



## Country profile – Denmark

The section 'Key climate- and energy-related data' was prepared by the EEA. It includes the latest data available as of 31 July 2014

The section 'Climate and energy policy framework' was prepared by eclareon and Ecologic Institute, Germany. It includes the latest information on national policies and measures available as of 31 May 2014.

For methodological details and other country profiles, see [www.eea.europa.eu/themes/climate/country-profiles](http://www.eea.europa.eu/themes/climate/country-profiles).

## Key climate- and energy-related data — Denmark

Key data on GHG emissions	2005	2011	2012	2013	EU 2012
Total GHG emissions (UNFCCC, Kyoto Protocol) (Mt CO <sub>2</sub> -eq.)	64.1	56.5	51.6	53.2	4 544.2
GHG per capita (t CO <sub>2</sub> -eq./cap.)	11.8	10.2	9.3	9.5	9.0
GHG per GDP (g CO <sub>2</sub> -eq./PPS in EUR)	426	322	288	293	350
Share of GHG emissions in total EU-28 emissions (%)	1.2 %	1.2 %	1.1 %	1.2 %	100 %
EU ETS verified emissions (Mt CO <sub>2</sub> -eq.)	26.5	21.5	18.2	21.6	1 848.6
Share of EU ETS emissions in total emissions (%)	41 %	38 %	35 %	41 %	41 %
ETS emissions vs allowances (free, auctioned, sold) (%)	- 29.0 %	- 9.9 %	- 32.3 %	- 18.1 %	- 14.1 %
Share of CERs & ERUs in surrendered allowances (%)	0.0 %	13.8 %	43.6 %	n.a.	26.4 %
Non-ETS (ESD) emissions, adjusted to 2013–2020 scope (Mt CO <sub>2</sub> -eq.)	37.5	34.9	33.3	31.5	2 566.6
Key data on renewable energy	2005	2010	2011	2012	EU 2012
Share of renewable energy in gross FEC (%) ( ) = including all biofuels consumed in transport	(15.6 %)	(22.6 %)	24.0 %	26.0 %	14.1 %
Share of renewable energy for electricity (%)	24.7 %	32.7 %	35.9 %	38.7 %	23.5 %
Share of renewable energy for heating and cooling (%)	22.1 %	30.7 %	31.8 %	33.3 %	15.6 %
Share of renewable energy for transport (%) ( ) = including all biofuels consumed (%)	(0.2 %)	(0.9 %)	3.8 %	5.8 %	5.1 %
Key data on energy consumption	2005	2010	2011	2012	EU 2012
Primary energy consumption (Mtoe)	19.3	19.9	18.5	17.9	1 584.8
Primary energy consumption per capita (Mtoe/cap.)	3.6	3.6	3.3	3.2	3.1
Final energy consumption (Mtoe)	15.5	15.2	14.5	14.1	1 104.5
Final energy consumption per capita (Mtoe/cap.)	2.9	2.7	2.6	2.5	2.2
Efficiency of conventional thermal electricity and heat production (%)	73.4 %	74.2 %	75.5 %	79.8 %	50.0 %
Energy consumption per dwelling by end use	2005	2009	2010	2011	EU 2011
Total energy consumption per dwelling (toe/dwelling)	1.80	1.70	1.63	n.a.	1.42
Space heating and cooling (toe/dwelling)	1.50	1.43	1.35	n.a.	0.96
Water heating (toe/dwelling)	0.00	0.00	0.00	n.a.	0.18
Cooking (toe/dwelling)	0.03	0.03	0.03	n.a.	0.08
Electricity (lighting, appliances) (toe/dwelling)	0.27	0.25	0.25	n.a.	0.20

**Progress towards GHG targets (under the Effort Sharing Decision, i.e. non-ETS emissions)**

2013 ESD target (% vs base year)	- 3.4 %	2020 ESD target (% vs base year)	- 20.0 %
2013 ESD emissions (% vs base year)	- 15.0 %	2020 ESD projections WEM (% vs base year)	- 21.6 %
		2020 ESD projections WAM (% vs base year)	n.a.

