NETHERLANDS

Country at a glance

- Population: 16.61 million (2010) [1]
- Total area: 41,543 sq. km [2]
- Carbon emissions per capita: 11.26 metric tons (2010) [3]
- Energy consumption per capita: 60 MWh (2010) [4]
- Percentage of global carbon emissions: 0.62% (2010) [3]

Houtribdijk (Markerwaarddijk) - a dam between IJsselmeer and Markermeer by GerardM. Permission Under CC BY-AS 3.0 License. upload.wikimedia.org/wikipedia/commons/9/9f/Houtribdijk.jpg

Houtribdijk Dam in Netherlands

This 27km dam connects the cities of Lelystad and Enkhuizen. It separates two large inland freshwater lakes which were formed by building another dam across the mouth of a huge sea lagoon. The lakes act as reservoirs for freshwater and are also used for flood control – particularly needed if sea levels rise. These large civil engineering works also resulted in some land reclamation.

Table 1 Breakdown of energy use, electricity and heat generation, 2010

	Primary energy sourced within country		Energy imports minus exports	Primary energy used within the country[a]			Electricity Generation[b]		Heat Generation[c]	
unit	ktoe	%	ktoe	ktoe	GWh	%	GWh	%	GWh	%
Coal, including brown coal & peat	0	0	9,238	7,599	88,380	9	25,798	22	5,575	14
Oil fuels	1,684	2	45,716	31,488	366,208	38	1,253	1	1,483	4
Natural gas	63,414	91	-24,204	39,195	455,840	47	74,202	63	30,506	75
Nuclear	1,034	1	0	1,034	12,029	1	3,969	3	0	0
Hydroelectric	9	0	0	9	105	0	105	0	0	0
Biofuels and waste	3,231	5	176	3,468	40,330	4	8,606	7	3,264	8
Solar photovoltaics	5	0	0	5	60	0	60	0	0	0
Solar thermal	24	0	0	24	278	0	0	0	0	0
Tide, wave and ocean	0	0	0	0	0	0	0	0	0	0
Wind	343	0	0	343	3,994	0	3,993	3	0	0
Geothermal	8	0	0	8	88	0	0	0	0	0
Electricity (imported)	0	0	239	239	2,776	0	0	0	0	0
Sub total Renewables	3,620	5	176	4,891	44,855	5	12,764	11	3,264	8
Totals	**69,752**	**100**	**31,165**	**83,413**	**970,089**	**100**	**117,986**	**100**	**40,829**	**100**

Source: Based on World Energy Statistics and Balances Database 2012, "World Energy Balances." © OECD/IEA, 2012.

Notes:

Standard conversion used is 1 ktoe = 11.63 GWh

(a) Sum of energy sourced within country, energy imports minus exports, international marine and aviation bunkers and stock change flows.

(b) Includes all electricity generation, including any exported.

(c) Does not include electrical heating. Includes waste heat recovery from electicity generation plants.

Table 2 Breakdown of transport fuel use, 2010

(in ktoe)	Total transport mix	%	Domestic aviation	Road	%	Rail	Pipeline transport	Domestic navigation	Non-specified (transport)
Oil products	11,139	97	50	10,898	98	34	0	158	0
Natural gas	11	0	0	11	0	0	0	0	0
Biofuels and waste	229	2	0	229	2	0	0	0	0
Electricity	149	1	0	0	0	148	0	0	0
Sub total Renewables	229	2	0	229	2	0	0	0	0
Total	**11,527**	**100**	**50**	**11,138**	**100**	**182**	**0**	**158**	**0**

Source: Based on World Energy Statistics and Balances Database 2012, "World Energy Balances." © OECD/IEA, 2012.

Stand on climate change

The Netherlands signed the Kyoto Protocol on 29 April 1998 and ratified it on May 31 2002. It was later entered into force on 16 February 2005.

National climate change programmes

The Netherlands aims to reduce CO_2 emissions by 80-95% by 2050 as compared to the 1990 levels. In order to do so, the Dutch Government has set policies that encourage the use of renewable energy sources (RES) on a large scale in the long term.

The following are short-term goals that the Dutch Government has set in order to reduce carbon emissions as well as encourage large-scale usage on RES:

- 20% reduction in CO_2 emissions by 2020 as compared to 1990 levels [5].

The Netherlands aims to cut CO_2 emissions by 20% by 2020 and then 80% to 95% by 2050 (compared with levels of 1990). There are three main objectives in Dutch energy policy, i.e. the energy supply must be sustainable, reliable and affordable. RES play a vital part of the plan, but at the moment are still relatively expensive. The Dutch Government is therefore pursuing an innovation policy to drive down the cost of RES and encourage large-scale application of renewables in the long term.

- 14% of overall energy requirements to come from RES by 2020 [6].

