

# Energy balance - new methodology

Statistics Explained

This article presents the basic methodology information about energy balances compiled and disseminated by [Eurostat](#).

## What is an energy balance?

The energy balance is the most complete statistical accounting of energy products and their flow in the economy. The energy balance allows users to see the total amount of energy extracted from the environment, traded, transformed and used by end-users. It also allows seeing the relative contribution of each energy carrier (fuel, product). The energy balance allows studying the overall domestic energy market and monitoring impacts of energy policies. The energy balance offers a complete view on the energy situation of a country in a compact format, such as on energy consumption of the whole economy and of individual sectors.

The energy balance presents all statistically significant energy products (fuels) of a country and their production, transformation and consumption by different types of economic actors (industry, transport, etc.). Therefore, an energy balance is the natural starting point to study the energy sector. The energy balance is a multi-purpose tool to:

- Provide comprehensive information on the energy supply and demand in order to understand the energy security situation, the effective functioning of energy markets and other relevant policy goals, as well as to formulate energy policies;
- Provide the essential basis for calculating various indicators, including indicators monitoring progress towards Energy Union and Europe 2020 targets (energy efficiency indicators, share of renewable energy, energy dependency, etc.);
- Ensure comparability of statistical information between different reference periods and between different countries/regions;
- Provide data for the calculation of greenhouse gas emissions from fuel combustion;
- Serve as a quality tool to ensure completeness, consistency and comparability of energy statistics;
- Provide an input for modelling and forecasting.

The concept of an energy balance is an accounting framework for the compilation, reconciliation and understanding of data on all energy products entering, exiting and used within a country (territory).

## The use of energy balances

In 1976 the United Nations Statistical Commission agreed on the use of energy balances as the key instrument to coordinate work on energy statistics and to provide data in a suitable form to understand and analyse the role of energy in the economy. Energy balance is the starting point for constructing several indicators, such as import

dependency. Certain aggregates of the energy balance contribute to cross-domain indicators, such as energy intensity (energy input per unit of output (GDP)). More generally, a number of questions can be answered by looking at the data in the energy balance (such as the evolution of energy consumption by sector or efficiency of electricity generation from combustible fuels). In addition, the energy balance can be used as a high-level check on the data quality: the coherence and accuracy of energy statistics reported for individual energy products. Substantial statistical differences in energy units, apparent energy gains, significant losses in transformation processes, unexplained variations in indicators may point towards underlying data problems. Overall, the energy balance is an extremely useful and powerful tool, which is complemented by additional indicators calculated and disseminated by Eurostat. Such indicators include:

- Detailed data on origin and destinations of international trade (import/export data);
- Technical data: generation and production capacities, data on fuel stockholding, various product or flow specific indicators;
- Additional disaggregation of individual statistics into specific subcategories.

## Energy balances in European policy decision making

The European [Energy Strategy and Energy Union](#) needs to be underpinned by statistical evidence for sound decision making. To this end, energy balances are a key input for the Commission's [impact assessments](#) in the area of energy policies. As energy is vital to many sectors of the economy, energy data are used for other purposes too, notably transport and climate change. The European Union's energy policy targets include the need for secure energy supplies, sustainable energy consumption and lower fossil fuel dependence. Energy balances help in assessing progress in these areas. They are also an essential input for monitoring the energy efficiency target of the Europe 2020 strategy. [Directive 2012/27/EU on energy efficiency](#) and its implementation measures refer to the aggregates of energy balances published by Eurostat. In the context of Eurostat's work on [sustainable development indicators](#), energy balances provide a central contribution to [SDG 7 Affordable and clean energy](#).

## Constructing energy balances

When constructing energy balances, one has to bear in mind the first law of thermodynamics. The law of conservation of energy states that the total energy of an isolated system is constant; energy can be transformed from one form to another but can be neither created nor destroyed. The first law is often formulated by stating that the change in the internal energy of a closed system is equal to the amount of heat supplied to the system, minus the amount of work done by the system on its surroundings. Consequently, energy gains are not possible and if present, they are results of either statistical discrepancy (data of low accuracy) or not fully considering all input products in the scope of energy statistics.

