This article provides a fact sheet of the European Union (EU) agri-environmental indicator energy use. It consists of an overview of data, complemented by information needed to interpret these data. This article on indicator name in the EU is part of a set of similar fact sheets, providing a comprehensive picture of the integration of environmental concerns into the Common Agricultural Policy (CAP).

The use of machinery and mineral fertilisers has made it possible to increase agricultural productivity and food supply. However, agriculture, as an energy user, contributes to the depletion of non-renewable energy sources and to global warming through energy-related emissions.

**Key messages**

- Energy consumption by agriculture made up only 2.8 % of final energy consumption in the EU in 2017. The share of agriculture in final energy consumption was highest in the Netherlands (8.2 %) and Poland (5.6 %).

- Energy consumption by agriculture in the EU decreased by 15 % between 1997-2017.

- Oil and petroleum products was the main fuel type and contributed to 53 % of total energy consumption by agriculture in the EU-28 in 2017, but the share of electricity and renewables and biofuels increased since 1997.

**Analysis at EU and country level**

**Energy consumption by agriculture decreased by 15.4 % between 1997-2017**

Energy consumption by agriculture made up only 2.8 % of final energy consumption in the EU-28 in 2017. The share of agriculture in final energy consumption was highest in the Netherlands (8.2 %) and Poland (5.6 %) (Table 1).

Total energy consumption in the EU-28 was similar in 1997 and in 2017 (842 and 855 million tonnes of oil equivalent, respectively). In the period between, however, energy consumption increased and peaked in 2007 at 905 million tonnes of oil equivalent before falling back. Energy consumption by agriculture decreased by 15.4 % between 1997-2017 (from 29 to 24 million tonnes of oil equivalent) (Table 1 and Figure 1).

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1 Data for Germany are not available for this publication.
The share of the fuel types electricity and renewables and biofuels increased since 1997 in the energy consumption by agriculture in the EU-28. Oil and petroleum products (excluding biofuel portion) contributed to 53 % of total energy consumption by agriculture in the EU-28 in 2017 and was the main fuel type in most countries, the principal exceptions being the Netherlands (where natural gas is the dominant fuel type), Greece (electricity), Sweden and the United Kingdom (renewables and biofuels) (Figure 2). For the EU-28 (data for Germany are not available and therefore not included in this publication), oil and petroleum products (excluding biofuel portion), solid fossil fuels and heat decreased between 1997 and 2017, the share of electricity and renewables increased. In particular, the share of renewables and biofuels
increased from 4 to 10% during the 20 years time period (Figure 3).

![Figure 2: Share of fuel type in energy consumption by agriculture, EU-28, 2017](thousand tonnes of oil equivalent)Source: Eurostat (nrg_bal_s)

![Figure 3: Share of fuel type in energy consumption by agriculture, EU-28, 1997-2017](%)Source: Eurostat (nrg_bal_s)

Energy consumption per hectare declined most strongly in Greece and Sweden

Total levels of energy consumption do not allow direct comparison between countries, as countries differ in size. To compare trends across countries a common denominator needs to be defined to assess the energy consumption per unit across countries. Ideally there should be a strong link between the indicator and the denominator. A much used denominator to assess agri-environmental indicators across countries is the utilised agricultural area (UAA). Figure 4 shows the different levels of energy consumption per hectare of UAA in 2007 and 2017. The average energy consumption by agriculture in the EU-28 expressed per hectare of UAA in 2007 was 139 kilogram of oil equivalent per hectare (KgOE/ha), the value of 2017 is not available. Energy consumption per hectare declined most strongly in Greece and Sweden during this 20 years time reference period but
became notably higher in the Netherlands and Cyprus.

In some countries, however, the link between UAA and energy consumption requires further understanding. In particular, Figure 4 shows that energy use by agriculture per ha UAA was highest in the Netherlands. This was mainly due to intensive greenhouse farming that consumes a lot of energy, although covering only a small percentage of the total UAA in the Netherlands (only 0.5 % in 2013) according to the Farm Structure Survey.

