COUNTRY PRACTICE IN ENERGY STATISTICS

Topic/Statistics: Energy balances for Austria and the Laender of Austria

Institution/Organization: Statistics Austria

Country: Austria

Date:

CONTENTS

Abstract

Write a short abstract of the statistics, and try to limit it to one page. The purpose of the abstract is to give the reader a general overview of the statistics/topic. It should therefore include a brief overview of the background and the purpose of the statistics, the population, the sample (if relevant), the main data sources, and the main users of the statistics. The abstract should also mention what is the most important contribution or issue addressed in the country practice (e.g. the practice deals with challenges of using administrative data, using of estimation, quality control, etc.). If there are other elements that are considered important, please feel free to include them in the abstract.

Keep in mind that all relevant aspects of the statistical production will be covered in more detail under the different chapters in the template. Therefore, the abstract should be short and focused on the key elements. What the most important elements are can vary from statistics to statistics, but as a help to write an abstract you can use the table below. The table can either replace a text or can be filled out in addition to writing a short text.

Objective and purpose

The original purpose of the Energy Balances was to illustrate the general situation regarding Austrian energy supply with the accuracy and timeliness required for the making of fundamental political decisions and to show the role of energy supply in the Austrian national economy (relevance to National Accounts). Today it is also used to document in great detail the international obligations of Austria relating to the holding of fuel stocks (IEA treaty) or the fixed share of 34% of Renewable Energy until 2020 (DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009on the promotion of the use of energy from renewable sources). On national and regional level it is used to show the effects of subsidy measures (e.g. subsidy of solar energy in Salzburg and the CHP- Directive) and political management measures (e.g. the Green Electricity Act). In addition, it also forms a basis for calculation of Kyoto-relevant, energy-related greenhouse emissions in Austria (reference analysis) by the Austrian Umweltbundesamt (Austrian Environment Agency) and the EU Commission.

Subject of the statistics

The Energy Balances are a summary tabular list of the supply and consumption of fuels and energy flows.

Data sources, coverage

The data required to prepare the Energy Balances comes from very varied sources with different survey aims and therefore has unavoidable inconsistencies. In addition, there are parallel surveys of exports with, in some cases, contradictory results (e.g. foreign trade statistics collected by Statistics Austria in accordance with the Federal Statistics Act and the survey by the Federal Ministry of Economics, Family and Youth in accordance with the Oil Stockholding Act (FORM III)). In other areas, gaps in the data, which would require enormous time and effort to fill (if at all possible), necessitate qualified estimates. The resolution of such contradictions and/or the selection of a particular source necessitate the use of internal or external expertise that corresponds to the particular requirements.

It should also be mentioned that the sample error in the sample surveys can be very large, particularly for less frequently used energy sources. However, the sample sizes and survey frequencies cannot be increased for cost reasons. Methodological improvements in the form of the development and implementation of models are required and intensive work is currently underway in this area.

Data preparation

Data preparation consists of comparing and, if necessary, correcting the various data sources. Since the data situation varies greatly between different energy sources and balance items, there is no uniform

procedure. Instead, the procedures specific to each energy source are documented in detail in the description of energy sources (see fuel definitions) and balance items.

Quality

The quality of the Energy Balances is constantly checked and assured by means of consistency checks conducted by the IEA and EUROSTAT.

Publication

The Energy Balances are currently published solely on the Internet on the Statistics Austria website – Energy. The detailed Austrian Energy Balances are available as download for the whole time series. The regional balances are available as synoptic tables only.

Key elements	
Name of the statistics	Energy balances
Background and purpose of the statistics	Synoptic tables showing supply and use of energy commodities and energy flows
Population, sample and data sources	Material input statistics, Short term statistics; Electricity and natural gas surveys, Household energy consumption survey, Surveys on energy consumption in the service sector an in small and medium sized industries, Inta- and Extrastat, Biomass lighted heating plants, Form III
Main users	Federal Ministry of Agriculture, Forestry, Environment and Water Management Federal Ministry of Economics, Family and Youth Umweltbundesamt (Austrian Environment Agency) EUROSTAT International Energy Agency (IEA)
Important contribution or issue addressed	
Other remarks	

1. General information

1.1. Name of the statistics/topic

The statistics/topic could either be a specific energy statistics (e.g. electricity production) or a topic within energy statistics (e.g. energy balances). For more information, please see Section III of the Instructions.

Energy balances

1.2. History and purpose

State when the statistics were first published.
Describe briefly the main purpose of producing the statistics and why it is relevant.

The original purpose of the Energy Balances was to illustrate the general situation regarding Austrian energy supply with the accuracy and timeliness required for the making of fundamental political decisions and to show the role of energy supply in the Austrian national economy (relevance to National Accounts).

However, the requirements placed on the Energy Balances have continuously increased over the past few years.

Today it is also used to document in great detail the international obligations of Austria relating to the holding of fuel stocks (IEA agreement) and the effects of subsidy measures (e.g. subsidy of solar energy in Salzburg and the CHP Directive) and political steering measures (e.g. the Green Electricity Act – Ökostromgesetz). In addition, it also forms a basis for calculation of the Kyoto-relevant, energy-based greenhouse gas emissions (reference analysis) by the Austrian Umweltbundesamt (Austrian Environment Agency) and the EU.

The Austrian Energy Balances exist as time series starting 1970, the Regional Balances starting1988.

1.3. Reference period

State the time period the data are collected for.

1970 to 2010

1.4. Frequency

Specify how often the statistics are disseminated (e.g. annually, monthly, quarterly, etc.). If the statistics are not produced at regular intervals, state at what times they have been produced in the past and the main reasons behind the irregularities.

The Energy Balances are prepared on an annual basis and released in November of the following year

1.5. Dissemination

Describe how the statistics are published (e.g. printed publications, online publications, online databases, etc.). If applicable, include the web address to the main website of the statistics.

The Energy Balances are currently published solely on the Internet on the Statistics Austria website – Energy. The detailed Austrian Energy Balances are available as download for the whole time series. The regional balances are available as synoptic tables only.

1.6. Regional level

State the lowest geographical level (e.g. administrative regions, municipalities, etc.) for which the statistics are made available to the public.

Austria and its federal provinces (Laender)

1.7. Main users

Identify the key users of the data and the main applications. Include both internal and external users, and if possible try to distinguish between end users and others.

- Federal Ministry of Agriculture, Forestry, Environment and Water Management
- Federal Ministry of Economics, Family and Youth
- Umweltbundesamt (Austrian Environment Agency)
- Austrian Energy Agency
- Austrian Institute of Economic Research
- Laender
- EUROSTAT
- International Energy Agency (IEA)
- United Nations Economic Commission for Europe (UNECE)
- United Nations Statistics Division (UNSD)
- Various institutes for scientific research, universities, media etc.

1.8. Responsible authority

Write the name of the institution and department/office with the main responsibility for disseminating the statistics (e.g.: Statistics Norway, Department of Economics, Energy and the Environment).

Statistics Austria, Directorate Spatial Statistics

1.9. Legal basis and legally binding commitments

State the national legal basis for the data collection. Include a complete reference to the constitutional basis, and web address to an electronic version (e.g.: The Statistics Act of 16 June 1989 No. 54, §§2-2 and 2-3, http://www.ssb.no/english/about_ssb/statlaw/forskrift_en.html).

Federal Statistics Act 2000 as amended

If the data collection is not based on a legal basis, give a short description of other agreements or volunteer arrangements.

Five-year contracts with the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) and the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ – previously BMWA), annual contracts with the Laender

If applicable, give reference to national and international commitments that are legally binding (e.g. EU statistical legal acts).

Regulation (EC) No. 1099/2008 of the European Parliament and of the Council of 22 October 2008 on Energy Statistics.

1.10. Resource requirements

Specify how the production of the statistics is financed (e.g. over the ordinary budget, project based support, financial support from other institutions or organization). If applicable, state the contracting entity (e.g.: Ministry, EU Commission, OECD). A contracting entity is any entity which is ordering a survey or the compilation of a statistics, and paying for it

Five-year contracts with the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) and the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ – previously BMWA), annual contracts with the Laender

Specify the resource requirements for producing the statistics (e.g. man-labour days, number of workers involved in the statistical production process of the statistics/topic in question).

