



Statistisk sentralbyrå
Statistics Norway

Statistics Norway
Eurostat Grant Agreement 2017
No. 05121.2016.001-2016.275
**“Work towards meeting new requirements of PEFA, EGSS
and EPEA in Regulation (EU) No 538/2014 (phase V)”**

Part 1

Physical Energy Flow Accounts (PEFA)

The project was initiated by a grant proposal from Statistics Norway under the leadership of Ms. Kristine E. Kolshus, the head of the Division for Energy and Environmental Statistics.

The project has been carried out by the Division for Energy and Environmental Statistics.

The main editor of this summary-report has been Ms. Kristine E. Kolshus from the Division for Energy and Environmental Statistics.

Ms. Sigrid M. Hendriks and Ms. Nadiya Fedoryshyn from the Division for Energy and Environmental Statistics have had the main responsibility for the compilation, publication and reporting of the energy accounts.



Content

1. Introduction.....	3
2 New regular publication of PEFA-data.....	4
3 Documentation of the Norwegian PEFA	7
About the PEFA-statistics.....	7
Definitions.....	7
Administrative information.....	12
Background	13
Production	16
Accuracy and reliability	19
4 Further work.....	21



1. Introduction

Statistics for the Physical Energy Flow Accounts (PEFA) was in April 2014 amended in the EU-regulation 691/2011 on environmental accounting through the new regulation 538/2014. Since then Statistics Norway has been working step-by-step to develop different areas of the statistics in order to meet the reporting requirements in 2017.

This report presents the results of the project carried out in 2017 on Physical Energy Flow Accounts (PEFA), with the overall goal of finding solutions for the remaining data gaps for the output table and to identify possible methods for estimating the export related to EGSS.

The main objectives are:

- a) The reporting of the obligatory required PEFA-data to Eurostat in accordance to the EU-regulation (EU) 538/2014 for the obligatory years 2014 – 2015 as well as figures for a longer time-serie back to 2010.
- b) The PEFA quality report will be delivered together with the questionnaire.
- c) Description of the method used for energy use in land transport according to the resident principle.
- d) Link to the new regular publication of PEFA-data (article will be published in both English and Norwegian).

Conclusion:

Norway participated in the 2017 reporting on Physical Energy Flow Accounts (PEFA) stipulated under Regulation (EU) 691/2011, Annex V.

- Time series back to 2010 has been reported.

- Documentation is finalized and a report has been written both in Norwegian and in English. The Norwegian version is published online (<https://www.ssb.no/energi-og-industri/artikler-og-publikasjoner/attachment/313984?ts=15ce87988d0>). The English documentation report will be published online at www.ssb.no in January 2018. A short English version of the documentation has been published at <https://www.ssb.no/en/energi-og-industri/statistikker/energiregnskap> together with the publication of the figures and is also included in this report.

- All changes in methods regarding energy use in land transport have been incorporated in the calculation of the energy accounts.



2 New regular publication of PEFA-data

A new production solution has been developed and implemented for the energy account statistics in 2017.

The new production solution entails the reorganisation of figures for both the energy account and the energy balance. The same data sources are used for both, except where differences in the energy account and energy balance respectively call for specific information. This also applies to methods and classifications.

A new classification of energy products has been introduced in the new Statbank tables for energy accounts.

Figures for the Physical Energy Flow Accounts have been published for the energy products in the StatBank (https://www.ssb.no/en/energi-og-industri/statistikker/energiregnskap#definisjoner_av_viktige_begrep_og_variabler).

The energy accounts published in Statistics Norway has earlier not been in full accordance to the definitions and classifications of the energy accounts defined in hence SEEA, IRES and EU-Regulation (EU) 691/2011. In relation to the new reporting requirements of PEFA, the Norwegian energy accounts have been revised. The new as well as the old time series for the Norwegian energy accounts can be viewed in the StatBank of Statistics Norway; see <https://www.ssb.no/statistikkbanken/selecttable/hovedtabellHjem.asp?KortNavnWeb=energiregnskap&CMSSubjectArea=energi-og-industri&PLanguage=1&checked=true>.

The review of methods has made it possible to publish more detailed classifications for energy products. For example, waste, solid biofuels and liquid biofuels were previously grouped together under 'Biofuels and waste'. In the new classification, this group is divided into renewable waste, non-renewable waste, solid biofuels and liquid biofuels.