Based on approximated emission estimates for 2013, emissions covered by the Effort Sharing Decision (ESD) (i.e. in the sectors which are not covered by the EU ETS) are expected to be below the annual ESD target in 2013. Projections also indicate that 2020 ESD emissions are expected to be below the 2020 ESD target, with the current existing measures.

**Progress towards renewable energy targets**

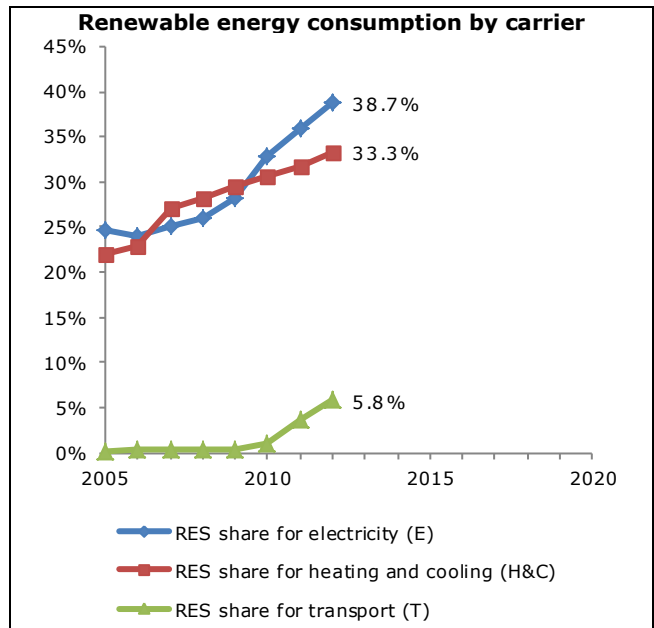
