Methodical contens of the CR energy balance indicators

(Czech Statistical Office methodology)

The Czech Statistical Office publishes the energy balance in methodology that was used in past years by the Federal Statistical Office, whereby the comparability of time series is guaranteed. Reporting of the final consumption in transport, where, from 1993, only liquid and gaseous fuels consumption and consumption of natural gas on its transit transport are stated in line with the IEA / OECD methodology, is a certain exemption. Basic methodical difference between the CSO and the IEA/OECD is in heat energy reporting.
The CSO reports all heat production including heat from plant (autoproducer undertakings) manufactories and fuel consumed for this heat production in the energy balance transformation sector while the IEA/OECD presents only heat produced in public manufactories, heat produced in plant (autoproducer undertakings) manufactories determined for sale out of own undertaking and fuel consumed on this heat production.
The IEA does not report the heat produced in plant manufactories for self-consumption inside of an undertaking in its energy balance, nevertheless the fuel consumed for this heat production is included in the final consumption.
Conversion into energy units (Joule) for individual kinds of fuel is realized by the IEA/OECD with gross calorific value utilization. This gross calorific value is approximately, as for solid and liquid fuels, by 5% greater and, as for gaseous fuels, by 10% greater than the calorific value that the CSO uses for conversion.
What is meant is the data obtained from producers and importers of individual fuels.

Energy balance is composed of three basic parts:
I. Primary energy sources
II. Energy processes
III. Final consumption of energy

Following description of energy balance indicators goes from aforesaid division. Individual parts are introduced by brief methodical characteristics.

I. Primary energy sources

Into this part of energy balance there are included:
- *natural energy resources*
- *imports and exports of fuels and energy*
- *changes in fuels and energy stock level and other sources (decreases)*

Natural resources

- Fuels exploitation on a saleable output level (i.e. after primary treatment, e.g. coal after classification and washing)
- Electricity from water power resources measured on generator terminals (no, however, electricity generated in pumped-storage power plants that come under category „output from energy processes“),
- Heat energy produced in nuclear power plants (CHP plants, heating plants) both for electricity generation and for its distribution.
- Heat arising during exothermic chemical reactions that is further utilized (e.g. heat arising during sulphuric acid manufacturing)
- Into natural resources there we also include renewable energy sources, namely solar energy, geothermal energy, energy from heat pumps, biogas energy, wind energy etc.

Imports [1]

Imports of all fuels and energy kinds, in form of intermediate/semi-finished products as well (e.g . different feedstocks from crude oil processing, namely straight run fuel oils and vacuum gas oils, raffinates, filtrates, hydrogenates and so on).

Electricity imports are indicated on the basis of measured data, not according to the data invoiced in the same way as in the international questionnaire on electricity.
Data on imports do not include transit fuel and energy supply.
Data on natural gas imports cover imports into storages rented on the other countries territory and serving to its consumption in the Czech Republic.

Exports [1]

Exports of all kinds of fuels and energy (including intermediate products).
Data on exports do not include transit fuel and energy supply/delivery and losses connected with the transit.
Electricity exports are reported as well as imports on the basis of measured data.

Stock draw (+), stocks build (-) of suppliers

Stocks draw (stocks decrease) increases available resources and therefore it is marked (+), stock build (stocks increase) decreases these sources and therefore it is marked(-).
Into suppliers stocks there are included:
- *fuel stocks held by mining (extraction) enterprises, production enterprises and sales activity organizations designed for sale, not for self-consumption*
- *gaseous fuels stocks in special underground gas storage facilities including so-called cushion gas*

Stocks draw (+), stocks build (-) of consumers

Fuels stocks designed for consumption in the reporting unit are included into consumer stocks, not stocks designed for sale.