### Constructing energy balances in 3 steps

- The first step is to construct commodity balances for each energy carrier in natural measurement units of the energy carrier – either physical unit (tonnes and cubic meters) or energy units (GWh for electricity and TJ for heat).
- The second step is to convert the commodity balance in various units into a common energy unit, by multiplying all the data by the appropriate conversion factor (calorific values for energy carriers in physical units and unit conversion factor for energy carriers measured in energy units).
- The third step refers to organising the columns and rows of the energy balance to avoid double counting of energy. For example, the production of secondary products is shown in the production row in commodity balances and it is reported as a transformation output in the energy balance.

*Regulation (EC) No 1099/2008*

# Annual energy statistics

*data in the form of commodity balances for each fuel*

## Convert every fuel to TJ

*calorific values & energy conversions*

## Re-organise rows & columns

*avoiding double counting of energy*

## Calculate aggregates

*for products (columns) & flows (rows)*

## Energy balances

*format: complete & simplified  
available in TJ, ktoe and GWh*

**Simplified scheme for constructing energy balances Source: Eurostat**

### **The choice of the primary energy form**

The choice of the primary energy form defines the boundaries of energy statistics. The general principle of Eurostat's approach is that the primary energy form should be the first energy form in the production process for which various energy uses are in reality practised. Eurostat's methodology is based on the physical energy content method. For directly combustible energy products (for example coal, crude oil, natural gas, biofuels, waste) it is their actual energy content measured by their gross and net calorific values. For products that are not directly combustible, the application of this principle leads to the choice of heat as the primary energy form for nuclear, geothermal and solar thermal; and to the choice of electricity as the primary energy form for solar photovoltaic, wind, hydro, tide, wave, ocean. The measurement of the primary energy form for the not directly combustible fuels is done as gross electricity production for those where electricity is the primary energy form and as gross heat

production for those where heat is the primary energy form. According to obligations in [Regulation \(EC\) No 1099/2008 on energy statistics](#) the reporting is covering geothermal and solar thermal inputs needed for electricity and/or heat production from these sources. In a similar way, the heat generated by nuclear reactors has to be declared according to the reporting obligations on annual nuclear statistics. If countries do not have information on energy inputs available, but only the amount of electricity and/or heat produced is known, the reporting countries are advised to use the following efficiencies to estimate inputs:

- For electricity from geothermal sources: 10 %
- For derived heat from geothermal sources: 50 %
- For electricity from concentrating solar: 33 %
- For derived heat from solar thermal energy: 100 %
- For electricity and derived heat from nuclear sources: 33 %

### **The choice of units in the energy balance**

The data for the different products need to be expressed in a common energy unit. The unit chosen can be any energy unit: terajoule (TJ), gigawatt-hour (GWh), thousands of tons of oil equivalent (ktoe), million tons of oil equivalent (Mtoe), etc. The unit adopted by Eurostat is the joule.

### **The choice of a heating value**

The energy balance can be expressed in the “net” or “gross” energy content, where net/gross refers to the calorific values used for conversion. The quantity known as gross calorific value (GCV) (or higher heating value or gross energy or upper heating value or higher calorific value) is determined by bringing all the products of combustion back to the original pre-combustion temperature, and in particular, condensing any water vapour produced. This is the same as the thermodynamic heat of combustion since the enthalpy change for the reaction assumes a common temperature of the compounds before and after combustion, in which case the water produced by combustion is condensed to a liquid, hence yielding its latent heat of vaporization. The quantity known as net calorific value (NCV) (or lower heating value or lower calorific value) is determined by subtracting the heat of vaporization of the water vapour from the higher heating value. This treats any H<sub>2</sub>O formed as a vapour. The energy required to vaporize the water, therefore, is not released as heat. As the net calorific value represents the amount of energy that can be actually used, Eurostat adopted the methodology of using the net calorific values for its energy balances. This applies to the conversion of all energy carriers (products, fuels) of energy balance for all flows of energy balance.

