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Presentation of annual energy statistics in Eurobase:
Changes in datasets in node [nrg_quanta]

Eurostat has updated and simplified the dissemination of annual energy statistics in Eurobase. In addition, a new methodology for the construction of energy balances has been released. Eurostat implemented both developments following the latest amendment of Regulation (EC) No 1099/2008 on energy statistics, the requests received from users and the need to align to the International Recommendations on Energy Statistics.

This document describes the new Eurostat's methodology for energy balances, as well as the changes in the presentation and content of the Eurobase node nrg_quanta, which is covering annual energy statistics (data defined in Annex B of Regulation (EC) No 1099/2008 on energy statistics).

During the last week of January 2019 the datasets currently disseminated in node nrg_quanta will be *archived*. The current node nrg_quanta will be renamed to nrg_quanta_h. Please see Annex 1 for the exact content and the list of datasets affected. In practise, this means that these datasets will not be updated anymore and will contain data only from 1990 to 2016.

During the last week of January 2019 a new structure of node nrg_quanta will be implemented – please see Annex 2 for its exact content. The new datasets will cover the period 1990-2017 or as long time series as provided by reporting countries.

In addition, Eurostat will implement a new methodology for energy balances. The new methodology is described in Annex 3 of this document. This methodology will be applied to all years (the whole 1990-2017 period).

The new methodology for energy balances will be also implemented in the Eurostat Sankey diagrams visualisation tool, which will be updated in the first months of 2019.

Hand in hand with the implementation of the new methodology, the Eurostat's Standard Code List (SCL) initiative was implemented in the energy domain. The *SCL initiative* resulted in the new dissemination codes.

In order to facilitate transition of IT systems for users, Eurostat starts with data dissemination on 3 December 2018. The current dissemination covers complete energy balances with new methodology and new codes. The country coverage will be increasing gradually according to the progress in data validation. By 31 January 2019, the full coverage of all EU Member States is expected to be reached (this timeline is fully in line with Article 5(5) of Regulation (EC) No 1099/2008 on energy statistics).

Contact for further questions, comments and suggestions: ESTAT-ENERGY@EC.EUROPA.EU

Annex 1: Eurobase structure until last week of January 2019

- Energy statistics - quantities, annual data (nrg_quanta)
  - Energy statistics - supply, transformation and consumption (nrg_10)
    - Simplified energy balances - annual data (nrg_100a)
    - Complete energy balances - annual data (nrg_110a)
    - Complete energy balances (nrg_bal_c) (Explanatory note)
    - Supply, transformation and consumption of solid fuels - annual data (nrg_101a)
    - Supply, transformation and consumption of oil - annual data (nrg_102a)
    - Supply, transformation and consumption of gas - annual data (nrg_103a)
    - Supply and transformation of nuclear energy - annual data (nrg_104a)
    - Supply, transformation and consumption of electricity - annual data (nrg_105a)
    - Supply, transformation and consumption of heat - annual data (nrg_106a)
    - Supply, transformation and consumption of renewable energies - annual data (nrg_107a)
    - Supply, transformation and consumption of wastes (non-renewable) - annual data (nrg_108a)
    - Primary production - all products - annual data (nrg_109a)
    - Sankey diagram dataset - annual data (nrg_sankey)
  - Energy statistics - imports (nrg_12)
    - Imports - solid fuels - annual data (nrg_122a)
    - Imports - oil - annual data (nrg_123a)
    - Imports - gas - annual data (nrg_124a)
    - Imports - electricity - annual data (nrg_125a)
    - Imports - renewables - annual data (nrg_126a)
  - Energy statistics - exports (nrg_13)
    - Exports - solid fuels - annual data (nrg_132a)
    - Exports - oil - annual data (nrg_133a)
    - Exports - gas - annual data (nrg_134a)
    - Exports - electricity - annual data (nrg_135a)
    - Exports - renewables - annual data (nrg_136a)
  - Energy statistics - infrastructure (nrg_11)
    - Infrastructure - electricity - annual data (nrg_113a)
    - Infrastructure - biofuel production capacities - annual data (nrg_114a)
    - Infrastructure - solar collectors' surface - annual data (nrg_115a)
    - Infrastructure - nuclear energy facilities (nrg_ind_333a)
  - Energy statistics - indicators and other data (nrg_indic)
    - Energy saving - annual data (nrg_ind_334a)
    - Share of energy from renewable sources (nrg_ind_335a)

Annex 2: Eurobase structure after implementation of changes (as of 31 January 2019)

- Energy statistics - quantities, annual data (nrg_quanta)
  - Energy balances (nrg_bal)
    - Simplified energy balance (nrg_bal_s)
    - Complete energy balances (nrg_bal_c)
    - Calorific values (nrg_bal_cv)
    - Primary production by type of fuel (nrg_bal_pp)
    - Production of electricity and derived heat by type of fuel (nrg_bal_peh)
    - Energy flow - Sankey diagram data (nrg_bal_sd)
  - Supply, transformation and consumption of solid fossil fuels (nrg_cb)
    - Supply, transformation and consumption of solid fossil fuels (nrg_cb_sff)
    - Supply, transformation and consumption of gas (nrg_cb_gas)
    - Supply, transformation and consumption of oil and petroleum products (nrg_cb_oil)
    - Supply, transformation and consumption of renewables and wastes (nrg_cb_rw)
    - Supply, transformation and consumption of electricity (nrg_cb_e)
    - Supply, transformation and consumption of derived heat (nrg_cb_h)
  - Energy indicators (nrg_ind)
    - Gross and net production of electricity and derived heat by type of plant and operator (nrg_ind_peh)
    - Gross production of electricity and derived heat from combustible fuels by type of plant and operator (nrg_ind_pehcf)
    - Production of electricity and heat by autoproducers, by type of plant (nrg_ind_pehap)
  - Energy infrastructure and capacities (nrg_inf)
    - Electricity production capacities by main fuel groups and operator (nrg_inf_epc)
    - Electricity production capacities for renewables and wastes (nrg_inf_epcrw)
    - Electricity production capacities for combustible fuels by technology and operator (nrg_inf_epct)
    - Liquid biofuels production capacities (nrg_inf_lbpc)
    - Solar thermal collectors' surface (nrg_inf_stcs)
    - Heat pumps - technical characteristics by technologies (nrg_inf_hptc)
    - Nuclear energy facilities (nrg_inf_nuc)
    - Gaseous natural gas storage facilities (nrg_inf_gngsf)
    - Liquefied natural gas storage facilities (LNG terminals) (nrg_inf_lngsf)
    - Refinery capacities by refinery processes (nrg_inf_ref)
  - Stocks (nrg_stk)
    - Stock levels for oil products (nrg_stk_oil)
    - Stock levels for gaseous and liquefied natural gas (nrg_stk_gas)
  - Trade by partner country (nrg_t)
    - Imports (nrg_ti)
      - Imports of solid fossil fuels by partner country (nrg_ti_cpo)
      - Imports of oil and petroleum products by partner country (nrg_ti_oil)
      - Imports of natural gas and manufactured gases by partner country (nrg_ti_gas)
      - Imports of biofuels by partner country (nrg_ti_bio)
      - Imports of electricity and derived heat by partner country (nrg_ti_eh)
    - Exports (nrg_te)
      - Exports of solid fossil fuels by partner country (nrg_te_cpo)
      - Exports of oil and petroleum products by partner country (nrg_te_oil)
      - Exports of natural gas and manufactured gases by partner country (nrg_te_gas)
      - Exports of biofuels by partner country (nrg_te_bio)
      - Exports of electricity and derived heat by partner country (nrg_te_eh)

