. The remainder is distributed in bags representing close to 50 % of supply. They all delivered A1 quality.

Figure 8 indicates about 2,000 pellet boilers in use in Wallonia in 2010. representing a total annual consumption of approximately 15 kton. Pellets are currently seen by the public as an ecologic alternative to fossil fuel but complicated and expensive.

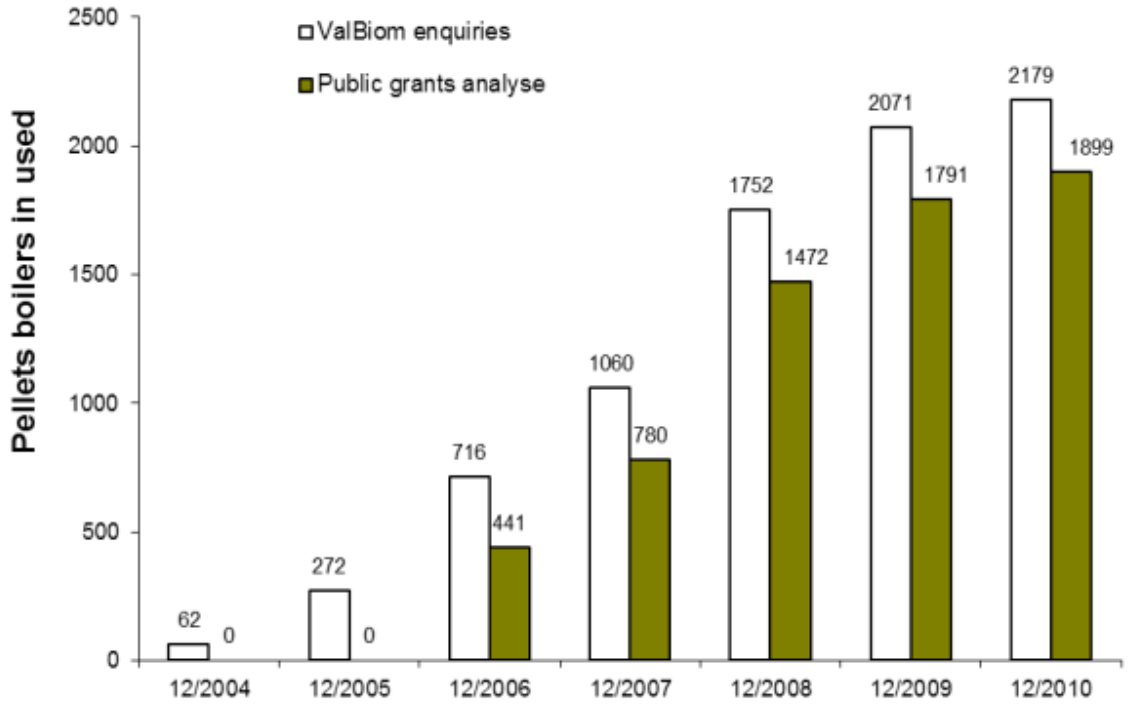


Figure 8: Pellets boilers in use based on the incentive delivered (Source: Pellcert, Valbiom; SPW-DGO4, ValBiom).

→ Flanders

For the Flemish region an enquiry was organised to estimate the number of pellet stoves and boilers sold in the residential in 2009 and 2011. The last update dates from December 2011 but results are not public yet. Figure 9 illustrates the latest public information on new appliances sold in the respective year (green) and existing appliances (blue) in the Flemish region (VITO, 2009).

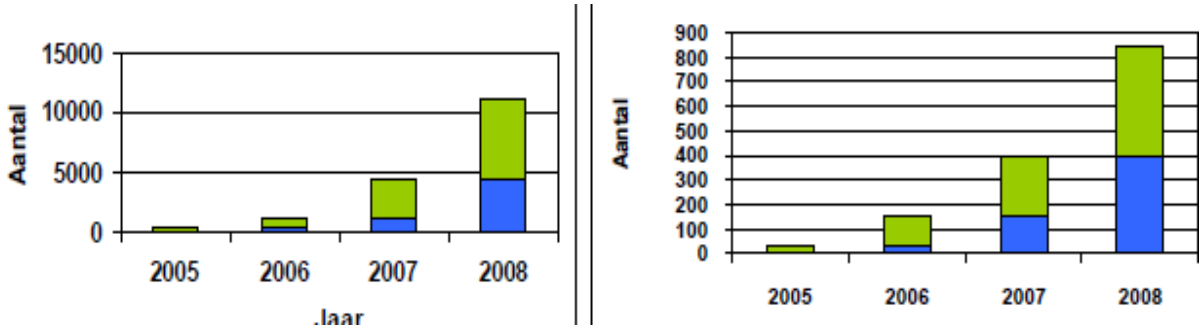


Figure 9: Combined sales statistics for pellet stoves (left) and pellet boilers (right) in Flanders (source: VITO, 2009, Prognosis for renewable energy and combined heat and power until 2020 (Flanders).