5 person-month

1.11. International reporting

List any international organizations and names of reporting schemes that the statistics are reported to. If available, also include the website where the reported data are published (e.g. International Energy Agency, Monthly Oil Statistics, UNSD, etc.).

EUROSTAT
International Energy Agency (IEA)
United Nations Economic Commission for Europe (UNECE)

2. Statistical concepts, methodology, variables and classifications

2.1. Scope

Describe the scope of the statistics (e.g. the statistics cover supply and use of all energy products in Norway, classified according to International Standard Industrial Classification of All Economic Activities – ISIC).

The Energy Balances are a summary tabular list of the supply and consumption of energy sources and energy flows. They are prepared for each calendar year at regional (Laender) and national level (total of all Laender). The single balances are released as a time series from 1970 – 2009 for Austria and from 1988 – 2009 for the Laender. The publication currently include 27 commodity balances (individual fuels as smallest displayed units), four fuel groups aggregated from the individual energy sources (coal, oil, gas and renewable energies) and the overall total balance (see Table 1 in Section 3, Subject of the statistics and fuel definitions). The individual energy sources are shown both in physical units (tonnes, 1000 m³ and MWh) and energy units (Terajoule). The fuel groups and overall balance are only shown in Terajoule (TJ).

They are broken down into balance aggregates as follows:

1. Indigenous Production of Primary Fuels
2. Imports
3. Stock Changes
4. Exports
5. Gross Inland Consumption
6. Transformation Input
7. Transformation Output
8. Consumption of Energy Industries
9. Transport Losses
10. Non Energy Use
11. Final Energy Consumption

2.2. Definitions of main concepts and variables

Describe the main concepts (e.g.: territory principle, resident principle, net calorific value, gross calorific value).

Territory principle, net calorific value

Describe the main variables (e.g. how are the different energy products defined in the statistics? How are production, intermediate consumption, final consumption, transformation, feed stock, the energy sector, etc. defined?).

Displayed is each of the balance fuels for each balance aggregate. The aggregates transformation input and output are broken down to eight transformation processes, plant operators and fuels used for transformation[1] and the final energy consumption is broken down to 21 IEA sectors. The fuels are presented in fuel specific physical units (t, m³, MWh) and for comparability reasons in TJ. The conversions are based on the current average fuel specific heating values. So the maximum data matrix includes 63 fuels[2] x 28 sectors x 9 Laender x 121 balance items x 7 useful energy categories by year. In additional sheets the efficiencies of the displayed transformation processes and, starting with the reporting period 2005, the shares of the renewable charging to the RES directive are presented.

2.3. Measurement units

Describe in what unit the data is collected (e.g. physical unit (m3, metric tons), monetary unit (basic prices, market prices)). Describe in what unit the data is presented. Describe if the calorific values are collected (e.g. on a net vs. gross basis) and how they are used.

If applicable, describe the density of the energy product(s) and the estimated *thermal efficiency coefficients* of different energy products and consumer groups or by appliance. Thermal efficiency coefficient indicates the share of the energy products which is actually usable for end consumption. Descriptions of density and thermal efficiency coefficient could alternatively be put in an annex.

physical units (tons, m³,MWh) and TJ

2.4. Classification scheme

Include references to relevant international and national standard classifications. If national, give a brief description of the standards. If available, include web addresses to the electronic version of the standards).

NUTS, NACE, Fuel Classification of IEA/EUROSTAT/UNECE (5 Joint questionnaires)

2.5. Data sources

Give an overview of the different data sources used in the collection and compilation of the statistics/topic (e.g. household survey, enterprise/establishment survey, administrative data/registers, foreign trade statistics, production statistics and other primary/secondary data sources).

Examples of administrative sources/registers are: business register for enterprises and establishments, population register, land register, housing and building registers, tax registers, international trade registers, etc.

For compiling the Energy Balances manifold data from multiple sources with different survey goals are used, including primary statistics conducted by Statistics Austria and other statistical bodies like E-Control GmbH und BMWFJ (former BMWA) as well as administrative data.

[1] This deep disaggregation leads to 11 items for transformation input and 101 items for transformation output

[2] This number is given since 1980 and was calculated back to 1970 only on demand.

In the following the main data sources are displayed. In case of surveys conducted by Statistics Austria additional information is available on the Statistics Austria webpage.

- Sample Survey on energy consumption of small to medium-sized establishments in manufacturing industries (Statistics Austria)

This survey was conducted the first time in January and February 2004 for the reporting period 2002 and was repeated for the reporting years 2004, 2006 and 2008. The results were integrated into the Energy Balances and the years between two surveys were extrapolated with heating degree days and moving averages.

Additionally to the detailed description of the survey and the questionnaire the methodological report includes the summary tables broken down by sectors and regions. The results are released in the framework of Energy Balances and Energy Accounts only but not independently because of the specific characteristic of the survey.

- Sample Survey on Energy Consumption in the Service Sector (Statistics Austria)

Additionally to the detailed description of the survey and the questionnaire the methodological report includes the summary tables broken down by sectors. The results are released in the framework of Energy Balances and Energy Accounts.

- Sample Survey on Energy Consumption of Households (Statistics Austria)

This sample survey is conducted every second year and covers some 0.6% of Austrian households. The results were integrated into the Energy Balances and the years between two surveys were extrapolated with heating degree days and moving averages. The survey is the main data source for fuel wood consumption in Austria. Although the sample size is relatively high the statistical errors are high, too, in case of rarely used fuels.

For the time being the survey is the only source for the sectoral breakdown of ambient heat and solar heat. Therefore the large statistical error leads to a high sectoral uncertainty. For the overall consumption it is not relevant because the data are collected with another survey (Annually survey on installed heat pumps, solar- and PV - panels).

Since 2004 the data is collected biannually with CATI (Computer Assisted Telephone Interview). The last survey was conducted in the 3rd quarter of 2008.

- Short Term Statistics (KJE, Statistics Austria, Metadata report available in German only)

Short term statistics is the main data source for lignite mining and oil and gas exploration. Since 2002 the “Characteristics of district heat industries“ are not published any more by the Austrian Natural Gas and District Heat Association. Therefore Short Term Statistics is the only data source for district heat production for the time being with the disadvantage that only transformation output but no corresponding transformation input is surveyed.

- Material Input Statistics (Statistics Austria, Metadata report available in German only)

Material input statistics is the main data source for the sectoral breakdown of the consumption of all fuels used in industries. Its disadvantage is that it displays the overall consumption. Therefore Material Input Statistics has to be adapted to the balance structure with other surveys e. g. CHP-statistics to separate transformation input and final energy consumption.

- Foreign Trade Statistics (Statistics Austria, Metadata report available in German only)

Foreign Trade Statistics is a main data source for solid fuels (coal, wood and biofuels) and natural gas imports.

- Form III (BMWFJ)

Basing on the "Oil stockholding and reporting (amendment) act" this survey conducted by BMWFJ includes foreign trade, transformation, stock keeping and putting into circulation at the first trade level. Therefore Form III provides a comprehensive and consistent data set for crude oil and oil products. Furthermore the fuel definition in Form III is identically with the balances needs and the survey is the exclusive data source for compiling refinery balances. Petrol coke which is of increasing importance in manufacturing of other non-metallic mineral products is excluded and has to be amended from Foreign Trade Statistics.

- Coal Statistics (BMWFJ)

This survey is an important complement to Foreign Trade Statistics and gives additionally information on supply of solid fossil fuels on a sectoral base. Although the data are rough and not always comprehensive it is an important source for estimating stock changes.

- Survey based on Electricity Statistics Directive (E-Control GmbH)

This survey is the bases for implementing electricity and the fuel electricity is generating from into the Energy Balances. Since 2002 power plants with capacities lower than 1MWe are excluded from the survey. Some difficulties occur in linking the plant based data with data from Material Input Statistics which is collected on establishment level.

- CHP-Statistics (E-Control GmbH)

Since 2001 this survey conducted by E-Control is a main data source for district heat production that includes corresponding transformation input figures, too. E-Control does not apply the 75% criterion for transformation efficiency. All electricity production is displayed as CHP production. Therefore the electricity generation data provided has to be split into CHP and electricity generation only figures by applying the 75% efficiency criterion. Some difficulties occur in linking the plant based data with data from the Material Input Statistics which is collected on establishment level.

