AGEB
AG Energiebilanzen e.V.

PREFACE

TO THE

ENERGY BALANCES

FOR THE

FEDERAL REPUBLIC OF GERMANY

November 2015

CONTENTS

Aims and Objectives of the Energy Balances

In the Federal Republic of Germany, energy statistics are published by a number of agencies, often with considerable differences in the presentation, data compression and demarcations. The associations of the German energy industry therefore formed the Working Group on Energy Balances (Arbeitsgemeinschaft Energiebilanzen, AGEB) in cooperation with economic research institutes with a view to evaluating statistics from all fields of the energy industry on the basis of uniform criteria, compiling the information available in a coherent form, and making the facts and figures concerned available to the public as energy balances.

These energy balances give an overview of interrelationships within the energy industry in the form of a matrix. They not only indicate energy consumption in the various sectors but also the flow of sources of energy from production to use in the various fields of production, conversion, and consumption.

The structure and relevance of the energy balances mean that they occupy a central position in the system of energy statistics. They are used by politicians, companies and associations within the energy industry as well as by research institutes concerned with energy matters as a basis for analyses, forecasts, and economic policy decisions in the field of the energy industry.

However, energy balances are not only important for energy policy but also to an increasing extent for environmental policy. For example, it would be impossible to meet national reporting obligations under the UN Framework Convention on Climate Change without energy balances as a basis for the calculation of carbon dioxide emissions.

AGEB first published a series of consistent energy balances based on uniform areas, conversion factors and sector demarcations in 1971 for the period from 1950 to 1969. This series has been continued by energy balances for succeeding years drawn up with the same structure. Today, AGEB can look back on a continuous series of energy balances covering the period since 1950 (within the borders that applied up to 3 October 1990). For the years from 1991 to 1994, separate energy balances were also published for the new states of eastern Germany and for Germany as a whole (within the borders that applied from 3 October 1990 onwards).

In an effort to maintain the information value of the energy balances, it is essential to take into account the statistics on which they are based, processes of change in the energy industry, and the changing needs of data users. Adaptations to the energy balances were already made in this respect in the 1970s. A further series of adjustments were required in the case of the energy balances for the years from 1995 onwards. The main changes are as follows. The methods used for assessing sources of energy for which no uniform yardstick, such as inferior calorific value, is available have been changed in accordance with standard international practice. Changes have also been made in some of the columns (sources of energy) and rows (sectors) used in the balances on the basis of a new system adopted for the classification of the manufacturing industry. In addition, for the years since 1995, energy balances have only been published for the territory of the Federal Republic of Germany as a whole. The statistics available no longer allow the production of separate balances for the original and new states of Germany.

Since 2003, new regulations have governed the official energy statistics, since the Energy Statistic Act (EnStatG) entered into force on 1 January 2003. With this new law, the official energy statistics with different legal bases were merged and adapted to users' new informational requirements. As a result, statistical data will be collected for the areas of the heating market, cogeneration of heat and power, and renewable energy sources.

These changes with respect to methodology, energy sources, sectors, and the geographical area covered must be taken into consideration when comparing energy balances for different periods.

As of September 2015, the members of the Working Group on Energy Balances include five energy industry associations

- Bundesverband der deutschen Energie- und Wasserwirtschaft e.V. (BDEW – Association of the German Energy and Water Industry), Berlin,
- Deutscher Braunkohlen-Industrie-Verein e.V. (DEBRIV – German Lignite Industry Association), Cologne,
- Gesamtverband Steinkohle (GVSt – General Association of the German Hard Coal Industry), Herne,

- Mineralölwirtschaftsverband e.V. (MWV – Association of the German Petroleum Industry), Berlin,
- Verein der Kohlenimporteure e.V. (VDKi - German Coal Importer Association), Hamburg,

and five economic and energy research institutes

- Deutsches Institut für Wirtschaftsforschung (DIW Berlin – German Institute for Economic Research), Berlin,
- EEFA GmbH (Energy Environment Forecast and Analysis), Münster,
- Energiewirtschaftliches Institut an der Universität Köln (EWI – Insitute of Energy Economics at the Universtiy of Cologne), Cologne,
- Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI – Rhine-Westphalian Institute for Economic Research), Essen,
- Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW - Centre for Solar Energy and Hydrogen Research Baden-Württemberg), Stuttgart.