Annex 3: new methodology for energy balances

Energy statistics

Eurostat constructs energy balances on the basis of data transmissions defined in Regulation (EC) No 1099/2008 on energy statistics. More specifically, annexes A and B of this Regulation define energy products and energy flows of annual energy statistics. All reporting countries are transmitting these energy data to Eurostat via EDAMIS. For the construction of energy balance of a country, all of the following datasets (as defined in EDAMIS) have to be completed and successfully validated (without any major data problem):

- ENERGY_ELECT_A (annual questionnaire for electricity & heat)
- ENERGY_NTGAS_A (annual questionnaire for natural gas)
- ENERGY_NUCLEAR_A (annual questionnaire for nuclear statistics)
- ENERGY_PETRO_A (annual questionnaire for oil)
- ENERGY_RENEW_A (annual questionnaire for renewables & waste)
- ENERGY_SOLID_A (annual questionnaire for coal)

This is very important for the process of constructing the energy balance since all data transmitted to Eurostat have the official legal status. For EU Member States, these data transmissions can be used for assessing legal compliance with the legislative framework of the European Union. Consequently energy balances constructed from these official data transmission are also considered as official data source and as such, energy balances are also used for the assessment of legal compliance with the legislative framework of the European Union, wherever relevant.

General methodology aspects

When constructing energy balance 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.

Simplified scheme for constructing energy balances

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 value for energy carrier 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.

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 practiced. **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 tons of oil equivalent (ktoe), million tons of oil equivalent (Mtoe), etc.

The unit adopted by Eurostat is the joule. The joule is a derived unit of energy in the International System of Units. It is the energy dissipated as heat when an electric current of one ampere passes through a resistance of one ohm for one second. This definition forms one of the basis of conversion between energy units: **1 GWh = 3.6 TJ**.

Historically, a unit used for energy balances is also the tonne of oil equivalent. It corresponds roughly to the average quantity of energy contained in a tonne of crude oil. Based on its energy content definition of 10^7kilocalories, the following conversion can be derived: **1 Mtoe = 41 868 TJ**.

Energy balance can be converted from one energy unit into another. Eurostat offers energy balance data in TJ, ktoe and GWh in its database. The Eurostat's balance builder tool adds Mtoe. The table below presents the conversion factors between various energy units.

To: / From:	**TJ**	**Mtoe**	**GWh**
TJ		/ 41 868	/ 3.6
Mtoe	× 41 868		× 11 630
GWh	× 3.6	/ 11 630	

The choice of a heating value (calorific value)

The energy balance can be expressed in the "net" or "gross" energy content, where net/gross refer 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_2O 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 conversion of all energy carriers (products, fuels) of energy balance for all flows of energy balance.

The actual choice of calorific values

Related to the choice of heating value is the actual choice of net calorific values used. **Eurostat set up a cascade system for the choice of the net calorific values used for the construction of energy balances**.

1. The net calorific values are covered by the data transmission obligations in Regulation (EC) No 1099/2008 on energy statistics. If reporting countries fulfil their reporting obligations, Eurostat uses for the construction of energy balances the values transmitted by countries.
2. For primary and secondary coal product, also a reporting of gross calorific values is foreseen. If net calorific values are not provided but gross calorific values are provided, Eurostat will use the estimate of net calorific value. The estimation is based on the assumption that GCV = 1.05 × NCV (the gross calorific value is 5% higher than the net calorific value).
3. For primary and secondary coal products, if specific sectoral calorific values are not provided but calorific values for other sectors are provided, then the arithmetic average of available calorific values is used for constructing the energy balance.

   For oil products in table 1 of the oil questionnaire (crude oil, NGL, refinery feedstock, additives/oxygenates or other hydrocarbons), if an average calorific value is not reported but calorific values for production, imports or exports are provided, then the arithmetic average of available calorific values is used for constructing the energy balance.
4. If no calorific values are provided by a reporting country, Eurostat uses the net calorific values enacted in Commission Regulation (EU) No 601/2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.
5. For products not covered by the Commission Regulation (EU) No 601/2012, the net calorific values used are Eurostat's estimates. These estimates take into account the Commission Decision 2007/589/EC establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.

The references to the European legislation are based on the consolidated versions of legal acts as available on 16 August 2017. In practical terms, Commission Decision 2007/589/EC and Commission Regulation (EU) No 601/2012 refer to the 2006 IPCC Guidelines.

For coal and coal products, it should be noted that calorific value reported under "For other uses" are used (among other flows) also for the following flows of the energy balance: recovered products, stock changes, autoproducers, gas works, coal liquefaction plants, final non-energy consumption and distribution losses.

