IEA Bioenergy

The Netherlands – 2018 update

Bioenergy policies and status of implementation

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 report[1] for all country reports.

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NATIONAL POLICY FRAMEWORK IN THE NETHERLANDS

The Dutch energy policy aims to secure energy supply for the future and reduce emissions from the energy sector. Future targets for renewable energy are governed by the European Directive on the promotion of the use of energy from renewable sources (Renewable Energy Directive, EU-RED, 2009/28/EC) which sets an obligatory target for renewable energy sources for the Netherlands at 14% share of final energy consumption by 2020. The National Renewable Action Plan (NREAP) outlines pathways which will allow them to meet their 2020 renewable energy, energy efficiency and GHG reduction targets. The expectation is that the renewable energy share could be 14.5% in gross final energy consumption in 2020, with a split in sectors as displayed in the table below.

Table 1: *The Netherlands´s 2020 renewable energy targets.*

Sector	Expected share	Targets set in the RED and the NREAP
Overall target	14.5%	14.0%
Heating and cooling	8.7%	
Electricity	37%	
Transport[2]	16%	10%

Source: National Renewable Energy Action Plan (NREAP) of the Netherlands (2010)[3]

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

[2] This includes multiplication factors which can be applied for several types of options (advanced/waste based biofuels, renewable electricity in road vehicles).

[3] https://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans

The European objective of 14% renewable energy in 2020 and the raised objective for 2023 of 16% in the Dutch Energy Agreement are the official targets. In 2013 this Energy Agreement[4] was established by different stakeholders (NGOs, government, industry) to agree on a pathway to realise the 14% Renewable Energy target in 2020 and 16% in 2023. Important pillars of this agreement are doubling the energy efficiency, increased solar and wind energy (10 times more) and also doubling the share of bioenergy.

In order to achieve these targets the Netherlands established a comprehensive legal and administrative framework nurturing deployment of renewables with a number of complementary financial, fiscal and promotional measures, like feed-in premium (SDE and SDE+), biofuels obligation, research support and green deals.

The 'Stimuleringsregeling Duurzame Energieproductie' – **SDE+** [Incentive Scheme for Sustainable Energy Production] initiates a new system of feed-in premium allocation subsidising renewable energy in the electricity, heat and gas sectors. It supports all different kinds of renewable energy. For co-firing of solid biomass in coal-fired power plants a cap of 25 PJ of only sustainable biomass has been agreed. Given the current lack of EU binding sustainability criteria[5] for solid biomass and sustainability risks which might emerge from imported solid biomass, the Netherlands has developed an advanced sustainability scheme[6] and accompanying sustainability requirements for the use of solid biomass in industrial steam boilers (>5MW), wood pellet burners (≥ 5 MW_{heat} and ≤ 100 $MW_{electricity}$) and for co-firing in coal fired power plants[7]. Biomass suppliers and bioenergy producers who wish to receive a SDE+ subsidy, need to demonstrate that the biomass meets the legal sustainability requirements. Those are requirements of greenhouse gas emissions reduction, requirements for carbon and land use changes, requirements for sustainable forest management and requirements for the chain of custody. Sustainability proofs can be demonstrated by either certification schemes approved by the Minister of Economic Affairs and Climate Policy or a combination of certification and verification, or third-party verification.

The SDE+ provides a feed-in premium[8] (FIP) subsidy that covers the difference between wholesale market prices of electricity and the cost of electricity from renewable sources. The budget is made available in auctions where the lowest bidder is awarded an 8 – 15 year contract first. The budget comes from a levy on the energy consumers (see footnote 4). Regarding imported solid biomass for co-firing, the final years of the MEP contracts from 2013 resulted in about 600 ktons of wood pellet imports in 2013, decreased to 200 ktons in 2014 and was negligible in 2015 and 2016. The bioenergy produced from solid biomass increased again in 2017 and continues a higher pace in 2018 thanks to available SDE+ budget. Import will pick up again in 2018, under the new sustainability scheme.