- Green Electricity Statistics (E-Control GmbH)

This data set was released by E-Control 2003 firstly and includes most power plants < 1MWe that are excluded by the Electricity Act (ELWOG) from the two surveys mentioned above. For the reporting period 2006 the data are available on a regional base, too.

- Survey based on Gas Statistics Directive (E-Control GmbH)

Since the reporting period 2003 this survey is the main data source for extraction, stock changes and overall consumption of natural gas as well as for calculation of export figures. Until 2002 BMWFJ was responsible for this survey.

- Survey on number and installed capacities of district heat plants (Chamber of Agriculture)

Basing on this survey and together with production characteristics - surveyed in 1996 by the Austrian Biomass Association and 2005 by Statistics Austria- and heating degree days annually production of district heat is estimated.

The results of this annual survey are the core element of the model for extrapolating the district heat production as well as the corresponding transformation inputs.

- Survey on Fuel Input and Heat Production of Biomass Lighted District Heat Plants (Statistics Austria, Metadata report available in German only)

This survey was conducted the first time in 2005. All plant operators were asked to report the annual heat production and the corresponding transformation input broken down by fuel types. The next survey is planned for the year 2010.

- Characteristics of District Heat Industries (Austrian Natural Gas and District Heat Association)

Up to and including the year 2001 this annually release was the main data source for district heat production and corresponding transformation inputs. Since 2002 the detailed data is not available any more

- Characteristics of gas industries (Austrian Natural Gas and District Heat Association)

Up to and including the year 2001 this annually release was the main data source for regional natural gas supply. Since 2002 the detailed data is not available any more

- Statistics on windmill based electricity generation (IG Windkraft)

This dataset is the basis for the regionalisation of overall annual wind power figures provided by E-Control GmbH.

- Survey on Annually Installed Numbers and Capacities of Heat Pumps, Solar- and PV-Panels (IFF Klagenfurt, since 2008 TU-Wien)

Basing on this survey the annually production of ambient and solar heat as well as not grid connected PV based electricity generation is estimated. The disadvantage of the survey is that it contains no hint whether an installation is a new one or a replacement. Details one can find using the following link

http://www.nachhaltigwirtschaften.at/nw_pdf/1015_marktstatistik_09.pdf (available in German only)

2.6. Population

Describe the entire group of units which is the focus of the statistics (the population).

Not relevant

Specify the following statistical units:

- Reporting units:
- Observational units:
- Analytical units

Examples of different kind of statistical units include: enterprise, enterprise group, kind-of-activity unit (KAU), local unit, establishment, homogeneous unit of production.

In most cases the reporting unit, observational unit and analytical unit are identical, but there are examples where this is not the case. In electricity statistics, you may find that energy companies (the reporting unit) provide data about different consumers like the individual household or manufacturing company (the observational unit). The analytical unit may be a group of energy consumers, defined by the ISIC.

- Reporting units: Fuels, balance aggregates, Laender and economic sectors
- Observational units: Fuels, balance aggregates, Laender and economic sectors
- Analytical units: Fuels, balance aggregates, Laender and economic sectors

2.7. Sampling frame and sample characteristics

Describe the type of *sampling frame* used in the collection and compilation of the statistics (e.g. list, area or multiple frames). A sampling frame is the source material or device from which a sample is drawn. Note that the sampling frame might differ from the population.

Not relevant

For each survey(s) used for the compilation of the statistics, specify the *sampling design* (e.g. random, stratified, etc.). Describe the routines employed for updating the sample. Include information about the sample size, and discuss to what extent the sample covers the population (e.g. energy consumption in the sample compared to total energy use by the population).

Note that chapter *2.7: Sample frame and sample characteristics* may overlap with chapter *3.4: Grossing up procedures.*

2.8. Collection method

For each survey used for the compilation of the statistics/topic, describe how the data are collected (e.g. face-to-face, telephone, self-administered, paper and internet-based questionnaires, or administrative data and registers).

Not relevant

2.9. Survey participation/response rate

For each survey used for the compilation of the statistics/topic, specify the average response rate, or refer to response rates for specific surveys conducted.

Not relevant

3. The statistical production process

3.1. Data capture and storage

Describe how the data is captured and stored (e.g. if the respondent replies using Internet-based questionnaire, the received data are electronically transferred to the production database. Paper questionnaire responses are keyed manually to the production database).

All data are received and transferred electronically

3.2. Data editing

Describe the regular routines employed for detecting and correcting errors. This may include:

- Manual routines for detecting and correcting errors

- Automatic error-detection (and correction)
- Micro- and macro editing procedures
- Data validation procedures
- Outlier identification
- Processes and sources used for quality controls

In preparing all statistics used for the Energy Balances, care has constantly been taken to ensure the best possible utilisation of existing/available data sources. However, the data sources used have some unavoidable inconsistencies. In addition, in external trade there are parallel surveys with, in some cases, contradictory results (e.g. Foreign Trade Statistics by Statistics Austria in accordance with the Federal Statistics Act and the FORM III survey by the Federal Ministry of Economics and Family and Youth in accordance with the Oil stockholding and reporting (amendment) act). In other areas, gaps in the data, which would require enormous time and effort to fill (if at all possible), necessitate qualified estimates. The resolution of such contradictions and/or the selection of the most suitable source necessitate the use of internal or external expertise that corresponds to the "state of the art". Changing requirements and new sources – even where the definitions remain the same – inevitably lead to the need for revisions that must be made to the entire time series in order to avoid discontinuities as far as possible. The Energy Balances represent a living system that requires on-going revision.

In addition, the sources and calculations used for the balances have been (and still are) continuously coordinated with each other and checked for inconsistencies.

The data from all sources is checked for consistency with supply and consumption information and, if relevant, complemented with non-recorded stock movements, particularly in the household and service sectors. In order to avoid systematic errors, a careful check by means of a time series analysis is made to ensure that these stock additions are not continuously in one direction.

During preparation of the balance, each energy sub-source is assigned to ten balance items/units and to the relevant federal provinces. Final Energy Consumption is also subdivided into sectors as classified by the IEA/EU. A wide range of data sources is used, and these sources have very varied origins with different survey aims. If the survey does not allow the data to be clearly assigned to a sector or Land, it is sectorised[3]/regionalised on the basis of the Business Register and assigned to the given Laender.

From reporting year 2003 onward, there are current surveys for all sectors with the exception of agriculture. This has made it possible to significantly improve both the sectoral and the regional classification. In addition, direct annually surveyed information from large companies (e.g. VOEST and OMV) is also taken into account. From reporting year 2005 onward, the allocation data of the Austrian Environment Agency has been available for inclusion in the sectoral breakdown of the Energy Balances. The problem here lays in the clear identification of the NACE classification of plant operators as well as comparison with Statistics Austria and E-Control (CHP Statistics) respondents. Furthermore, a comparison of the total values of the sectors at Laender level must be carried out to ensure that the Energy Balances record all these plants in the relevant sector and Land.

Up to and including reporting year 2002, the basis for the sectoral and regional classification of Final Energy Consumption (of the energy source volumes in those (sub-)sectors for which no current information was available) was the structure of the Final Energy Consumption for 1998. "Excess" energy source volumes were distributed iteratively to the sectors in accordance with this structure. This structure is based on the Economic Survey 1998 for Manufacturing Industries and Construction, the Household Energy Consumption Sample Survey, a Sample Survey of the Service Sector 1998, the Useful Energy Analysis 1998 and extrapolation of the Agricultural Sample Survey 1997. This structural extrapolation applied to small and medium-sized enterprises in manufacturing industries and construction, the service sector and agriculture with the exception of diesel use.
Depending on the relevant energy source and balance item, different additional data sources like small telephone interviews or direct information of single (big) companies are used to calculate the balance items in the Energy Balances.

[3] In this context the sector is not based on the National Accounts but on the business sectors as defined by the IEA.

3.3. Imputation

Describe the principles for imputation and the assumptions that these principles are based on.
Note that this chapter may overlap with chapter *3.2: Data editing* and chapter *5.2: Accuracy*

Not relevant

3.4. Grossing up procedures

Describe how the population is divided into strata and what statistical models the estimations in the strata are based on. Describe how sub-indices are combined into aggregate indices and how uncertainty is estimated.

Not relevant

3.5. Analytical methods

Give a description of any analytical methods used to adjust the data (e.g.: seasonal adjustment and temperature adjustment). A more detailed description of the analytical method can also be included as an annex.