Furthermore, the work is supported by:

- Der Energieeffizienzverband für Wärme, Kälte und KWK e.V. (AGFW – The Energy Efficiency Association for Heating, Cooling, and CHP), Frankfurt
- Verband der Industriellen Energie- und Kraftwirtschaft e.V. (VIK – Association of the Energy and Power Generation Industry), Essen.

The energy balances published up to 1994 had been prepared by the Gesamtverband des deutschen Steinkohlenbergbaus (General Association of the German Hard Coal Industry), Essen. In 1994, the Working Group on Energy Balances transferred responsibility for the preparation of energy balances to DIW Berlin. Starting with the 2002 energy balance, AGEB commissioned EEFA GmbH and DIW Berlin with compiling the energy balances. DIW Berlin has in turn subcontracted Mr Rossbach from MWV to complete the energy balances for mineral oil. Further information on the Working Group on Energy Balances is available on the Internet under:

http://www.ag-energiebilanzen.de

Notes on the Energy Balances

1 Structure

The **energy balance** is a matrix showing supply, conversion, and consumption figures for energy carriers within a national economy or an economic area over a defined period in a form which is as comprehensive and detailed as possible.

The structure which has been used by the Working Group on Energy Balances since 1995 is a table with 33 columns and 68 rows (including total and subtotal rows and columns).

1.1 Columns

Each of the columns in the energy balance represents the energy carrier that may be put to use either in the form of energy or for other purposes(non-energy consumption).

The term **carrier of energy or energy carrier** is used to refer to all sources or substances in which energy may be stored in mechanical, thermal, chemical, or physical form.[1]

In the energy balances, energy carriers are divided into the following categories:

- Fossil fuels

  Fossil fuels are materials in which energy is stored in chemical form, including hard coal, lignite, petroleum, natural gas, and substances produced by processing these materials, such as hard coal briquettes, hard coal coke, lignite briquettes, petrol and diesel fuel, fuel oil, coke oven gas and blast furnace gas.

- Renewable energy sources

  Renewable energy sources is an umbrella term for natural energy sources that are either continuously available in nature or are derived from sources that are renewed or replenished within foreseeable periods of a few generations. These include:

  - solar energy
  - ambient heat
  - wind energy
  - hydropower
  - energy from biomass
  - geothermal energy

- Electricity

- Nuclear fuels

  Nuclear fuels include all substances from which energy stored in physical form may be released by atomic fission or fusion processes.

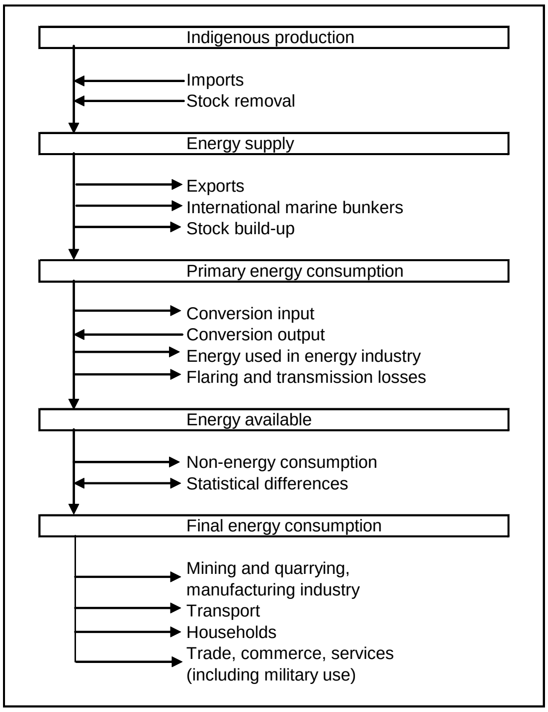
- District heating

1.2 Rows

The rows of the energy balance indicate the quantities of each energy carrier available, converted, and consumed on the basis of the row structure indicated below:

[1] Definition from “Begriffe der Versorgungswirtschaft”, Part D, Section 1: "Energiewirtschaftliche Grundbegriffe" published by VDEW/BGW, 1st edition 1997, VWEW-Verlag, Frankfurt am Main.