The table below presents overview of calorific values with respect to point 4 (green shading) and point 5 (yellow shading).

Product	Net calorific value (TJ/kt)
Anthracite	26.7
Coking coal	28.2
Other bituminous coal	25.8
Sub-bituminous coal	18.9
Lignite	11.9
Patent fuels	20.7
Coke oven coke	28.2
Gas coke	28.2
Coal tar	28.0
Brown coal briquettes	19.0
Peat	9.76
Peat products	16.0
Oil shale and oil sands	8.9
Crude oil	42.3
Natural gas liquids	44.2
Refinery feedstocks	43.0
Additives and oxygenates	42.5
Other hydrocarbons (w/o bio)	42.5
Refinery gas	49.5
Ethane	46.4
Liquefied petroleum gases	47.3
Motor gasoline (w/o bio)	44.3

Product	Net calorific value (TJ/kt)
Aviation gasoline	44.3
Gasoline-type jet fuel	44.3
Kerosene-type jet fuel	44.1
Other kerosene	43.8
Naphtha	44.5
Gas oil and diesel oil (w/o bio)	43.0
(Residual) Fuel oil	40.4
White spirit and SPB	40.2
Lubricants	40.2
Bitumen	40.2
Petroleum coke	32.5
Paraffin waxes	40.2
Other oil products	40.2
Charcoal	29.5
Pure biogasoline	27.0
Blended biogasoline	27.0
Pure biodiesels	27.0
Blended biodiesels	27.0
Pure bio jet kerosene	44.0
Blended bio jet kerosene	44.0
Other liquid biofuels	27.4

Creating the matrix

The energy balance is presented as a matrix: a 2 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 subsequent text describes the columns and rows of Eurostat energy balance. Essentially 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 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 balance and the source data.

Hierarchical relationships between products and their aggregates

The next table presents hierarchical presentation of all products and all aggregates. The hierarchical relationship is ordinary sum (addition) and is valid for all instances in data presentation of energy balances by Eurostat.

Label	Simplified balance	Complete balance
Total	✓	✓
Coal and manufactured gases		
Solid fossil fuels	✓	✓
Hard coal		
Anthracite		✓
Coking coal		✓
Other bituminous coal		✓
Brown coal		
Sub-bituminous coal		✓
Lignite		✓
Coal products		
Patent fuels		✓
Coke oven coke		✓
Gas coke		✓
Coal tar		✓
Brown coal briquettes		✓
Manufactured gases	✓	✓
Gas works gas		✓
Coke oven gas		✓
Blast furnace gas		✓
Other recovered gases		✓
Peat and peat products	✓	✓
Peat		✓
Peat products		✓
Oil shale and oil sands	✓	✓
Oil and petroleum products	✓	✓
Crude oil, NGL, feedstocks and other hydrocarbons		
Crude oil		✓
Natural gas liquids		✓
Refinery feedstocks		✓
Additives and oxygenates (excluding biofuel portion)		✓
Other hydrocarbons		✓
Oil products		
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		✓

Label	Simplified balance	Complete balance
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 n.e.c.		✓
Natural gas	✓	✓
Renewables and biofuels	✓	✓
Biofuels		
Solid biofuels		
Primary solid biofuels		✓
Fuelwood, wood residues and by-products		
Black liquor		
Bagasse		
Animal waste		
Other vegetal material and residues		
Renewable fraction of industrial waste		
Charcoal		✓
Liquid biofuels		
Biogasoline		
Pure biogasoline		✓
Blended biogasoline		✓
Biodiesels		
Pure biodiesels		✓
Blended biodiesels		✓
Bio jet kerosene		
Pure bio jet kerosene		✓
Blended bio jet kerosene		✓
Other liquid biofuels		✓
Biogas		✓
Biogases from anaerobic fermentation		
Landfill gas		
Sewage sludge gas		
Other biogases from anaerobic fermentation		
Biogases from thermal processes		
Renewable municipal waste		✓
Hydro		✓
Pure hydro power		
Mixed hydro power		
Pumped hydro power		
Tide, wave, ocean		✓
Geothermal		✓

Label	Simplified balance	Complete balance
Wind		✓
Wind on shore		
Wind off shore		
Solar		
Solar thermal		✓
Solar photovoltaic		✓
Ambient heat (heat pumps)		✓
Non-renewable waste	✓	✓
Industrial waste		✓
Non-renewable municipal waste		✓
Nuclear heat	✓	✓
Heat	✓	✓
Electricity	✓	✓

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 industry, transport and other sectors)

In the medium block, the difference between transformation input and transformation output constitutes the transformation losses.

Supply (top block)

The top block – Supply – covers the top down approach from the perspective of production, trade and stock changes. As recommended in IRES, international maritime bunkers as well as international aviation are excluded at the top block of the energy balance.

Primary production

Primary production represents any kind of extraction of energy products from natural sources. It takes place when the natural sources are exploited, for example extraction of lignite in coal mines or extraction of crude oil. It also includes electricity and heat according to the choice of the primary energy form (electricity generation using hydro, wind and solar PV).

Transformation of energy from one form to another, such as electricity or heat generation in power plants using natural gas or coke oven coke production in coke ovens is included in the transformation output (middle block of the energy balance) and not on the primary production. Therefore primary production for all secondary fuels is zero.

Recovered and recycled products

For coal this includes recovered slurries, middlings and other low-grade coal products, which cannot be classified according to type of coal. This includes coal recovered from waste piles and other waste receptacles.

For petroleum products, these are finished (petroleum) products which pass a second time through the marketing network, after having been once delivered to final consumers (for example used lubricants which are reprocessed).

Imports

Imports represent all entries into the national territory excluding transit quantities. However, if electricity is transited through a country, the amount is reported as both an import and an export. Data reflect amounts having crossed the national territorial boundaries, whether customs clearance has taken place or not. Quantities of crude oil and

products imported under processing agreements (i.e. refining on account) are included. Petroleum products imported directly by the petrochemical industry should be included.