A detailed description of the various productions is found online, but can only be reached via the StatBank-tables:

1. Choose StatBank at https://www.ssb.no/en/energi-og-industri/statistikker/energiregnskap#definisjoner_av_viktige_begrep_og_variabler



StatBank

Find detailed figures from Production and consumption of energy, energy account

[TO STATBANK](#)

2. Select a table

Production and consumption of energy, energy account

Create your own tables and graphs

- 1 Select the table containing the variables you want
- 2 Select values from different variables
- 3 See, export or save your custom table

[Log on](#)

Select table	
11557: Energy accounts, overview. Supply and use of energy products	(2010 - 2016)
11558: Energy accounts. Production and consumption of energy products, by industries and households	(2010 - 2016)
11601: Energy accounts. Energy intensity for Norwegian economic activity, by industry (GWh/NOK billion)	(2010 - 2016)
11602: Index decomposition analysis of energy consumption in Norwegian economic activity, using the LMDI method, by industry (GWh)	(2010-2016 - 2015-2016)
Closed time series	
04371: Energy use outside the energy sectors and international shipping, by industry (closed series)	(1976 - 2015)
04372: Energy use outside the energy sectors, by commodity, except energy used as raw materials and for transport, by energy product (closed series)	(1976 - 2015)
10703: Energy accounts. Use of energy products outside the energy sectors, by industry (SIC2007) (closed series)	(2011 - 2015)
10704: Energy accounts. Extraction, conversion and use of energy products (closed series)	(2011 - 2015)
10705: Energy accounts. Use of energy products outside the energy sectors and ocean transport, by industry (SIC2007) (closed series)	(2011 - 2015)
10776: Energy accounts. Energy use for Norwegian economic activity, by industry and energy product (GWh) (closed series)	(2000 - 2015)
10777: Energy accounts. Energy intensity for Norwegian economic activity, by industry (GWh/NOK billion) (closed series)	(2000 - 2015)
10908: Index decomposition analysis of energy consumption in Norwegian economic activity, using the LMDI method, by industry (GWh) (closed series)	(2000-2001 - 2014-2015)

Some tables have a character in brackets which shows the lowest regional level you can extract figures for.
(C)=county, (M)=municipality, (BU)=Basic statistical unit, (UD)=urban district, (US)=urban settlement

[User manual for StatBank](#)

3. Select "Energy product account in order to see the statistical code list used in the Norwegian Energy Accounts for the energy products.



Production and consumption of energy, energy account

Create your own tables and graphs

1 Select the table containing the variables you want → 2 Select values from different variables → 3 See, export or save your custom table

Table: 11557: Energy accounts, overview. Supply and use of energy products

My table | Select via search | Select via groups | Information [Log on](#)

Contents 1 of 3

- Quantity (GWh) - Unit: GWh
- Quantity (PJ) - Unit: PJ
- Quantity (see energy product) - Unit: See energy product

Energy account item 0 of 8 | [Energy product accounts](#) 0 of 8 | Year 1 of 7

Main posts

Total supply	Coal and coal products (ktonn)	2016
Production	Natural gas (mSm3)	2015
Imports	Oil and oil products (excl. bio) (ktonn)	2014
Total use	Biofuels (ktonn)	2013
Consumption by industries and households	Waste (ktonn)	2012
Export	Electricity (GWh)	2011

So far you have selected 1 figures - at most. Select values from the listboxes and click 'Show table'.

Show table >>

[User manual for StatBank](#)



3 Documentation of the Norwegian PEFA

This documentation is a short version describing the metadata in the Norwegian PEFA. It is also found online together with the main figures for the energy accounts under the heading “About the statistics”: Since the figures for the energy balances and the energy accounts are part of the same production process, and since there often are questions related to the differences and similarities between the energy balances and the energy accounts, the short version of the documentation covers both accounts.

About the PEFA-statistics

The energy account shows all energy products produced and used by industries in the Norwegian economy, also abroad. Also included are figures for energy intensity and figures from decomposition analyzes of changes in energy consumption. The national accounts definitions are followed.

Definitions

[Definitions of the main concepts and variables](#)

Energy carriers

Sources of energy are called energy bearers. The units used to measure energy bearers are consistent with those normally used in the primary statistics. Coal, coke, crude oil and petroleum products are measured in tonnes, natural gas in standard cubic metres (Sm³), fuel wood, black liquor and waste and other gases in tonnes of oil equivalents (toe) and electric power and district heating in GWh. The energy bearers included in the energy statistics are specified below:

Coal : Anthracite, hard coal and brown coal

Coke : Coal coke and petrol coke

Biofuel : Fuel wood, pellets, briquettes, wood waste, wood chippings, sawdust, shavings, bark, black liquor, biodiesels, bioethanol and charcoal

Garbage/waste : Different types of garbage/waste

Crude oil : Crude oil

Petrol : Naphtha, auto petrol, extraction petrol and aviation fuel

Kerosene : Kerosene type jet fuel, heating kerosene and other kerosene

Middle distillates : Auto diesel, marine gas oil, light heating oils and heavy distillate

Heavy oil : Heavy fuel oils

Waste oil : Waste oil, paint and varnish

Liquefied gases : LPG (propane and butane) and NGL (propane, butane and ethane)

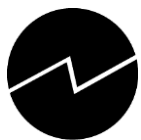
Natural gas : Natural gas in gaseous form and LNG (liquefied natural gas)