CHAPTER 4 CURRENT AND EXPECTED FUTURE ENERGY USE OF BIOMASS AND CURRENT BIOMASS USERS

4.1. CURRENT USE OF ALL MAJOR (>10% OF TOTAL CURRENT BIOMASS USE) BIOMASS TYPES

Currently a study is being accomplished by VITO and CRA-W under the authority of the Belgian Directorate General of Environment addressing 'The quantification of biomass streams, produced and imported within the territory of Belgium with the goal of producing energy or industrial products (1989-2009)'. The study responds to the willingness of the Belgian authorities to better understand the biomass markets in order to be able to support the markets if necessary. While biomass was formerly mostly used as a food, feed or direct material resource, recently biomass is being increasingly used as a energy, fibre or chemical resource. This growth in demand increases the pressure on biomass markets. In a first stage a methodology has been developed to quantify the biomass streams. The study focuses on the following biomass streams:

- cereals
- sugar beet
- oil seeds
- animal and vegetable fats and oils
- press cake
- wood (pellets, chips,...)
- pulp (paper and paperboard)
- textile fibres

Regarding the collection of local biomass streams a major problem was the data being dispersed or not available. Regarding international trades statistics from the National Bank of Belgium were being used. For each stream the following data are available for the period 1989-2009:

- Local biomass production (in Belgium)
- Imported biomass (and country of origin)
- Exported biomass (and country of destination)
- Type of use/application (food, feed, material, chemistry, energy (electricity, heat, CHP), biofuels (biodiesel, bioethanol)

Detailed and complete data on the type of use were not found for the different biomass types. This information was gathered through literature study, research reports, expert interviews and industry consultations. Due to this intensive method of data gathering, the different uses of the biomass types were only assessed for one year.

Major drawback of the database at the moment is, that the import and export data are not considering buffers build up during the years, this in combination with data for type of use only for 1 year give distorted and incorrect amounts of biomass used for certain type of uses. This drawback will only be countered with collecting data for use for a couple of years or by collecting data on buffers.

Considering the difficulties stressed above the results of the study must be seen as a first analysis of the compiled data and as a demonstration of its possibilities. Any interpretation of the results must be made with precaution. The estimated quantities must be considered as an order of magnitude and not as exact data.

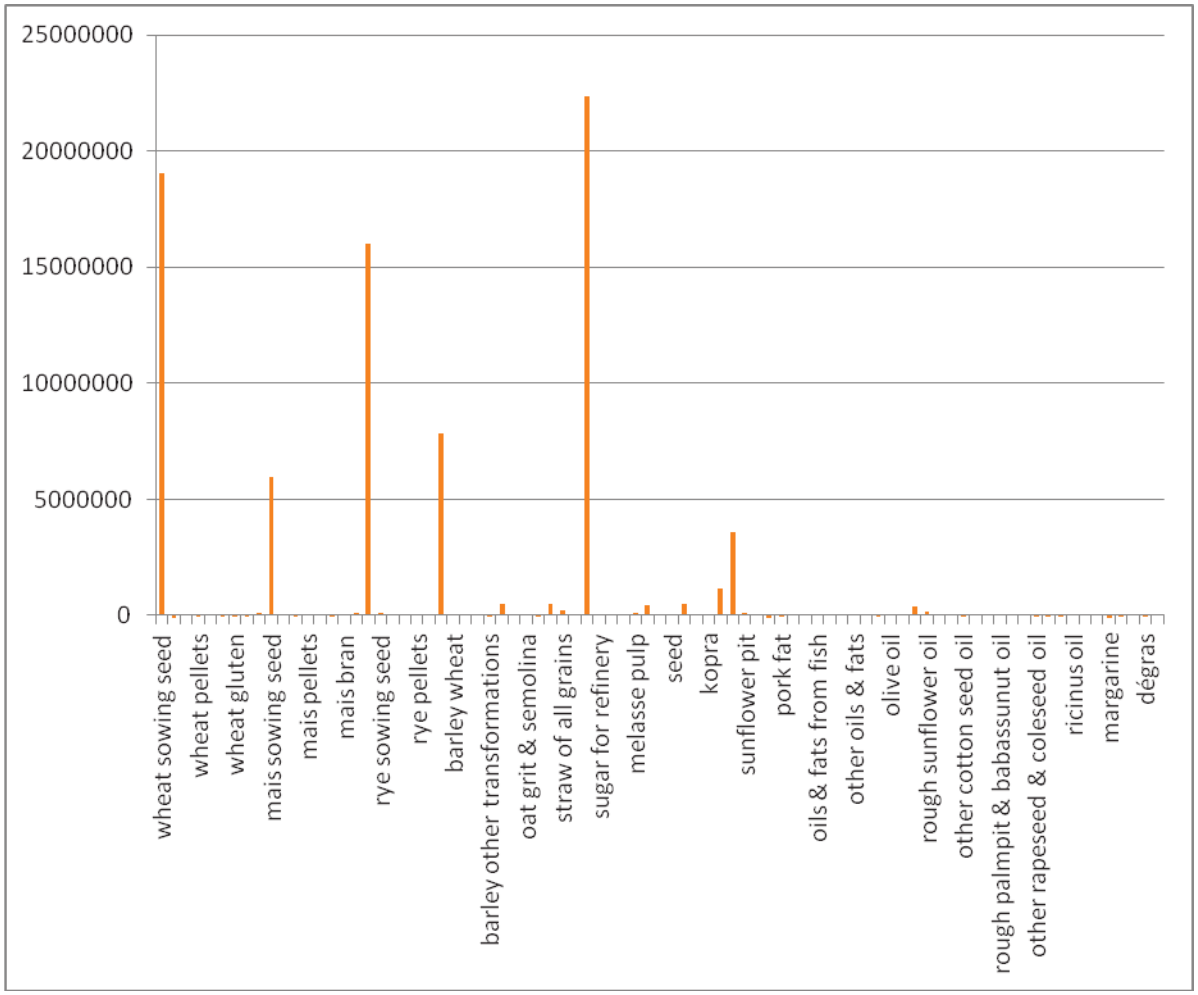


Figure 10: Quantities of biomass used for food/feed (tonnes)

The two figures below present a complete application scheme for deciduous wood and coniferous wood related to their type of use.