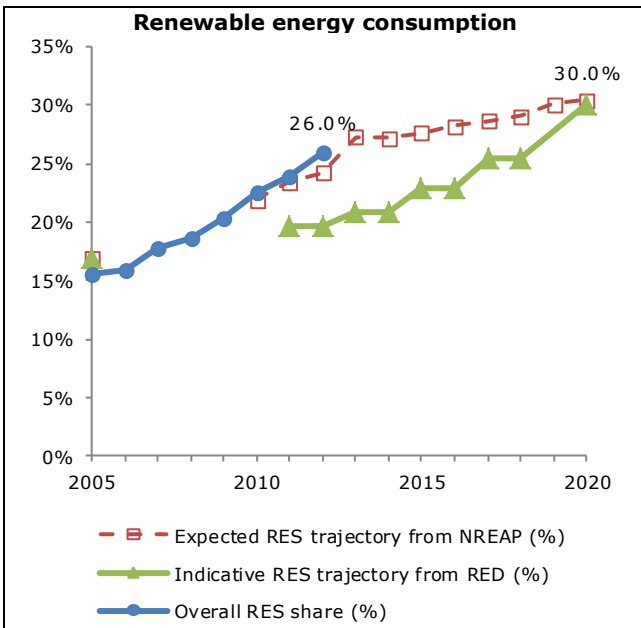
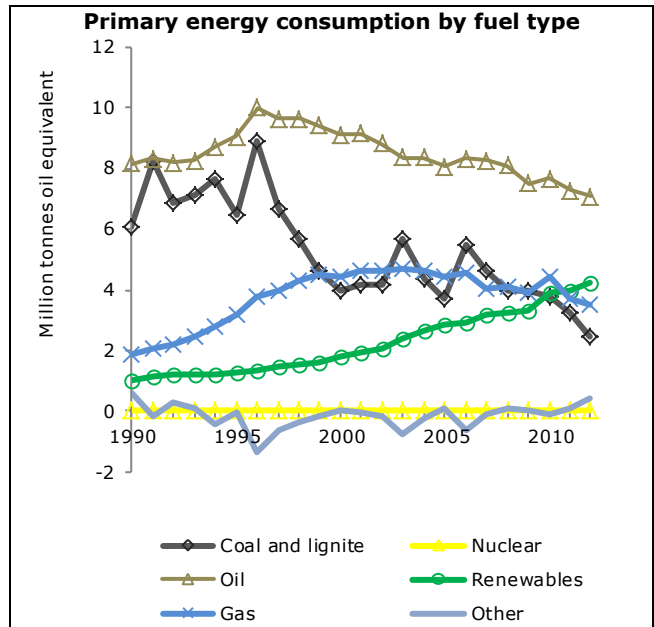
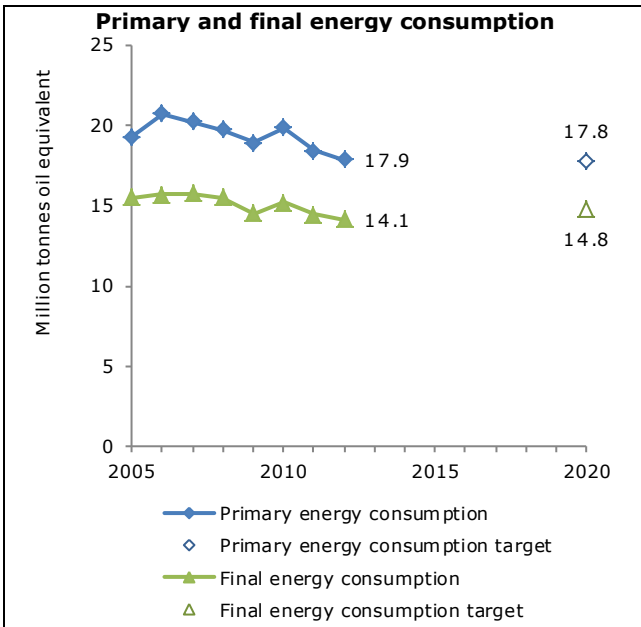
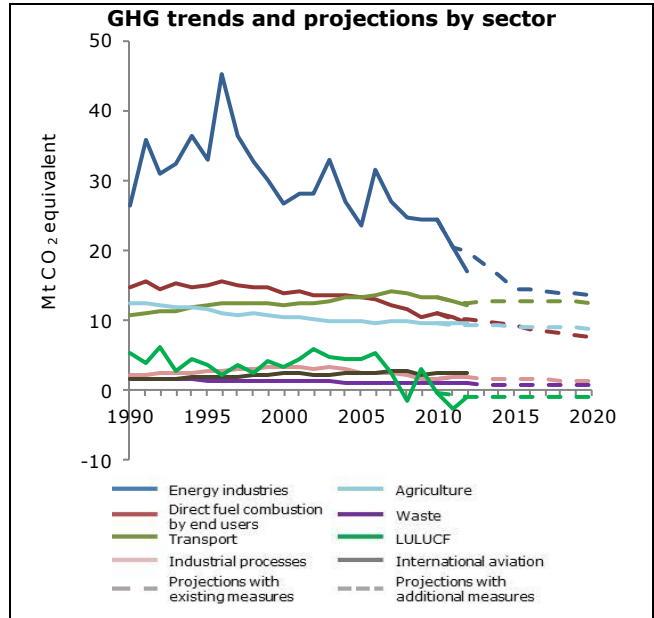
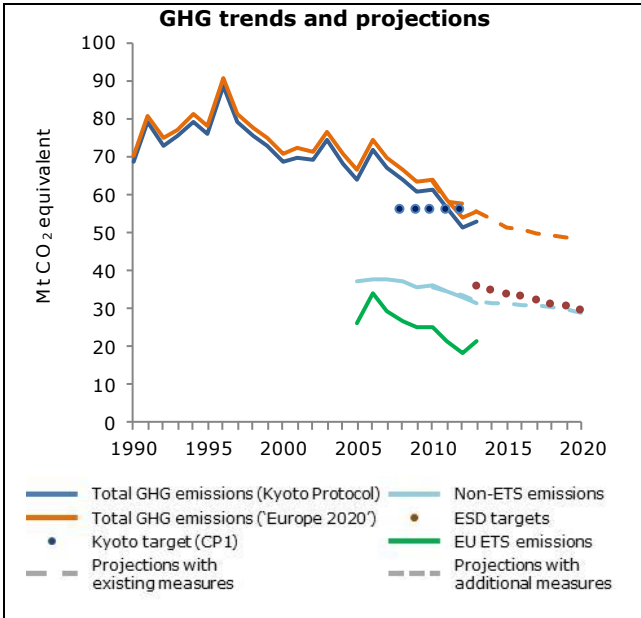
2012 RES share in gross final energy consumption (%)	26.0 %	2011–2012 indicative share from RES Directive (%)	19.6 %
2020 RES target (%)	30.0 %	2012 expected share from NREAP (%)	24.2 %