Exports

Exports represent all exits from the national territory excluding transit quantities. However, if electricity is transited through a country, the amount is reported as both an import and an export. Data reflect amounts having crossed the national territorial boundaries, whether customs clearance has taken place or not. Quantities of crude oil and products exported under processing agreements (i.e. refining on account) are included. Petroleum products exported directly by the petrochemical industry should be included.

Change in stock

The difference between the opening stock level and closing stock level for stocks held on national territory. Stock changes do not refer to reserves (proven or probable) of not yet extracted products, such as underground deposits of crude oil, natural gas and coal.

Positive value for stock changes means stock draw (fuel put in stocks in previous years was used during the reference year). Negative value for stock changes means stock build (fuel was put in stocks during the reference year and can be used in future).

For natural gas, variations of stocks represent also the quantities of gas introduced into and removed from the transportation systems. For natural gas it refers to recoverable natural gas stored in special storage facilities (depleted gas and/or oil field, aquifer, salt cavity, mixed caverns, or other) as well as liquefied natural gas storage. Cushion gas should be excluded.

For non-blended liquid biofuels, stock changes may include stock changes of liquid biofuels destined to be blended.

Gross available energy

This aggregate is calculated with the following arithmetic definition:

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

For total of all products, the *Gross available energy* is one of the most important aggregate of energy balance and represents the quantity of energy necessary to satisfy all energy demand of entities operating under the authorities of the geographical entity under consideration.

Its interpretation for individual products is different. For secondary products, which are produced as transformation output and not as primary productions, the *Gross available energy* can be negative.

International maritime bunkers

Quantities of fuels delivered to ships of all flags that are engaged in international navigation. The international navigation may take place at sea, on inland lakes and waterways, and in coastal waters. Excluded are:

- consumption by ships engaged in domestic navigation. The domestic/international split should be determined on the basis of port of departure and port of arrival, and not by the flag or nationality of the ship,
- consumption by fishing vessels,
- consumption by military forces,
- aviation bunkers.

International aviation

Quantities of fuels delivered to aircrafts for international aviation. The domestic/international split is determined on the basis of departure and landing locations and not by the nationality of the airline. Excludes fuels used by airlines for their road vehicles (see Not elsewhere specified (Transport)) and military use of aviation fuels (see Not elsewhere specified (Other)).

Total energy supply

This aggregate reflects on the recommendations in IRES for calculation of key aggregates of energy balances. This is an aggregate with the following arithmetic definition:

Total energy supply =	+ Primary production + Recovered & Recycled products + Imports – Export + Stock changes – International maritime bunkers – International aviation

For total of all products, the *Total energy supply* is one of the most important aggregate of energy balance and represents the quantity of energy necessary to satisfy inland consumption (inland fuel deliveries) of the geographical entity under consideration.

Its interpretation for individual products is different. For secondary products, which are produced as transformation output and not as primary productions, the *Total energy supply* can be negative.

Transformation input (medium block)

The transformation of energy is generally executed by energy industries. However, many entities that are not a part of energy industries are also involved in the transformation and production of energy products. This is to satisfy their own needs or to deliver (sell) these products to third parties. Consequently this transformation of energy products is recorded in the energy balances in the middle block (transformation input and transformation output). The most typical example is companies producing their own electricity and or heat (so called autoproducers). Another example is blast furnaces because its by-product, blast furnace gas and other types of recovered gases, are often captured and used as energy product.

Transformation input covers all inputs into the transformation plants destined to be converted into derived products. Transformation is only recorded when the energy products are physically or chemically modified to produce other energy products, electricity and/or heat. Quantities of fuels used for heating, operation of equipment and in general in support of the transformation are not included (see Energy sector).

The Transformation input and Transformation output includes real energy product transformations as well as virtual product transformations with pre-defined efficiencies. These virtual transformations cover the following aspects:

- blending of various products into each other (100% efficiency)
- methodological transformations of electricity produced from non-combustible renewables such as hydro and wind (100% efficiency)
- methodological transformations of electricity produced from nuclear heat, solar thermal and geothermal (efficiency depending on data availability – see chapter 4)
- interproduct transfers, backflows and exchanges between petroleum refineries and petrochemical industries (100% conversion ratio measured in tons)

Note: please see also notes for Transformation output.

In energy balance, this is an aggregate with the following arithmetic definition:

Transformation output =	+ 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

Electricity & Heat generation

In energy balance, this is an aggregate with the following arithmetic definition:

Electricity & Heat generation =	+ Main activity producer electricity only + Main activity producer CHP + Main activity producer heat only + Autoproducer electricity only + Autoproducer CHP + Autoproducer heat only + Electrically driven heat pumps + Electric boilers + Electricity for pumped storage + Derived heat for electricity production

- **Main activity producer electricity only**

  Quantities of fuels used to produce electricity in electricity only units/plants by main activity producers.

- **Main activity producer CHP**

  Quantities of fuels used to produce electricity and/or heat in CHP units/plants by main activity producers.

- **Main activity producer heat only**

  Quantities of fuels used to produce heat in heat only units/plants by main activity producers.

- **Autoproducer electricity only**

  Quantities of fuels used to produce electricity in electricity only units/plants by autoproducers.

- **Autoproducer CHP**

  All quantities of fuels used to produce electricity and the proportional part of fuels used to produce heat sold in CHP units/plants by autoproducers. The proportional part of fuels used to produce heat that was not sold (auto-consumed heat) is included in the specific sector of final energy consumption based on NACE classification. Heat not sold but delivered to other entities under non-financial agreements or entities with different ownership is reported on the same principle as heat sold.

- **Autoproducer heat only**

  The proportional part of fuels that corresponds to the quantity of heat sold in heat only units/plants by autoproducers. The proportional part of fuels used to produce heat that was not sold (auto-consumed heat) is included in the specific sector of final energy consumption based on NACE classification. Heat not sold but delivered to other entities under non-financial agreements or entities with different ownership is reported on the same principle as heat sold.

- **Electrically driven heat pumps**

  The electricity used in heat pumps corresponding to the Derived heat in Transformation output.

- **Electric boilers**

  The electricity used in electric boilers corresponding to the Derived heat in Transformation output.

- **Electricity for pumped storage**

  The electricity consumed by pumping the water uphill in hydro-electric pumped storage power plants and mixed plants.