### **Creating the matrix**

The energy balance is presented as a matrix: a two-dimensional table with rows and columns. This matrix can be created in different energy units, for different geographical regions and also for different time periods. While the choice for unit, country and time period, is intuitive and has user-specific needs, the choice of rows and columns needs to be harmonised within one methodology approach. The actual link between the matrix and source data for every individual position of energy balance is available within [Eurostat's energy balance builder tool](#) . In the tool, every cell of the energy balance matrix is created with a link to the source data cell (mostly one data item, but for several data cells it is a sum, difference or other formula) with a combination of a conversion factor to TJ (calorific values). For many cells of the energy balance, this link is direct one to one relationship between the cell in the balance matrix and the source data. Consequently, the actually applied calculation methodology is described in the most exhaustive level of details in [the actual MS Excel file representing the Eurostat's energy balance builder tool](#) .

European Union (28 countries)	Total	Solid fossil fuels	Manufactured gases	Peat and peat products	Oil shale and oil sands	Oil and petroleum products	Natural gas	Renewables and biofuels	Non-renewable waste	Nuclear heat	Heat	Electricity
ktoe	2017											
+ Primary production	758 209	124 466	Z	1 604	4 147	73 390	103 091	226 586	14 201	210 724	Z	Z
+ Recovered & recycled products	1 627	468	Z	0	0	1 160	Z	0	Z	Z	Z	Z
+ Imports	1 528 083	115 370	0	58	0	968 451	392 136	18 493	487	Z	6	33 081
- Exports	580 306	15 016	0	15	0	425 156	96 029	11 844	37	Z	5	32 204
+ Change in stock	11 810	3 098	0	527	55	8 680	-788	241	-3	Z	Z	Z
<b>= Gross available energy</b>	<b>1 719 424</b>	<b>228 386</b>	<b>0</b>	<b>2 174</b>	<b>4 202</b>	<b>626 525</b>	<b>398 411</b>	<b>233 476</b>	<b>14 648</b>	<b>210 724</b>	<b>1</b>	<b>877</b>
- International maritime bunkers	44 499	0	0	0	0	44 472	27	0	Z	Z	Z	Z
- International aviation	51 158	Z	Z	Z	Z	51 158	Z	0	Z	Z	Z	Z
<b>= Total energy supply</b>	<b>1 623 766</b>	<b>228 386</b>	<b>0</b>	<b>2 174</b>	<b>4 202</b>	<b>530 894</b>	<b>398 384</b>	<b>233 476</b>	<b>14 648</b>	<b>210 724</b>	<b>1</b>	<b>877</b>
<b>Transformation input</b>	<b>1 528 381</b>	<b>231 542</b>	<b>8 505</b>	<b>1 874</b>	<b>4 136</b>	<b>786 331</b>	<b>125 258</b>	<b>144 558</b>	<b>10 724</b>	<b>210 724</b>	<b>775</b>	<b>3 954</b>
+ Electricity & heat generation	665 619	157 823	8 504	1 764	2 494	16 279	123 327	129 251	10 724	210 724	775	3 954
+ Coke ovens	36 454	36 027	0	0	16	399	11	0	Z	Z	Z	Z
+ Blast furnaces	33 150	33 090	0	0	0	27	33	0	Z	Z	Z	Z
