

Resource efficiency and low carbon economy

Household energy consumption



Indicator	EU indicator past trend	Selected objective to be met by 2020	Indicative outlook of the EU meeting the selected objective by 2020
Energy consumption by households		Reduce the overall environmental impact of production and consumption in the housing sector - 7th EAP	
The energy consumption of households in the EU decreased. Policies in place and the targets set for energy consumption under the Energy Union process should help to maintain this trend up to 2020 and beyond			

The Seventh Environment Action Programme (7th EAP) includes the objective that the environmental impact of housing is reduced. Energy consumption in the use phase of housing causes the largest environmental impacts. The energy consumption of households in the EU declined by 12 % between 2005 and 2014. This shows that policies on the energy performance of buildings and appliances are having an effect, but these efficiency gains have been partly offset by an increasing number of electrical appliances and larger and more homes. Climatic conditions also play an important role in energy consumption by households. Targets set for energy consumption under the Energy Union process should help to maintain the momentum towards further energy efficiency improvements and subsequent reductions in energy use by households.

For further information on the scoreboard methodology please see Box I.1 in the [EEA Environmental indicator report 2016](#)

Setting the Scene

The 7th EAP calls for ‘structural changes in production, technology and innovation as well as consumption patterns and lifestyles to reduce the environmental impact of production and consumption in the food, housing and mobility sectors’ (EU, 2013). This briefing focuses on housing aspects, while food (AIRS_PO2.10, 2016)¹ and mobility (AIRS_PO2.9)² are dealt with in two other related briefings. The construction and use of housing leads to a number of environmental impacts ranging from land take and the consumption of resources to the production of waste during construction and demolition. The largest environmental impacts arguably result from energy consumption during the use phase.

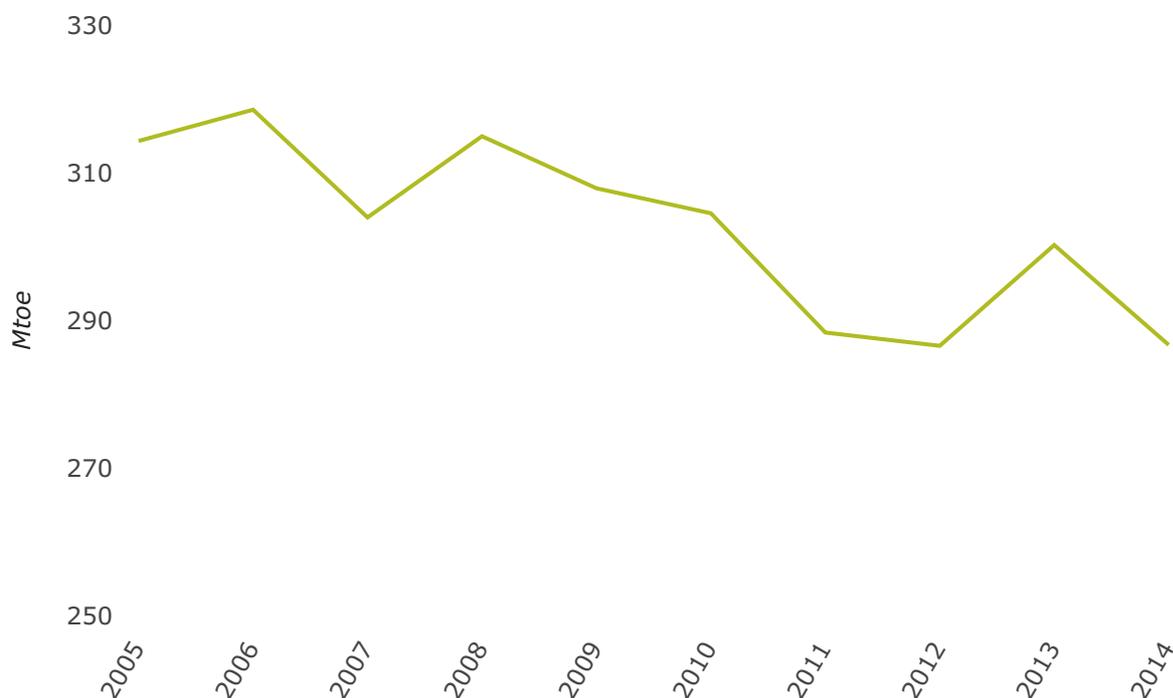
Policy targets and progress

There is no environmental acquis equivalent to the 7th EAP selected objective. The key EU policies that influence household energy use are the Energy Performance of Buildings Directive (EPBD; EU, 2010a), the Energy Labelling Directive (EU, 2010b), the Ecodesign Directive (EU, 2009) and the Energy Efficiency Directive (EU, 2012). The EPBD requires Member States to set minimum energy performance standards for new buildings, to establish inspection schemes for heating and air conditioning systems or to put in place measures with equivalent effect, and to display energy performance certificates in building sale or rental advertisements. The Directive also requires all new buildings to be near zero energy by 2020 (2018 for public buildings). The Energy Efficiency Directive requires countries to set indicative targets for energy consumption, pursue renovation of at least 3 % of buildings owned and occupied by central government annually and draw up long-term plans for renovation strategies. The Energy Labelling Directive aims to encourage producers and consumers to favour more energy-efficient appliances, while the Ecodesign Directive sets minimum standards for a growing number of appliances and other energy-related products.