The average share of renewable sources in gross final energy consumption for 2011–2012 was 25.0 % (3.9 Mtoe), which is higher than the indicative RED target for 2011–2012 (19.6 %). At the same time, the share of renewables in 2012 (26.0 %) is higher than the expected 2012 NREAP target (24.2 %). Over the period 2005–2012 the observed average annual growth rate in renewable energy consumption amounted to 6.6 %. In order to reach its 2020 NREAP target, Denmark needs an average annual growth rate of 2.9 % in the run-up to 2020. In absolute terms, this is equivalent to 0.7 time its cumulative effort so far.

**Progress towards energy efficiency targets**

Primary energy consumption:		Final energy consumption:	
2005–2012 average annual change	-1.1 %	2005–2012 average annual change	-1.3 %
2012–2020 average annual change to target	0.0 %	2012–2020 average annual change to target	0.6 %

In Denmark, primary and final energy consumption decreased over the period 2005–2012 at a faster pace than is necessary to meet the 2020 targets. While the economic crisis may have played a role, energy efficiency policies made a significant contribution via the energy efficiency obligation scheme as one example. The efficiency in transformation has been improved. New goals included in the new Energy Deal, adopted in 2012, and enhanced innovation due to eco-design requirements can contribute to further reducing the energy consumption in buildings. For example, the best windows available on the Danish market today exceed the requirements originally set for 2020.



## Climate and energy policy framework

### Challenges and opportunities

Denmark puts an emphasis on the importance of green growth as part of its economic strategy and brands itself as a 'green lab'. Over the last decades, Denmark has been increasingly substituting oil and coal with natural gas and renewable energy, first and foremost wind energy.

However, challenges remain in specific sectors. Emissions from transport have increased around 20 % since 1990 and they make up almost a quarter of total emissions in Denmark (as of 2011). Some slight reductions have been realised since 2007, mainly due to the economic recession and implementation of the 2009 Green Transport Policy agreement. As part of the initiatives outlined in the new Climate Plan, the government is currently working on a roadmap to phase out fossil fuel use in transport by 2050. But, next to this ambitious long-term target, Denmark also needs to tackle transport emissions in the short run, especially with respect to road transport. As in many EU Member States, diesel is taxed at much lower rates than petrol, creating misleading incentives with respect to emission reductions. Even when taking into account the Danish carbon dioxide (CO<sub>2</sub>) tax, excise duties for petrol and diesel are below the rates applied, for example, in neighbouring Germany. Increasing taxes on transport fuels could increase incentives for alternative modes of transport and the use of fuel-efficient cars, and generate additional revenues, which could be used to support green economy-related programmes.

Also, emissions from buildings remain a challenge. Denmark has a long history of providing information on the energy performance of buildings through labelling, and energy performance standards are regularly tightened. However, energy consumption in buildings is still relatively high when compared to other EU Member States, and it accounts for almost 40 % of all energy consumption. This is partly due to the fact that a large share of the buildings was constructed before the first energy performance standards were introduced in the 1970s. Hence, retrofitting of existing buildings is crucial for reducing energy consumption and related expenditure by households. Moreover, such investments could lead to local job creation in the construction and renovation industry.

### Climate and energy strategies

Denmark published its 'Government's Climate Plan Towards a Society without GHGs' in 2013, which stipulates a 40 % reduction target by 2020 compared to 1990, as a step towards the long-term EU target of an 80–95 % reduction by 2050. The 78 measures address emissions from transport, agriculture, buildings and waste. On the basis of the Climate Plan, the government plans to develop a climate change bill that will be introduced to parliament in the coming parliamentary year (ENS, 2013a).