Other gases : Refinery gas, fuel gas, methane and CO gas

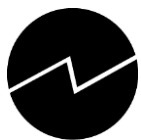
Electricity : Priority and non-priority power

District heating : Hot water and steam distributed via a district-heating network

Energy content, density and fuel efficiency



Energy commodity	Theoretical energy content	Density	Fuel efficiency		
			Manufacturing and mining	Transport	Other consumption
Coal	28,1 GJ/tonne	..	0,80	0,10	0,60
Coal coke	28,5 GJ/tonne	..	0,80	-	0,60
Petrol coke	35,0 GJ/tonne	..	0,80	-	-
Crude oil	42,3 GJ/tonne = 36,0 GJ/m ³	0,85 tonne/m ³	..	..	..
Refinery gas	48,6 GJ/tonne	..	0,95	..	0,95
Natural gas (2015) ²	35,31 GJ/1000 Sm ³	0,85 kg/Sm ³	0,95	..	0,95
Liquefied propane and butane (LPG)	46,1 GJ/tonne = 24,4 GJ/m ³	0,53 tonne/m ³	0,95	..	0,95
Fuel gas	50,0 GJ/tonne	..	..	..	..
Petrol	43,9 GJ/tonne = 32,5 GJ/m ³	0,74 tonne/m ³	0,20	0,20	0,20
Kerosene	43,1 GJ/tonne = 34,9 GJ/m ³	0,81 tonne/m ³	0,80	0,30	0,75
Diesel oil, gas oil and light fuel oil	43,1 GJ/tonne = 36,2 GJ/m ³	0,84 tonne/m ³	0,80	0,30	0,80
Heavy distillate	43,1 GJ/tonne = 37,9 GJ/m ³	0,88 tonne/m ³	0,80	0,30	0,70
Heavy fuel oil	40,6 GJ/tonne = 39,8 GJ/m ³	0,98 tonne/m ³	0,90	0,30	0,75
Methane/landfillgas	50,2 GJ/tonn	..	..	..	..
Ved	16,8 GJ/tonne = 8,4 GJ/fast m ³	0,5 tonne/fm ³	0,65	-	0,65



Wood waste (dry matter)	16,25-18 GJ/tonne = 6,5-7,2 GJ/fm ³	0,4 tonne/fm ³	..	..	..
Garbage/waste	10,5 GJ/tonne	..	..	..	..
Electricity	3,6 GJ/MWh	..	1,00	1,00	1,00
Uranium	430-688 TJ/tonne	..	..	..	..

¹ The theoretical energy content of a particular energy commodity may vary. The figures therefore indicate mean values.

² Sm³ = standard cubic metre (15 °C og 1 atmospheric pressure). Net Calorific Value (NCV).

Source: Energy statistics, Statistic Norway, Norwegian Petroleum Industry Association (NP), Norwegian Association of Energy Users and Suppliers, Norwegian Building Research Institute.

Energy units

	PJ	TWh	Mtoe	Mbarrels	MSm ³ o.e. oil	MSm ³ o.e. gas	quad
1 PJ	1	0,278	0,024	0,18	0,028	0,025	0,00095
1 TWh	3,6	1	0,085	0,64	0,100	0,090	0,0034
1 Mtoe	42,3	11,75	1	7,49	1,18	1,055	0,040
1 Mbarrels	5,65	1,57	0,13	1	0,16	0,141	0,0054
1 MSm ³ o.e.olje	36,0	10,0	0,9	6,4	1	0,90	0,034
1 MSm ³ o.e. gas	39,9	11,1	0,9	7,1	1,11	1	0,038
quad	1053	292,5	24,9	186,4	29,29	26,33	1

1 Mtoe = 1 million tonnes (crude) oil equivalent

1 Mbarrels = 1 million barrels crude oil (1 barrel = 0.159 m³)

1 MSm³ o.e. oil = 1 million Sm³ oil

1 MSm³ o.e. gas = 1 billion Sm³ natural gas

1 quad = 10¹⁵ Btu (British thermal units)

1 joule (J) = 1 watt x 1 second

Source: Energy statistics, Statistics Norway and Norwegian Petroleum Directorate.



Commonly used prefixes

Name	Symbol	Factor
Kilo	k	10^3
Mega	M	10^6
Giga	G	10^9
Tera	T	10^{12}
Peta	P	10^{15}
Exa	E	10^{18}

Production

In the energy sources balance sheet/energy balance sheet, energy production is divided into primary and derived energy bearers. Primary energy bearers include those that are produced without the input of other energy bearing raw materials. The primary energy bearers are coal, fuel wood, crude oil, naphtha, NGL and natural gas. The production of derived energy bearers includes the production of energy bearers in which other energy bearers are used as input, for example, petroleum products manufactured from crude oil in oil refineries or district heating produced through the combustion of waste.