Furthermore, the Renewable Energy Directive (RED) has been implemented by the **Dutch Decree on Energy in Transport**. The change of the RED by the iLUC Directive is implemented by an amendment of this Decree, published end of May 2018 and intended retroactive to 1 January 2018. First of all this law obliges fuel suppliers bringing fuels on the Dutch market to sell a certain share of biofuels on the market based on the energy content, which will increase in the coming years. In 2018, a limit to conventional biofuels and an obligation for advanced biofuels are introduced. Suppliers of liquid and gaseous biofuels must demonstrate European binding sustainability criteria for the whole biofuel supply chains. Biofuel sustainability can be proved by certification through voluntary schemes recognised by the European Commission. The Dutch certification system NTA 8080 (or Better Biomass) is popularly used for biogas certification whilst ISCC EU is applied for most of liquid biofuels.

[4] https://www.ser.nl/en/publications/publications/2013/energy-agreement-sustainable-growth.aspx

[5] As part of the RED-II, mandatory sustainability requirements for solid biomass have been decided, but these will likely only come into effect after 2020.

[6] https://english.rvo.nl/subsidies-programmes/sde/sustainability-criteria

[7] https://www.rvo.nl/onderwerpen/duurzaam-ondernemen/duurzame-energie-opwekken/bio-energie/duurzaamheid-van-vaste-biomassa

[8] http://english.rvo.nl/subsidies-programmes/stimulation-sustainable-energy-production-sde

***Table 2**: Biofuel obligations for fuel suppliers based on energy content 2010-2020*[9]

	2010	2018	2019	2020
Total obligation	4.0%	8.5%	12.5%	16.4%
Limit conventional		3%	4%	5%
Obligation advanced*		0.6%	0.8%	1.0%

**including double counting mechanism for these types of fuels*

The law also prescribes that biofuels are only allowed to count towards the target in case these meet the sustainability criteria of Article 17 of the RED and provides the possibility of double-counting biofuels from waste and residues.

In 2017 the government has set a target of 49% GHG reduction in 2030 and in 2018 a Climate Agreement will be formulated as a follow-up of the Energy Agreement.

A detailed description of all fiscal and non-fiscal supports for bioenergy development is available at: http://www.iea.org/policiesandmeasures/renewableenergy/?country=netherlands

[9] Source: http://wetten.overheid.nl/BWBR0040922/2018-07-01

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

The total primary energy supply of the Netherlands in 2016 amounted to 3,115 petajoule (PJ) and is still overwhelmingly dominated by fossil fuels (92%): 1,257 PJ natural gas, 1,181 PJ oil products, 427 PJ coal products and a small fraction of non-renewable waste of 36 PJ. 18 PJ of electricity is imported, which represents 0.6% of Dutch TPES. Renewable energy sources have a share of 5.1% or 158 PJ – 3.8% bioenergy and 1.3% other renewable energy forms.

Compared to 5 years earlier (2011) the share of natural gas has gone down from 44.2% to 40.3%. In the same period the share of coal increased from 9.5% to 13.7%, while the share of oil products, nuclear energy and waste remained stable, and the share of renewable energy increased from 4.2% to 5.1%.