+ Gas works	721	518	0	0	185	0	18	0	Z	Z	Z	Z
+ Refineries & petrochemical industry	769 433	Z	Z	Z	Z	769 433	Z	Z	Z	Z	Z	Z
+ Patent fuel plants	208	145	0	0	0	63	Z	0	0	Z	Z	Z
+ BKB & PB plants	3 807	3 696	0	111	0	Z	Z	0	0	Z	Z	Z
+ Coal liquefaction plants	1 440	0	0	0	1 440	Z	Z	Z	Z	Z	Z	Z
+ For blended natural gas	599	Z	0	Z	Z	130	Z	469	Z	Z	Z	Z
+ Liquid biofuels blended	14 503	Z	Z	Z	Z	Z	Z	14 503	Z	Z	Z	Z
+ Charcoal production plants	244	Z	Z	Z	Z	Z	Z	244	Z	Z	Z	Z
+ Gas-to-liquids plants	0	Z	Z	Z	Z	Z	Z	0	Z	Z	Z	Z
+ Not elsewhere specified	2 201	241	1	0	0	0	1 870	90	0	Z	Z	Z
<b>Transformation output</b>	<b>1 175 554</b>	<b>31 255</b>	<b>19 888</b>	<b>77</b>	<b>Z</b>	<b>766 501</b>	<b>501</b>	<b>14 260</b>	<b>Z</b>	<b>Z</b>	<b>59 391</b>	<b>283 680</b>
+ Electricity & heat generation	343 071	Z	Z	Z	Z	Z	Z	Z	Z	Z	59 391	283 680
+ Coke ovens	33 926	27 315	6 611	Z	Z	Z	Z	Z	Z	Z	Z	Z
+ Blast furnaces	12 762	0	12 762	Z	Z	Z	Z	Z	Z	Z	Z	Z
+ Gas works	468	0	468	Z	Z	Z	Z	Z	Z	Z	Z	Z
+ Refineries & petrochemical industry	763 656	Z	Z	Z	Z	763 656	Z	0	Z	Z	Z	Z
+ Patent fuel plants	137	137	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
+ BKB & PB plants	3 880	3 803	Z	77	Z	Z	Z	Z	Z	Z	Z	Z
+ Coal liquefaction plants	955	Z	Z	Z	Z	955	Z	Z	Z	Z	Z	Z
+ Blended in natural gas	501	Z	Z	Z	Z	Z	501	Z	Z	Z	Z	Z
+ Liquid biofuels blended	14 174	Z	Z	Z	Z	Z	Z	14 174	Z	Z	Z	Z
+ Charcoal production plants	86	Z	Z	Z	Z	Z	Z	86	Z	Z	Z	Z
+ Gas-to-liquids plants	1 644	Z	Z	Z	Z	1 644	Z	Z	Z	Z	Z	Z
+ Not elsewhere specified	294	0	47	0	Z	247	Z	Z	Z	Z	Z	Z
<b>Energy sector</b>	<b>79 194</b>	<b>653</b>	<b>5 125</b>	<b>20</b>	<b>Z</b>	<b>30 098</b>	<b>16 614</b>	<b>666</b>	<b>75</b>	<b>Z</b>	<b>4 866</b>	<b>21 075</b>
+ Own use in electricity & heat generation	15 183	19	15	0	0	30	66	23	8	Z	1 160	13 862
+ Coal mines	1 467	301	32	0	2	72	31	0	0	Z	123	905
+ Oil & natural gas extraction plants	8 315	Z	Z	Z	Z	700	6 911	0	Z	Z	17	687
+ Patent fuel plants	0	0	0	0	0	Z	Z	0	0	Z	0	0
+ Coke ovens	3 417	123	3 046	0	0	0	29	0	0	Z	93	127
+ BKB & PB plants	1 019	187	0	20	0	Z	Z	18	0	Z	367	427
+ Gas works	14	0	0	0	0	0	0	4	0	Z	0	10
+ Blast furnaces	2 236	1	1 996	0	0	1	37	0	39	Z	11	150
+ Petroleum refineries (oil refineries)	43 104	21	25	0	0	29 067	8 538	40	0	Z	2 246	3 167
+ Nuclear industry	102	Z	Z	Z	Z	Z	Z	Z	Z	Z	0	102
+ Coal liquefaction plants	26	0	0	0	0	Z	Z	Z	Z	Z	8	18
+ Liquefaction & regasification plants (LNG)	199	Z	Z	Z	Z	Z	197	Z	Z	Z	0	2
+ Gasification plants for biogas	538	Z	Z	Z	Z	Z	Z	535	0	Z	3	0
+ Gas-to-liquids (GTL) plants	0	Z	Z	Z	Z	Z	0	Z	Z	Z	0	0
+ Charcoal production plants	0	Z	Z	Z	Z	Z	Z	0	0	Z	0	0
+ Not elsewhere specified (energy)	3 573	0	10	0	0	229	805	47	28	Z	838	1 617
<b>Distribution losses</b>	<b>25 892</b>	<b>30</b>	<b>905</b>	<b>1</b>	<b>0</b>	<b>30</b>	<b>1 937</b>	<b>66</b>	<b>0</b>	<b>Z</b>	<b>5 186</b>	<b>17 736</b>