- **Derived heat for electricity production**

  Purchased derived heat consumed as input to electricity generation. It includes also heat from chemical processes (primary energy form of heat and not waste heat of energy processes) used for electricity generation.

Coke ovens

Quantities of fuels used in coke ovens to produce coke oven coke and coke oven gas.

Blast furnaces

Quantities of fuels entering the blast furnace vessel, whether through the top along with the iron ore, or through the tuyeres in the bottom along with the heated blast air.

Gas works

Quantities of fuels used to produce gas work gas in gas works and in coal gasification plants.

Refineries & petrochemical industry

In energy balance, this is an aggregate with the following arithmetic definition:

Transformation input: Refineries & petrochemical industry =	+ Refinery intake + Backflows from petrochemical industry + Products transferred + Interproduct transfers + Direct use + Petrochemical industry intake

- **Refinery intake**

  This is defined as the total observed amount of Crude oil, Natural gas liquids, Additives/Oxygenates and Other hydrocarbons that have entered the refinery process.

- **Backflows from petrochemical industry**

  This flow represents the backflows from the petrochemical industry to refineries. These are finished or semi–finished products which are returned from petrochemical industry to refineries for processing, blending or sale. They are usually by–products of petrochemical manufacturing. For integrated petrochemical industries this flow can be estimated. Transfers from one refinery to another within the country should be excluded. Transformation input represents the products that *disappear* from their availability for further use in the economy and Transformation output represents Refinery feedstocks that *appears* for further use. In tons the sum of reported backflows of individual products has to be equal to the Refinery feedstocks.

- **Products transferred**

  Products transferred are energy products, e.g. in the case of oil, products which are reclassified as refinery feedstock for further processing in the refinery, without delivery to final consumers. For example, Naphtha imported for upgrading would be first reported as imports of Naphtha and then as Products transferred. Transformation input represents the products that *disappear* from their availability for further use in the economy and *appears* in the Transformation output as Refinery feedstocks.

- **Interproduct transfers**

  Interproduct transfers result from reclassification of products either because their specification has changed or because they are blended with another product. For example, quantities of kerosene may be reclassified as gasoil after blending with the latter in order to meet its winter diesel specification. In the annual questionnaire this operation would produce negative “Interproduct transfers” for kerosene and positive for gasoil. The sum of reported Interproduct transfers in tons should equal to zero. As Transformation input the reported “Interproduct transfers” with negative sign are shown, but with positive sign. This represents the products that *disappear* from their availability for further use.

- **Direct use**

  Crude oil, Natural gas liquids, Additives/Oxygenates and Other hydrocarbons which are used directly without being processed in petroleum refineries are reported as Direct use. These products *disappear* from their availability for further use in for Refineries & Petrochemical industry and *appear* as available products for the rest of the economy under Primary product receipts. The sum of reported Direct use in tons should equal to Primary product receipts in tons.

- **Petrochemical industry intake**

  Returns from petrochemical industry cover finished or semi-finished products, which are returned from final consumers to refineries for processing, blending or sale. They are usually by-products of petrochemical manufacturing processes. Transfers from one refinery to another within the country are excluded.

Patent fuel plants

Quantities of fuels used in patent fuel plants to produce patent fuel.

BKB & PB plants

Quantities of fuels used to produce brown coal briquettes (BKB) in BKB plants and quantities of fuels used in peat briquettes plants to produce peat briquettes (PB).

Coal liquefaction plants
Quantities of fuel used to produce synthetic oil.

For blended natural gas
Quantities of gases blended with natural gas into the gas grid (gas network).

Liquid biofuels blended
Quantities of liquid biofuels blended with their fossil counterparts.

Charcoal production plants
Quantities of solid biofuels converted to charcoal.

Gas-to-liquids plants
Quantities of gaseous fuels converted to liquid fuels.

Not elsewhere specified

Quantities of fuels used for transformation activities not included elsewhere.

Transformation output (medium block)

Transformation output is the result of the transformation process of energy products. This output covers production of derived products (secondary products, by-products and co-products). Transformation output refers always to gross production of derived products, i.e. the products used for the own consumption of the transformation plants are included in the transformation output and their use is reported in the Energy sector.

This part of the energy balance has the most elements of reorganisation of data between the reported format of annual questionnaires and the energy balance matrix.

For many products the transformation output is reported as production in the annual questionnaire. For primary products this is attributed to Primary production (see supply) and secondary products it is attributed to transformation output.

When reading the energy balance from the top to the bottom, it can be noted that several products already exported or used as transformation input are only now appearing as transformation output. Also it should be noted that in the full production chain, especially with respect to petrochemical industry and oil refineries, the products can pass several cycles of transformation.

Note: please see also notes for Transformation input

In energy balance, this is an aggregate with the following arithmetic definition:

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

Electricity & Heat generation

In energy balance, this is an aggregate with the following arithmetic definition:

Electricity & Heat generation =	+ Main activity producer electricity only + Main activity producer CHP + Main activity producer heat only + Autoproducer electricity only + Autoproducer CHP + Autoproducer heat only + Electrically driven heat pumps + Electric boilers + Pumped hydro + Other sources

- **Main activity producer electricity only**

  This category includes production of electricity in electricity only units/plants by main activity producers.

- **Main activity producer CHP**

  This category includes production of electricity and/or derived heat in CHP units/plants by main activity producers.

- **Main activity producer heat only**

  This category includes production of derived heat in heat only units/plants by main activity producers.

- **Autoproducer electricity only**

  This category includes production of electricity in electricity only units/plants by autoproducers.

- **Autoproducer CHP**

  This category includes production of electricity and/or derived heat in CHP units/plants by autoproducers. Only derived heat sold in included; heat auto-consumed is excluded.

- **Autoproducer heat only**

  This category includes production of derived heat in heat only units/plants by autoproducers. Only derived heat sold in included; heat auto-consumed is excluded.

- **Electrically driven heat pumps**

  This category includes the derived heat output from electrically driven heat pumps only where the heat is sold to third parties.

- **Electric boilers**

  This category includes the heat from electric boilers where the output is sold to third parties.