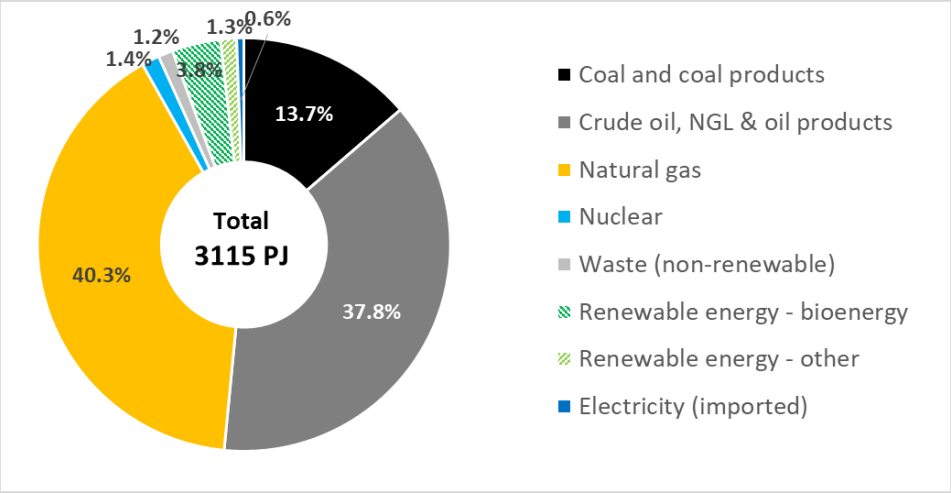

Figure 1: Total primary energy supply in the Netherlands in 2016 (Source: World Energy Balances © OECD/IEA 2018)

The total primary energy supply of renewable energy sources is for three quarters covered by energy from biomass, with 119 PJ. Wind energy contributes almost 20% with 29 PJ and solar energy 7 PJ. Geothermal energy accounts for 3 PJ, while the role of hydropower is not significant.

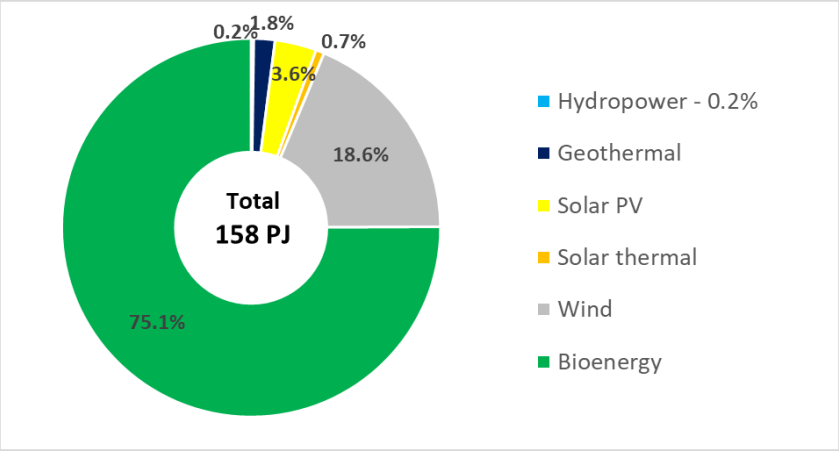

Figure 2: Total primary energy supply of Renewable Energy Sources in the Netherlands in 2016 (Source: World Energy Balances © OECD/IEA 2018)

The two biggest sources of bioenergy in the Netherlands are solid biomass (51 PJ), of which 19 PJ solid biomass are consumed in the residential sector, and renewable municipal waste (42 PJ). 11.5% are coming from biogas (13 PJ), 5.6% from biodiesel and 4.6% from biogasoline.

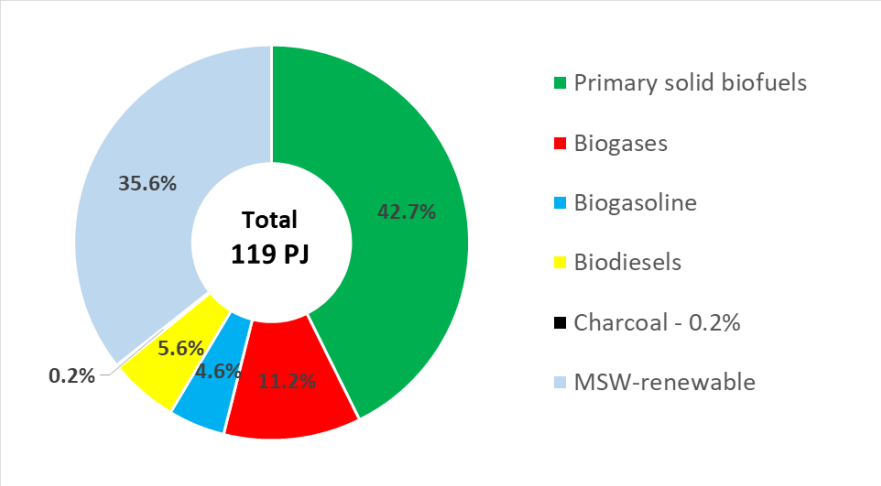

Figure 3: Total primary energy supply from bioenergy in the Netherlands in 2016 (Source: World Energy Balances © OECD/IEA 2018)

