

Country Reports

IEA Bioenergy: 09 2018

This report was prepared from the 2018 OECD/IEA World Energy Balances, combined with data and information provided by the IEA Bioenergy Executive Committee and Task members. Reference is also made to Eurostat. All individual country reports were reviewed by the national delegates to the IEA Bioenergy Executive Committee, who have approved the content. General background on the approach and definitions can be found in the central introductory report¹ for all country reports.

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NATIONAL POLICY FRAMEWORK IN BELGIUM

Belgium has a national binding target for renewable energy stated in the EU Renewable Energy Directive (2009/28/EC) to account for 13% of gross final energy consumption in 2020. The targeted shares of the three sectors heating/cooling, electricity and transport are shown in the table below.

Table 1: Belgium's 2020 renewable energy targets.

Sector	Share in gross final consumption per sector
Overall target	13 %
Heating and cooling	12 %
Electricity	21 %
Transport	10 %

Source: National Renewable Energy Action Plan of Belgium (2010)²

Energy policy responsibility in Belgium is divided between the federal government and the three regions (Flanders, Wallonia, and Brussels). Nuclear energy, offshore wind energy, high voltage electricity transmission and transport fuel pricing are federal responsibility. Apart from offshore wind and taxation of biofuels for transport, renewables policy is mainly the responsibility of the regions. The three regions of Belgium have adopted numerous policies and measures, including regional climate policy plans and strategies and programmes for low-carbon energy supply. Regions support renewable energy technologies through investment subsidies and green certificates. Additionally, the federal government

¹ Available at <https://www.ieabioenergy.com/iea-publications/country-reports/2018-country-reports/>

² <https://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans>

provides tax incentives (IEA country report Belgium 2016 Review).

In order to foster electricity production from renewable sources, green certificate schemes have been established. Electricity suppliers need to fulfil yearly quota for green power. If an overshoot of certificates is disturbing the market, grid operators are obliged to buy green certified power at minimum guaranteed prices. Criteria for the attribution of a green certificates and minimum prices are set by the federal government for offshore wind power and ocean power, and by the regional governments for all other kinds of renewable sources, including biomass.

Parallel to that, investment subsidy schemes exist in all regions in renewable energy projects.

In terms of biofuels, obligatory blending is ruled by the law for the incorporation of biofuels in fossil fuels (at federal level).

A detailed description of all fiscal and non-fiscal supports for bioenergy development is available at:

<http://www.iea.org/policiesandmeasures/renewableenergy/?country=Belgium>

TOTAL PRIMARY ENERGY SUPPLY (TPES) AND THE CONTRIBUTION OF BIOENERGY

The total primary energy supply of Belgium in 2016 amounted 2,366 petajoule (PJ) and is dominated by fossil fuels (70%). Oil products account for 40% of the energy consumption (943 PJ); and natural gas is contributing another 25% (599 PJ). The role of coal is limited to a little over 5% (124 PJ). Nuclear energy in nuclear power stations (which produce 53% of the electricity) represents 20% of total primary energy supply or 475 PJ. Renewable energy sources have a share of merely 6.9% or 164 PJ – 5.5% bioenergy and 1.4% other renewable energy sources. 22 PJ of electricity is imported, which represents 0.9% of Belgian TPES.

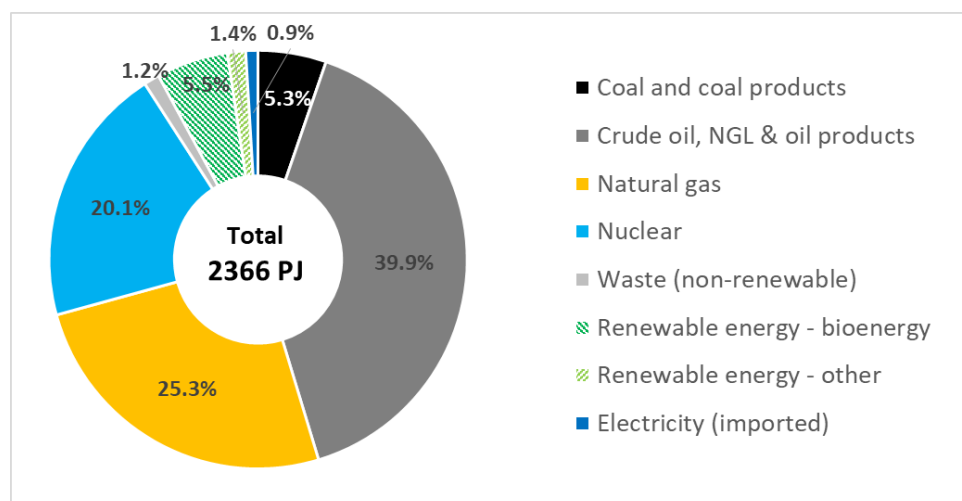


Figure 1: Total primary energy supply³ in Belgium in 2016 (Source: World Energy Balances © OECD/IEA 2018)