Row structure of the German energy balance



The energy balance consists of three main sections:

- ♦ the PRIMARY ENERGY BALANCE,
- ♦ the CONVERSION BALANCE and
- ♦ the FINAL ENERGY BALANCE.

The **primary energy balance** is the first stage in the energy balance. In this stage, energy carriers are recorded under the following headings:

- indigenous production of energy sources,
- foreign trade with energy sources, with imports and exports indicated separately,
- international marine bunkers, i.e., the supply of fuel oils, diesel fuel and lubricants to German and foreign vessels in German ports, fuel supplied to inland and coastal vessels. Fuel supplied to inland and coastal vessels and for fishing is taken into consideration under ‘transport’ (in the final energy balance).
- stock changes, with stock withdrawal and stock build-up indicated separately.

The **primary energy consumption in Germany** is therefore calculated from the **supply side** as the sum of energy production in the country, stock changes and net foreign imports, less international marine bunkers.

However, primary energy consumption can also be determined by the **consumption side** by calculating the sum of final energy consumption, non-energy consumption, and net conversion (input minus output).

The **conversion balance** considers the physical and chemical conversion of energy carriers, with input and output indicated separately (see Section 4.1).

Consumption in the process of energy production and conversion as well as the flaring and transmission losses (see Section 4.6) are also taken into consideration in the conversion balance.

The primary energy consumption and

the conversion balance are used to calculate the **energy available for final energy consumption**

Among other things, this available energy is used to cover **non-energy consumption**, indicated in a separate row of the balance. This is necessary since some energy sources (e.g. hard coal and lignite, naphtha, fuel oils, and natural gas) are not only used in energy production but also as feedstocks for chemical processes. This heading also includes substances produced during conversion which are not needed because of their energy content but because of other properties (e.g. tar oils, coal derivatives, and bitumen). These materials are shown under the headings 'coal derivatives' and 'other petroleum products' (see Sections 4.8 and 4.11).

Final energy consumption represents the use of energy sources directly for the production of useful energy. Final energy consumption is broken down into the energy consumption of defined user groups and sectors.

The energy consumption figures for **industry** (**other mining, stone and clay quarrying, manufacturing)** are based largely on the statistics published by the Statistisches Bundesamt (Federal Statistical Office). Industrial sectors are now defined based on the German Classification of Economic Activities, 2008 edition (WZ 2008), sectors: mining and quarrying of stone and clay, manufacturing industry, which has superseded the classification of the manufacturing industry (SYPRO) used until 1994.

In view of the changes in demarcation between the various sectors of industry, the figures for the years before and after 1995 are only comparable with limitations. The structure of the fourteen sectors of industry now used in the energy balances in accordance with WZ 2008 is shown in the table in section 5.2.

Energy consumption for **transport** is divided into the following sectors:

- railways,
- road transport,
- air transport,
- inland navigation.

This figure only includes energy consumption for the direct provision of transport services by all means of transport in Germany, to the extent that statistics are available. Indirect energy consumption (e.g., for lighting transport facilities) and fuel consumption for agriculture are not included.

The energy consumption figures for transport are generally based on statistics of deliveries to transport organizations. In some cases, the results of market research are also used.

As far as the sectors **private households, trade, commerce, and services** as well as military bases are concerned, energy consumption data is not available or can only be derived from statistics. For the purposes of the energy balance, the final energy consumption of these sectors is assumed to be equal to deliveries of energy sources to the corresponding sectors.

This sector as a whole is very heterogeneous and includes:

- private households,
- manufacturing firms with fewer than 20 employees not included in manufacturing industry,
- commercial properties and enterprise premises,
- agriculture,
- commercial enterprises,
- private and public service companies and organisations (including banks, insurance companies, laundries, hospitals, public authorities and the German postal service).