<b>Available for final consumption</b>	<b>1 165 852</b>	<b>27 416</b>	<b>5 354</b>	<b>356</b>	<b>64</b>	<b>480 936</b>	<b>255 076</b>	<b>102 445</b>	<b>3 849</b>	<b>0</b>	<b>48 565</b>	<b>241 792</b>
<b>Final non-energy consumption</b>	<b>102 208</b>	<b>1 660</b>	<b>17</b>	<b>0</b>	<b>53</b>	<b>85 372</b>	<b>15 105</b>	<b>0</b>	<b>Z</b>	<b>Z</b>	<b>Z</b>	<b>Z</b>
<b>Final energy consumption</b>	<b>1 060 037</b>	<b>25 609</b>	<b>5 247</b>	<b>433</b>	<b>19</b>	<b>394 125</b>	<b>239 278</b>	<b>102 366</b>	<b>3 847</b>	<b>Z</b>	<b>48 528</b>	<b>240 585</b>
+ Industry	261 037	14 443	5 233	154	19	26 833	82 617	23 042	3 538	Z	16 122	89 035
+ Iron & steel	27 860	3 656	4 976	0	0	610	8 343	7	3	Z	486	9 780
+ Chemical & petrochemical	52 696	3 107	78	3	0	7 267	18 783	316	481	Z	6 859	15 801
+ Non-ferrous metals	10 323	297	34	0	0	309	3 573	2	11	Z	158	5 939
+ Non-metallic minerals	34 184	4 176	81	1	19	5 847	13 310	1 768	2 736	Z	227	6 020
+ Transport equipment	8 697	241	37	0	0	388	2 783	16	0	Z	577	4 655
+ Machinery	19 565	111	13	0	0	994	7 110	100	7	Z	593	10 637
+ Mining & quarrying	3 516	172	12	0	0	880	601	49	2	Z	119	1 681
+ Food, beverages & tobacco	29 948	1 366	1	1	0	1 792	14 198	1 142	7	Z	1 309	10 131
+ Paper, pulp & printing	34 356	869	0	148	0	700	6 835	13 438	140	Z	2 138	10 088
+ Wood & wood products	8 859	43	0	1	0	231	677	5 029	33	Z	584	2 261
+ Construction	7 505	45	0	0	0	3 746	1 772	93	1	Z	40	1 808
+ Textile & leather	4 245	57	0	0	0	218	2 033	21	1	Z	147	1 768
+ Not elsewhere specified (industry)	18 988	303	1	0	0	3 852	2 598	766	118	Z	2 885	8 466
+ Transport	326 872	12	0	0	0	303 031	3 383	14 891	0	Z	Z	5 557
+ Rail	6 532	12	0	0	0	1 932	Z	28	0	Z	Z	4 560
+ Road	306 247	Z	Z	Z	Z	289 576	1 687	14 855	0	Z	Z	129
+ Domestic aviation	6 139	Z	Z	Z	Z	6 139	Z	0	Z	Z	Z	Z
+ Domestic navigation	5 052	0	0	0	0	5 047	Z	4	0	Z	Z	Z
+ Pipeline transport	1 807	Z	Z	Z	Z	9	1 638	0	Z	Z	Z	160
+ Not elsewhere specified (transport)	1 095	0	0	0	0	328	57	3	0	Z	Z	707
+ Other	472 128	11 153	14	279	0	64 261	153 279	64 434	310	Z	32 405	145 994
+ Commercial & public services	154 041	896	3	9	0	16 003	45 206	10 060	303	Z	9 632	71 928
+ Households	287 975	9 201	11	207	0	32 371	103 789	50 500	7	Z	22 443	69 445
+ Agriculture & forestry	24 282	1 012	0	62	0	12 872	3 418	2 390	0	Z	250	4 278
+ Fishing	1 493	0	0	0	0	1 297	1	47	0	Z	0	148
+ Not elsewhere specified (other)	4 338	44	0	0	0	1 718	864	1 437	0	Z	80	194
<b>Statistical differences</b>	<b>3 607</b>	<b>147</b>	<b>90</b>	<b>-77</b>	<b>-8</b>	<b>1 440</b>	<b>692</b>	<b>78</b>	<b>2</b>	<b>0</b>	<b>37</b>	<b>1 206</b>
Gross electricity production	283 260	56 910	2 804	451	852	5 216	57 034	86 467	2 182	71 343	Z	Z
Gross heat production	57 628	13 378	908	722	46	2 342	21 699	15 271	3 108	108	Z	46