- **Pumped hydro**

  It includes pure pumped storage plants generation and the pumped storage generation portion of mixed plants. In case the production of electricity from water previously pumped uphill is not known, it is calculated as 73% of the electricity used for pumping water uphill.

- **Other sources**

  This category includes electricity and heat produced from other sources not specified above, For example: electricity from fuel cells or the recovered waste heat from industry sold to third parties. Electricity and derived heat produced from waste heat originating from energy driven processes are excluded from reporting in this category (production is reported under specific products).

  This category also includes the heat originating from processes without direct energy input, such as a chemical reaction (for example the treatment of zinc oxide ore with hydrochloric acid).

Coke ovens

Quantities of coke oven coke and coke oven gas produced in coke ovens.

Blast furnaces

Quantities of blast furnace gas and other recovered gases produced in blast furnaces.

Gas works

Gas work gas produced in gas works. Includes the output of coal gasification plants.

Refineries & petrochemical industry

In energy balance, this is an aggregate with the following arithmetic definition:

Transformation output: Refineries & Petrochemical industry =	+ Refinery output + Backflows + Products transferred + Interproduct transfers + Primary product receipts + Petrochemical industry returns

- **Refinery output**

  This is production of petroleum products at a refinery. This category excludes Refinery losses and includes Refinery fuel.

- **Backflows**

  This flow represents the backflows from the petrochemical industry to refineries. These are finished or semi–finished products which are returned from petrochemical industry to refineries for processing, blending or sale. They are usually by–products of petrochemical manufacturing. For integrated petrochemical industries this flow can be estimated. Transfers from one refinery to another within the country should be excluded. Transformation input represents the products that *disappear* from their availability for further use in the economy and Transformation output represents Refinery feedstocks that *appears* for further use. In tons the sum of reported backflows of individual products has to be equal to the Refinery feedstocks.

- **Products transferred**

  Products transferred are energy products, e.g. in the case of oil, products which are reclassified as refinery feedstock for further processing in the refinery, without delivery to final consumers. For example, Naphtha imported for upgrading would be first reported as imports of Naphtha and then as Products transferred. Transformation input represents the products that *disappear* from their availability for further use in the economy and *appears* in the Transformation output as Refinery feedstocks.

- **Interproduct transfers**

  Interproduct transfers result from reclassification of products either because their specification has changed or because they are blended with another product. For example, quantities of kerosene may be reclassified as gasoil after blending with the latter in order to meet its winter diesel specification. In the annual questionnaire this operation would produce negative “Interproduct transfers” for kerosene and positive for gasoil. The sum of reported Interproduct transfers in tons should equal to zero. As Transformation output the reported “Interproduct transfers” with positive sign are shown. This represents the products that *appear* for further use.

- **Primary product receipts**

  Crude oil, Natural Gas Liquids, Additives/Oxygenates and Other hydrocarbons which are used directly without being processed in petroleum refineries are reported as Direct use. These products *disappear* from their availability for further use in for Refineries & Petrochemical industry and *appear* as available products for the rest of the economy under Primary product receipts. The sum of reported Direct use in tons should equal to Primary product receipts in tons.

- **Petrochemical industry returns**

  This represents products produced by the petrochemical industry that are available as Backflows from petrochemical industry for further processing in refineries. By definition, this line is equal to Transformation input - Backflows from petrochemical industry. It is necessary to include in the energy balance the production of these products to ensure balance between inputs and outputs of commodities.

Patent fuel plants

Quantities of patent fuel produced in patent fuel plants.

BKB & PB plants

Quantities of brown coal briquettes (BKB) and quantities of peat briquettes (PB) produced in BKB or PB plants.

Coal liquefaction plants
Quantities of liquid fuels produced in Coal liquefaction plants.

Blended in Natural gas
Quantities of gases blended with natural gas into the gas grid (gas network).

Liquid biofuels blended
Quantities of liquid biofuels blended with their fossil counterparts.

Charcoal production plants
Quantities of charcoal produced.

Gas-to-liquids plants
Quantities of liquid fuels produced from gaseous fuels input.

Not elsewhere specified
Quantities of fuels produced in transformation activities not included elsewhere.

Energy sector (medium block)

The consumption of the energy sector covers the consumption of own-produced energy and of energy purchased by energy producers and transformers in operating their installations. This means quantities consumed by the energy industry to support the extraction (mining, oil and gas production) or plant operations of transformation activities. This corresponds to NACE Rev. 2 Divisions 05, 06, 19 and 35, NACE Rev. 2 Group 09.1 and NACE Rev. 2 classes 07.21 and 08.92.

Excludes quantities of fuels transformed into another energy form (see Transformation input) or used in support of the operation of oil, gas and coal slurry pipelines (see Transport sector).

This is an aggregate with the following arithmetic definition:

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)

Elements in this section are included in energy balances with exactly the same conceptual definition as in the reported data based on the definitions in Regulation (EC) No 1099/2008 on energy statistics and in the reporting instructions and, naturally, converted with calorific values from reported units to the energy units of the energy balance. Consequently only a brief summary of these elements is provided here.

Own use in electricity & heat generation
Quantities of fuels consumed as energy for support operations at plants with Electricity only, Heat only and CHP units.

Coal mines
Quantities of fuels consumed as energy to support the extraction and preparation of coal within the coal mining industry. Coal burned in pithead power stations should be reported in the Transformation Sector.

Oil & natural gas extraction plants
Quantities of fuels consumed in the oil and natural gas extraction facilities. Excludes pipeline losses (see Distribution losses) and energy quantities used to operate pipelines (see Transport sector).

Patent fuel plants
Quantities of fuels consumed as energy for support operations at patent fuel plants.

Coke ovens
Quantities of fuels consumed as energy for support operations in coke ovens (coking plants).

BKB & PB plants
Quantities of fuels used as energy for support operations in BKP/PB plants (briquetting plant).

Gas works
Quantities of fuels consumed as energy for support operations at gas works and coal gasification plants.

Blast furnaces
Quantities of fuels consumed as energy for support operations at blast furnaces.

Petroleum refineries (oil refineries)
Quantities of fuels consumed as energy for support operations at petroleum refineries (oil refineries).