In response to calls for greater transparency, this sector was subdivided into the following sectors in the energy balances from 1995 onwards

- private households on the one hand and
- trade, commerce and services (including military facilities) on the other.

The energy consumption of trade, commerce and services is calculated by deducting the energy consumption of private households from the figure for the sector as a whole.

In order to allow a better assessment of the quality of the data presented, it must be expressly stated that this subdivision of the private households, trade, commerce and services sector is largely based on estimates and projections, which are in turn based on the results of market research.

It is not possible to give comprehensive energy consumption figures for military facilities. The figures which are available are included in the total for trade, commerce and services.

It is necessary to draw a distinction between final energy consumption (as the term is used in the energy balance) and the final stage of **useful energy.** Useful energy is the form of energy actually required by the energy user to meet an energy need.[2] These energy balances do not include any indication of useful energy consumption, since neither sound statistics nor other sufficiently sound models of estimating consumption are currently available.

2 Conversion Factors for the Uniform Measurement of Energy Carriers

In the energy balances, figures for each energy carriers are initially shown in the specific units in which it is normally measured. These figures are then added separately for each energy carriers in the subtotal and total rows. The units used for this purpose are tonnes (t), cubic metres (m^3), kilowatt-hours (kWh), and joules (J).

In order to make the figures for different carriers of energy comparable and to allow them to be added up, they must be expressed in a common unit. Conversion factors are used for this purpose.

Since 1977, figures in other units have all been converted into joules. This unit, which is in accordance with the applicable statutory requirements, has now replaced the calorie (cal), the unit previously used for this purpose. One joule is equivalent to 0.2388 cal.

Figures for carriers of energy normally measured in other units are converted into joules based on their net caloric value (ncv), expressed in kilojoules (kJ = 10^3 J)**.** The multiple units used are terajoules (TJ = 10^{12} J) in the energy balances themselves and petajoules (PJ = 10^{15} J) in the evaluation tables.

For a transitional period, balances and evaluation tables are being issued not only in joules but also in tonnes of coal equivalent (tce, 1 million tce = 29.308 PJ).

Since the quality of some energy carriers changes over time, there are corresponding changes in the calorific value. In the case of energy sources with changing caloric values such as hard coal, lignite and also petroleum products, the conversion factors are therefore adjusted from time to time.

There is no uniform value such as the caloric value that can be used for ex-

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2 Normally the following types of useful energy are distinguished: work (often referred to as ‘power’ or ‘mechanical energy’), heat (including thermal electromagnetic radiation), including ‘cold’ which is simply a reversed heat flow, light, useful electricity and sound.

pressing electricity imports and exports, water or wind power, photovoltaic energy, or nuclear fuels used for electricity generation in comparable terms. In such cases, the **”physical energy content” method**, similar to the procedure adopted by international organisations (IEA, EUROSTAT, ECE) has also been used in the energy balances for Germany since 1995.

In this method, a representative energy conversion efficiency of 33% is used for measuring nuclear energy. In the case of electricity generation from hydropower and other renewable sources of energy that cannot be measured in terms of a calorific value (wind, photovoltaic energy), the energy input is assumed to be equivalent to the electricity generated. The calorific value of electricity, 3,600 kJ/kWh, is also used for measuring electricity imports and exports, corresponding to an ‘efficiency’ of 100%.

Up to 1994, a different method was used. It was assumed that electricity generated from hydropower, nuclear energy, waste products and waste heat, and the surplus of electricity imports over exports could be substituted for electricity generated in conventional thermal power stations reducing the energy input required at these stations. The average specific fuel consumption at conventional thermal power stations in general (public) supply systems was therefore used for measuring the primary energy input required for generating such energy sources.