Example of Eurostat's simplified energy balance Source: Eurostat

More details and additional information on construction of energy balances is available in [the Eurostat's energy balance guide](#).

## Technical specificity of Eurostat's energy balance

- The energy balance is a table matrix represented by columns and rows. Columns of the energy balance represent energy products (fuels). Rows represent flows of the balance (production – transformation – consumption sectors).
- The energy balance is constructed for each calendar year. Currently energy balances for all EU Member States are available starting in year 1990. Eurostat data also cover several non-EU countries and for most of them data are also available starting in 1990.
- The energy balance covers the national territory of a given country. The trade of energy commodities between countries is covered in the imports and exports.
- The energy balance calculated by Eurostat is available in thousands of tons of oil equivalent (ktoe), in terajoules (TJ) and in gigawatt-hours (GWh)

### Products (columns of the energy balance)

This chapter presents the basic relationships between energy products (fuels). For the full set of relationships between products, please refer to the Energy balance guide. For the definition of individual fuels, please refer to the Regulation (EC) No 1099/2008 on energy statistics.

**Total** = Solid fossil fuels + Manufactured gases + Peat and peat products + Oil shale and oil sands + Oil and petroleum products (excluding biofuel portion) + Natural gas + Renewables and biofuels + Non-renewable waste + Nuclear heat + Heat + Electricity

**Fossil fuels** = Solid fossil fuels + Manufactured gases + Peat and peat products + Oil shale and oil sands + Oil and petroleum products (excluding biofuel portion) + Natural gas + Non-renewable waste

**Solid fossil fuels** = Anthracite + Coking coal + Other bituminous coal + Sub-bituminous coal + Lignite + Patent fuels + Coke oven coke + Gas coke + Coal tar + Brown coal briquettes

**Manufactured gases** = Gas works gas + Coke oven gas + Blast furnace gas and Other recovered gases

**Peat and peat products** = Peat + Peat products

**Oil and petroleum products** = Crude oil + Natural gas liquids + Refinery feedstocks + Additives and oxygenates (excluding biofuel portion) + Other hydrocarbons + Refinery gas + Ethane + Liquefied petroleum gas + Motor gasoline (excluding biofuel portion) + Aviation gasoline + Gasoline-type jet fuel + Kerosene-type jet fuel (excluding biofuel portion) + Other kerosene + Naphtha + Gas oil and diesel oil (excluding biofuel portion) + Fuel oil + White spirit and special boiling point industrial spirits + Lubricants + Bitumen + Petroleum coke + Paraffin waxes + Other oil products not elsewhere specified

**Renewables and biofuels** = Hydro power + Tide + wave and ocean + Wind power + Solar photovoltaic + Solar thermal + Geothermal + Primary solid biofuels + Charcoal + Biogases + Renewable municipal waste + Pure biogasoline + Blended biogasoline + Pure biodiesels + Blended biodiesels + Pure bio jet kerosene + Blended bio jet kerosene + Other liquid biofuels + Ambient heat (heat pumps) Non-renewable waste = Industrial waste (non-renewable) + Non-renewable municipal waste

### Flows (rows of the energy balance)

Eurostat's energy balance has 3 blocks:

- Top block: Supply
- Medium block: Transformation input, Transformation output, Consumption of the energy branch and Distribution losses

- Bottom block: Final non-energy consumption and Final energy consumption (disaggregated into subsectors of the industry, transport and other sectors)

In the medium block, the Transformation input and Transformation output include real energy product transformations as well as virtual product transformations. These virtual transformations cover the following aspects:

- blending of various products into each other
- methodological transformations of electricity produced from non-combustible fuels such as nuclear heat, hydro, wind, geothermal, solar thermal and photovoltaic
- interproduct transfers, backflows and exchanges between petroleum refineries and petrochemical industries

The difference between transformation input and transformation output constitutes the transformation losses. This chapter presents only the relationships between the elements used in this publication. For the full set of relationships as well as a more detailed definition of each category, please refer to the Energy balance guide.