Compared to 5 years earlier (2011) the share of coal has gone down from 6.2% to 5.3%, and the share of nuclear from 22.4% to 20.1%. The share of oil products increased slightly from 38.4% to 39.9%. In the same period the share of renewable energy increased from 5.6% to 6.9%.

³ TPES underestimates the actual role of pure electricity sources like PV, wind or hydro energy, and overestimates the role of resources producing electricity with a high share of unused waste heat (like nuclear or condensing power plants).

The total primary energy supply of renewable energy sources is largely covered by energy from biomass, with 80% (131 PJ). Wind energy contributes 12% (20 PJ) and solar energy around 7% (12 PJ). Hydro energy amounts for 0.8% (1.3 PJ) and the role of geothermal energy is not significant.

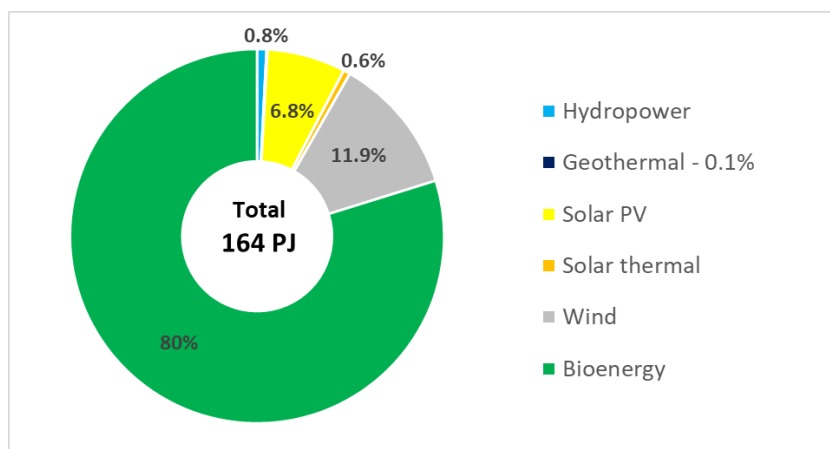


Figure 2: Total primary energy supply of Renewable Energy Sources in Belgium in 2016 (Source: World Energy Balances © OECD/IEA 2018)

Most of the bioenergy consumed in Belgium comes from solid biofuels; their share accounts for two thirds of the total use of bioenergy or 86 PJ. Solid biofuels include fuel wood, wood pellets and chips, bark and industry residues. 26 PJ of solid biomass are consumed by the residential sector. The other bioenergy types are biodiesel (17 PJ) followed by the renewable share of municipal waste (16 PJ). Biogas contributes 9 PJ and biogasoline 2 PJ.

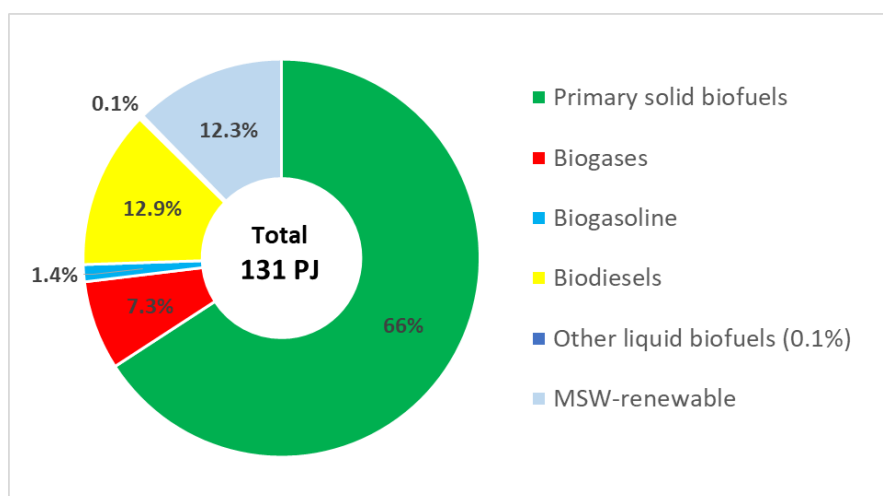


Figure 3: Total primary energy supply from bioenergy in Belgium in 2016 (Source: World Energy Balances © OECD/IEA 2018)