In comparison to this so-called substitution principle, the **”physical energy content”** principle results in higher primary energy figures for nuclear power and lower figures in the case of the other energy sources considered.[3]

3 Calculating Fuel Consumption for the Products Electricity and Heat using the Finnish Method

Directive 2004/8/EC of European Parliament and the European Council of 11 February 2004 is used as the basis for calculating the amount of fuel consumed to generate electricity and heat, both in industrial cogeneration and in general power generation. First, primary energy saving is calculated. In the Directive, norms are specified for power efficiency in electricity (40%) and heat (80%) generation. The amount of fuel consumed for

3 Information on primary energy consumption in Germany from 1980 onwards, based on the physical energy content principle, is available on the Internet under: http://www.ag-energiebilanzen.de

electricity and heat, separately, is determined using the following formulae:

$$W_{FC,th} = W_{FC}\ (1 - PES)\frac{\eta_{th,CHP}}{\eta_{th,REF}}$$

$$W_{FC,el} = W_{FC}\ (1 - PES)\frac{\eta_{el,CHP}}{\eta_{el,REF}}$$

PES is calculated as follows:

$PES = 1 - 1/(\eta_{th,CHP}/\eta_{th,REF} + \eta_{el,CHP}/\eta_{el,REF})$

where

$\eta_{th,CHP}$ = heat generation*100/W_{FC}

$\eta_{th,REF}$ = 80% (reference)

$\eta_{el,CHP}$ = electricity generation*100/W_{FC}

$\eta_{el,REF}$ = 40% (reference)

PES	Primary energy savings (percentage)
W_{FC}	Total fuel input
$W_{FC,th}$	Fuel input to generate thermal energy
$W_{FC,el}$	Fuel input to generate electricity

4 Notes on Individual Balance Items

4.1 Use of the Gross Value Principle in the Conversion Sector

In the conversion sector, the gross value principle is always used. In other words, energy carriers subject to a conversion process are included completely both in conversion input and in conversion output. This is, for example, the case with fuel oil used for power station firing. Considered separately, conversion input and output therefore include energy quantities that have been counted twice. However, this duplication is eliminated in the line 'energy available' only the difference between conversion input and conversion output is included.

The use of the gross value principle is problematic in cases where energy input declared as energy consumption in the underlying statistical material is in fact subject to conversion. This is the case in the metals (iron-producing) and chemical industries. If both the energy sources used in these sectors of industry and the consumption of the energy sources generated by conversion were recorded, the energy sources originally used would be counted twice.

The methods used for avoiding double counting are described in the notes on the individual energy carriers concerned.

4.2 Conversion Input for Electricity Generation

In the case of public thermal power stations, industrial power stations, and nuclear power stations, only the fuel input actually used for electricity generation is recorded as conversion input.

As regards hydro, wind, and photovoltaic power stations, the corresponding values in joules from the primary energy balance are also used as conversion input. Pumped storage is also taken into consideration in the conversion balance, since this is a type of electricity conversion.[4] The electricity used for pumping is recorded as conversion input and the electricity generated by the pumped storage station as a conversion output.

4.3 Conversion Input for Heat Generation

In the conversion input for cogeneration plants and district heating stations only the fuel used for heat generation is included. Cogeneration plants and district heating stations are only taken into consideration to the extent that they supply district heat to third parties via pipelines in the form of hot water or steam. Energy carriers used for the generation of heat to be used solely by the plant operator are recorded under the appropriate final energy consumption heading. This applies especially to industrial cogeneration plants. The fuel used for power generation is recorded under conversion, while the fuel used for heat generation is recorded under final energy consumption.

4.4 Use of Coke for Blast Furnace Gas Production

In blast furnace processes, among other things, coke is converted into blast furnace gas. This gas is an energy carriers and part of the gas produced is used directly in the gas furnace process, while part is supplied to other points. Blast furnace gas is therefore recorded in a separate column of the energy balance. If the gross value principle were applied to blast furnace gas, the energy concerned would be counted twice as both the coke used and the blast furnace gas itself would be recorded under energy consumption. In order to avoid this problem, the coke equivalent (based on the caloric value) of the blast furnace gas produced is substracted from the coke used in the sector ‘manufacture of basic metals’ (‘iron-producing industry’ up to 1994) and is shown as conversion input for blast furnaces. A similar approach is used in the case of converter gas produced in the steel production process.