Other sources (+), other decreases (-)

Other registered and in other indicators not included increases or decreases of sources, e.g. draw or build of state material reserves, stocks draw or stocks build of liquid fuels intermediate products and so on.
Result from reclassification of produced liquid fuel, either in consequence of its specification change or because it was blended into another product, is incorporated here, too. [2]
A negative entry for one product must be compensated by a positive entry (or several entries) for another product or several products and vice versa.
The total net effect of this reclassification at the entry „total liquid fuels" should be zero.
As for natural gas, such reclassification can also occur in case that a definite quantity from the non-associated gas system is transferred into the associated gas system. [3]
Concerning solid fuels, fuels reclassification can also occur, especially between categories of steam coal and coking coal.
At the solid fuels entry there is also valid, that the total net effect of this reclassification should be zero.

Total primary energy sources

Arithmetical sum of above-mentioned indicators, i.e. natural resources (+)imports, (-)exports, (+/-) stocks level change, (+/-) other sources.

II. Energy processes

Energy processes are productive activities whose result is enhancement of utility value of the energy materials that pass through them.
*We consider, under energy processes in the energy balance, only those processes in which it is balanced on the one hand charge/input into processes and on the other hand production and losses in charge. In addition to this energy processes balance there are further observed fuels and energy which were expended on energy process operation (**working consumption**).*

As energy processes in the energy balance there are (or were) mentioned the following activities:[1]

1. *Sub-bituminous coal (brown coal) briquetting*
2. *High-temperature carbonization in coking plants*
3. *Gasification under pressure of coal including carburation*[4]
4. *Blast-furnace gas production in blast furnaces*
5. *Gasification in industrial generating stations*
6. *Liquid fuels production from crude oil and tars*
7. *Mazout gasification*
8. *Production of heat for distribution in CHP plants (including nuclear power plants)*
9. *Production of heat for distribution in heating plants*
10. *Electricity production in steam power plants*
11. *Electricity production in nuclear power plants*[5]
12. *Electricity production in pumped-storage power plants*
13. *Production of electricity by combustion engines, gas turbines and from exhaust heat.*
14. *Production of electricity by steam gas cycle and co-generation*

Production from energy processes

Only those kinds of fuels and energy are involved here which pass through energy processes for fuels upgrading (return/form EP 8-01) and heat and electricity production except heat from nuclear energy and electricity from hydro electric power plants (out of pumped-storage power plants). Fuels and energy extracted from natural resources without upgrading are not included.

Total sources including returns/fuels

Sum of primary sources and production

Secondary energy sources

It is the quantity of energy that was, after its use in definite energy or technological process, newly utilized in form of fuels or heat, either in the identical process or for other energy purposes.
In form of heat, there is observed the utilized exhaust heat especially from these following processes:
heat taken away from the cooling systems of production units (high and open-heart furnaces, pyritic furnaces, gas generators, heating furnaces etc.)
heat from products of production, i.e. heat acquired from different stages of manufacturing process (heat from coke quenching, heat from heated metal, from products of crude oil processing, chemical products, heat from lyes cooling, heat arisen at condensate boil, at cellulose processing, from distiller's

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[1] *Imports and exports of electricity and natural gas are stated according to data of the relevant supervisory service. Imports of other fuels are stated according to the CR customs statistics.*

[2] *This indicator occurs in international questionnaire on crude oil (OIL) under the title „Interproduct Transfers".*

[3] *The international questionnaire on crude oil (OIL) contains even another method of oil products reclassification, when an imported liquid fuel is not as such delivered to final consumers but it is used in the refinery for further processing and therefore it is reclassified as feedstock/raw material for this further refinery process. Such case is stated in the above mentioned international questionnaire in separate indicator „Products Transferred". It relates, for example, to imported naphta for further processing in the refinery because of its upgrading. This naphtha will be first reported as imports of naphta and then apear also as products transferred/manufactured of naphtha. This method of reclassification is solved, in our energy balance methodology, directly in the balance of crude oil processing on return EP 8-01.*

[4] *Productionof town gas (coal gas) by pyrolysis and coal gasification under pressure expired in the first half – year 1996. Unpurified town gas original as product of coal gasification under pressure is, from second half – year 1996, used under term „energogas" particulary for electric energy production and in smaller quantity in chemical industry.*