In order to become a low-carbon economy in the longer term (2050), the Dutch government is promoting innovation in the field of sustainable energy technology. The target is to achieve 14% of overall energy supply from sustainable sources by 2020. In 2010, RES accounted for 4% of total Dutch energy consumption. By 2020, the Government plans to increase this percentage to 14. This increase must however take place in an economically responsible manner and must not result in excessive costs. Innovation is necessary to enable renewables to compete with grey energy in the long term (2050 onwards). The Government wishes to help, not by offering expensive and ineffective operating grants, but by promoting innovation, among other things through the renewable energy incentive schemes.

- 20% energy saving by 2020 [7].

To achieve this, the government has introduced fiscal measures, stricter energy requirements for buildings and agreements with private sectors and other measures. By 2020, all new buildings must be energy neutral. Houses will then produce (almost) as much energy as they consume (connecting solar energy to the national grid).

The Dutch Government further incorporated the following into their Climate and Energy Package by including provisions for RES [8].

- Bio-energy

Bio-energy is energy generated from organic material (biomass). Biomass can be used as a raw material for the production of renewable electricity, green gas, renewable heat and biofuel for vehicles. It is important that the biomass is sustainable, which is to say that it does not compete with the production of food crops.
Biomass currently accounts for around 62% of sustainable energy production in the Netherlands. The Government believes the Netherlands can become a world centre for sustainable biomass applications in the chemical and energy sectors.

- Transport

The Dutch Government plans to increase biofuel content in petrol by 10% by 2020, following the European Directive on Renewable Energy. This 10% may also be supplemented with other forms of renewable energy, such as sustainably generated electricity or biogas. The Netherlands has opted to gradually increase the percentage of biofuels at the pump over the coming years: a quarter percent in 2011 and 2012, and a half percent in 2013 and 2014. This provides more time to develop even more sustainable (second generation) biofuels (based on waste materials). At the same time, the Government is promoting electric vehicles: by 2025 it hopes there will be a million electric cars on Dutch roads.

- Onshore wind

In the coming years, onshore wind will remain one of the most inexpensive ways of producing renewable energy. The Dutch Government's target is 6000 megawatts installed power capacity from onshore wind turbines by 2020. Currently, 2000 onshore wind turbines provides around 4% of the total Dutch electricity requirement.
The Netherlands' flat and windswept countryside make it highly suitable for wind energy. The Government wants to greatly increase wind energy capacity in the coming years. Government policy increasingly aims for groups of wind turbines on carefully selected sites. Open landscapes where there is plenty of strong wind therefore take precedence (industrial and port areas, agricultural complexes, open water).

Two large windfarms are currently being developed in Flevoland and in the Noordoostpolder. The wind farm in the Noordoostpolder can supply 400,000 households (almost a million people) with electricity.

- Offshore wind

Offshore wind energy is still too expensive to play a significant role in the energy supply. This may change in the future, as innovation can greatly drive down costs. There are currently two Dutch offshore wind farms, producing a total of 228 megawatts:

1. The Near Shore Windpark lies off the coast of Egmond aan Zee. It has 36 turbines and a total output of 108 megawatt.
2. The Prinses Amalia windfarm lies off IJmuiden, with 60 turbines and a total output of 120 megawatts.

The Netherlands has applied to the European Commission for a subsidy to develop an innovative offshore windfarm to serve as a test site. The FLOW-programme, is another testing ground for innovative foundation techniques for wind turbines and other innovations in the North Sea.

Ministries involved in climate change/energy policy making:

Ministries involved	Web links
Ministry of Foreign Affairs	**www.government.nl/ministries/bz**
Ministry of Infrastructure and Environment	**www.government.nl/ministries/ienm**
Ministry of Education, Culture and Science	**www.government.nl/ministries/ocw**
Ministry of Finance	**www.government.nl/ministries/fin**
Delta Programme Commission	**www.deltacommissaris.nl/english/**

Education institutes involved in climate change/energy policy making:

Ministries involved	Web links
Energy Research Centre of the Netherlands	**www.ecn.nl/home/**
Netherlands Environmental Assessment Agency	**www.pbl.nl/en**
National Institute of Public Health and the Environment (RIVM)	**www.rivm.nl/en/**
Royal Netherlands Meteorological Institute	**www.knmi.nl/index_en.html**
Research School for Socio-Economic and Natural Sciences of the Environment	**www.sense.nl/**

References

[1] "World Population Prospects: The 2010 Revision." Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

[2] "CIA - The World Factbook." Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/th.html. [Accessed: 12-Mar-2013].

[3] CO_2 Emissions from Fuel Combustion Statistics database 2012, "Indicators for CO_2 emissions." © OECD/IEA, 2012.

[4] World Energy Statistics and Balances database 2012, "World Energy Balances." © OECD/IEA, 2012.

[5] Government of the Netherlands – Energy in the future. Available at: http://www.government.nl/issues/energy/energy-in-the-future

[6] Government of the Netherlands – Towards low carbon energy management. Available at: http://www.government.nl/issues/energy/energy-in-the-future

[7] Government of the Netherlands – Reducing carbon emissions. Available at: http://www.government.nl/issues/energy/energy-in-the-future

[8] Government of the Netherlands – Sustainable energy. Available at: http://www.government.nl/issues/energy/sustainable-energy

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