Electricity is treated as primary production in the energy accounts and as derived production in the energy sources balance sheet. The opposite is true of fuel wood. The production of derived energy bearers outside the conversion sectors, for example the production of fuel wood and fuel gas is included in the energy accounts under "other supply". The energy accounts define the sectors that produce primary energy bearers as "extraction sectors" and those that produce derived energy bearers as "conversion sectors". Together, the extraction and conversion sectors are referred to as "energy sectors". The extraction sectors include coal mining and the production of crude oil, natural gas and hydroelectric power. The conversion sectors include oil refineries, thermal power stations, district heating plants and dual-purpose power stations.

Input of intermediate goods In the energy sources balance sheet, energy converted (item 8) represents the volume of energy bearers used as input in the production of derived energy bearers. This item includes inter alia the crude oil that goes to the refineries. The energy sector consumption not used to produce other energy bearers, but used for heating, etc, is entered under consumption by the energy sectors (item 9). In the energy accounts, all input, including input to conversion and input to heating, are entered under "energy sector inputs".

Raw materials

The term "raw material" refers to energy bearers that are not used for energy. This mainly comprises input of petroleum products used to manufacture chemical raw materials. For



coal and coke, it is difficult to distinguish between raw material consumption and energy consumption. Accordingly, both the energy accounts and the energy sources balance sheet consider all industrial consumption of coal and coke as energy consumption. Raw material consumption of other energy bearers are separated in the energy sources balance sheet (item 10), but distributed by industry and fuel consumption in the energy accounts.

Consumption outside energy sectors

The consumption outside the energy sectors, net domestic consumption in the energy sources balance sheet (item 13), of coal, fuel wood, electricity and district heating is the same in both systems. There is a deviation in the consumption of LPG because the consumption of raw materials is included in the energy accounts. The consumption of gasoline, kerosene, middle distillates and heavy oil deviates because of different ways of treating international shipping, aviation and raw materials. The consumption of coal for the production of CO gas is included in energy converted in the energy sources balance sheet, while it is included in consumption outside the energy sectors in the energy accounts.

Transportation

The energy sources balance sheet has a separate item for energy consumed for transportation purposes (item 15). This means that the transport sector/item includes not only energy consumed by transport companies, but also consumption for transport purposes in other enterprises, including industries and households. The energy accounts place the consumption of all energy under the relevant consumer sector, regardless of whether the consumption refers to transportation, heating or processing. This leads to different ways of recording the transport oil, gasoline, kerosene type jet fuel, auto diesel, marine gas oil and heavy fuel oil. Aviation is treated differently in the two systems, as Norwegian transport companies' acquisitions abroad are included and purchases by foreign transport companies in Norway are deducted from the energy accounts. Military consumption of kerosene type jet fuel is entered under public administration, not under aviation.

International shipping

Regardless of a vessel's nationality, energy bearers supplied by Norwegian ports to vessels in international shipping are categorised as bunkering in the energy sources balance sheet and not included in the total consumption (item 4). International shipping is considered a separate transport sector in the energy accounts, so consumption is recorded under the item "consumption outside the energy sectors". The energy accounts also include Norwegian vessels' consumption of energy abroad. International shipping both buys and uses most of its fuel abroad. Correspondingly, the energy sources that foreign vessels buy directly in Norway are deducted.

Common energy unit for the energy accounts and the energy sources balance sheet

Both the energy accounts and the energy sources balance sheet are presented in two different types of units: in physical units (tonnes, GWh etc) and in a common energy unit, petajoule (PJ). Presented in PJ, the energy sources balance sheet is referred to as the energy balance sheet. The figures in PJ are calculated on basis of the figures measured in physical units, using factors for the theoretical energy content for each commodity. From 2006, some new tables are published, with all commodities presented in GWh.

The layout of the energy balance sheet differs from the layout of the energy sources balance sheet on several points: In the energy balance sheet, there is a column showing



the total for all the energy commodities. There is also a column for waterfall energy, showing the primary stage for electricity produced by the hydroelectric power plants.

Item 1.2. "Production of derived energy bearers" has been moved to avoid double entries in the total column on the supply side.

Item 7. "Net domestic supply" shows the consumption of energy before the transformation processes begin. This level of measurement includes the production of primary energy bearers adjusted for imports, exports/bunkering and changes in stock. For example, crude oil is included in this calculation. To avoid double entries, the consumption of individual petroleum products derived from crude oil has not been included.

Item 13. "Net domestic consumption" shows the theoretical energy content of bearers delivered for end use - the energy supply. Thus the values at this level of measurement have a degree of efficiency utilisation of 100 per cent for all energy bearers on end consumption. Of course, in practice, this would be impossible. The loss of efficiency that occurs when the energy bearers are used to produce heat, run motors, etc is not taken into account. Take a furnace, for example: Some of the theoretical energy content will not reach the consumer as heat, because a furnace is not 100 per cent efficient. Chapter 6 in NOS Energy Statistics 2000 (see link below) contains a table showing the consumption of utilised energy. The consumption is calculated on the basis of figures from the energy balance, and the estimated thermal efficiency coefficient of different energy sources (see separate table).