Nuclear industry
Quantities of fuels consumed as energy for support operations for the manufacture of chemical materials for atomic fission and fusion and related processes.

Coal liquefaction plants
Quantities of fuels consumed as energy for support operations at coal liquefaction plants.

Liquefaction & regasification plants (LNG)
Quantities of fuels consumed as energy for support operations in natural gas liquefaction and regasification plants.

Gasification plants for biogas
Quantities of fuels consumed as energy for support operations in biogas gasification plants.

Gas-to-liquids (GTL) plants
Quantities of fuels consumed as energy for support operations in Gas-to-liquid conversion plants.

Charcoal production plants
Quantities of fuels consumed as energy for support operations in charcoal production plants.

Not elsewhere specified (energy)
Quantities of fuels related to energy activities not included elsewhere.

Distribution losses (medium block)

This category includes quantities of fuel losses which occur due to transport and distribution, including pipeline losses. Specifically for electricity, transmission losses are included here.

Energy available for final consumption (medium block)

This is an aggregate with the following arithmetic definition:

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

Final non-energy consumption (bottom block)

Elements in this section are included in energy balances with exactly the same conceptual definition as in the reported data based on the definitions in Regulation (EC) No 1099/2008 on energy statistics and in the reporting instructions and, naturally, converted with calorific values from reported units to the energy units of the energy balance.

The level of details is fuel specific and therefore the level of details in the energy balance is a compromise between the level of detailed available and the relative importance of the non-energy consumption. By definition, the consumption of energy from renewable sources for non-energy purposes is excluded from the scope of energy statistics (for example use of solid biofuels for the building construction or furniture manufacturing or passive use of solar energy heating buildings).

In the energy balance, the final non-energy consumption is disaggregated into the following elements:

Non-energy use industry/transformation/energy

- Non-energy use in transformation sector
- Non-energy use in energy sector
- Non-energy use in industry sector

Non-energy use in transport sector

Non-energy use in other sectors

Depending on actual data availability, the following arithmetic relationships apply:

Final non-energy consumption =	+ Non-energy use industry/transformation/energy + Non-energy use in transport sector + Non-energy use in other sectors

Non-energy use industry/transformation/energy =	
	+ Non-energy use in transformation sector + Non-energy use in energy sector + Non-energy use in industry sector

Final energy consumption (bottom block)

Elements in this section are included in energy balances with exactly the same conceptual definition as in the reported data based on the definitions in Regulation (EC) No 1099/2008 on energy statistics and in the reporting instructions and, naturally, converted with calorific values from reported units to the energy units of the energy balance. Consequently only a brief summary of these elements is provided here.

This is an aggregate with the following arithmetic definition:

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

In the energy balance, the final energy consumption is further disaggregated into Industry sector, Transport sector and Other sectors. Each of these sectors have several subsectors.

Industry sector

This refers to fuel quantities consumed by the industrial undertaking in support of its primary activities. For heat only or CHP units, only quantities of fuels consumed for the production of heat used by the entity itself (heat auto-consumed) are included. Quantities of fuels consumed for the production of heat sold and for the production of electricity are reported as Transformation input.

This is an aggregate with the following arithmetic definition:

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)

- **Iron & steel**: NACE Rev. 2 Groups 24.1, 24.2 and 24.3; and NACE Rev. 2 Classes 24.51 and 24.52 (transformation input in blast furnaces is included in the transformation sector)
- **Chemical & petrochemical**: NACE Rev. 2 Divisions 20 and 21
- **Non-ferrous metals**: NACE Rev. 2 Group 24.4; and NACE Rev. 2 Classes 24.53 and 24.54
- **Non-metallic minerals**: NACE Rev. 2 Division 23
- **Transport equipment**: NACE Rev. 2 Divisions 29 and 30
- **Machinery**: NACE Rev. 2 Divisions 25, 26, 27 and 28
- **Mining & quarrying**: NACE Rev. 2 Divisions 07 (excluding 07.21) and 08 (excluding 08.92); NACE Rev. 2 Group 09.9
- **Food, beverages & tobacco**: NACE Rev. 2 Divisions 10, 11 and 12
- **Paper, pulp & printing**: NACE Rev. 2 Divisions 17 and 18
- **Wood & wood products**: NACE Rev. 2 Division 16.
- **Construction**: NACE Rev. 2 Division 41, 42 and 43
- **Textile & leather**: NACE Rev. 2 Divisions 13, 14 and 15
- **Not elsewhere specified (industry)**: NACE Divisions 22, 31 and 32

Transport sector

This refers to energy used in all transport activities irrespective of the NACE category (economic sector) in which the activity occurs. Fuels used for heating and lighting at railway, bus stations, shipping piers and airports are reported in

the "Commercial and Public Services" and not in the Transport sector.

This is an aggregate with the following arithmetic definition:

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

- **Rail**

  Quantities of fuels used by rail traffic, including industrial railways and rail transport as part of urban or suburban transport systems (for example trains, trams, metro).

- **Road**

  Quantities of fuels used in road vehicles. Includes fuel used by agricultural vehicles on highways and lubricants for use in road vehicles. Excludes energy used in stationary engines (see Other sector), for non-highway use in tractors (see Agriculture), military use in road vehicles (see Other sector – Not elsewhere specified), bitumen used in road surfacing and energy used in engines at construction sites (see Industry sub-sector Construction).

- **Domestic aviation**

  Quantities of fuels delivered to aircraft for domestic aviation. Includes fuel used for purposes other than flying, e.g. bench testing of engines. The domestic/international split is determined on the basis of departure and landing locations and not by the nationality of the airline. This includes journeys of considerable length between two airports in a country with overseas territories. Excludes fuels used by airlines for their road vehicles (see Not elsewhere specified (Transport)) and military use of aviation fuels (see Not elsewhere specified (Other)).

- **Domestic navigation**

  Quantities of fuels delivered to vessels of all flags not engaged in international navigation (see International marine bunkers). The domestic/international split should be determined on the basis of port of departure and port of arrival and not by the flag or nationality of the ship.