Application per sector	Deciduous	Coniferous	TOTAL
Sawmills	14 %	58 %	44,5 %
Paper	51 %	2 %	18 %
Fibre board	20 %	25 %	23 %

Chantiers de découpe (piquets, etc.)	-	7 %	4,7 %
Veneer	1 %	-	0,5 %
Energy wood	13 %	9 %	10,3 %

Table 12: Overview of wood use per application

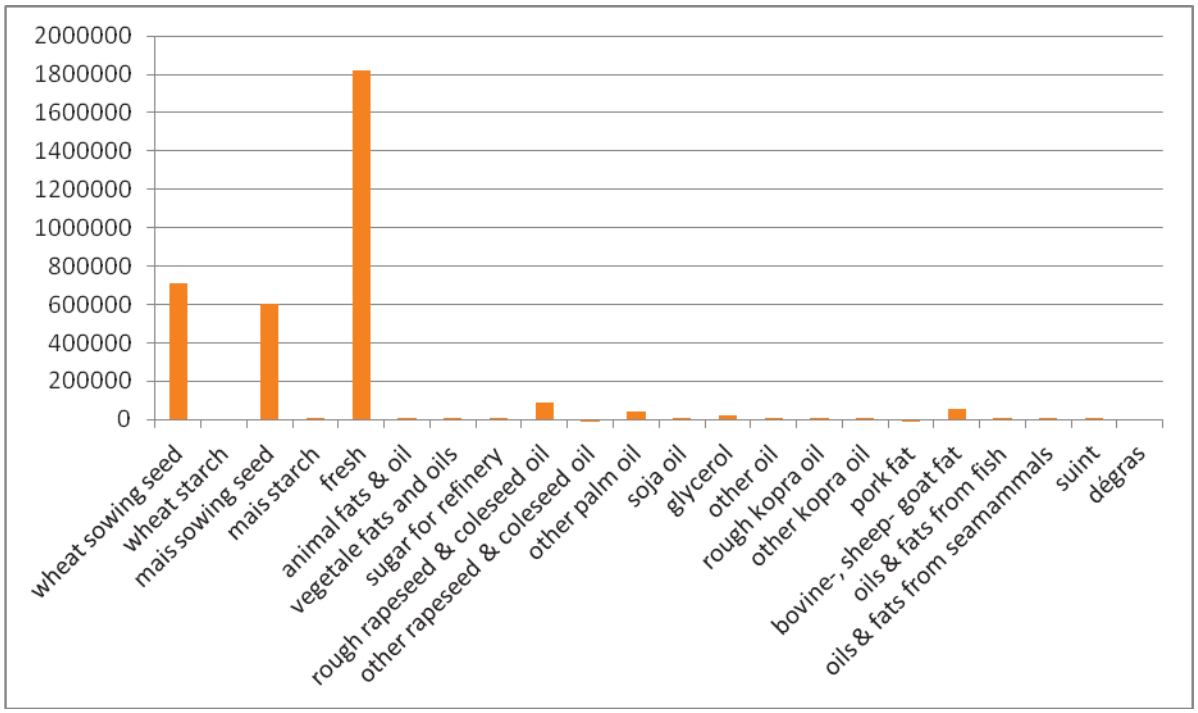


Figure 11: Quantities of biomass used for chemistry (tonnes)