Apart from smaller quantities for non-

[4] For this reason, the electricity generated by pumped storage stations is not included in hydropower generation in the primary energy balance (with the exception of electricity generated using natural inflows at pumped power stations).

energy use, the total coke consumption of the 'basic metal manufacturing' sector consists of the final energy consumption recorded for this user group and coke input to blast furnaces for conversion.

4.5 Other Energy Producers

The other energy producers shown in the energy balances include

a) coal derivative plants,
b) the chemical industry, to the extent that energy sources in the form of pyrolysis gasoline, residual gases and processing residues of petroleum products are returned to refineries (return product flows, see Section **4.9**),
c) petroleum and natural gas processing plants which produce condensate and used oil processing plants,
d) plants for the production of ores containing fertile or fissionable materials,
e) plants for the production or processing of fertile or fissionable materials,
f) wastewater treatment plants.

4.6 Flaring and Transmission Losses

Although all carriers of energy are affected by losses, most of these losses are not recorded statistically and uniform treatment in the energy balances is therefore not possible. They are only indicated in the appropriate row for electricity, gas, and district heat. Losses in the petroleum sector are indicated indirectly by the difference between conversion input and output. Losses with respect to other energy sources are included in the 'statistical differences row' of the balance.

4.7 Final Energy Consumption in Manufacturing Industry

The final energy consumption in the manufacturing industry recorded by the Federal Statistical Office includes coke converted into gas in blast furnace processes, inputs for electricity generation and non-energy consumption. This use of energy is already included in the conversion balance and must be substracted from energy consumption in order to avoid double counting. Only the remaining quantities are then recorded as final energy consumption in the industrial sectors concerned.

4.8 Other Lignite Products

Since 1995, lignite coke, fluidized bed coal, pulverized coal and dry coal have all been grouped together under the heading 'other lignite products'.

4.9 Naphtha

Naphtha is a light fraction produced during crude oil refining and the cracking of petroleum products. In the petrochemical industry, it is used almost solely for the production of base chemicals (such as olefins and aromatics) as feedstocks for plastic production. The full input for chemical conversion is shown in the energy balances (following the gross value principle).

During the chemical conversion process, about two-thirds of the naphtha used is converted into base chemicals and one-third is returned to the refinery process. These return products include pyrolysis gasoline, used as a high-octane component of motor fuel. After deducting these returns, the naphtha consumption of the petrochemical industry is recorded under 'non-energy consumption'.

The returns are netted out in the conversion balance allowing the assignment of the energy sources to the sectors in which they are actually used without any duplication.

4.10 Heavy Fuel Oil

The column "Heavy Fuel Oil" in the energy balance covers different kinds of heavy oils. Due to the definition in DIN51603-3 resp. 51603-5 (both norms are different to the legal maximum content of sulfur) heavy fuel oil is used by industry and power plants for generation of process heating and electricity. In the international maritime shipping (incl. international marine bunkers) fuels are used with technical specifications that are defined in ISO 8217 (Marine Fuels). A large part of the total consumption of heavy oil is used for non-energy consumption. These are residuals incurring to refinery processes. The quality of these products is not standardized. The products are used for petrochemical manufacturing pre-products, fertilizer, and methanol.

4.11 Other Petroleum Products

Petroleum products used solely for non-energy purposes are grouped together under this heading. These products include special grades of petroleum spirit, white spirit, paraffins, waxes, vaseline, bitumen, and residues. Some petroleum and lubricants, especially part of the used oil available, are used as sources of energy.

4.12 Renewable Energy Sources

In the energy balances up to 1994, only wood, hydropower, and sewage gas (together with waste, etc., to the extent that these materials were appropriately classified) were included under the heading of renewable energy sources.

With the entry into force of the new Energy Statistic Act in 2003, the data basis on renewable energy sources has improved considerably.