**Source data for tables and graphs**

- Energy use statistics

**Data sources**

**Indicator definition**

The indicator relates to the direct use of energy (solid fuels, petroleum products, gas, electricity, renewables, heat) by agriculture per hectare (ha) of utilised agricultural area (UAA). It assesses the trend of energy consumption, per ha and per fuel type and is measured by the following indicators:

**Main indicator**

Total direct energy use at farm level in KgOE per ha per year

**Supporting indicator** Annual direct use of energy at farm level by fuel type (KgOE/ha)

**Links with other indicators**

This indicator has links to a number of other AEI indicators that describe developments related to agriculture and the environment.

**Data used and methodology**

For a detailed description of the data source see the methodology of:
• Energy Statistics (nrg_bal)
• Crop products (apro_cp)

Data for Germany on energy use in agriculture are not available since the energy consumption in this sector is not separately surveyed. Since Germany has a major share of the final energy consumption (FEC), Germany is therefore not included in the EU FEC since it would distort the data, i.e. data for Germany is not included in the calculations in this article.

Data are expressed in tonnes of oil equivalents. Tonne(s) of oil equivalent, abbreviated as toe, is a normalized unit of energy. By convention it is equivalent to the approximate amount of energy that can be extracted from one tonne of crude oil. It is a standardized unit, assigned a net caloric value of 41,868 kilojoules/kg and may be used to compare the energy from different sources.

The main data source for this indicator is the joint Eurostat/IEA/UNECE questionnaire. Energy indicators are compiled on the basis of the data collected under the standard collection cycles of the "Energy Statistics Unit". The relevant energy data collections are regulated since 2008 with the entry-into-force of the Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics. The energy statistics derived from the Joint Eurostat/OECD-IEA/UNECE questionnaires aim at presenting the full spectrum of the energy balances positions from supply through transformation to final energy consumption by sector and fuel type. Energy consumption by agriculture is of negligible importance to overall energy flows. Though the energy statistics are of high quality in general, the data on energy consumption by agriculture are of lower quality due to errors and incomplete data (e.g. no data on energy consumption by agriculture for Germany is available). No corrections have been made to the data as published in Eurobase. Energy consumption as presented here may therefore be underestimated due to missing data. Errors and missing data may also affect the trends in energy consumption over time and by fuel type.

In the Joint Questionnaires agriculture, forestry and fishing were combined in one category until 2004. From 2004 the questionnaires have distinguished fishing separately from agriculture/forestry. In 2014, 20 Member States and 5 other countries delivered separate data on fishing. For remaining countries it is possible that energy consumption by fishing is still included in the category agriculture/forestry. The share of fishing in the sum of energy consumption by agriculture, forestry and fishing is often not negligible. The share was in 2014 in Iceland 85 %, Norway 56 %, Portugal 21 %, Denmark 14 %, Croatia 12 %, Greece 9 %, France and Italy 7 %, Cyprus 6 %, and in Latvia, the Netherlands, Finland and Sweden 5 %. The share of fishing was below 5 % in Bulgaria, Czechia, Estonia, Spain, Lithuania, Hungary, Malta, Poland, and Romania.

Energy consumption by agriculture may be overestimated in countries with significant forestry sector. From Denmark data have been received from the environmental accounts for energy use by agriculture, forestry and fishing separately and from Norway from the energy accounts. Data from these data sources show that the share of forestry in energy consumption by agriculture and forestry combined is around 1 % in Denmark (1990-2008) and the share of forestry in energy consumption by agriculture and forestry combined is of minor significance in Norway (ca 5 % in 2007). For other countries data on the use of energy by forestry is not available and an estimate for the share of energy consumption in energy consumption by agriculture and forestry cannot be provided. In most countries however the energy consumption by forestry is expected to be of minor significance.

For the indicator per ha, land use data from crop statistics are used. These data are annually available. Agriculture is highly heterogeneous in the EU; to target policies data would be needed by farm-type and region. This would also allow using different denominators for different farm types, for example for livestock farms a more appropriate denominator could be the number of animals.