Bioenergy consumption in Belgium increased more than fivefold from 1990 to 2010, with the sharpest rise between 2005 and 2010 when the use of solid biomass almost doubled and liquid biofuels were established on the market. Since 2010 the share of bioenergy has increased modestly from 4.4% of TPES in 2010 to 5.5% in 2016. In 2014 there was a temporary drop in solid biomass use, and in 2015 for liquid biofuels, both related to market and regulatory circumstances. Both have recovered in 2016. Biogas has had average growth rates around 10% per year between 2005 and 2015, and seems to stabilize around 9 PJ. Since 2010 renewable MSW is fairly stable around 15 PJ.

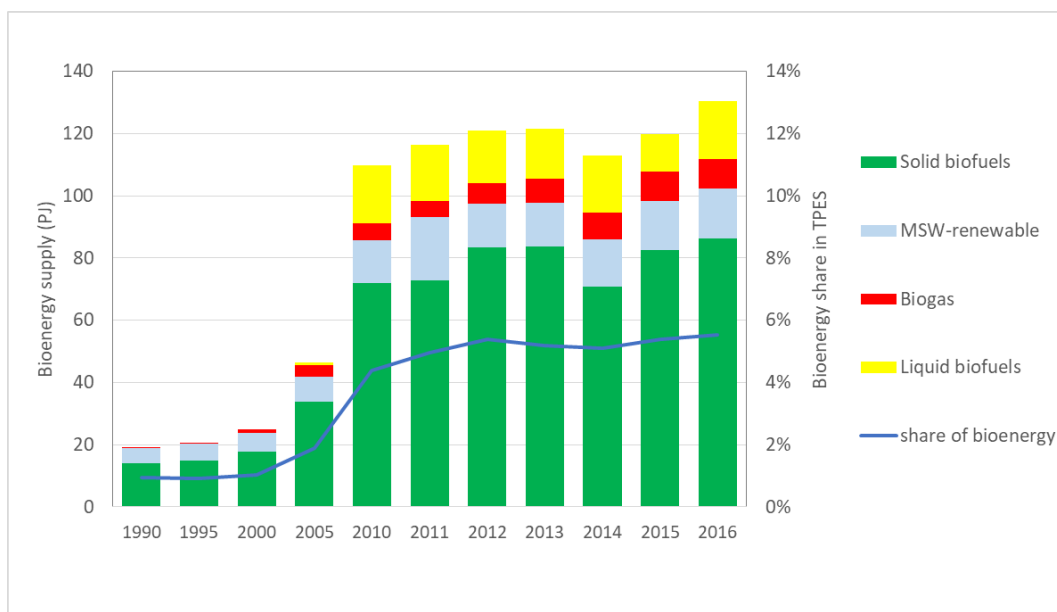


Figure 4: Development of total primary energy supply from bioenergy in Belgium 1990 – 2016 (Source: World Energy Balances © OECD/IEA 2018)

Table 2 expresses the 2016 TPES figures per capita, considering the Belgian population of 11.3 million people. Compared to the other 22 member countries of IEA Bioenergy (expressed per capita), Belgium is at the top 10 for renewable waste and biogas, and halfway for solid biofuels and liquid biofuels.

Table 2: Total primary energy supply per capita in 2016

	GJ/capita
Total energy	209.4
Bioenergy	11.6
Solid biofuels	7.6
Renewable MSW	1.4
Biogas	0.8
Liquid biofuels	1.7

Source: World Energy Balances © OECD/IEA 2018

Role of bioenergy in different sectors

Belgium has a modest share of renewable electricity (less than 20%), which is almost equally divided between electricity from biomass, solar energy and wind energy.

The share of biofuels for transport amounts 5%, which is around European average.

Overall, the direct share of biomass for heating in the different sectors is 8%, clearly lower than European average. In the residential sector biomass represents about 10% of fuel/heat consumption. Heat output generated and sold by CHP plants and heat plants represents only 3% of fuel/heat provided. This heat output is on average only 5% based on biomass.