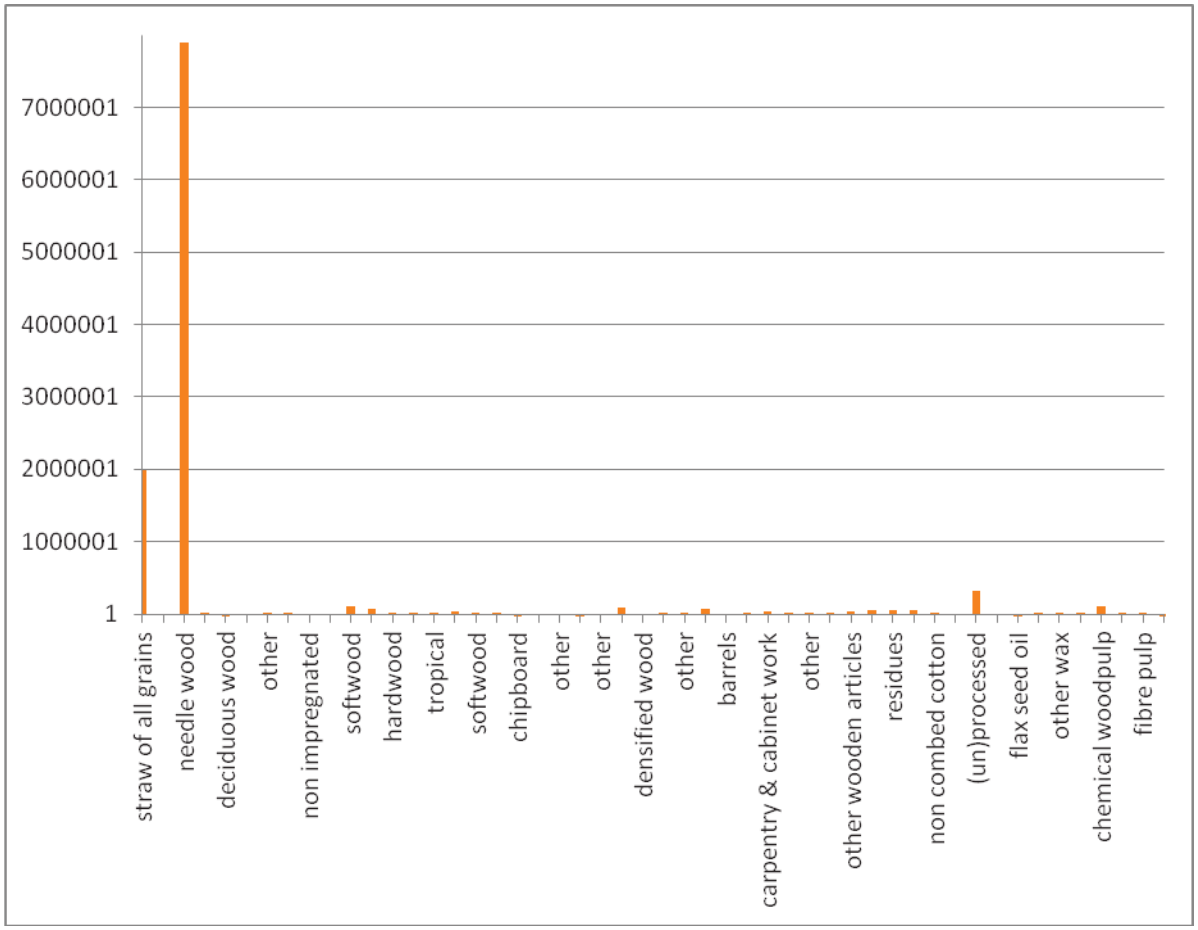


Figure 12: Quantities of biomass used for energy purpose (tonnes)

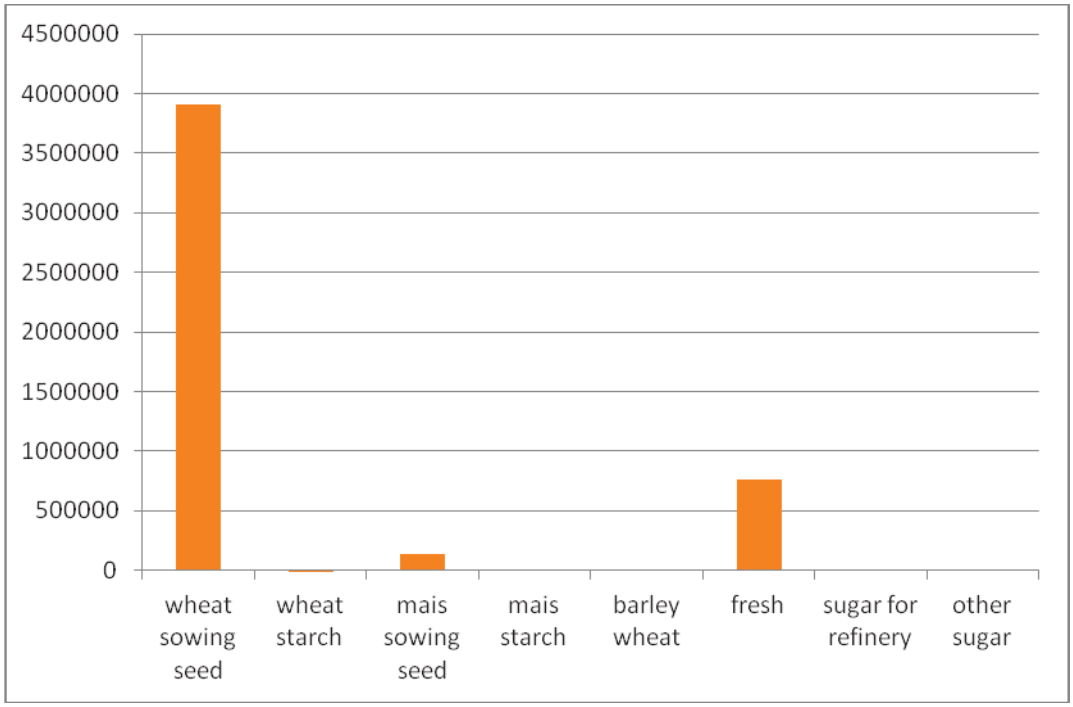


Figure 13: Quantities of biomass used for bio-ethanol production

The figures below show the quantities of biomass used in Belgium for the applications as: food/feed, materials, chemistry, energy and bio-ethanol production