The Climate Plan complements the Energy Agreement 2012–2020, a broad climate and energy strategy with an investment package of DKK 90–150 billion (EUR 12–20 billion). The Agreement sets objectives and measures intended to reach Denmark's long-term domestic target of 100 % renewable energy in both the energy and transport sectors by 2050, and several other benchmarks by 2020. The latter include obtaining 35 % of final energy consumption from renewables, 50 % wind power in electricity consumption and a 7.6 % reduction in gross energy consumption compared to 2010. The measures in the Agreement are expected to reduce greenhouse gas (GHG) emissions by 34 % by 2020 compared to 1990, and to create 4 000 additional jobs in 2013 and 2014, and 6 000 to 8 000 jobs between 2015 and 2018 (Danish Ministry of the Environment, 2012). In addition, the 2013 Growth Plan for Energy and Climate aims to create growth, jobs, and better export opportunities for Danish companies in the energy technology and solutions industries.

### Renewable energy

Denmark is strongly encouraging the production of renewable energy and the country has long been the world leader in wind power. Since 2008, Denmark supports generation of electricity from renewable sources through a premium tariff system based on bonus payments, which is paid on top of the market price. The sum of the market price and the bonus may not exceed a statutory maximum per kWh, differentiating by source of energy and date of connection. The scheme is financed through a fee consumers pay on their electricity bill. Loans for feasibility studies for wind energy plants, and subsidies for small renewable electricity generation installations that are considered to be of strategic importance, are also available. As part of the measures foreseen in the Energy Agreement, Denmark is currently reviewing the support schemes for renewable electricity, including for small-scale photovoltaics.

For renewable heating, a premium tariff exists for the use of biogas. To further promote renewables in heating, the installation of oil and natural gas boilers in new buildings is banned since 2013. The Energy Agreement foresees a further ban of these boilers for existing buildings from 2016 onwards, and sets aside a funding budget of DKK 42 million annually from 2012–2015 to support the replacement in existing buildings with renewable energy-based heating. Additionally, financial support totalling DKK 3.75 billion (EUR 0.5 billion) is available for companies that switch to renewable energy or district heating in their production processes, make energy efficiency improvements or use biomass cogeneration ('VE til process'). The scheme is estimated to increase the share of renewable energy by 1.1 % per year, and to reduce CO<sub>2</sub> emissions by 1.5 % per year (compared to 1990) (ENS, 2013b).

### Energy efficiency

The energy intensity of the Danish economy was the second-lowest among Member States in 2011. The Energy Agreement 2012–2020 sets the ambitious goal of reducing gross energy consumption by 7.6 % by 2020 compared to 2010.

Denmark has the highest implicit **tax rate** on energy products in the EU. Since 1992, Denmark also applies a specific CO<sub>2</sub> tax, currently at rates of around DKK 90 (EUR 12) per tonne CO<sub>2</sub> with an annual increase of 1.8 %. However, energy-intensive industry is partly reimbursed for these taxes.

**Energy distributors** of electricity, natural gas, district heating and heating oil have to improve the energy efficiency of their consumers under an obligation scheme in place since 2006. The scheme was revised as part of the Energy Agreement, increasing the reduction obligation of total energy consumption to 2.6 % in 2013 and 2014, and to annually 2.9 % between 2015 and 2020. An evaluation of the scheme in 2012 showed that it led to cost-effective energy reductions with average costs of about EUR ct 5.6 per kWh (DEA, 2012).

Denmark has the highest share of **combined heat and power** (CHP) in electricity production in the EU, due to strong support by the government since the late 1970s. The Energy Agreement envisages DKK 30 million (EUR 4 million) per

year (2013 to 2020) for maintaining and promoting industrial CHP.

Voluntary agreements with **industry** on energy efficiency improvements were in place until 2013, in return for exemptions from the carbon tax. From 2014 onwards, industry is generally exempt from the carbon tax on electricity, as part of the Danish Growth Plan. The government also announced the introduction of a new support scheme with a total budget of DKK 525 million (EUR 70.3 million) for energy-intensive enterprises for the period 2015–2020 once the new European state aid guidelines are published (ENS, 2013c).