Temperature adjustment (space heating and heat for district heating), diesel consumption in agriculture is calculated from the agricultural area, moving averages in case of multiannual survey frequencies

4. Dissemination

4.1. Publications and additional documentation

Describe the form of dissemination of the statistics/topics in question (e.g. printed publications, website, etc.). Please provide relevant website link(s) if available.

The results of the Energy Balances can be viewed on Statistics Austria's website.

Give a complete reference to publicly available statistics databases where data from the statistics can be extracted. Include web addresses if available online.

Indicate whether you charge users for access to the statistics at any level of aggregation.

4.2. Revisions

Describe the current revision policies. E.g.: Is historical data revised when new methodology, new definitions, new classifications etc. are taken into use? Is the data continuously revised, or is the data revised at certain points in times (e.g. every third year, annually, etc.)?

If applicable, describe any major conceptual or methodological revisions that have been carried out for this statistic/topic in the past.

4.3. Microdata

Describe how microdata are stored.

Not relevant

Specify if microdata are available for scientific and/or public use. If so, describe under what conditions these are made available.

Not relevant

4.4. Confidentiality

Describe the legal authority that regulates confidentiality, and what restrictions are applied to the publication of the statistics.

Describe the criteria used to suppress sensitive data in statistical tables (cell suppression).

Not relevant

Describe how confidential data are handled.

Information from individual reporting units is treated in strict confidence and used solely for the purposes of producing official statistics. Since the data is aggregated at federal province or Austria-wide level, no anonymised items of data exist once the Energy Balances are prepared, except in the case of OMV (refinery) and VOEST. Both companies have given their permission for publication of the data.

Describe any confidentiality standards that go beyond what is legally required.

Not relevant

5. Quality

5.1. Relevance

State to which degree the statistical information meet the real needs of clients/users.

On national level the Energy Balances are used to generate the "Energy report of the Austrian government" and on national and regional level they are used to calculate the energy based CO_2 emissions. The relevance on international level is secured because the Austrian Energy Balances are using the same data sources that are used to fill in the five Joint IEA/EUROSTAT/UNECE Questionnaires. That fact guarantees that national and international energy reports as well as greenhouse gas emission calculations are harmonised.

5.2. Accuracy

State the closeness of computations or estimates to the exact or true values that the statistics were intended to measure.

see Annex (page 71)

Measurement and processing errors

Discuss the measurement and processing errors that are relevant for the statistics. Try as far as possible to give an estimation of the size and scope of the errors.

Not relevant

Non-response errors
State the size of the unit non-response and the item non-response, distributed by important variables in the population (e.g. region, industry). Consider if the non-response errors are systematic, and if so, describe the methods used to correct it. Indicate whether the effects of correcting non-response errors on the results have been analysed, and, if so, describe them.

Not relevant

Sampling errors
Discuss the size of the sampling errors. Compare the population and sample with regards to important properties (e.g. coefficient of variance).

Sampling effects appear on regional and sectoral level because of the implementation of sample surveys. A detailed description one can find in the standard methodological reports of the respective surveys. Relevant for main balance aggregates on national level they are only in case of biofuels for which only consumption and no supply is surveyed. In these cases an underestimation can happen by trend.

Other sources of error
Discuss other sources of errors that might be relevant for the statistics. E.g.: Model assumption errors, coverage errors

Due to the extrapolation of heating fuels with heating degree days blurring can occur on sectoral and regional level because structural changes can be taken into account ex post (after the follow up survey). Relevant for main balance aggregates on national level they are only in case of biofuels for which only consumption and no supply is surveyed. Such revisions are possible up to six years after because of the low survey frequency in case of public and private services as well as in biomass lighted district heating pants.

5.3. Timeliness and punctuality

Specify the time between the end of the reference period and publication.
If the statistics are published both as preliminary and final figures, specify the time between publication of preliminary and final figures. You should also point out whether the publication date is set according to certain rules (e.g. advance release calendar, a specific day or prior to other publications).

The Energy Balances are prepared on an annual basis and released in November of the following year together with the submission of the 5 Joint Questionnaires.

Point out if there have been any major discrepancies between the planned publication date and the actual publication date in recent years. If so, state the length of this discrepancy and its cause.

5.4. Accessibility

Describe how easily accessible the statistics are. In particular, is there an advance release calendar to inform the users about when and where the data will be available and how to access them?

Are metadata and other user support services easily available? Are there particular groups that don't have access to the published statistics (e.g.: visually disadvantaged)?

An annually revised Metadata Report (see Annex) is available

5.5. Comparability

Discuss the comparability of the statistics over time, geographical areas and other domains.

Comparability over time

Discuss comparability over time and include information about whether there have been any breaks in the time series of the statistics and why. Also describe any major changes in the statistical methodology that may have had an impact on comparability over time.

The comparability in time is secured for the whole time series by continuous revisions.

Comparability over region

Discuss comparability over geographical areas, and include information about whether the statistics are comparable to relevant statistics published by other countries and/or international organisations.

The spatial and sectoral comparability within Austria is guaranteed by harmonising the regional balances with the national one and the international comparability is given by applying the IEA/EUROSTAT/UNECE methodology to the Austrian energy balance with two exceptions.

1. Non energy consumption of coke oven coke, hard coal an heavy fuel oil that are displayed in the Austrian energy balances are defined as final energy consumption on international level.
2. In opposition to EUROSTAT and IEA no transformation losses appear in the national balances in case of electricity and heat production from geothermal energy. That is analogue to the treatment of hydro- and wind power, PV, solar and ambient heat.

The quality of the Energy Balances is constantly checked and assured by means of consistency checks conducted by the IEA and EUROSTAT.

Annual Energy Questionnaires Report Card; Austria 2006 Data Cycle

How to Read a Report Card

Comparative assessment of the annual reporting
On 22 June 2007 there was an audit of the Energy Department at Statistics Austria (as the most important supplier of data for the calculation of CO2 emissions) by the Umweltbundesamt (in its function as "Accredited Inspection Agency No. 241 as per EN ISO/IEC 17020 (Type A) by resolution of the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ, formerly the BMWA) of 25 January 2006 GZ BMWA-92.715/0036-I/12/2005").

All the improvement measures recommended in this audit have since been implemented. For example, an estimate of the overall uncertainty of the energy balance at Austrian level was carried out for the first time for reporting year 2006, resulting in a relative error of +/-2.5% with 95% statistical dependability. The methodology and detailed results are included in this report as Annex 1. It is planned to carry out this estimate of uncertainty every five years.

When preparing the Energy Balances, one is constantly confronted not just with increasing requirements. The constantly changing political and economic conditions, e.g. energy market liberalisation, result among other in serious restrictions of data availability. New models need to be developed and implemented to fill these data gaps.

These developments mean that the preparation of the Energy Balances cannot be viewed as a routine task and that fundamental revisions need to be made almost every year in order to meet all requirements. These revisions are applied to the whole time series to avoid methodological breaks.

As the results of the Material Input Statistics since reporting year 2005 have been largely provided on time (approx. 85% of the surveyed data), this has enabled a considerable improvement in the quality of the provisional Energy Balances.

A further improvement in quality compared with previous years was also achieved 2006 by the inclusion of updated individual power plant data from E-Control GmbH for the years 1999, 2000, 2001 and 2003.

Since 2006, sectoral transformation balances have been prepared for the Laender and transmitted electronically to the Austrian Umweltbundesamt (Austrian Environment Agency) as the basis for calculating sector-relevant emissions. These are compatible/harmonised with the currently applicable version of the Energy Balances. With this fundamental regional modification of the transformation processes, incorrectly reported data in individual years has been identified and corrected by checking the individual data. This has enabled the correction of annual fluctuations within individual sectors.

Comparability over other domains

Discuss comparability over domains, and include information about whether the statistics are comparable between different industries, different types of households etc.

To be able to fulfill the reporting obligations of the RES-directive an additional aggregate – Gross Final Energy Consumption – had to be implemented. It is the sum of Final Energy Consumption + Own Consumption of electricity and district heat suppliers[4] + Transport Losses of electricity and heat for district heating +Non Energy Use in blast furnaces[5].