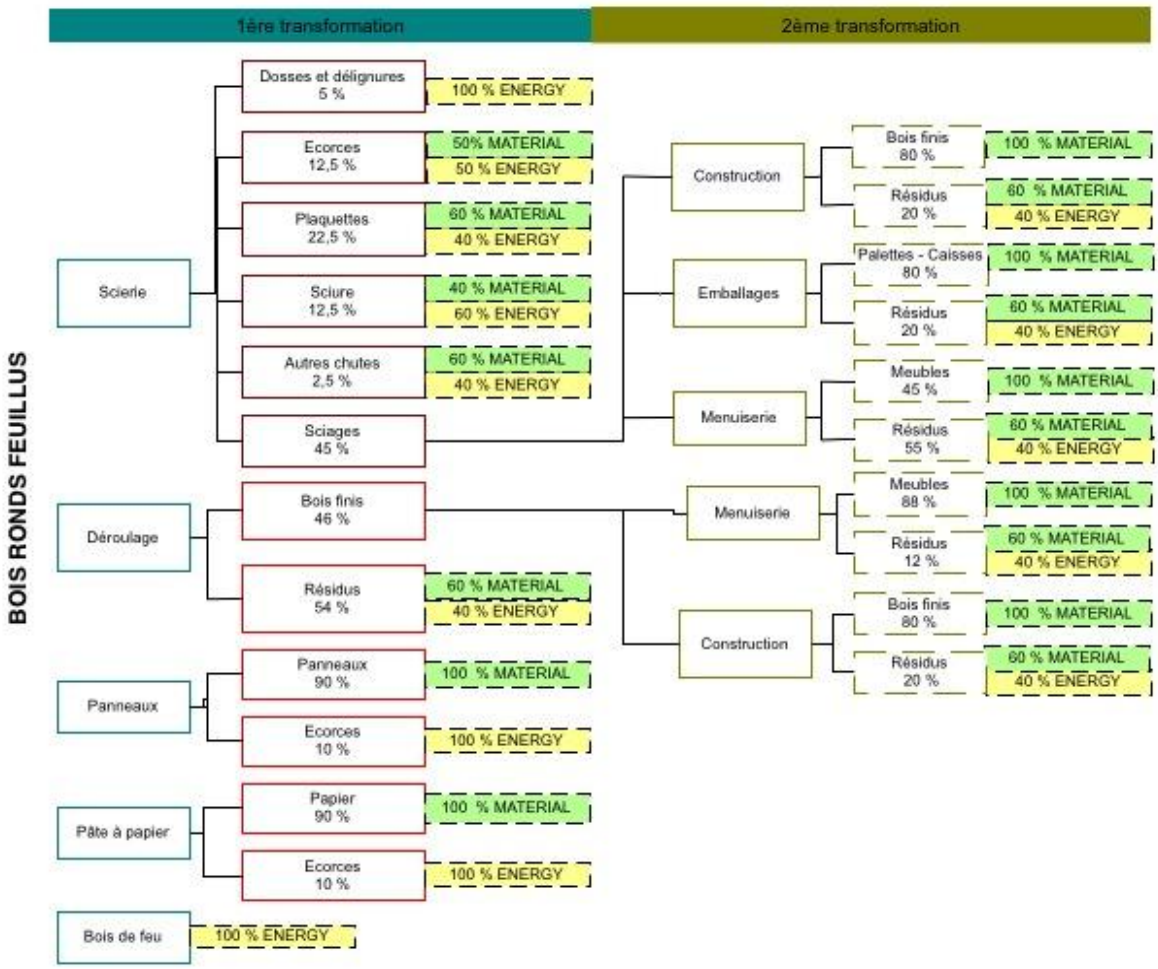


Figure 14: Application scheme for deciduous wood in Belgium (2008)

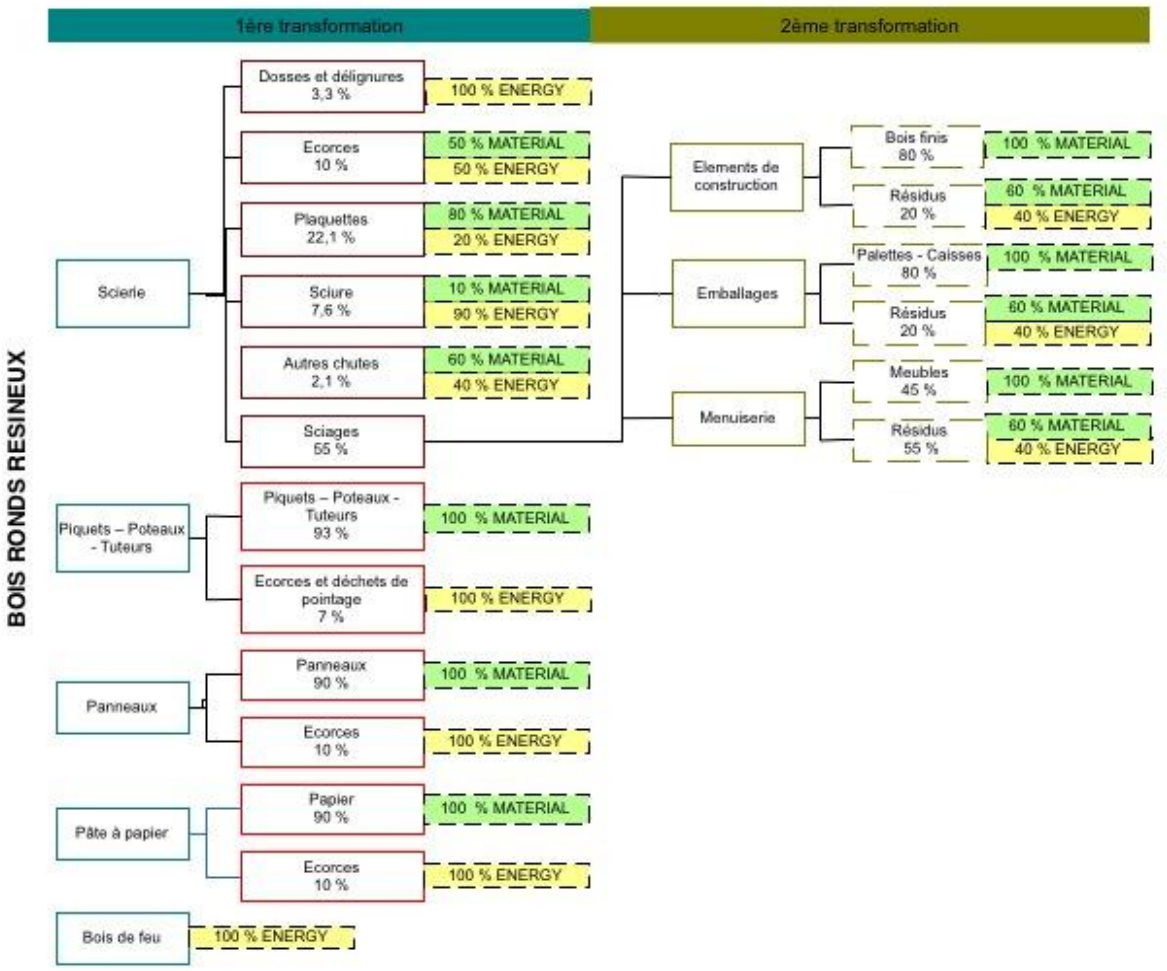


Figure 15: Application scheme for coniferous wood in Belgium (2008)