[5] *Considering that heat is the primary energy recorded in nuclear power plants, nuclear heat used for electricity production is stated as charge/input for electricity production is stated similarly, too.*

yeast and slops and so on.)
heat from flue gases from industrial furnaces, boiler units, waste slags, from humid air of different drying systems etc.
heat utilized in driving units of pumps, compressors and presses **.**

The secondary energy sources occur in forms of fuels especially in chemical industry, e.g . rich gas extracted from the chemical processing of coke-oven gas in nitrogen factories, terminal gas from high-temperature tars processing and so on.
The quantity of cellulose leaches rising at production in the paper and pulp industry is shown in form of solid fuels, provided they were used for energy production.

Total sources including secondary ones

Sum of total sources including production and secondary sources.

Charge, consumption at fuels upgrading

Charge, consumption for heat production

Charge, consumption for electricity production

Fuels and energy that are processed in energy processes in order to change their utility qualities, e.g *.lignite\sub-bituminous coal for patent fuels and energogas production, coking coal fit for coke and coke-oven gas production, crude oil for liquid fuels production, fuels for heat and electricity production in steam power plants and electricity used for repumping in pumped-storage power plants, heat produced in nuclear power plants and used for electric energy and heat production for distribution.*

In case non-energy materials occur in a charge, they are expressed by quantity of energy needed to their obtaining (e.g . hydrogen incoming into hydrogenation is reported by synthesis gas quantity spent on its obtaining in a plant).

Operating consumption

Operating/working consumption of energy processes (consumption serving directly to maintenance and ensuring the relevant energy process operation).

. *Fuel and energy consumption at their extraction and processing*
- *at fuels extraction (including mining transport)*
- *at primary fuels treatment (classification, washing and so on)*

Losses (during fuels and energy distribution and losses of fuels by their depreciation and destruction)

Difference between fuels and energy input into long-distance transport systems (oil and gas pipelines, public electricity and heat distribution systems) and output from them. Losses in intra-plant distribution systems, that are parts of consumption, are not included here.
Reasoned losses caused by depreciation and destruction are included into this entry, too.

Balance differences

Differences, which originate in the energy balance between primary energy sources decreased by losses in energy processes and final consumption.

Differences originating due to time shift between records at individual places of survey from producers, importers and exporters of fuels and energy through commercial organizations to individual consumers.

As for solid fuels, these differences originate owing to natural character of these fuels (loose materials) that adversely influence the measurement and recording level in comparison with other fuels and energy kinds.

III. Final consumption

It is the fuels and energy consumption ascertained before their input into consumers/appliances in which they are utilized for final utility effect, not for other energy production (with the exception of secondary energy sources).
Final consumption is divided in the energy balance according to sectors:
consumption in agriculture and forestry
consumption in industry
consumption in construction
consumption in transport
consumption of other branches
consumption in household

Total final consumption

Total primary energy sources (+) secondary energy sources (-) total charge/input into energy processes (+) production from energy processes (-) operating consumption (-) losses (+/-) balance differences.

Consumption in industry

As for gaseous fuels, electricity and heat there is reported the final consumption in industry in division according to two-digit numerical NACE codes.

Consumption in transport

Consumption for own transport is reported, not total consumption of subjects registered under NACE codes/divisions 60, 61 and 62..

Consumption for non-energy use (purposes)

Fuels used for non-energy (especially chemical purposes) use. It is for example natural or coke-oven gas used for ammonia and other chemical products manufacturing, synthesis gas for methanol production and so on.[6] (This indicator is not reported at present).
The above described balance indicators are part of the individual fuels and energy kinds balance. (Tables A, B, C, D).
They are also included in the total energy balance (tables E).

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[6] *It is necessary to distinguish these matters of energy character (fuels) from matters which occur as products from energy processes and have non-energy character already from their origin. These are matters from oil processing, e.g. gasoline for petrochemical sector, aromates, lubricants and lubricating oils, paraffines, ceresines, paraffin scales, asphalts and so on; or products of coke-oven plants (high temperature crude benzene and tar).*