Chargeable Renewable Energy Sources according the directive are:

1. Final Energy consumption of:

- Biomass
- Solar-, geothermal- and ambient heat
- Biofuels for transport[6]

2. Production of electricity and heat for district heating from:

- Biofuels
- Solar-, geothermal- and ambient heat
- Normalised hydropower except production from pumped storage
- Normalised wind power
- PV

The calculation of the chargeable RES follows the methodology given in the directive – especially Annex 2 in case of normalizing hydropower (15 years) and wind power (4 years) – and the specifications by EUROSTAT. Latter focus on implementation of hydropower plants with mixed storage and ambient heat.

The calculation of the current version assumes 83.5% efficiency of the pumps used and therefore a production from pumped storage as 83.5% of the electricity used for pumping. This share is significantly higher than the EU average of some 70% and a future adaptation seems meaningful.

The currently proposed methodology for implementation of heat pumps meets the one used for compiling the national balances. Therefore only small adaptations, if any, have to be expected.

Starting with reporting year 2009 and back to 2005 – the base year for the RES directive – the renewable fuels as well as the transformation processes for electricity and heat sold to third parties are displayed much more in detail. Last but not least an additional sheet calculating the shares of chargeable RES by applying the most recent methodology from 2005 onwards has been implemented.

[4] In the energy balances part of Consumption of the Energy Sector

[5] Necessary because this consumption is defined as Final Energy Consumption on EU level

[6] Provided that they are produced under sustainable conditions to be defined on EU level during the next years

5.6. Coherence and consistency

Discuss the coherence/consistency between preliminary and final figures.

Discuss the coherence/consistency between monthly, quarterly or yearly statistics within the same subject area. Can the results of different frequencies for the same reference period be combined in a reliable manner?

Discuss the coherence/consistency with other related statistics (also those produced by other institutions/organisations on the same subject).

The sectoral breakdown of Final Energy Consumption does not correspond to the breakdown in the National Accounts was consciously taken into account. However, with the growing requirement over recent years for harmonised data, Energy Accounts that are formally aligned to the framework of the National Accounts were calculated for the first time in 2008. The harmonisation, though, is not restricted to the sectoral breakdown. Rather, the Energy Accounts are calculated on the "national treatment" principle, as opposed to the Energy Balances, which are calculated on the "territorial" principle. The trigger for compiling these energy accounts were the needs of for energy data fully consistent to the Energy Balances but following the National Accounts framework. To ensure the coherence with National Accounts bridge tables between Energy Balances and Input/Output tables of National Accounts are under development for the time being.

To avoid any misunderstandings the differences between these two frameworks are explained in detail in the following.

- The term sector like it is used in this report follows the economic sectors defined by IEA and EUROSTAT and is different to the definition in National Accounts.
- The term territory principle like it is used in this report means that all fuels placed into circulation in Austria are taken into account independently who is purchasing and consuming these fuels.
- Traction and the respective fuel consumption are in opposition to the National Accounts taken into account in five functionally defined transport sectors and not in the sectors operating it.
- Energy suppliers and energy transformation establishments are pictured in the Energy Balances separately and their fuel consumption is defined as energy sector use and not as final energy consumption
- Imports and exports focus on the national territory strictly.
- The private households (as consumers) are treated equally like all other sectors.
- In opposition to National Accounts in Energy Balances all fuels (even the cost free) and all transformation activities even those which are operated for own purposes only are taken into account.
- National Accounts include energy services which are excluded in energy balances.

Concerning the last two aspects the energy accounts follow the energy balance framework.

6. Future plans

Are there any current or emerging issues that will need to be addressed in the future? These could include gaps in collection, timeliness issues, data quality concerns, funding risks, confidentiality concerns, simplifications to reduce respondents' burden etc.?

The current version of the energy balances is the deepest breakdown allowed by database and confidentiality rules A more detailed display will not be able without changing the rules.

Annexes

Standard documentation
Meta information
(Definitions, comments, methods, quality)

on

Energy balances for Austria and the Laender of Austria

This documentation is valid for the reference period/due day:

1970 – 2010 (Austria)
1988 – 2010 (Laender)

Status: **February 2012**

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Contents

Executive Summary

Preliminary remarks

Primary goal of the Austrian Energy Balances which are compiled since the reporting year 1970 is to documenting the consumption of all fuels used during a calendar year in a consistent manner and including all connected flows in physical and energetic units. Since the reporting year 1988 Regional Energy Balances are ordered by the Laender of Austria as a basis for the Austrian Umweltbundesamt (Austrian Environmental Agency) to compile regional greenhouse gas emission balances.

In 1997, when international energy reporting was taken over from the Austrian Institute of Economic Research, the national Austrian Energy Balances were aligned in liaison with contracting entities and main users to the international formats used by EUROSTAT and the International Energy Agency (IEA). The major reasons for this were to avoid confusion arising from different data by the publication of national and international balances that were harmonised as far as possible and to ensure international comparability of the Austrian balances.

Further advantages of this alignment are that the quality controls set by the international organisations directly guarantee the quality of the national balances, and the national and international estimates of greenhouse gas emissions are largely analogous.

The disadvantage that, because of this alignment, the sectoral breakdown of Final Energy Consumption (= energy supply to final consumers) does not correspond to the breakdown in the National Accounts was consciously taken into account. However, with the growing requirement over recent years for harmonised data, Energy Accounts that are formally aligned to the framework of the National Accounts were calculated for the first time in 2008. The harmonisation, though, is not restricted to the sectoral breakdown. Rather, the Energy Accounts are calculated on the "residents" principle, as opposed to the Energy Balances, which are calculated on the "territorial" principle. The trigger for compiling these energy accounts were the needs of NAMEA (= National Account Matrix including Environmental Accounts) for energy data fully consistent to the Energy Balances but following the National Accounts framework.

To avoid any misunderstandings the differences between these two frameworks are explained in detail in the following.

- The term sector like it is used in this report follows the economic sectors defined by IEA and EUROSTAT and is different to the definition in National Accounts.
- The term territory principle like it is used in this report means that all fuels placed into circulation in Austria are taken into account independently who is purchasing and consuming these fuels.
- Traction and the respective fuel consumption are in opposition to the National Accounts taken into account in five functionally defined transport sectors and not in the sectors operating it.
- Energy suppliers and energy transformation establishments are pictured in the Energy Balances separately and their fuel consumption is defined as energy sector use and not as final energy consumption
- Imports and exports focus on the national territory strictly.
- The private households (as consumers) are treated equally like all other sectors.
- In opposition to National Accounts in Energy Balances all fuels (even the cost free) and all transformation activities even those which are operated for own purposes only are taken into account.
- National Accounts include energy services which are excluded in energy balances.

Concerning the last two aspects the energy accounts follow the energy balance framework.

Objective and purpose

The original purpose of the Energy Balances was to illustrate the general situation regarding Austrian energy supply with the accuracy and timeliness required for the making of fundamental political decisions and to show the role of energy supply in the Austrian national economy (relevance to National Accounts). Today it is also used to document in great detail the international obligations of Austria relating to the holding of fuel stocks (IEA treaty) or the fixed share of 34% of Renewable Energy until 2020 (DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009on the promotion of the use of energy from renewable sources). On national and regional level it is used to show the effects of subsidy measures (e.g. subsidy of solar energy in Salzburg and the CHP-Directive) and political management measures (e.g. the Green Electricity Act). In addition, it also forms a basis for calculation of Kyoto-relevant, energy-related greenhouse emissions in Austria (reference analysis) by the Austrian Umweltbundesamt (Austrian Environment Agency) and the EU Commission.

Subject of the statistics

The Energy Balances are a summary tabular list of the supply and consumption of fuels and energy flows.

Data sources, coverage

The data required to prepare the Energy Balances comes from very varied sources with different survey aims and therefore has unavoidable inconsistencies. In addition, there are parallel surveys of exports with, in some cases, contradictory results (e.g. foreign trade statistics collected by Statistics Austria in accordance with the Federal Statistics Act and the survey by the Federal Ministry of Economics, Family and Youth in accordance with the Oil Stockholding Act (FORM III)). In other areas, gaps in the data, which would require enormous time and effort to fill (if at all possible), necessitate qualified estimates. The resolution of such contradictions and/or the selection of a particular source necessitate the use of internal or external expertise that corresponds to the particular requirements.

It should also be mentioned that the sample error in the sample surveys can be very large, particularly for less frequently used energy sources. However, the sample sizes and survey frequencies cannot be increased for cost reasons. Methodological improvements in the form of the development and implementation of models are required and intensive work is currently underway in this area.