Since the energy balance for 1995 attempts have been made to provide information that is as comprehensive as possible by using all the official information sources available, the results of surveys conducted by companies, associations and institutes, evaluations of promotional programs and the associated measurement programs, and so on. As mentioned above, since the founding of AGEE-Stat (in February 2004) and the cooperation with the AGEB that has followed, detailed data produced in this Working Group are shown in a separate balance, while renewable energy sources are grouped together under the following three main headings:

- **Hydro, wind, and photovoltaic energy**
  - ☐ Hydropower
  - ☐ Wind energy
  - ☐ Photovoltaic energy
- **Biomass and waste**
  - ☐ solid biomass, sewage sludge (since 2013)
  - ☐ Bio fuels and other liquid biogenic materials
  - ☐ Sewage gas, biogas
  - ☐ Biogenic waste, landfill gas
- **Other renewable energy sources**
  - ☐ Geothermal energy
  - ☐ Solar thermal energy
  - ☐ Ambient heat

4.13 Further Notes

In the process of evaluating the energy balances from 1995 onwards, the following additional changes have been made compared to the energy balances for the preceding years:

- The ‘black lignite’ column now includes the use of peat as a source of energy.
- Romonta (lignite wax) is included in ‘other lignite products’.
- Converter gas generated during steel production is now grouped together with blast furnace gas.

5 Appendices

5.1 Energy Units and Conversion Factors (Standard Values)

The *Gesetz über die Einheiten im Messwesen (*Law Concerning Units of Measurement, see BGBI [Federal Law Gazette], p. 981) was enacted on 2 July 1969. This law and subsequent statutory instruments govern the conversion of customary technical units into SI (Système International d'Unités) units for official and business transactions in the Federal Republic of Germany. The use of SI units has been mandatory in the Federal Republic of Germany since 1 January 1976.

Defined units for energy:

- joule (J) for energy, work, and heat quantities
- watt (W) for power, energy flow, and thermal flux

1 joule (J) = 1 newton meter (Nm)
= 1 watt second (Ws)

Prefixes for energy units:

kilo	k	10^3	thousand
mega	M	10^6	million
giga	G	10^9	billion
tera	T	10^{12}	trillion
peta	P	10^{15}	quadrillion
exa	E	10^{18}	quintillion

Conversion factors:

Some conversion factors are given in the table below:

Unit	kJ	kWh	kcal	kg ce	kg oe
1 kJ	x	0.000278	0.2388	0.0000341	0.0000239
1 kWh	3600	x	860	0.123	0.086
1 kcal	4.1868	0.001163	x	0.000143	0.0001
1 kg ce	29308	8.141	7000	x	0.7
1 kg oe	41868	11.63	10000	1.429	x

5.2.1 Classification of Economic Activities in the Sectors ‘Mining and Quarrying, Manufacturing Industry’ in accordance with the German Classification of Economic Activities, 1993 Edition (WZ 93) and 2003 Edition (WZ 2003)

Segment	**Classification No. according to WZ 93 or WZ 2003**
Quarrying, other mining	10.30, 12, 13, 14
Food and tobacco	15, 16
Paper	21
Basic chemicals	24.1
Other chemical industry	24 without 24.1
Rubber and plastic products	25
Glass and ceramics	26.1, 26.2, 26.3
Mineral processing	26 without 26.1, 26,2, 26.3
Manufacture of basic metals	27.1
Non-ferrous metals, foundries (ferrous and non-ferrous metals)	27.4, 27.5
Metal processing	27 without 27.1, 27.4 and 27.5, incl. 28
Manufacture of machinery	29K
Manufacture of transp. equip.	34, 35
Other segments	all other classifications, except 10.10, 10.20, 11.10, 11.20, 23.1, 23.2, 23.3

5.2.2 Classification of Economic Activities in the Sectors 'Mining and Quarrying, Manufacturing Industry' in accordance with the German Classification of Economic Activities, 2008 Edition (WZ 2008)