4.2. TREND ANALYSIS OF DOMESTIC PRODUCTION/CONSUMPTION UNTIL 2015/2020

Sector of origin	2015		2020	
	Amount of domestic resource	Primary energy production	Amount of domestic resource	Primary energy production
	(ktonnes)	(ktoe)	(ktonnes)	(ktoe)
A) Biomass from forestry, of which:	**1,892.78**	**732.03**	**2,227.631**	**868.59**
1. direct supply of wood biomass from forests and other wooded land for energy generation	572.3	226.1	572.3	225.1
2. indirect supply of wood biomass for energy production	1,320.48	505.93	1'655.331	643.49
B) Biomass from agriculture and fisheries	**1,0571.5**	**1,669.5**	**8,855.6**	**1,030.3**
1. Agricultural crops and fishery products	8,110.7	221.6	3,404.7	489.8
2. By-products and residues	2,460.8	1,447.9	5,450.9	540.5
C) Biomass from waste	**2,401**	**561.4**	**3,225.7**	**535.8**
1. Biodegradable fraction of municipal solid waste	1,751.6	413.5	2,263.7	369.6
2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)	558.3	138.4	868	155.8
3. Sewage sludge	91.1	9.5	94	10.4

Table 13: Estimated domestic supply 2015 and 2020

4.3. BIOMASS IN NEW INDUSTRIES

Some industrial sectors get used to produce energy with biomass (forestry, pulp & paper, boards and the energy sectors), others have the potential (raw material availability, suitable production process) to use biomass as an energy carrier (electricity and/or heat/stream) but sometimes don't exploit it. A third category of industries would like to produce renewable energy but have not any inside raw material potential. Consequently, they are dependent of an extern supply. The second aim of this report is consequently to identify, for these 'new industries', the barriers and the opportunities to produce energy with biomass[17].

By 'new industries' are concerned the shaper industry sectors (metal, cement, food processing, beverages and construction industries). The forestry, pulp & paper and the energy sector were excluded because they are common bioenergy users, they will be considered in another part of the project. The agricultural production sector (farmers, stockbreeding, vegetables culture, etc.) is also excluded. In Belgium, the shaper industry sectors (NACE 2 C code) are very well developed. A short description of the main Belgian activities for the biomass use in new industries is given below (source: Eubionet III, country report Belgium).

[17] Source: Eubionet III (http://www.eubionet.net).

NACE code	Description
C10. Manufacture of food products	This sector is well represented in Belgium. It is the third most important industrial sector in terms of business. Production units are set up along the main industrial Belgian axes. Meat production, bakeries, beverages, chocolate factories and breweries account for the most important part of this sector activity.
C11. Manufacture of beverages	Included in C10
C19. Manufacture of coke and refined petroleum products	In Belgium, oil refineries are concentrated near Antwerpen. Several storages are spread over the country, the biggest one is located in Feluy. Main companies are Total and Esso.
C20. Manufacture of chemicals and chemical products	Second important industrial sector in Belgium, The chemical production units are concentrated near Antwerp (Flemish region), pharmaceutical production units are located in Wallonia with UCB, GSK and Solvay.
C21. Manufacture of basic pharmaceutical products and pharmaceutical preparations	Included in C20
C23. Manufacture of other non-metallic mineral products	Four groups are present in Belgium for cement production, they belong to the five most important groups in the world: Holcim, Heidelberg, Ciment Français, Lafarge. Their PIB contribution is equal to 0.2 %. Rock is also extracted in Belgium to produce lime and cement. Major part of extraction activities and transformation are located in Wallonia rich in quarries.
C23.3 Manufacture of clay building materials	See C23
C23.5.1 + C23.5.2 Manufacture of cement, lime and plaster	See C23
C23.6 Manufactrure of articles of concrete, cement and plaster	See C23
C24 Manufacture of basic metals	In Belgium, the steel production depends on international groups like Arcelor Mittal (70%) and Duferco (20%). Production units are present in Flanders and in Wallonia. Belgium is an important steel producer with 1 T/capita.

(Sources: ESSENSCIA, FEBIAC, FBP, FEB, FEBIEX, FEBELCEM)

Table 14: Description of selected industries (source: Eubionet III, country report Belgium)

Currently substantial research funds are invested in bio-technology research examining and assessing which types of biomass resources can be used as a resource for green chemistry. For Essencia, a multisectoral umbrella organisation that represents the numerous sectors of activities in the field of chemicals and the life sciences, this is a major topic of interest, now and in the coming years. The 'green chemistry' sector is a rather new, but important, player in the already crowded pool of sectors using biomass as a resource/feedstock. In the near future it will be important to coordinate the use of biomass resources between the more classical biomass market players (e.g. food, feed, energy,...) and new biomass using sectors (e.g. green chemistry).

CHAPTER 5 BIOMASS PRICES

5.1. BELGIUM

Biomass prices are not available in Belgium in a concerted way. Prices for different biomass feedstocks for energy use (pellets, chips, logs,...) are diffusely available and/or not transparent. No price-indexes are available at this time. Mostly, for official studies, is referred to international statistics when it comes to biomass price references.