Data preparation

Data preparation consists of comparing and, if necessary, correcting the various data sources. Since the data situation varies greatly between different energy sources and balance items, there is no uniform procedure. Instead, the procedures specific to each energy source are documented in detail in the description of energy sources (see fuel definitions) and balance items.

Quality

The quality of the Energy Balances is constantly checked and assured by means of consistency checks conducted by the IEA and EUROSTAT.

Publication

The Energy Balances are currently published solely on the Internet on the Statistics Austria website – Energy. The detailed Austrian Energy Balances are available as download for the whole time series. The regional balances are available as synoptic tables only.

Energy balances – Important elements	
Main purpose of the statistics	Synoptic tables showing supply and use of energy commodities and energy flows
Observed unit / reporting unit / presentation unit	Not relevant
Type of statistics	Balance
Data sources/Survey techniques	Material input statistics, Short term statistics; Electricity and natural gas surveys, Household energy consumption survey, Surveys on energy consumption in the service sector an in small and medium sized industries, Inta- and Extrastat, Biomass lighted heating plants, Form III
Reference period or due day	1970 to 2010
Periodicity	The Energy Balances are prepared on an annual basis and released in November of the following year.
Survey participation	Not relevant
Legal bases	Five-year contracts with the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management and the Austrian Federal Ministry of Economy, Family and Youth, annual contracts with the Laender, Federal Statistics Act 2000 in the current version, Regulation (EC) No. 1099/2008 of the European Parliament and of the Council of 22 October 2008 on Energy Statistics.
Regional breakdown	Laender
Availability of the results	Preliminary figures: t + 11 Final figures: t + 23
Other	Territory principle

1. General information

1.1 Objective and purpose, history

The original purpose of the Energy Balances was to illustrate the general situation regarding Austrian energy supply with the accuracy and timeliness required for the making of fundamental political decisions and to show the role of energy supply in the Austrian national economy (relevance to National Accounts).

However, the requirements placed on the Energy Balances have continuously increased over the past few years.

Today it is also used to document in great detail the international obligations of Austria relating to the holding of fuel stocks (IEA agreement) and the effects of subsidy measures (e.g. subsidy of solar energy in Salzburg and the CHP Directive) and political steering measures (e.g. the Green Electricity Act – Ökostromgesetz). In addition, it also forms a basis for calculation of the Kyoto-relevant, energy-based greenhouse gas emissions (reference analysis) by the Austrian Umweltbundesamt (Austrian Environment Agency) and the EU.

The Austrian Energy Balances exist as time series starting 1970, the Regional Balances starting1988.

1.2 Contracting entity

- Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
- Federal Ministry of Economy, Family and Youth (BMWFJ, previously BMWA)
- Laender

1.3 Main users

- Federal Ministry of Agriculture, Forestry, Environment and Water Management
- Federal Ministry of Economics, Family and Youth
- Umweltbundesamt (Austrian Environment Agency)
- Austrian Energy Agency
- Austrian Institute of Economic Research
- Laender
- EUROSTAT
- International Energy Agency (IEA)
- United Nations Economic Commission for Europe (UNECE)
- United Nations Statistics Division (UNSD)
- Various institutes for scientific research, universities, media etc.

1.4 Legal basis

Five-year contracts with the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) and the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ – previously BMWA), annual contracts with the Laender, Federal Statistics Act 2000 as amended, Regulation (EC) No. 1099/2008 of the European Parliament and of the Council of 22 October 2008 on Energy Statistics.

2. Statistical concepts and methodology

2.1 Statistical concepts and methodology

2.1.1 Subject of the statistics

The Energy Balances are a summary tabular list of the supply and consumption of energy sources and energy flows. They are prepared for each calendar year at regional (Laender) and national level (total of all Laender). The single balances are released as a time series from 1970 – 2009 for Austria and from 1988 – 2009 for the Laender. The publication currently include 27 commodity balances (individual fuels as smallest displayed units), four fuel groups aggregated from the individual energy sources (coal, oil, gas and renewable energies) and the overall total balance (see Table 1 in Section 3, Subject of the statistics and fuel definitions). The individual energy sources are shown both in physical units (tonnes, 1000 m³ and MWh) and energy units (Terajoule). The fuel groups and overall balance are only shown in Terajoule (TJ).

They are broken down into balance aggregates as follows:

12. Indigenous Production of Primary Fuels
13. Imports
14. Stock Changes
15. Exports
16. Gross Inland Consumption
17. Transformation Input
18. Transformation Output
19. Consumption of Energy Industries
20. Transport Losses
21. Non Energy Use
22. Final Energy Consumption

The relationship between the **11 balance aggregates** is shown in the following **balance equations**:

	Supply		**Consumption**
	Indigenous Production of Primary Fuels		Transformation Input
+	Imports	-	Transformation Output
+/-	Stock Changes	+	Consumption of Energy Industries
		+	Transport Losses
-	Exports	+	Non Energy Use
		+	Final Energy Consumption
=	Gross Inland Consumption	=	Gross Inland Consumption

The Energy Statistics Manual released by IEA, EUROSTAT and UNECE which is the main base for the fuel nomenclature of the Austrian Energy Balances draws the following picture concerning the fuel cascade:

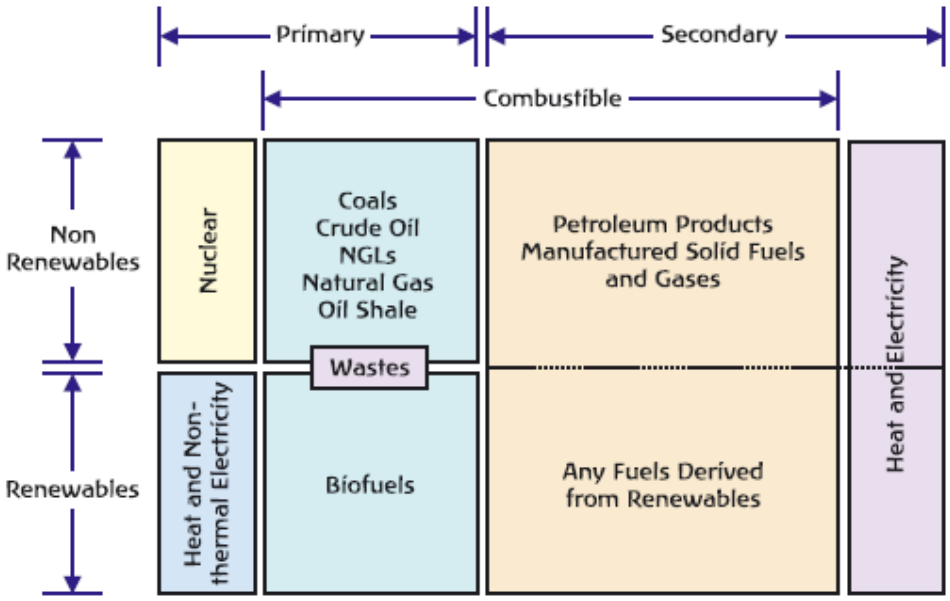
"Energy commodities are either extracted or captured directly from natural resources (and are termed primary) such as crude oil, hard coal, natural gas, or are produced from primary commodities. All energy commodities which are not primary but produced from primary commodities are termed secondary commodities. Secondary energy comes from the transformation of primary or secondary energy.

The generation of electricity by burning fuel oil is an example. Other examples include petroleum products (secondary) from crude oil (primary), coke-oven coke (secondary) from coking coal (primary), charcoal (secondary) from fuelwood (primary), etc.

Both electricity and heat may be produced in a primary or secondary form. Primary electricity is obtained from natural sources such as hydro, wind, solar, tide and wave power. Primary heat is the capture of heat from natural sources (solar panels, geothermal reservoirs) and represents the arrival of "new" energy into the national supplies of energy commodities. Secondary heat is derived from the use of energy commodities already captured or produced and recorded as part of the national supplies (heat from a combined heat and power plant, for instance)

Primary energy commodities may also be divided into fuels of fossil origin and renewable energy commodities. Fossil fuels are taken from natural resources which were formed from biomass in the geological past. By extension, the term fossil is also applied to any secondary fuel manufactured from a fossil fuel. Renewable energy commodities, apart from geothermal energy, are drawn directly or indirectly from current or recent flows of the constantly available solar and gravitational energy. For example, the energy value of biomass is derived from the sunlight used by plants during their growth. Figure 1 gives a schematic illustration of renewable versus non-renewable energy, and primary versus secondary energy."