**Gross available energy** = Primary production + Recovered & Recycled products + Imports – Export + Stock changes

**Total energy supply** = Gross available energy – International maritime bunkers – International aviation

**Transformation input** = Electricity & heat generation + Coke ovens + Blast furnaces + Gas works + Refineries & petrochemical industry + Patent fuel plants + BKB & PB plants + Coal liquefaction plants + For blended natural gas + Liquid biofuels blended + Charcoal production plants + Gas-to-liquids plants + Not elsewhere specified

**Transformation output** = Electricity & Heat generation + Coke ovens + Blast furnaces + Gas works + Refineries & Petrochemical industry + Patent fuel plants + BKB & PB plants + Coal liquefaction plants + Blended in Natural gas + Liquid biofuels blended + Charcoal production plants + Gas-to-liquids plants + Not elsewhere specified

**Energy sector** = Own use in electricity & heat generation + Coal mines + Oil & natural gas extraction plants + Patent fuel plants + Coke ovens + BKB & PB plants + Gas works + Blast furnaces + Petroleum refineries (oil refineries) + Nuclear industry + Coal liquefaction plants + Liquefaction & regasification plants (LNG) + Gasification plants for biogas + Gas-to-liquids (GTL) plants + Charcoal production plants + Not elsewhere specified (energy)

**Energy available for final consumption** = Total energy supply – Transformation input + Transformation output – Energy sector – Distribution losses

**Final energy consumption** = Industry sector + Transport sector + Other sectors

**Industry sector** = Iron & steel + Chemical & petrochemical + Non-ferrous metals + Non-metallic minerals + Transport equipment + Machinery + Mining & quarrying + Food, beverages & tobacco + Paper, pulp & printing + Wood & wood products + Construction + Textile & leather + Not elsewhere specified (industry)

**Transport sector** = Rail + Road + Domestic aviation + Domestic navigation + Pipeline transport + Not elsewhere specified (transport)

**Other sectors** = Commercial & public services + Households + Agriculture & forestry + Fishing + Not elsewhere specified (other)

**Statistical differences** = Energy available for final consumption – Final non-energy consumption – Final energy consumption

*Primary production + Recovered and recycled products  
+ Import – Exports ± Change in stock*

## **Gross available energy**

– International maritime bunkers  
– International aviation

## **Total energy supply**

**Energy transformation inputs & outputs**  
*fuel conversions, blending and reclassifications*

**Energy sector**  
*consumption in a support of energy transformation processes*

**Distribution losses**  
*including transmission losses*

## **Energy available for final consumption**

**Statistical difference**

## **Final energy consumption**

*Industry, transport, households,  
commercial and public services,  
agriculture, ...*

## **Final non-energy consumption**

**Simplified scheme of Eurostat's energy balances Source: Eurostat**

### **Interpretations of zeros**

The statistical data collection system for energy statistics cannot distinguish between the following cases:



- Energy quantity is a real zero (real no consumption)
- Consumption is negligible (quantity is less than half of the respective lowest reporting unit)
- Data are not available to the reporting authority
- Data are confidential and not shown

All these cases are shown as “zero”.

### Specific flags used

Symbol **Z** means data are not applicable. This is either due to a methodologically impossible combination in the energy balance matrix or due to the non-existence of combination at the data collection phase. By the way of example, the following elements are not feasible: consumption of solid fossil fuel in aviation, use of hydro power in households and renewables as transformation output of blast furnaces.

Symbol **:** means data are not available. This is when countries did not make transmissions for the reference period concerned. It only relates to periods in past. If a country made data transmission, any eventual not available data might be shown as zero.

## Additional information and more details

More details and additional information on construction of energy balances is available in [the Eurostat's energy balance guide](#) .