Context

Energy is consumed directly by agriculture with the use of machinery (e.g. cultivation of fields with tractors) and the heating of livestock stables and greenhouses. Agriculture also uses energy indirectly, for the production of agrochemicals, farm machinery and buildings. Considerable amounts of natural gas are used for the production of inorganic nitrogen fertilisers. The indicator currently only includes direct energy consumption.

Policy relevance and context

The Energy Union Strategy (COM(2015) 80 final) confirmed the energy efficiency target of 20 % by 2020
first set out in Europe 2020 (COM (2007) 1 final). This is the basis for moving forward to a reduction of at least 27% by 2030 to be reviewed by 2020, having in mind a figure of 30%. In 2014, the Commission concluded in its Energy Efficiency Communication (COM(2014) 520 final) that the EU would achieve energy savings of around 18-19% in 2020. Since then Member States have made improved efforts to implement EU energy efficiency legislation and have set more ambitious energy efficiency targets.

To assess energy efficiency, data on energy consumption would need to be linked to outputs produced. The FP7 research project "State of the Art on Energy Efficiency in Agriculture" produced country data on energy consumption in different agro-production sectors in European countries. Scenario building showed that the specific energy input (direct and indirect energy) in crop production differed between countries for the same crop. For example, specific energy input in wheat production was twice as high in Portugal as in the Netherlands.

The structure of direct and indirect energy use may reflect the potential for energy savings. The figures presented for agriculture in this fact sheet relate only to direct energy use and are therefore underestimations of the total energy use. Agriculture uses also energy indirectly through the use of fertilisers, pesticides, animal feed and agricultural machinery (which are produced using large amounts of energy). Data on indirect use of energy by agriculture are not available at EU-level. The "State of the Art on Energy Efficiency in Agriculture" project showed for example that indirect energy use was higher than the direct energy use in most countries for wheat production, while the direct energy use was over 90% for sunflower production in Portugal and for cotton production in Greece. With this kind of information it is possible to better target energy savings. The structure of direct and indirect energy use may reflect the potential for energy savings.

Agri-environmental context

The use of machinery and mineral fertilisers has made it possible to increase agricultural productivity and food supply. However, agriculture, as an energy user, contributes to the depletion of non-renewable energy sources and to global warming through energy-related emissions (like CO2 emissions from fossil fuel combustion). To facilitate influencing energy consumption levels through policy measures, the factors which influence energy levels should be understood. The indicator could be improved if data would be available by farm-type and region.

Agriculture is also an energy producer through renewable resources such as biogas, biomass, wind and solar energy. Under the Rural Development Programmes 2014-2020 almost EUR 3 billion (public and private funding) will be invested in improving energy efficiency in agriculture and food processing. Another EUR 3 billion will be invested in renewable energy production on farms and in rural areas.

Other articles

- Agri-environmental indicators (online publication)
- Renewable energy statistics
- Sustainable development in the European Union

Publications

- Shedding light on energy in the EU — A guided tour of energy statistics (digital publication) — 2018 edition
- Agriculture, forestry and fishery statistics - 2018 edition
- Agriculture, forestry and fishery statistics (Statistical book) — 2017 edition
- Agriculture, forestry and fishery statistics - 2016 edition
- Agriculture, forestry and fishery statistics - 2015 edition
Database

- **Energy**, see

Energy Statistics - quantities (nrg_quant)
- Energy Statistics - quantities, annual data (nrg_quanta)
- Energy balances (nrg_bal)
  - Simplified energy balances (nrg_bal_s)

- **Agriculture**, see

Agricultural production (apro)
- Crops (apro_crop)
  - Crop product (apro_cp)
    - Crop production in EU standard humidity (from 200 onwards) (apro_cpsh)
    - Crop production in EU standard humidity (apro_cpsh1)

Dedicated section

- **Agri-Environmental Indicators**
- **Energy**
- **Environmental Accounts**

Methodology

- Energy Statistics (nrg_bal)
- Crop products (apro_cp)

Legislation

- Commission Communication COM(2006) 508 final - Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy
- Commission Staff working document accompanying COM(2006)508 final

External links

- European Commission - Energy - Renewable energy
- European Commission - Europe 2020