Figure 1 shows that the final energy consumption of households in the EU has been declining since 2005.

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Figure 1. Climate corrected final energy consumption in the households sector



Data sources: a. Eurostat. [Final energy consumption in households \(tsdpc320\)](#)
b. Eurostat. [Heating degree days \(HDD-2014\)](#)

Energy efficiency policies have led to reductions in energy consumption, while lifestyle changes have had the opposite effect. Energy efficiency improvements in space heating and the use of more efficient electrical appliances, as well as behavioural changes driven by higher energy prices and the 2008 economic downturn all contributed to reductions in overall energy consumption. An increase in the number of appliances, in the average size of dwellings, in the number of dwellings and in the level of comfort partially offset efficiency improvements.

Approximately two thirds of energy used by households in Europe is for space heating. Energy efficiency improvements for space heating occurred as a result of the improved energy performance of the building envelope and increased efficiency of the heating equipment. In 2013, a number of EU regulations on labelling and ecodesign for space heating equipment were introduced, and they are expected to result in further reductions in energy consumption in the residential sector and, consequently, a reduction in the associated environmental impacts (JRC, 2016).

Improvements in the energy efficiency of large appliances is driven by EU directives on mandatory energy labelling and ecodesign. The proportion of the most efficient appliances (A+, A++ or, more recently, A+++) has increased significantly: from 10 % in 2005 to 96 % in 2014 for

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refrigerators, and from 16.5 % to 90 % for washing machines (EEA, 2016).

On 25 February 2015, the Commission adopted 'A framework strategy for a resilient energy union with a forward-looking climate change policy' (EC, 2015). The framework creates the momentum to bring about a transition to a low-carbon, secure and competitive energy system along five closely related and mutually reinforcing dimensions: security of supply, a fully integrated energy market, energy efficiency, climate change, and research and innovation.

Looking to the future, the energy efficiency targets set under the revised Energy Efficiency Directive and Energy Union process should help to keep the momentum towards increasing energy efficiency and lead to further reductions in the energy consumption of households.