Figure 1 _ Terminology for Energy Commodities



For an initial assessment of the energy situation of a region, two aggregated figures are used – Gross Inland Consumption and Final Energy Consumption. The Gross Inland Consumption can be calculated in terms of supply and use from the balance. On the supply side, the Gross Inland Consumption is calculated based on the Indigenous Production of Primary Fuels and the balances from Foreign Trade and Stock Changes; on the consumption side, the total is calculated from the Final Energy Consumption, the difference between Transformation Input and Output (=transformation losses) as well as from the Consumption of Energy Industries and Non-Energy Use.

The Gross Inland Consumption represents a key item in the Energy Balances. This variable is the volume of energy that was needed overall to cover domestic requirements in the reporting period. The Gross Inland Consumption is, however, not entirely suitable for isolated energy source-specific analysis. There are sometimes negative values here that are easily explained by the above-mentioned relationships. For instance, Lower Austria displays negative Gross Inland Consumption values for petroleum products, which result from the location of the only refinery there (in Schwechat) and the exports to other Laender.

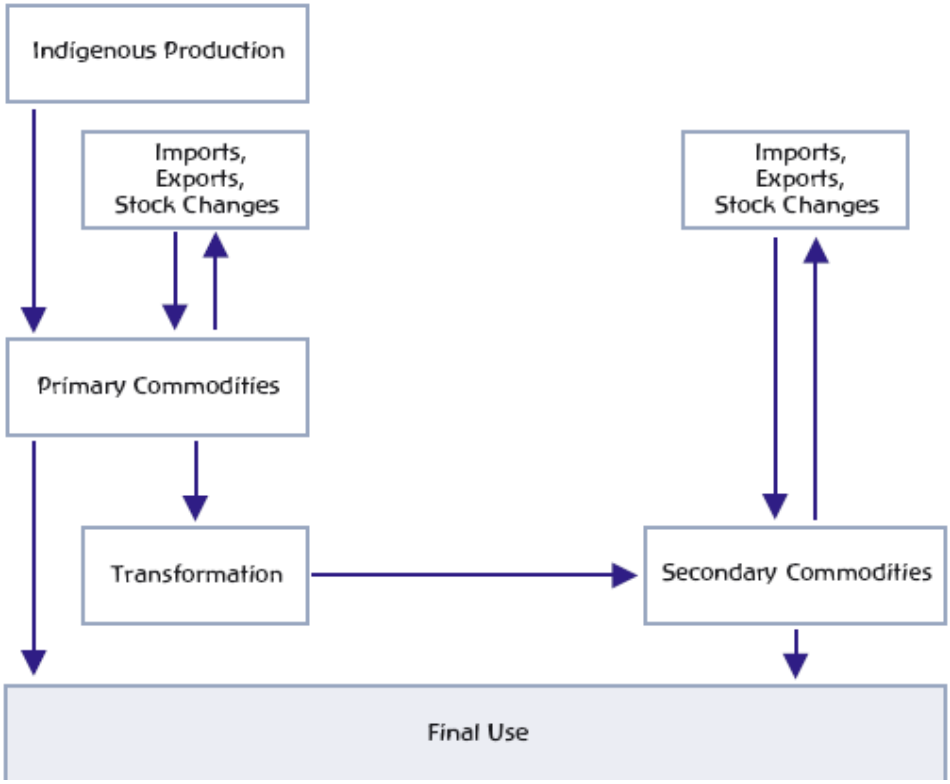
A further key aggregate item in the Energy Balances is Final Energy Consumption. The Final Energy Consumption can be derived from the Gross Inland Consumption, taking into account the Transformation Input and Output (transformation losses), the Non-Energy Use and the Consumption of Energy Industries. The Final Energy Consumption is that volume of energy supplied to the consumer for conversion into useful energy (space heating, lighting, computing, mechanical work etc.).

In terms of the other items in the Energy Balances, specific reference also needs to be made to the Indigenous Production of Primary Fuels. This is an aggregate item that is of key importance, particularly in relation to self-supply.

The residuum to balance supply and consumption is the aggregate with the worst data availability. The complex methodology and the multiple data sources cause different residua, depending on fuel type.

Energy Balances include the possibility to describe commodity streams as material flows through the Austrian socio-economic system, too. Figure 2 gives a schematic overview over the main commodity flows pictured by energy balances.

Figure 2 _ Main Commodity Flows (Source Energy Statistics Manual)



In the Energy Balances all changes in quantities as well as all flows of all fuels starting from their primary forms and ending with their final consumption are taken into account.

The simplest formats are isolated commodity balances (e.g. mining, export and import as well as consumption of coal). But fuels often are not consumed finally in their primary form. They are transformed once or several times. So hard coal e.g. is used to produce electricity or district heat for Final Energy Consumption. This leads to the necessity to account for the following transformation processes including input and output additionally.

- Refinery (see Refinery in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)

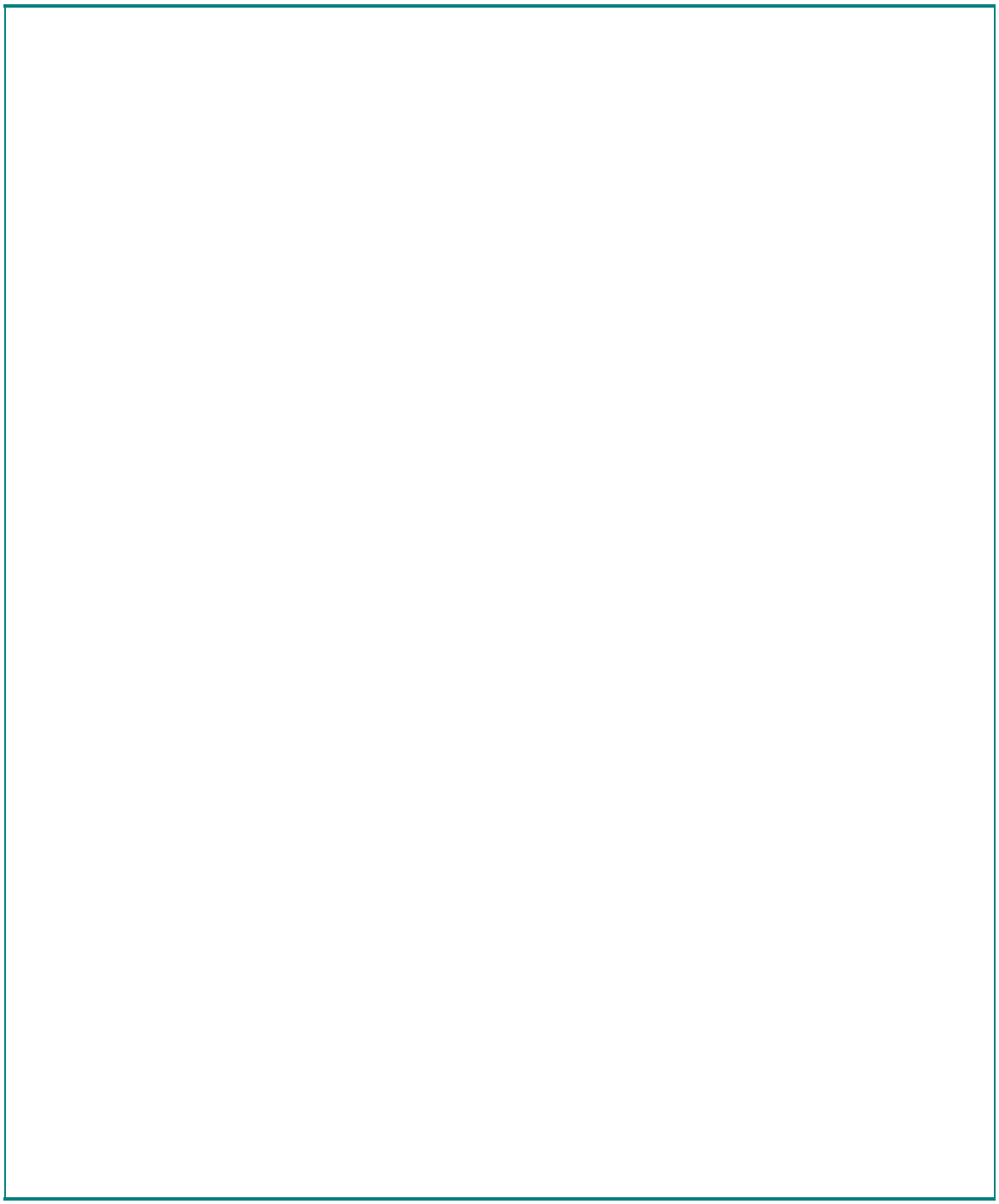
- Coke ovens (see Coke ovens in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- Blast furnaces (see Blast furnaces in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- Hydropower plants (see Hydropower, Windpower, PV in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- Wind turbines (see Hydropower, Windpower, PV in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- PV (see Hydropower, Windpower, PV in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- CHP plants (see CHP in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- Thermal power plants (see Thermal power plants in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used)
- Heating plants (see Heating plants in Section. 4, Compilation of the final data set, (other) models and statistical estimation techniques used) and
- Charcoal production

As plausibility checks the transformation efficiencies are used, that means the relation between Transformation Input and Output of this processes on plant and if available of generating unit level has to fit into a certain range depending on process and plant type.