In international statistics, the expression "Total primary energy supply" (TPES) is used.
 $TPES = \text{Total primary production} + \text{imports} - \text{exports} - \text{bunkering} - \text{changes in stocks}$.

The structure of the energy accounts in PJ differs only slightly from the energy accounts expressed in physical units.

[Standard classifications](#)

The industrial classification used is an aggregated and somewhat modified version of the EU standard NACE. The figures are even more aggregated in the published tables. In 2009, from and including the reference year 2008, the industry classification in the energy accounts / balances was changed according to the new NACE standard SN2007.

Administrative information

[Name and topic](#)

Name: Production and consumption of energy, energy account
Topic: Energy and manufacturing

[Responsible division](#)

Division for Energy and Environmental Statistics

[Regional level](#)



Only national figures are published. The figures for consumption of fossil fuels and bio fuel are also distributed by municipality for use as a basis for the calculation of emissions to air.

[Frequency and timeliness](#)

Annual Energy accounts and energy sources balance sheet: Publishing in the autumn of figures for year t-2, preliminary figures for year t-1 (year t is the publishing year)

Energy sources balance sheet: Publishing in the spring of "very preliminary figures" for year t-1.

[International reporting](#)

The energy sources balance sheet is reported annually to the IEA/OECD, Eurostat and the UN.

[Microdata](#)

The energy accounts for the most detailed sector classification level are available in Excel files for each year back to 1976, the energy balances on the detailed level are available back to 1990. Micro data for the single units (enterprises) from the statistics on energy use in the manufacturing sector are stored on Unix files. The excel files may contain confidential data and can therefore not be published.

Background

[Background and purpose](#)

The statistics have been published annually since 1976. In 1993, Statistics Norway introduced a new industrial standard, based on the EU standard NACE. The energy accounts and the energy sources balance sheet use an aggregated and somewhat modified version of this. It is somewhat more aggregated, partly due to that information about energy consumption not is available for all the NACE sectors. The nomenclature in the energy account /balances was adapted to the nomenclature in the national accounts (for 1995), but there are some discrepancies, partly because the nomenclature in the national accounts has changed since then. For the years 1990-92 the energy accounts and the energy sources balance sheet have adapted the old industrial codes to this new classification. In a revision of the sector classification of the Central Register of Establishments and Enterprises, some enterprises were reclassified and placed in other sectors from 1993. This means that the figures for energy consumption in some sectors are not fully comparable for the years prior to and after 1993. Prior to 1990, various sources were to some extent used in the energy accounts and the energy sources balance sheet. From 1990, however, the data are consistent. The only differences between the energy accounts and the energy sources balance sheet now are the principles and definitions.

[Users and applications](#)

The statistics are used by public and private institutions that work with different types of energy questions and analyses. Internally in Statistics Norway, the Division for Energy and



Environmental Statistics, the Research Department and the Division for National Accounts are important users. The energy accounts are an important part of the data material that is used as a basis for the calculation of emissions to air. Statistics Norway calculates the emissions in co-operation with the Norwegian Environment Agency. The Research Department uses the statistics for analyses and prognoses, while the Division for National Accounts uses it in the NOREEA (environmental accounts). Schools, the media and various organisations are other users of the statistics. Figures for energy consumption by region are used in local energy and climate plans.

Because the energy sources balance sheet and the energy accounts are based on different principles and definitions, some of the figures differ. It should therefore be considered which of the two presentations will be the most relevant. One should, however, avoid mixing figures from the two accounts.

The *energy sources balance sheet* is based on international standards for how to set up an energy balance. However, even if an energy balance follows certain principles, there are some minor differences in how different countries and organizations such as IEA set up the energy balance. Due to this, Norway's energy balance cannot directly be compared to other countries' or organizations' energy balance. An energy balance monitors the flow of energy in the country, irrespective of the nationality of the users. The balance sheet has a separate item for energy used for non-energy purposes (energy not used as fuel, but as input in industrial production). Regardless of this, all industrial consumption of coal and coke is considered as energy consumption because it is difficult to distinguish between raw material consumption and energy consumption. All energy used for transport purposes is also placed in a separate item in the balance, irrespective of user group.

The *energy account* is based on the definitions in the national accounts, and follows the residence principle while the energy balance follows the territorial principle. Energy used by Norwegian transport services and tourists abroad is included, while energy consumed by foreign transport sectors and tourists in Norway is excluded. Energy used for non-energy purposes is distributed by user group together with other energy consumption. Energy used for transport purposes is placed in the user group that actually uses it.