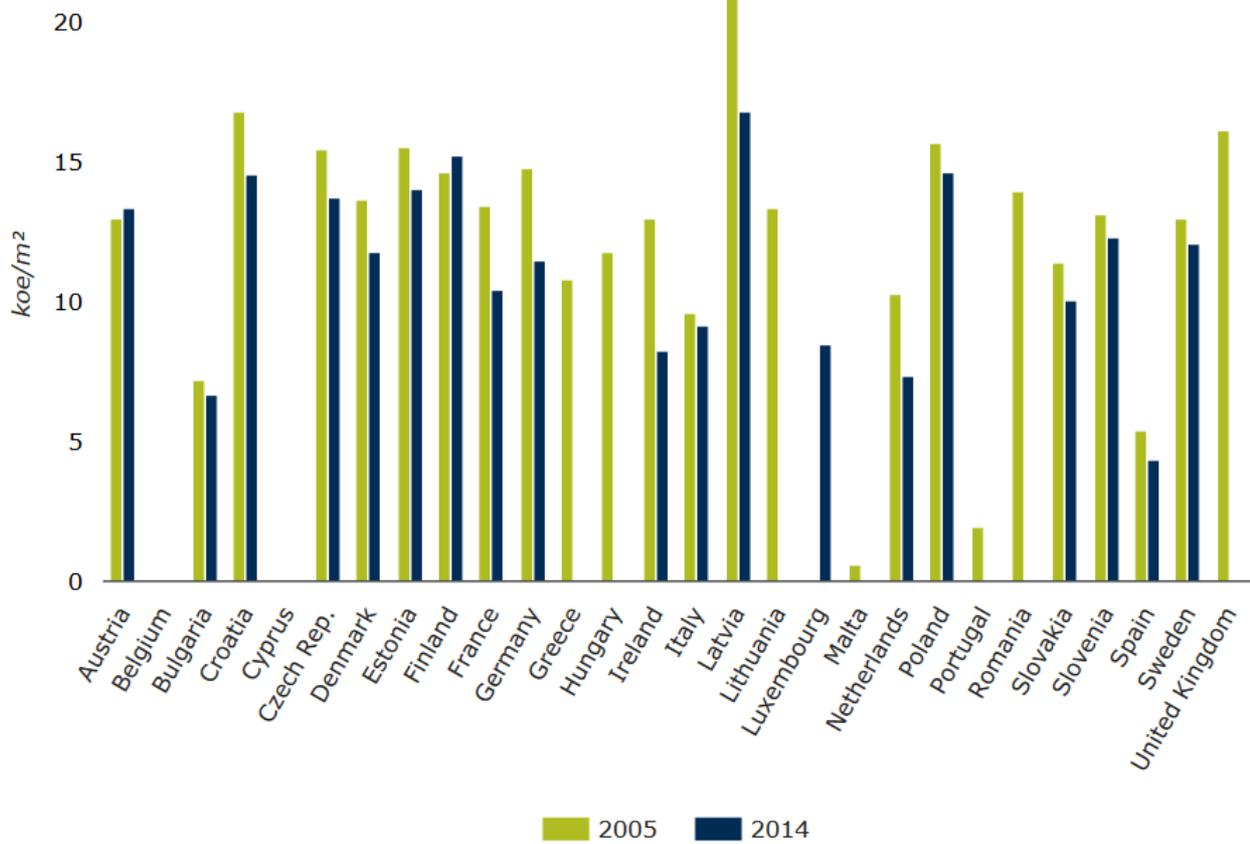
Country Level Information

Figure 2 shows the annual average energy household consumption per square metre for EU countries in 2005 compared with 2014. The data have been corrected for annual variations in weather across all countries.

Energy use, measured in kilograms of oil equivalent (koe) per square metre, differs widely between countries because of the state and age of the building stock, the size of the dwelling, the heating/cooling systems used and energy efficiency measures. In 2014, energy consumption for space heating ranged from less than 10 koe/m² in countries such as Spain, Bulgaria and Italy to more than 14 koe/m² in countries such as Croatia, Estonia, Latvia, Finland and Poland.

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Figure 2. Climate corrected average energy consumption per dwelling in 2005 and 2014 in selected EU countries



Data sources: ODYSSEE - Energy Efficiency Indicators in Europe. Energy consumption per dwelling

Outlook beyond 2020

Energy use in households accounts for about one quarter of all the energy used in the EU. Therefore reductions in household energy consumption are necessary if Europe is to achieve the low-carbon growth envisaged in the long-term vision of the 7th EAP.

Reducing energy consumption in existing buildings presents a major challenge to achieving this goal as the turnover of the building stock is slow and behavioural changes take time to implement on a large scale. Progress can be achieved by making better use of climate finance and revenues from energy taxation, for example to support large-scale renovation and local authorities, and by encouraging changes in consumers' behaviour through the creation of framework conditions that can better enable the consumer to participate in the energy market (OpenExp, 2016).

The recently launched Heating and Cooling Strategy (EC, 2016) should help reduce the energy consumption of households by promoting increased use of district heating and better integration of renewable energy sources.

About the indicator

Figure 1 represents final energy consumption by households. This is the total energy consumed each year by the household sector. It excludes energy lost in the production and transport of the energy to households, as well as the energy consumption of household members for transport. The data are corrected to account for annual variations in weather using heating degree-days for space heating. Figure 2 represents the energy consumption of households for space heating per square metre. The indicator is calculated as the ratio between final energy consumption of households for space heating corrected for annual variations in weather using heating degree-days across countries and the average size of dwellings in each Member State multiplied by the number of dwellings (ODYSSEE, 2016).

Footnotes and references

EC, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank 'A framework strategy for a resilient Energy Union with a forward-looking climate change policy' (COM(2015) 080 final)

EC, 2016, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'An EU strategy on heating and cooling' (COM(2016) 51 final)

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EEA, 2016, 'Progress on energy efficiency in Europe (ENER 037)', European Environment Agency (forthcoming).

EU, 2009, Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (OJ L 285, 31.10.2009, p. 172–197).

EU, 2010a, Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast) (OJ L 153, 18.6.2010, p. 124–146).

EU, 2010b, Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (OJ L 153, 18.6.2010, p. 1–12).

EU, 2012, Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1–56).

EU, 2013, Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet', Annex A, paragraph 43 (OJ L 354, 28.12.2013, p. 171–200).

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OpenExp, 2016, 'Energy transition of the EU building stock: Unleashing the 4th Industrial Revolution in Europe' (<http://openexp.eu/publications/energy-transition-eu-building-stock-unleashing-4th-industrial-revolution-europe>) searched on 17 October 2016

AIRS briefings

1. AIRS_PO2.10, 2016, Food consumption — animal based products, European Environment Agency.
2. AIRS_PO2.9, 2016, Transport greenhouse gas emissions, European Environment Agency.

Environmental indicator report 2016 – In support to the monitoring of the 7th Environment Action Programme, EEA report No30/2016, European Environment Agency