5.2. WALLONIA[18]

In Wallonia, domestic pellets price is monitored monthly by enquiries and compared to heat fuel and gas prices. In Wallonia, domestic pellets price is really stable. The most important factor in the price building is the raw material cost. Three producers have raw material available inside their plant due to a parallel sawmill activity. The others have to buy sawdust on the market (Belgian sawmills, France, etc.). Sometimes, wood chips are also used.

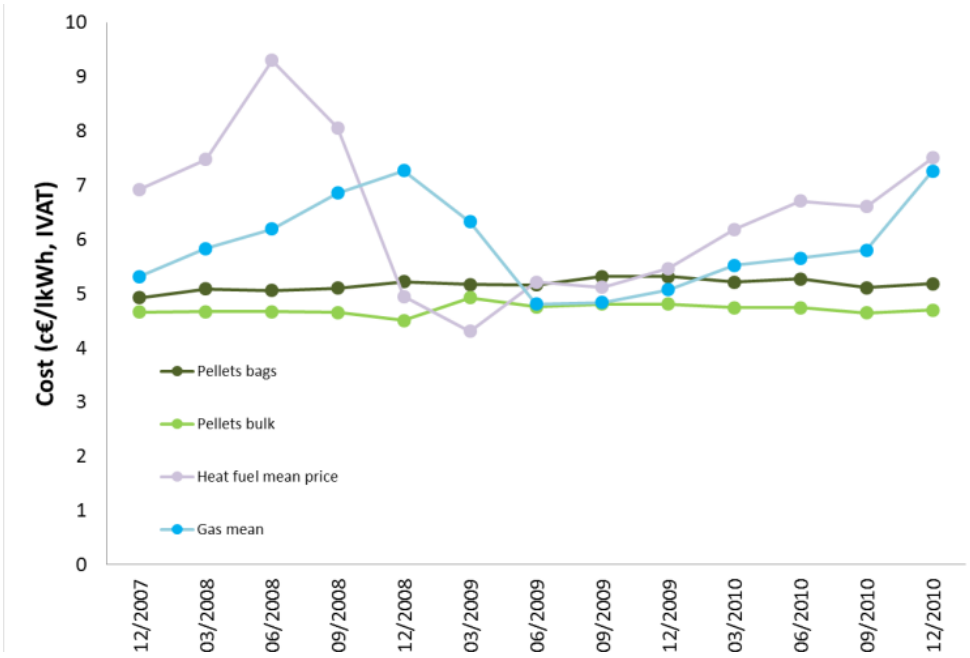


Figure 16: Prices evolution of pellets in bag and in bulk in comparison with natural gas and oil, for residential use (Source: Pellcert, ValBiom, CWaPE, Statbel).

[18] Source : Pieret N. (2011) National pellet report – Belgium (website : http://www.enplus-pellets.eu/wp-content/uploads/2012/01/BE_pellet_report_Jan2012.pdf)

CHAPTER 6 BIOMASS IMPORT AND EXPORT

6.1. QUALITATIVE: ALL BIOMASS TYPES BEING IMPORTED OR EXPORTED

See chapter 4

6.2. QUANTITATIVE: BIOMASS AMOUNTS IMPORTED OR EXPORTED OF THE MAJOR BIOMASS STREAMS

See chapter 4

6.3. QUALITATIVE: WHAT ARE THE MAIN TRADE ROUTES, TO WHICH COUNTRIES, WHICH LOGISTIC CHAINS (TRUCK, TRAIN, SHIP)

Belgian pellets market was recently studied in the frame of IEA Bioenergy Task 40 (Cocchi and Marchal, 2011, Cocchi *et al*., 2011). The following comes from the Belgian part of the study.
Pellet production in Belgium has experienced a large growth since 2005 (Marchal, 2010), increasing from a production capacity of 18,000 tons to 500,000 tons in 2009, 470,000 of which from Wallonia and 30,000 from Flanders. The growth in the production capacity from 2008 to 2009 was of 50,000 t/year, below the average for the last 4 years.
The pellet production capacity in December 2009 was estimated at 544,000 tons. While in the region of Flanders there is only 1 pellet plant with a capacity of 20,000 tons, Wallonia has 7 factories, whose output is about 286,000 tons/year (Pieret, 2011). Preliminary data for 2011 indicate a production of 300,000 tons.
The consumption of pellet shows regional differences: in Wallonia 79,500 tons were consumed for domestic use in 2010, 4,000 for district heating and 400,000 to produce electricity in the Les Awirs power plant (Pieret, 2011). This means that in this region the annual consumption amounted to approximately 483,500 tons and that the current Walloon production can satisfy the domestic demand for Wallonia.
In the region of Flanders, in 2010 the industrial sector used 50,000 tons, 18,000 tons in the residential sector, and 1,000 tons in the tertiary sector, and generates electricity in a power plant with 400,000 tons (Guisson, 2009). This means that in this region the annual consumption amounted to approximately 470,000 tons.
Therefore, the demand for pellet in Belgium in 2010 amounted to approximately 940,000 tons.
The domestic pellet production in Belgium is therefore not able to satisfy this huge demand. It is noteworthy that in Flanders about 90% of the pellet used in the region comes from abroad. In Wallonia, more than the half of the pellets used is from outside. Power plants import almost all of pellets needs. They principally come from Canada, U.S. and Germany.
As European standards EN 14961-1 and EN 14961-2 were adopted at the European level, Belgium has to adapt its national standards. In the case of pellets, a Royal Decree was adopted on 5th April 2011. The objective of the Decree is to implement conditions to put on the market wood pellets for use in boilers and stoves, capacity less than 300 kW. On the other hand, the ENplus certification system continues its development. Up to now, pellets produced in Belgium generally fulfil the foreign standards (e.g. German DIN plus). Pellets imported in Belgium also fulfil general quality standards.