Segment	**Classification No. according to WZ 2008**
Quarrying, other mining	08
Food and tobacco	10, 11, 12
Paper	17
Basic chemicals	20.1
Other chemical industry	20 and 21 without 20.1
Rubber and plastic products	22
Glass and ceramics	23.1, 23.2, 23.31, and 23.4
Mineral processing	23 without 23.1, 23,2, 23.31, and 23.4
Manufacture of basic metals	24.1
Non-ferrous metals, foundries (ferrous and non-ferrous metals)	24.4, and 24.5
Metal processing	24.2, 24.3, and 25
Manufacture of machinery	28 without 28.23
Manufacture of transport equipment.	29, 30
Other segments	all other classifications, except 05.1, 05.2, 06, 09, 19.1, and 19.2

5.3 Sources

All energy sources	**Statistisches Bundesamt (Federal Statistical Office)** **43 Manufacturing Industry: Energy and Water Supply** 433 Specialist statistics on energy and water supply 43311 Monthly electricity supply report (066) 43321 Monthly gas supply report (068) 43331 Survey on electrical sales, revenues (083) 43341 Survey on gas distribution, imports and exports, as well as revenues (082) 43351 Survey on power generation plants in mining and manufacturing industry (067) 43371 Annual survey on power input for network operators (070) 43381 Annual survey on sewage gas (073) 43391 Annual survey on liquefied petroleum gas (075) **434 Statistics on Energy and Water Supply: Heat Generation** 43411 Annual survey on generation, use, purchase and transmission of heat (064) 43421 Survey on geothermal energy (062) **435 Other Statistics on Energy and Water Supply** 43511 Monthly survey on coal imports and exports (061) 43521 Survey on biofuels (063) 43531 Annual survey on energy use in mining and manufacturing (060) Wolfgang Bayer (2003): Amtliche Energiestatistik neu geregelt (Official Energy Statistics Revised) in: Wirtschaft und Statistik, Issue 1, pp. 33-40. **Bundesverband der deutschen Energie- und Wasserwirtschaft e.V. (BDEW - Association of the German Energy and Water Industry)** **Market research results, company data, calculations made by the Working Group**
Hard coal and lignite	**Statistik der Kohlenwirtschaft e.V. (Coal Industry Statistics)** Coal Mining in the Energy Industry of the Federal Republic of Germany – Annual Reports – Coal Industry Statistics Sales statistics and other unpublished energy statistics
Petroleum	**Bundesamt für Wirtschaft und Ausfuhrkontrollen (Federal Office of Economics and Export Control)** Official Petroleum Statistics for the Federal Republic of Germany **Mineralölwirtschaftsverband e.V. (MWV – Association of the German Petroleum Industry)** Statistics on Mineral Oil – Annual Reports **Wirtschaftsverband Erdöl- und Erdgasgewinnung e.V. (As-**

	sociation of the Oil and Gas Industry) Annual Reports **Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (Federal Ministry of Food, Agriculture, and Consumer Protection)** Gasoil Consumption in Agriculture
Gases	**Statistisches Bundesamt, Außenstelle Düsseldorf (Federal Statistical Office, Dusseldorf Branch)** Iron and Steel Statistics: Fuel, Gas, and Electricity Statistics **Wirtschaftsverband Erdöl- und Erdgasgewinnung e.V. (Association of the Oil and Gas Industry)** Annual Reports **Statistik der Kohlenwirtschaft e.V. (Coal Industry Statistics)** Gas Statistics **Deutscher Verband Flüssiggas e.V. (German Liquefied Petroleum Gas Association)** The LPG Market – Annual Reports
Other energy sources	**Der Energieeffizienzverband für Wärme, Kälte und KWK e.V. (AGFW – The Energy Efficiency Association for Heating, Cooling, and CHP)** District Heating Reports **Arbeitsgruppe Erneuerbare Energien-Statistik (AGEE-Stat - Working Group on Renewable Energy Statistics)** Renewable Energy Sources in Figures
'Non-energy carrier'	**Mineralölwirtschaftsverband e.V. (MWV – Association of the German Petroleum Industry)** **Statistisches Bundesamt (Federal Statistical Office)** **Verband der Chemischen Industrie e.V. (VCI – Association of the German Chemical Industry)**