- **Pipeline transport**

  Quantities of fuels used as energy in the support and operation of pipelines transporting gases, liquids, slurries and other commodities. Includes energy used for pump stations and maintenance of the pipeline. Excludes energy used for the pipeline distribution of natural or manufactured gas, hot water or steam from the distributor to final users (to be reported in the energy sector), energy used for the final distribution of water to household, industrial, commercial and other users (to be included in Commercial and Public Services) and losses occurring during this transport between distributor and final users (to be reported as distribution losses).

- **Not elsewhere specified (transport)**

  Quantities of fuels used for transport activities not included elsewhere. Includes fuels used by airlines for their road vehicles and fuels used in ports for ships' unloaders, various types of cranes.

Other sectors

This is an aggregate with the following arithmetic definition:

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

- **Commercial & public services**

  Quantities of fuels consumed by business and offices in the public and private sectors. NACE Rev. 2 Divisions 33, 36, 37, 38, 39, 45, 46, 47, 52, 53, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 80, 81, 82, 84 (excluding Class 84.22), 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96 and 99. Fuels used for

heating and lighting at railway, bus stations, shipping piers and airports should be reported in this category and also including fuels used for all non-transport activities of NACE Rev. 2 Division 49, 50 and 51.

- **Households**

  Quantities of fuels consumed by all households including “households with employed persons”. NACE Rev. 2 Divisions 97 and 98.

- **Agriculture & forestry**

  Quantities of fuels consumed by users classified as agriculture, hunting and forestry; NACE Rev. 2 Divisions 01 and 02.

- **Fishing**

  Quantities of fuels delivered for inland, coastal and deep-sea fishing. Fishing should cover fuels delivered to ships of all flags that have refuelled in the country (include international fishing) and energy used in the fishing industry. NACE Rev. 2 Division 03.

- **Not elsewhere specified (other)**

  Quantities of fuels used for activities not included elsewhere (such as NACE Rev. 2 Class 84.22). This category includes military fuel use for all mobile and stationary consumption (e.g. ships, aircraft, road and energy used in living quarters), regardless of whether the fuel delivered is for the military of that country or for the military of another country.

Statistical differences

In Eurostat's energy balance, the item statistical differences represents the difference between the top and medium blocks on one side and the bottom block on the other side. Negative statistical differences indicate higher observed final consumption than available from the supply and transformation. Positive statistical differences indicate that the observed final consumption is lower than available from the supply and transformation.

This is an aggregate with the following arithmetic definition:

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

Complementing indicators

The energy balance is complemented with a set of several key indicators.

Gross electricity and heat production

The blocks of energy balance matrix do not allow seeing electricity and heat generation from each specific fuel. Therefore the matrix is complemented by the rows that allow showing electricity and heat production from each fuel.

Note: The total electricity and heat production by fuel can be lower than total transformation output due to category "Other sources". This category cannot be attributed to any specific fuel.

Gross electricity production =	+ Main activity producer electricity only + Main activity producer CHP + Autoproducer electricity only + Autoproducer CHP
Gross heat production =	+ Main activity producer CHP + Main activity producer heat only + Autoproducer CHP + Autoproducer heat only

Attention: Gross electricity and heat production can be shown in the same energy units as the rest of the energy balance or for convenience reasons, also in more natural units measuring electricity (GWh, TWh) and heat (TJ, GJ).

Gross inland consumption

This aggregate is calculated to ensure continuity and transition from the old Eurostat energy balance into the new Eurostat energy balance. This is an aggregate with the following arithmetic definition:

Gross inland consumption =	+ Gross available energy – International maritime bunkers

Its interpretation for individual products is different. For secondary products, which are produced as transformation output and not as primary productions, the *Gross inland consumption* can be negative.

Gross inland consumption (Europe 2020-2030)

In order to allow comparison with Europe 2020 targets established prior to the actual methodology of energy balance, this indicator estimates Gross inland consumption to that calculated under the old methodology – the methodology in place at the time of establishing the Europe 2020 targets. This indicator should be used also for tracking progress towards Europe 2030 targets. This is an aggregate with the following arithmetic definition:

Gross inland consumption (Europe 2020-2030) [All products total] = + Gross inland consumption [All products total] – Gross inland consumption [Ambient heat (heat pumps)]

Numerically this aggregate can be also calculated in the following way:

Gross inland consumption (Europe 2020-2030) [All products total]= + Gross available energy [All products total] – Gross available energy [Ambient heat (heat pumps)] – International maritime bunkers [All products total]

This aggregate is calculated only for *All products total*.

Primary energy consumption (Europe 2020-2030)

This indicator reflects on the definition given in Article 2 of the Directive 2012/27/EU as well as the methodology of energy balances in place at the time of establishing the Directive and Europe 2020 targets. This indicator should be used also for tracking progress towards Europe 2030 targets. This is an aggregate with the following arithmetic definition:

Primary energy consumption (Europe 2020-2030) [All products total] =
+ Gross inland consumption (Europe 2020-2030) [All products total]
– Final non-energy consumption [All products total]

This aggregate is calculated only for *All products total*.

Final energy consumption (Europe 2020-2030)

In order to allow comparison with Europe 2020 targets established prior to the actual methodology of energy balance, this indicator estimates Final energy consumption to that calculated under the old methodology – the methodology in place at the time of establishing the Directive and Europe 2020 targets. This indicator should be used also for tracking progress towards Europe 2030 targets. This is an aggregate with the following arithmetic definition:

Final energy consumption (Europe 2020-2030) [All products total] =
+ Final energy consumption [All products total]
– Final energy consumption [Ambient heat (heat pumps)]
+ International aviation [All products total]
+ Transformation input Blast furnaces [All products total]
– Transformation output Blast furnaces [All products total]
+ Energy sector Blast furnaces [Solid fossil fuels]
+ Energy sector Blast furnaces [Manufactured gases]
+ Energy sector Blast furnaces [Peat and peat products]
+ Energy sector Blast furnaces [Oil shale and oil sands]
+ Energy sector Blast furnaces [Oil and petroleum products]
+ Energy sector Blast furnaces [Natural gas]

This aggregate is calculated only for *All products total*.