The greatest part of woodchips is used in the fiberboard and paper pulp industries. A significant part is also used to produce energy, but at the present time there is no accurate data on this market.

A number of operators are substituting all the coal feedstock with biomass. GDF Suez and its Electrabel subsidiary commissioned a 100% biomass power plant on the Rodenhuize site in September 2011 (Observ'ER, 2011). It took EUR 125 million to convert the existing coal-fired plant into a 100% biomass plant. The 180 MW capacity Rodenhuize plant will generate a volume of green electricity equivalent to the annual consumption of 320 000 families, thus reducing annual CO2 emissions by 1.2 million tonnes. The coal has been entirely replaced by wood pellets. Electrabel points out that these pellets are certified by an independent body as being sustainably-sourced. One-third of the supply will come from the Pacific BioEnergy production facility in Canada, which has secured a long-term contract with Electrabel to supply 225 000 tonnes of biomass per annum, to be shipped to the port of Ghent.

CHAPTER 7 BARRIERS & OPPORTUNITIES

7.1. BARRIERS AND OPPORTUNITIES SPECIFICALLY RELATED TO (INTERNATIONAL) BIOMASS TRADE[19]

Belgium has a limited-resource potential. Biomass importations will thus play a major role to reach national targets. In this situation, setting up sustainable and quality criteria will be necessary. This certification system could be a trade barrier if they are too restrictive as an opportunity by ensuring a good image. Despite the inland limited biomass resource potential, raw materials are exported due to a lack of demand to use these resources or a restrictive waste or/and environmental policy (i.e. domestic wastes or used oils valorisation).

One of the most important biofuel market is wood pellets trade. In Belgium, wood pellets are used to produce electricity in big Electrabel power plants (Wallonia: Les Awirs, Flanders: Rodenhuize) or to produce heat (public bodies, householders, etc.). Due to electricity production, wood pellets importations are huge in Belgium from Canada, North America and Germany principally. Wood pellets are mainly imported by boat. However, it can be noted that Belgian pellets are exported (estimated to 500 - 1,000 T/y) for private use to neighbouring countries, mainly France.

Supply network starts to be well developed: 50 providers are registered in Wallonia and 5 bulk trucks are working in Wallonia (ValBiom data). Before 2011, there was no certification system or quality controls implemented for pellets used by public or private bodies, only foreign norms were used: two producers are DINplus certified, some traders import only DINplus pellets. Consequently, bad quality pellets were available on the market for householders causing trouble to the whole chain. From a general point of view, the quality of Pellets produced in Wallonia is good (Depoorter *et al.*, 2009), whereas quality problems are observed with imported pellets. Consequently, quality starts to become a barrier due to numerous household boilers out of use. Wood pellets image get spoiled and consumers are gradually loosing trust in pellets. To resolve this problem, a federal law was adopted on 5th April 2011. The objective is to fix wood pellets quality criteria for private use. Regarding certification systems and quality controls, a certification system is working for pellets imported to produce electricity (Laborelec and SGS collaboration, see EUBIONET III- Belgium report on different criteria for sustainability and certification of biomass and solid, liquid and gaseous biofuels). Based on questionnaires to pellets traders for private use, more barriers are identified for this branch of the Belgian pellets trade. Some traders are only importing DINplus pellets. They report big difference of price between inland produced wood pellets and imported pellets without any explanation, slowing down importations of DINplus pellets for example. Consequently, good quality imported pellets are penalized. A price reference should be implemented as the CARMEN index in Germany. The current economic crises and the low fossil fuels prices slow down investments in wood energy projects, for householders but also in public or industrial sectors. Furthermore, regional governments decide to reduce subsidies to wood energy to encourage other RES. Pellets traders consider that Belgian situation is very bad for the moment and announce some redundancies could happen in a near future if the situation doesn't get better! The concurrence with other sawdust or wood chips users could be problematic in the future. Forest residues valorisation should be increased to reduce competition for raw material. However, wood

[19] Source: Eubionet III (http://www.eubionet.net).

production for an energetic valorisation is not the main objective of the forest management policy at all. Indeed, governments are very careful about this topic. The legal requirements for the Walloon forest exploitation mentioned that branches with a diameter less than 4 cm have to be left in site. Despite the quite well developed supply network, traders consider it should be more developed and implemented.

The distance between production unit and the consumer should be reduced. In addition, boat and/or railway transportations should be privileged. Transport pellets and storage costs are also important and storage capacities are not big enough for the moment to guarantee furnishing householders during hard winter conditions. Aware of this problem, some pellets producers have just make investments to increase their storage capacity. Logistic and supply networks should be developed and adapted to users' demand characteristics (storage capacities) to have a well adapted supply.

Energy audits should be achieved to promote only the best technologies. Financial support should be increased because best technologies are more expensive. A minimum fossil fuel price should be fixed to use the gain for financial support increments in RES projects. Service quality was not guaranteed and many boilers were out of use due to a wrong installation. The situation is improving, but one solution could be to create a real professional corporation qualified in biomass heat production systems (in particular wood) installation and management. Financial support should be allocated only to projects implemented by a trained installer.

People have to change their way of life by becoming responsible consumers: energy can become rare and thus has to be cautiously used. It is of major importance to follow up people awareness to favour RES use despite their currently higher cost.

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