Table 3: Role of bioenergy and renewable energy in electricity production, transport and heat consumption in 2016

Sector	Share of bioenergy	Share of renewable energy	Overall production/ consumption
Electricity production	6.3%	16.8%	84.4 TWh (304 PJ)
Transport energy (final consumption)*	4.9%	5.2%	380 PJ
Overall fuel and heat consumption⁴ *	8.0%	8.3%	744 PJ

Source: World Energy Balances © OECD/IEA 2018

According to Eurostat⁵, the following renewable energy shares in gross final energy consumption were reached in Belgium in 2016:

- Overall share: 8.7%
- In heating and cooling: 8.1%
- In electricity: 15.8%
- In transport: 5.9%

The electricity sector seems to be on track towards its 2020 target, but important additional efforts are still to be made in the other sectors (see Table 1).

⁴ This includes final consumption of fuels and heat in industry, the residential sector, commercial and public services and agriculture/forestry. Transport fuels are excluded. Energy used for transformation and for own use of energy producing industries is also excluded.

⁵ http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en

RESEARCH FOCUS RELATED TO BIOENERGY

In Flanders the bioenergy research has broadened its scope to bio-based value chains, not only making energy but also materials and chemicals from biomass. The following bio-based value chains in a bio-based economy receive important attention in research:

- Wood, more specific lignin based bio-refinery to bio-aromatics: Universities like KULeuven, UGent and research institutes like VITO and Bio Base Europe are researching possibilities of using lignin for production of bio-aromatics in a bio-refinery concept.
- The region of Flanders has at the moment 40 anaerobic co-digestion installations producing biogas. Research is focusing on the use of the digestate after the digestion. Under certain (environmental) restrictions, certified digestate can be returned to the agriculture fields. Research is focusing on separating parts of the wet fraction and converting these fractions into fertilizer and soil improvers, with similar characteristics. A first demonstration at full scale on ammonia stripping will be implemented.
- Around 2014-2015 there was an impressive evolution of the amount of pocket digestion installations of cattle manure. Research is going on to see if such kind of pocket digesters can also be used to process pig manure.
- Significant attention is given to research on the cascading principles in the use of biomass. As a general rule the use of biomass for non-energy applications (materials and chemicals) is favoured over use for bioenergy

Since 2013, Wallonia has been running an extra-programme for research in the field of anaerobic digestion. Main subtopics are:

- Digestate recycling;
- Biogas storage to promote flexible electricity generation;
- Biomethane injection into the natural gas network;
- Anaerobic pocket digestion development.

New projects have emerged on the following topics:

- Extraction of high added value molecules from raw materials, prior to their energy recovery.
- Microalgae production from digests. Algae are then dedicated to the production of biofuel.

RECENT MAJOR BIOENERGY DEVELOPMENTS

The region of Flanders intended to approve the permit and green certificate process for 2 large scale solid biomass combustion power plants: one new plant in the harbour of Ghent and a converted coal power plant in Langerlo (a complete transformation of a former coal combustion plant to a dedicated biomass power plant). Both would focus on producing electricity, with the possibility of heat delivery in a CHP configuration to be investigated. Total installed capacity of the two installations would be 550 MWe. However, the Flemish government decided in 2016 not to support the Ghent facility. Moreover, early 2017 the new owner of the Langerlo facility decided to stop the plant, and the conversion of this plant to biomass will not be pursued. This means that only two large scale biomass (wood pellet) power plants are operational in Belgium: one in Rodenhuis (205 MWe) in Flanders, which has recently been granted a five-year extension (post 2019) to run, and one in Les Awirs (80 MWe) in Wallonia. Both are largely running on imported (certified) wood pellets.

Flanders has a well-developed waste wood recycling policy and infrastructure. In recent years a surplus of postconsumer waste wood was available on the Flemish market due to a combination of factors (mild winters, surplus supply from the UK, and temporary decrease in demand for recycled wood in particle

board production). However prognosis foresees a turnover from surplus to deficit in local waste wood availability by 2020. The provisioned local supply amounts to 1.1 million tonnes per year and does not match the estimated demand of 2.2 million tonnes, leading to a potential import need of circa 1.0 million tonnes.