[Equal treatment of users](#)

Not relevant

[Coherence with other statistics](#)

The preliminary energy balance is published in the spring. This is a rough balance without any detailed sector division. The consumption of oil products is to a large extent based on sales figures for the different products. As the sector distribution in the statistics on deliveries of petroleum products is not satisfactory, the figures for consumption by sector are uncertain. However, the total figures are reliable.

Preliminary figures for emission to air are presented at the same time as the preliminary energy balance, and are partly based on the same figures. A more detailed preliminary version of the energy accounts and energy sources balance sheet and final figures for the previous year are produced and published in the autumn.



The energy accounts should in principle be comparable to the national accounts because the sector classification and principles/definitions are approximately similar. However, there have been some discrepancies because different sources are used for quantity figures in the energy accounts and value figures in the national accounts.

Coherence between the energy balance and the monthly and annual electricity statistics

The annual and monthly electricity statistics is the data source for production and consumption of electricity in the energy balance / accounts. When finally and preliminary energy account / balance for year t -1 and t-2 respectively, (year t is the publishing year) is prepared during the autumn, figures from the annual electricity statistics are used in the final figures while figures from monthly statistics are used in the preliminary figures. The annual electricity statistics is not published before about 15 months after the reference year, and is due to this not available for the preliminary energy balance for year t-1 in the autumn. Figures in the annual electricity statistics and the energy balance (final figures) should in principle be the same, but there are some exceptions. Production plants, or plants that generates electricity for their own use mainly, should be included in the annual electricity statistics, but it can take some time before they are included, and are sometimes not included for all years. In these cases, we have in the energy balance added their production and consumption to the other figures in the annual electricity statistics.

There are also some differences in the contents in certain concepts. The net consumption of electricity is defined different in the energy balance and the electricity statistics. In the annual electricity statistics, this is defined as total production + imports - exports - consumption in power stations - pump consumption - losses and statistical differences. In the energy balance, consumption in other energy producing industries, such as district heating plants, oil and gas extraction, oil refineries and coal extraction are also excluded from the net domestic consumption. This implies that the net domestic consumption of electricity in the energy balance becomes lower than in the annual electricity statistics.

Regarding electricity consumption by sector and industry, the annual electricity statistics is the main source in the energy balance. An exception is manufacturing industries, where figures from a separate survey on energy consumption in manufacturing industries are the source. Usually, this survey shows a higher consumption for manufacturing industries than the electricity statistics does. To calibrate total electricity consumption in the energy balance and the electricity statistics, we have to reduce the consumption in other sectors, usually the service sectors. For households, the sum of consumption in households and cottages/holiday houses from the annual electricity statistics is used directly as consumption in households in the energy balance.

[Legal authority](#)

The Statistics Act §§ 2-1, 2-2 and 2-3. The statistics are mainly based on data from other statistics

[EEA reference](#)

Not relevant



Production

[Population](#)

The statistics cover the consumption and supply of all energy commodities in Norway (oil, electricity, gas, coal, coke, district heating, biofuels etc). Energy sources that are of very little importance for the Norwegian energy supply, for instance solar energy and geothermal energy, are not included. On the consumption side, the statistics cover energy consumption in all sectors (energy sectors, manufacturing industries, construction, private and public services, primary sectors, households). The statistics include about 130 different sectors, but the figures are published on a more aggregated level

[Data sources and sampling](#)

The sources are available basic statistics, partly from Statistics Norway's own statistics, partly from other institutions. Relatively few figures are collected only for the purpose of being used in the energy accounts and the energy sources balance sheet. Internal statistics that are used include statistics on energy use in the manufacturing sector (a separate survey from 1998), electricity statistics, statistics on delivery of petroleum products, refinery statistics, domestic use of natural gas statistics, district heating statistics, external trade statistics and the national accounts statistics. For some sectors, projections of figures from previous energy consumption surveys are used. Data from the Norwegian Petroleum Directorate on the production of crude oil and natural gas are among the many external data that are used. The various statistics that are used as data sources do not always provide all the details needed in the energy accounts and balances, and therefore, some figures are based on estimates.

Production

The production figures for coal, petroleum products and refinery gas are taken from internal sources in Statistics Norway, while those for crude oil and natural gas are taken from the Norwegian Petroleum Directorate. The production figure for fuel wood is calculated as the sum of consumption of fuel wood plus exports minus imports. The production figures for blast furnace gas and fuel gas are taken from two major Norwegian companies. The production figures for electricity are taken from Statistics Norway's annual electricity statistics, while figures for district heating are taken from Statistics Norway's district heating statistics.