Bioenergy consumption in the Netherlands more than doubled between 2000 and 2010 with a high increase of solid biomass and biogas and the establishment of liquid biofuels on the market. In this period the share of bioenergy in TPES increased from 1.7% to 3.4%. Since 2010 the share of bioenergy has stabilized around 3.8% - the use of solid biomass dropped from 60 PJ to 50 PJ after 2012 because of a reduction in biomass co-firing, while biogas and renewable waste remained fairly constant at 13 PJ and 40 PJ respectively. Consumption of liquid biofuels fluctuates between 10 and 15 PJ since 2011.

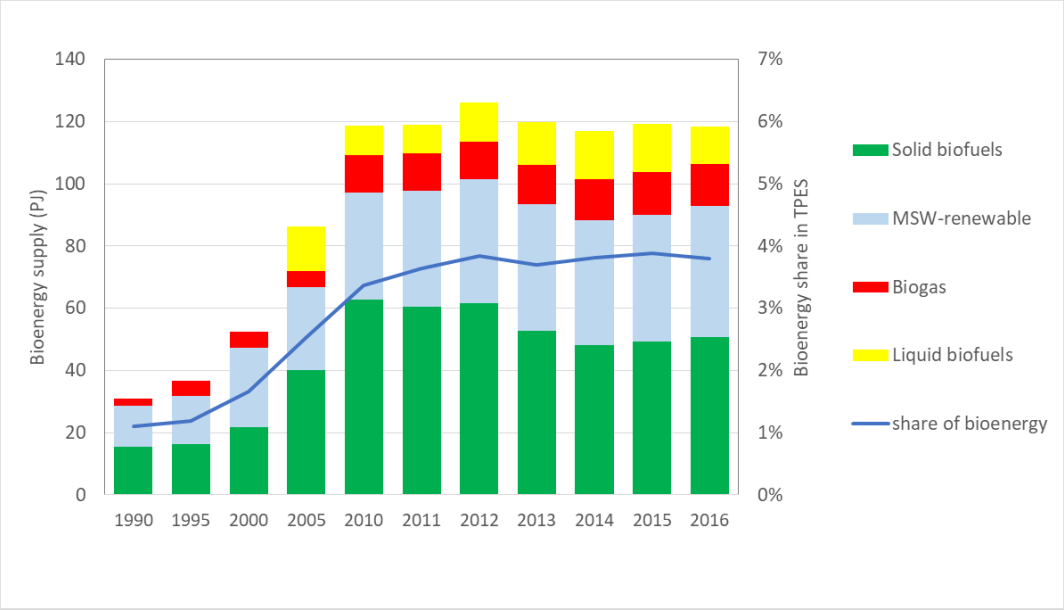

Figure 4: Development of total primary energy supply from bioenergy in the Netherlands 1990 – 2016 (Source: World Energy Balances © OECD/IEA 2018)

Table 2 expresses the 2016 TPES figures per capita, considering the Dutch population of 17.03 million people.

Compared to the other 22 member countries of IEA Bioenergy, the Netherlands ranks in the top 5 for renewable MSW, in the top 10 for biogas, halfway for liquid biofuels, and in the low end for solid biofuels. The latter is linked to the low amount of forests in the Netherlands and the high population density. Nevertheless, the Netherlands will likely import up to 3.5 million tons of woody biomass between 2019 and 2024 for co-firing in coal power plants (which may partially also be converted to 100% biomass plants over time).

Table 3: Total primary energy supply per capita in 2016

	GJ/capita
Total energy	183.3
Bioenergy	7.0
Solid biofuels	3.0
Renewable MSW	2.5
Biogas	0.8
Liquid biofuels	0.7

Source: World Energy Balances © OECD/IEA 2018

Role of bioenergy in different sectors

The Netherlands has a modest share of renewable electricity, more than half of renewable electricity is produced by wind energy and a third by bioenergy.