- Energy balance guide ([direct link to the pdf file](#))
- Energy balance builder tool ([direct link to the xlsx file](#))
- Data in database format (free for commercial and non-commercial use): [complete energy balances](#) and [simplified energy balances](#)
- Energy balances in the MS Excel file format ([direct link to the zip file](#))
- Relationships between products and flows of energy balances ([direct link to the xlsx file](#))

## Explore further

### Other articles

- [Calculation methodologies for the share of renewables in energy consumption](#)
- [Energy balance - old methodology](#)

### Database

- [Energy - detailed datasets \(nrg\)](#) , see:

Energy statistics - quantities (nrg\_quant)

Energy statistics - quantities, annual data (nrg\_quanta)

#### **Energy balances (nrg\_bal)**

Supply, transformation and consumption - commodity balances (nrg\_cb)

Energy indicators (nrg\_ind)

Energy infrastructure and capacities (nrg\_inf)

Stocks (nrg\_stk)

Trade by partner country (nrg\_t)

## Thematic section

- [Energy](#)

[Energy - Energy balances](#)

## Publications

- [Energy data \(2020 edition\)](#)
- [Energy balance sheets - 2017 data \(2019 edition\)](#)
- [Energy balance sheets - 2016 data \(2018 edition\)](#)
- [Energy balance sheets - 2015 data \(2017 edition\)](#)
- [Energy balance sheets - 2014 data \(2016 edition\)](#)
- [Energy balance sheets - 2013 data \(2015 edition\)](#)

## Selected datasets

- [Energy - selected datasets \(t\\_nrg\)](#) , see:

[Energy \(t\\_nrg\)](#)

[Energy statistics - main indicators \(t\\_nrg\\_indic\)](#)

[Sustainable Development indicators Goal 7 - Affordable and clean energy \(t\\_nrg\\_sdg\\_07\)](#)

## Methodology

- [Energy statistics, European and national metadata](#) (ESMS metadata file)
- [Energy balances](#) (ESMS metadata file)

## External links

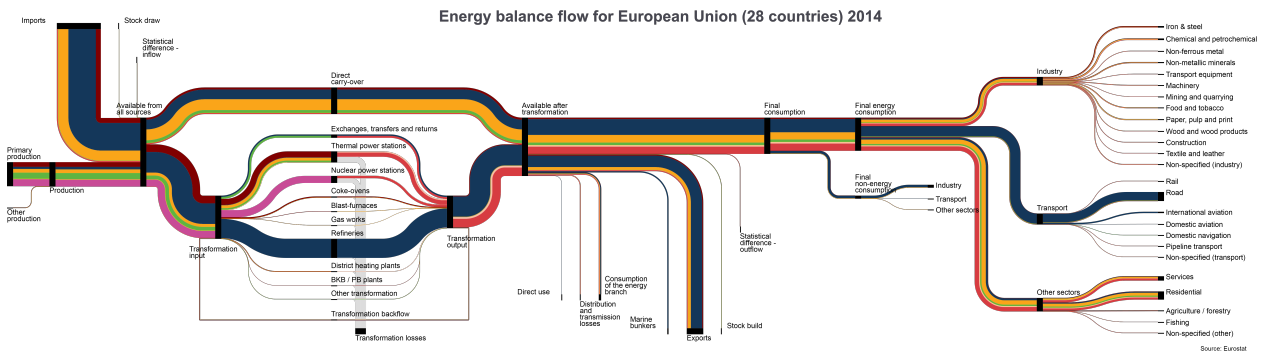
- [United Nations Statistics Division - Energy Balances](#)
- [United Nations Statistics Division - International Recommendations for Energy Statistics](#)
- [International Energy Agency - Energy balances](#)

## Legislation

- [Regulation \(EC\) No 1099/2008](#) on energy statistics
- [Summaries of EU legislation: Common system for the production of energy statistics](#)

## Visualisation

- This [interactive tool](#) allows you to easily visualise energy balances, see how much energy is imported or produced, find out sectors where the energy is consumed and check out different energy sources. You can customise your table and charts by choosing the fuel, country, year, unit and compare your country with others.
- The [Eurostat Sankey diagrams tool](#) published on the Eurostat website allows the visualisation of energy balances. Sankey diagrams allow the user to get an overview of the main energy flows and how they contribute to the global energy balance.



**Example of Sankey diagram of complete energy balance of Eurostat Source: Eurostat**