Imports, exports, stock changes, intermediate goods and losses

The import and export figures are extracted from Statistics Norway's external trade statistics. The changes in stock are mainly taken from Statistics Norway's statistics on stocks, which include stocks at refineries, crude oil terminals and oil fields. Changes in coal and coke stocks include changes in the stocks of Store Norske Spitsbergen Kulkompani and major consumers. The input of intermediate goods (input in energy producing industries) are based on figures from the monthly refinery statistics, figures from the Norwegian Petroleum Directorate, annual or monthly (for preliminary figures) electricity statistics, the district heating statistics and refinery statistics and the Norwegian Petroleum Directorate. Figures on losses are derived from the annual electricity Statistics and the district heating statistics.

Coal, coke and energy used as raw materials

Coal and coke are mainly used as raw materials in manufacturing industries in Norway.



The figures for industrial consumption of coal and coke are taken from a separate survey for the 40-50 largest enterprises in Norway. Figures for other energy sources used as raw materials, as LPG, is also collected in this survey. The sample cover the main users of coal and coke and other energy used as raw materials in Norway. The figures on agricultural and private household consumption of coal and coke are estimates based on information provided by Forenede Kulimportører A/S, Scancem A/S and Store Norske Spitsbergen Kulkompani A/S.

Manufacturing industries

Figures for energy consumption in manufacturing industries, except energy used as raw materials, are from 1998 taken from a separate statistics of energy use in the manufacturing sector. Prior to this, the source was manufacturing statistics, which also included figures for energy consumption.

Fuel wood in households

Statistics on use of wood in households is based on figures on the amount of wood burned from the annual survey on consumer expenditure for the years before 2005. For the years after 2005 the figures are based on responses to questions relating to wood-burning in Statistics Norway's Travel and Holiday Survey. The survey quarterly gathers data that cover the preceding twelve months. The figure used in the emission calculations is the average of 3 to 5 quarterly surveys. More than 1 000 persons are interviewed by telephone every quarter. The response rate is around 60 per cent.

Theoretical energy content is calculated by multiplying the consumption of wood by the factor for energy content. (See table under Definitions.) Energy generated is calculated by multiplying the theoretical energy content by rates of energy efficiencies for different ovens technologies.

Energy efficiencies for different oven technologies. Per cent

	Open fireplace	Enclosed stove, old technology	Enclosed stove, new technology
Energy efficiency	15	50	75

Petroleum products

The consumption figures for petroleum products are based on statistics on deliveries of petroleum products. The breakdown by industrial group comes from the statistics on energy use in the manufacturing sector. The Norwegian Environment Agency is the source for consumption of landfill gas, while the consumption of waste oil, paint and varnish etc is based on figures from NORSAS until 1999. From 2000, these data are included in the statistics on energy use in the manufacturing sector. For other industries, data are collected by the division for Energy and Environmental Statistics.

Electricity

The distribution of electricity consumption between the main groups is taken from annual electricity Statistics. The statistics are based on data submitted by all companies that produce and distribute electricity. Since this sector usually categorizes its own statistics on the basis of various types of tariffs, it is often difficult to accommodate data to the



categorization used in the energy sources balance sheet. Industrial energy consumption figures are taken from the statistics on energy use in the manufacturing sector.

District heating

The distribution of district heating consumption between consumer groups is taken from the district heating statistics. To achieve a more detailed distribution, statistics from the Directorate of Public Construction and Property have been used.

Natural gas

The consumption of natural gas by industry outside the manufacturing industries is reported by the distributors of natural gas in Norway.

Statistical errors

Statistical errors represent deviations between the consumption and supply of energy bearers. In principle, the supply of energy (production + imports) should correspond to exports and consumption of energy. However, there are many reasons for deviations; erroneous registration, conversion from other units of measurement, the use of different statistical sources, etc. Statistical errors for crude oil and natural gas are sometimes very high. This could be due to inaccuracy in the figures for production or exports, or these figures might not be consistent. Even if the statistical errors are relatively low compared to total production, they can be high compared to the total domestic energy consumption.

Other sectors

Energy consumption in fish farms, distribution of water, IT activities and ocean transport are calculated on the basis of figures from the national accounts and prices from the electricity statistics, the Norwegian Petroleum Industry Association (NP) and Shell.

The energy accounts and the energy sources balance sheet cover the total supply and consumption of energy in Norway. The statistics that are used as sources are to a large extent statistics that cover the total population. The statistics on energy use in the manufacturing sector do not cover all enterprises, but the sample covers more than 90 per cent of the total energy consumption in the manufacturing industries. For other units, the energy consumption is estimated.

[Collection of data, editing and estimations](#)

Available data are used as much as possible, partly with small adjustments for calibrating the total accounts. For oil products, the energy accounts and energy sources balance sheet define the domestic consumption as identical to registered sales exclusive of consumption by international shipping and aviation. For sectors where reliable information is not available, the consumption is partly calculated as a residual, partly on previous surveys or data that may indicate the consumption (such as employment, the number of private cars etc). The statistics used as source are mainly annual, except the statistics on deliveries of petroleum products, the refinery statistics and the preliminary electricity statistics, which are monthly. From 2006, data on deliveries of biofuels are collected by survey.