The share of biofuels for transport amounts around 2.5% for 2016, which is below the European average. Remarkably, more than two thirds of all road transport fuels deployed in the Netherlands was biodiesel based on used cooking oil (61%) and animal fats (7%). The remainder was mainly ethanol from wheat, corn, sugarcane and sugar beet (in order of decreasing contribution). In both 2016 and 2017, no soy oil and palm oil was used in the Netherlands as feedstock for road transportation (Source: Dutch emission authority, NEA)[10].

Table 4: Role of bioenergy and renewable energy in electricity production, transport energy consumption and fuel/heat consumption in 2016

Sector	Share of bioenergy	Share of renewable energy	Overall production/ consumption
Electricity production	4.3%	12.8% (7.1% wind)	115 TWh (415 PJ)
Transport energy (final consumption)	2.3%	2.5%	436 PJ
Overall fuel and heat consumption[11]	Direct biomass: 3.3% Biobased heat: 1.0%	4.7%	1,048 PJ

Source: World Energy Balances © OECD/IEA 2018

Overall, the direct share of biomass for heating in the different sectors is around 3.3%. Heat output generated and sold by CHP plants and heat plants represents around 9% of fuel/heat provided, of which

[10] https://www.emissieautoriteit.nl/actueel/nieuws/2018/07/04/groei-biobrandstoffen-zet-door-afvalstromen-leveren-belangrijkste-bijdrage

[11] 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.

on average 11% is produced from biomass. In the residential sector biomass represents about 6% of fuel/heat consumption, mainly in the form of small stoves. Biomass based electricity is produced through co-firing of biomass in coal power plants, combustion of the organic fraction of MSW, and through smaller dedicated plants producing electricity (and heat) from wood or biogas.

According to Eurostat[12], the following renewable energy shares in gross final energy consumption were reached in the Netherlands in 2016:

- Overall share: 6.0%
- In heating and cooling: 5.5%
- In electricity: 12.5%
- In transport: 4.6%

Most sectors are still relatively far from their 2020 target (see Table 1), so significant additional efforts are still to be made. Mind that some of these figures can differ from the IEA derived data because of different accounting rules, particularly for renewable energy in transport (double counting of waste and residue based biofuels).

For the coming two decades, the latest publication of the Dutch national energy scenarios (Nederlandse Energieverkenningen, NEV) shows that the main increase in renewable energy consumption will be due to the development of mainly offshore wind, onshore wind and solar energy. Nevertheless, the contribution of bioenergy is still to more than double from the current level to 2025, and also is expected to still make a sizeable contribution by 2035 (see *Figure 5*).