For **buildings**, the government published a comprehensive strategy for energy retrofitting in May 2014. The strategy includes 21 initiatives, which are expected to reduce energy consumption for heating in existing buildings by 35 % (KEBMIN, 2014). Denmark already has minimum energy performance standards in place, which are regularly tightened. Energy Performance Certificates are mandatory for buildings. Denmark also requires that for existing buildings cost-effective energy improvements are carried out in combination with even minor renovations (Odyssey, 2012). The main financing mechanism is the obligation scheme for energy distributors.

### Transport

In 2008, Denmark adopted a Sustainable Transport Plan outlining actions on tax incentives, funding for research on green technologies, investment in public transport, intelligent traffic systems and a new road strategy.

Taxes on transport fuels are slightly above EU average but diesel is taxed 25 % less than petrol (European Commission, 2013). Denmark applies vehicle registration and ownership taxes. These are not based directly on CO<sub>2</sub> emissions but on fuel efficiency of vehicles (ACEA, 2012). The use of renewables in transport is promoted through a quota system since 2012 requiring that all fuels contain an average of 5.75 % of biofuels. The Energy Agreement envisages a 10 % target for 2020, pending analyses of alternative instruments carried out by 2015. The Agreement also allocated DKK 70 billion (EUR 9.4 billion) to infrastructure projects for electric vehicles, gas and hydrogen, and prolongs the tax exemption for hydrogen-fuelled cars and electric cars until 2015. A strategy for the promotion of energy-efficient vehicles will be set up based on a number of analyses to be carried out in 2013–2015, including a number of wells-to-wheels analyses.

Denmark aims to make significant investments in rail transport to make it a viable alternative to car usage. In 2013, Denmark allocated DKK 27.5 billion (EUR 3.7 billion) for upgrades of rail infrastructure, with expected emission reductions of 100 000 tonnes CO<sub>2</sub> equivalent per year. Additional funds are available for the electrification of the railway system. Improving conditions for cycling is another priority, and the government allocated DKK 1 billion (EUR 140 million) in its Climate Plan to improve and promote Danish cycle transport facilities from 2009 to 2014. The government is also currently working together with stakeholders on a National Cycle Strategy (Transportministeriet, 2014).

### Fluorinated gases (F-gases)

Since 1988, Denmark levies a tax on the import of CFC, HFC, PFC and SF<sub>6</sub> (*CFC – afgiftsloven*). Substances used in vehicle air conditioning systems are exempted. Rates range from DKK 30 to 600 (EUR 4 to 80) per kilogram, depending on the gas.

### Agriculture

Denmark expects that agricultural emissions will increase in importance and make up 20 % of total emissions by 2020. Measures that are expected to reduce emissions include a ban on burning straw, environmental approval for livestock holdings or the promotion of biogas plants. Since the late 1980s, Denmark has implemented action plans to reduce nitrogen leaching.

In 2013, an independent Commission on Nature and Agriculture, established by the government, presented a report recommending actions on how to improve the performance of the agriculture and food sectors as regards the environment and climate change. Proposed initiatives include the setting aside of farmland for nature, adoption of a new emissions-based environmental regulation, subsidies for establishing new biogas plants and subsidies for climate projects at the farm level. Denmark announced in the Climate Plan that a new policy framework would be elaborated in 2016, based on the recommendations.

### Waste

Since 1989, Denmark levies a tax on waste delivered to landfill sites or incineration plants and on raw materials (stone, gravel, sand, etc.) when commercially extracted or imported (Statutory Notice No 570 of 3 August 1998). For waste, the rates amount to DKK 330–375 per tonne (EUR 44–50), and for raw materials to DKK 5 (EUR 0.67) per cubic metre. Since 1997, landfilling of combustible waste is banned (Statutory Order on Waste).

### Land use, land-use change and forestry

Since 1989, the Denmark pursues the objective to double the forest area within 100 years. The 2005 National Forest Program further specified the objective to obtain 20 to 25 % forest coverage within 80–100 years. The government has introduced various measures to achieve these objective, such as legislation, forest management guidelines, awareness and capacity building campaigns, and economic incentives. For example, the government provides grants for afforestation on agricultural land, and has introduced a ban on burning straw on fields.

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