All the necessary data are not available at the time when the preliminary energy accounts and energy balance sheet are produced. As a result, some temporary calculations and estimates have to be used. These are revised when the final energy sources balance sheet is produced.



When the energy accounts and energy sources balance sheet are published, data for total supplied energy consumption are presented. In addition, the data from the energy balance sheet are presented as utilised energy. The figures for utilised energy take into account that it is not possible to fully utilise the theoretical energy content of any energy bearer (except electricity), due to heating equipment, car engines etc not being completely efficient. Utilised energy is calculated on the basis of the thermal efficiency coefficients of the different energy sources and consumer groups.

Both the energy accounts and the energy balance sheet are presented in two types of units: in physical units (tonnes, GWh etc) and in a common energy unit, petajoule (PJ) and GWh respectively. The figures in PJ and GWh are calculated on the basis of the figures measured in physical units, and with factors for the theoretical energy contents in the different energy products. When presented in PJ or GWh, the energy sources balance sheet is referred to as energy balance sheet.

Seasonal adjustment

Not relevant

Confidentiality

The general rule for publication is that data cannot be released unless they contain information from at least three or more participants (i.e. industrial enterprises etc). This rule can be waived if permission from the parties involved is granted.

Comparability over time and space

The energy accounts and the energy sources balance sheet have been produced since 1976. The sector classification was changed in 1993, and a rough adaptation to this new nomenclature was made for 1990-92. The sector codes for some enterprises were changed in 1993. Changes in the calculation methods over the years mean that the time series for consumption are not fully comparable for some sectors.

Accuracy and reliability

Sources of error and uncertainty

This depends on the quality of the source statistics. In the statistics on energy use in the manufacturing sector, errors may occur due to misunderstandings, or because those who fill in the questionnaire do not have enough knowledge about the actual energy consumption or how to classify the consumption. Use of estimates instead of actual figures represents another source of uncertainty. Errors may also occur during data transfer and revision. The statistics on deliveries of petroleum products by user group is uncertain because the oil companies do not know exactly where the end consumption takes place, for instance when oil products are delivered to filling stations that distribute the products to other customers. Furthermore, high uncertainty is connected to consumption figures based on projections of previous surveys, for instance consumption in many of the service sectors.

The preliminary figures for electricity distributed by consumer groups outside the manufacturing industries are quite uncertain because the annual electricity statistics are



not available when the preliminary energy accounts/energy sources balance sheet are produced.

The methods used in the energy accounts were evaluated in 2005. This work revealed several defects and weak points in the energy statistics and resulted in a list of possible new data sources and methods. Hopefully, making use of these new sources and methods will improve the quality of the accounts. A problem, however, is how to recalculate and achieve consistent time series.

Statistical errors represent deviations between the consumption and supply of the energy bearers.

The data sources are basic statistics which already are weighted and corrected for non-response errors.

Uncertainty in energy consumption in manufacturing industries

Uncertainty concerning energy use in manufacturing industries is connected to the fact that the results are based on data from only a part of the population/enterprises. This uncertainty is, however, small, as the enterprises in the sample represent 90 per cent of the energy use in mining and manufacturing.

Sources of uncertainties - wood consumption in households

There are several elements of uncertainty related to the data, including sample uncertainty and uncertainty in conversion factors

Final figures for 2011 are based on three quarterly surveys. Each survey asks about wood consumption for the last twelve months. The three surveys are weighted equally.

An uncertainty analysis was conducted in 2011. The coefficient of variation of the estimated total consumption in Norway is a little less than 3 percent. The table below shows how the uncertainty in the national numbers increases when the number of studies decreases:

Number of quarterly studies included	Coefficient of variation
5	3
4	3,4
3	3,9
2	4,8
1	6,6

In 2011 the total wood consumption in Norwegian households is estimated to be 1.3 (\pm 0,1) million tonnes. In addition, 210 000 (\pm 28 000) tonnes of wood were burnt in holiday



homes. The consumption of wood in households produced energy equivalent to 3.79 (\pm 0.3) TWh in 2011. The numbers for the municipalities are more uncertain than the national total. This is because the numbers are based on fewer respondents.

The statistics does not give the total number of furnaces in Norway, but the number households that uses firewood. If a household has more than one fireplace, they have provided information on the technology most used

Measuring problems or inconsistency in methods for collecting or calculating figures for production, exports and imports specially for oil, gas and oil products can imply statistical differences for these energy commodities.

4 Further work

There are still improvements to be done with the statistical differences for some of the balancing items in the energy accounts. This is mainly related to the parts of the PEFA regarding Natural Energy Products and Residuals.

The online publication of the main figures from PEFA is established in English. However, the articles published in Norwegian together with the release of the main figures still have to be published in English. The work and facilitation of these articles, including the documentation report have been finalized, but the online publication will be done in January 2018.