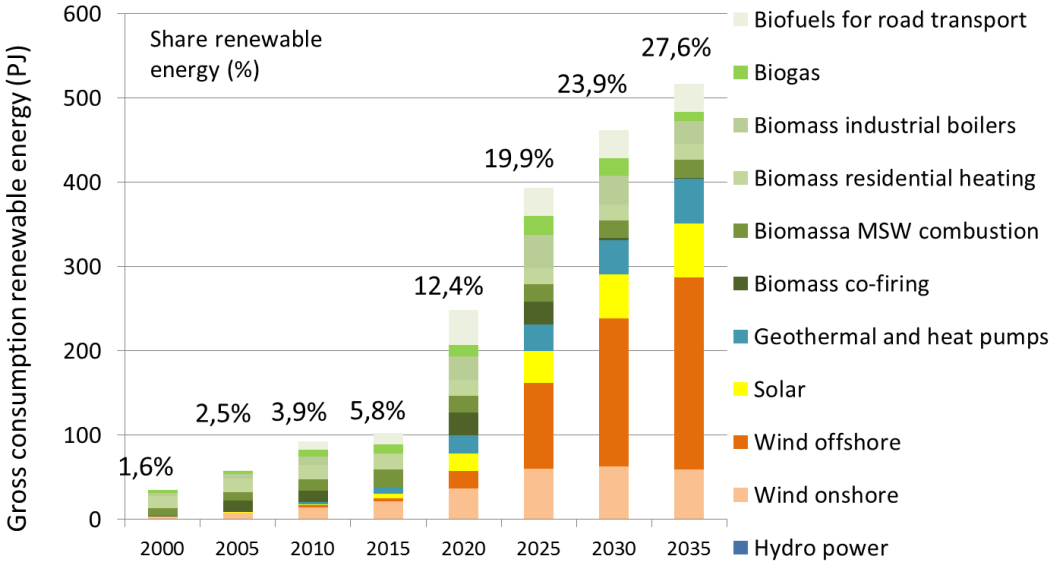

Figure 5: Past and expected future development of renewable energy in the Netherlands until 2035. (Source: Nationale Energieverkenningen, PBL, 2017)

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

RESEARCH FOCUS RELATED TO BIOENERGY

In 2015 a new Research Agenda for the Biobased Economy was produced by the Top Consortium for Knowledge and Innovation BioBased Economy: TKI-BBE[13]. The TKI-BBE operates within the Top sector Chemistry and Top sector Energy. Besides energy, biomass streams can also be used for materials. By separating biomass into fractions, and by valorisation of the molecular capital, financial gains are enhanced, and at the same time the use of fossil fuels in the chemical sector is reduced. The TKI BBE stimulates the development of this bio-cascading. The Research Agenda[14] is being developed via existing programme lines of the TKI BBE. These programme lines are linked to the relevant Top Sectors. They cover i) thermal conversion from biomass; ii) chemical catalytic conversion technologies; iii) biotechnological conversion technologies and iv) solar capturing (and biomass production).

Table 5: R&D Support in the Netherlands in EUR million (TKI-BBE)

	Investments in R&D (by industry, research institutes and government)					Governmental Support				
	2012	**2013**	**2014**	**2015**	**2016**	**2012**	**2013**	**2014**	**2015**	**2016**
Fiscal	175.0	210.0	231.0	196.0	215.0	24.6	34.8	34.0	30.0	38.0
Top sector support	76.3	37.8	51.8	74.3	102.2	37.5	16.4	27.0	37.8	46.1
Fundamental research						14.1	17.4	17.1	21.1	14.5
Total	251.3	247.8	282.8	270.3	317.2	76.2	68.6	78.1	88.9	98.6

RECENT MAJOR BIOENERGY DEVELOPMENTS

Green Growth, Circular Economy, Innovation and Biobased Economy are important pillars of the development of bioenergy in the Netherlands. A Biomass Vision 2030 was developed and sent to the Parliament in March 2016. In 2017 the Transition Agenda Biomass and Food was developed and sent to the Government in January 2018. The main elements are a steady growth in sustainable biomass production and integrated use for materials, biofuels for transport and high temperature heating. Sustainability is crucial and will constraint the exploitation of biomass, because of concerns about soil quality, nutrient balancing, biodiversity and food supply.

Major demonstrations of new technologies either exist or are under development, like the Empyro pyrolysis plant[15] (), the Avantium bio-MEG plant[16] and the BioBTX pilot plant[17].

[13] http://www.kennisnetbiobased.nl/nl/biobasedeconomy/Innovatie-en-onderzoek.htm (Dutch)
[14] https://www.topsectorenergie.nl/sites/default/files/uploads/BBE/Kennis-en-Innovatie-agenda-2016-2019-Biobased-Economy.pdf
[15] http://www.empyroproject.eu
[16] https://www.avantium.com/in-the-media/avantium-starts-construction-of-bio-meg-demonstration-plant-in-the-netherlands/
[17] https://www.biobtx.nl/

LINKS TO SOURCES OF INFORMATION

http://www.iea.org/policiesandmeasures/renewableenergy/

http://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans

http://www.iea.org/publications/countryreviews/

https://www.rijksoverheid.nl/documenten/rapporten/2018/07/03/bijlage-1-rapportage-energie-voor-vervoer-in-nederland-2017

http://www.pbl.nl/publicaties/nationale-energieverkenning-2017

https://www.emissieautoriteit.nl/actueel/nieuws/2018/07/04/groei-biobrandstoffen-zet-door-afvalstromen-leveren-belangrijkste-bijdrage