The aforementioned Flemish wood waste demand of 2.2 million tonnes is divided over material-recycling use (0.9 million tonnes) and waste wood for energy (1.3 million tonnes). The current combined waste wood for energy capacity is roughly 0.8 million tonnes, while by 2020 five new installations are provisioned with an additional capacity of 0.5 million tonnes per year. In view of climate and energy policy the implementation of CHP is stressed on towards 2020.

There are around 40 large-scale agricultural, industrial and domestic organic waste digesters in Flanders, using biogas in a CHP-engine, with a total installed power of 104 MWe. This number has stagnated since 2012.⁶ The growth path has probably reached its ceiling due to the limited availability of co-digestion feedstock streams. No new investments are expected in this sector.

From 2011 to 2015 anaerobic pocket digesters on cattle manure situated on farm scale (circa 10 kWe) have had an exponential increase: from 2 installations in Flanders in 2011 to 76 installations in 2015. One company developed a concept suitable and manageable for individual farmers. Export of this system is taking off.

Residential organic waste fraction is being collected separately in different regions in Belgium. Until recently the common practice was to compost the organic waste. At the moment local authorities are exploring the possibilities of investing in a pre-digestion installation producing biogas before composting the digestate. It is expected that the coming years a transformation of the residential waste sector could take place. There is currently enough separate waste collection to install circa 11 pre-digesters processing 60,000 tons organic waste per year. Biogas upgrading to biomethane is novel in Belgium. In March 2018, the erection of the first biomethane injection unit was started in Beerse. Additionally the bio-refinery potential of verge grass cuttings towards energy and materials is increasingly researched.

In Wallonia, four anaerobic digesters were added to the 49 already existing in 2017 (all ranges of powers). A unit is being built to treat the organic fraction of household waste, in addition to an existing one (26,000 tons/year). A legislation regulating the injection of biomethane into the network was also launched in 2017.

Small cogeneration from wood gasification units are now available on the market. Some have been installed to supply collective buildings. It should also be noted that small agro-fuel boilers (mostly miscanthus fuelled) are enjoying growing success on farms or for heating public buildings.

Wood in medium sized installations for heat production did not take off as forecasted. In the wood processing sector, wood combustion is often applied, but outside the sector no strong growth path can be seen.

Wood for residential heating is an important part of the renewable heat in Belgium. Historically this was the case and no changes are expected in the future. In Wallonia, an awareness campaign was launched to promote the proper use of logwood in domestic stoves. In Flanders a Green Deal is under negotiation to mitigate negative effects from residential wood combustion, with a focus on air quality effects.

In Flanders the Interdepartmental Working Group on Bio-economy is active on policy and action plan harmonization between the different relevant departments and administrations (energy, waste...).

⁶ <http://european-biogas.eu/2016/03/02/belgium-whats-new-in-the-biogas-sector-in-flanders/>

LINKS TO SOURCES OF INFORMATION

Energy Policies of IEA Countries - Belgium 2016 Review:

https://www.iea.org/publications/freepublications/publication/Energy_Policies_of_IEA_Countries_Belgium_2016_Review.pdf .

4th Renewable Energy Progress Report Belgium 2015-2016:

<https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>

Sustainable use and creation of value from renewable raw materials for biobased industrial production such as biomaterials and green chemicals in Flanders:

<http://www.vlaanderen.be/nl/publicaties/detail/sustainable-use-and-creation-of-value-from-renewable-raw-materials-for-biobased-industrial-production-such-as-biomaterials-and>

Actieplan biomassa reststromen 2015-2020: <http://www.ovam.be/actieplan-biomassa-reststromen-2015-2020>

Panorama des filières bois-énergie et agrocombustibles en Wallonie:

<https://energie.wallonie.be/fr/panorama-des-filieres-bois-energie-et-agrocombustibles-en-wallonie.html?IDC=6191&IDD=124279>

Panorama de la filière biométhanisation en Wallonie 2017: <https://energie.wallonie.be/fr/panorama-de-la-filiere-biomethanisation-en-wallonie-2017.html?IDD=124278&IDC=6191>

Green Deal domestic wood combustion (huishoudelijke houtverwarming) in Flanders:

<https://www.lne.be/green-deal-huishoudelijke-houtverwarming>

Report on sustainability criteria and an assessment framework for the use of woody biomass ('Rapport duurzaamheidscriteria en een afwegingskader voor de inzet van houtige stromen'):

<https://www.ovam.be/sites/default/files/atoms/files/Rapport-duurzaamheids-afwegingskader-houtige-stromen-DEF.pdf>