The fuels displayed in the Energy Balances are aggregated from subfuels reported in Austria. Table 1 shows the correspondence between the fuels used by IEA/EUROSTAT and the fuel breakdown available in Austria.

From energy balances 1970 – 2009 onwards the blue highlighted subfuels in table 1 are displayed as separate commodity balances starting with reference year 2005

Table 1: Correspondence between the fuels used by IEA/EUROSTAT and the fuel breakdown available in Austria



The exact fuel definitions are given in Annex 1.

In case of natural gas the definition is taken from IEA/EUROSTAT but not the conversion from m³ to Terajoule (TJ) with gross calorific value. Like all other fuels in the Austrian Energy Balances natural gas is converted with net calorific value into TJ which is 10% lower compared to gross calorific value conventionally.

During compilation of the Energy Balances all sub-fuels are assigned to the 11 balance aggregates.

[7] Displayed as commodity balance starting with reference period 2006

In case of Transformation Input and Output there is an additional breakdown into six transformation processes and in case of Final Energy Consumption a breakdown into 28 economic sectors. The sector definitions are following the IEA/EUROSTAT framework. Table 2 gives the link between IEE/EUROSTAT defined sectors and NACE 2003 and NACE 2008 sections and/or groups.

Table 2: Classification conform to IEA

IEA/ EU sector	NACE 2003 Section	NACE 2003 Group	NACE 2008 Section	NACE 2008 Group	Name
E 1	11		06	091	Extraction of crude petroleum and natural gas [8]
E 2	10,12		05		Mining of coal and lignite, Mining of uranium and thorium ores [2]
E 3		232		192	Manufacture of refined petroleum products[2]
E 4		231,233		191,244	Manufacture of coke oven products[2]
E 5		401		351	Electric power generation, transmission and distribution[2]
E 6		402		352	Manufacture of gas; distribution of gaseous fuels through mains [2]
E 7		403		353	Steam and air conditioning supply[2]
I 1		271,272,273, 2751,		241,242,243, 2451,	Iron and steel industry [9]
I 2	24		20, 21		Chemical industry (including petrochemical)[3]
I 3		274,2753, 2754		244,2453, 2454	Non-ferrous metal industry[3]
I 4	26		23		Glass, pottery & building material industry [3]
I 5	34, 35		29, 30		Transport equipment industry [3]
I 6	29		26, 27, 28		Machinery [3]
I 7	13,14		07,08	099	Ore extraction industry [3]
I 8	15, 16		10, 11, 12		Food, drink & tobacco industry [3]
I 9	21, 22		17, 18		Paper and pulp & printing industry [3]
I 10	20		16		Wood and wood product industry [3]
I 11	45		41, 42, 43		Construction [3]
I 12	17,18, 19		13, 14, 15		Textile, leather & clothing industry [3]
I 13	25, 28, 30 - 33,36		22, 31, 32		Other industries [3]
T 1		601		491, 492	(Traction) Railways[10]
T 2	10-99		06-99		(Traction) Road transport[11]
T 3		603		495	(Traction) Pipeline transport [4]
T 4	61		50		(Traction) Navigation [4]
T 5	62		51		(Traction) Air transport [4]
O 1	41, 50-93		33,36,38, 45 - 99		Private & public services [3]
O 2					Private households [3]
O 3	01, 02, 05		01, 02, 03		Agriculture, forestry & fishery[12]

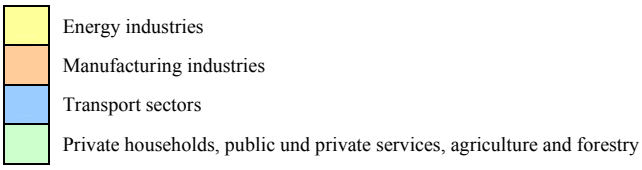
[8] These sectors by definition have no final energy consumption. The transport fuels are counted in the transport sectors and all other fuel consumption is consumption of energy sector

[9] All fuels except transport fuels.

[10] Transport fuels only (functionally defined transport) all other fuel consumption of the listed NACE sectors is counted in public and private services.

[11] All transport fuels of all NACE categories and the private households which are not included into one of the other 4 transport sectors (functionally defined transport).

[12] Including agricultural (off road) diesel consumption.



In the commodity balances all fuels are displayed in physical units (t, m³, MWh) as well as in energetic units (TJ). For conversion the respective current valid net calorific values are used.

2.1.2 Observed unit / reporting unit / presentation unit

Fuels, balance aggregates, Laender and economic sectors (IEA breakdown, see Tab. 2)

2.1.3 Data sources, coverage

For compiling the Energy Balances manifold data from multiple sources with different survey goals are used, including primary statistics conducted by Statistics Austria and other statistical bodies like E-Control GmbH und BMWFJ (former BMWA) as well as administrative data.

In the following the main data sources are displayed. In case of surveys conducted by Statistics Austria additional information is available on the Statistics Austria webpage.

- Sample Survey on energy consumption of small to medium-sized establishments in manufacturing industries (Statistics Austria)

  This survey was conducted the first time in January and February 2004 for the reporting period 2002 and was repeated for the reporting years 2004, 2006 and 2008. The results were integrated into the Energy Balances and the years between two surveys were extrapolated with heating degree days and moving averages.

  Additionally to the detailed description of the survey and the questionnaire the methodological report includes the summary tables broken down by sectors and regions. The results are released in the framework of Energy Balances and Energy Accounts only but not independently because of the specific characteristic of the survey.

- Sample Survey on Energy Consumption in the Service Sector (Statistics Austria)

  Additionally to the detailed description of the survey and the questionnaire the methodological report includes the summary tables broken down by sectors. The results are released in the framework of Energy Balances and Energy Accounts.

- Sample Survey on Energy Consumption of Households (Statistics Austria)

  This sample survey is conducted every second year and covers some 0.6% of Austrian households. The results were integrated into the Energy Balances and the years between two surveys were extrapolated with heating degree days and moving averages. The survey is the main data source for fuel wood consumption in Austria. Although the sample size is relatively high the statistical errors are high, too, in case of rarely used fuels.

  For the time being the survey is the only source for the sectoral breakdown of ambient heat and solar heat. Therefore the large statistical error leads to a high sectoral uncertainty. For the overall consumption it is not relevant because the data are collected with another survey (Annually survey on installed heat pumps, solar- and PV - panels).

  Since 2004 the data is collected biannually with CATI (Computer Assisted Telephone Interview). The last survey was conducted in the 3rd quarter of 2008.

- Short Term Statistics (KJE, Statistics Austria, Metadata report available in German only)

Short term statistics is the main data source for lignite mining and oil and gas exploration. Since 2002 the "Characteristics of district heat industries" are not published any more by the Austrian Natural Gas and District Heat Association. Therefore Short Term Statistics is the only data source for district heat production for the time being with the disadvantage that only transformation output but no corresponding transformation input is surveyed.

- Material Input Statistics (Statistics Austria, Metadata report available in German only)

  Material input statistics is the main data source for the sectoral breakdown of the consumption of all fuels used in industries. Its disadvantage is that it displays the overall consumption. Therefore Material Input Statistics has to be adapted to the balance structure with other surveys e. g. CHP-statistics to separate transformation input and final energy consumption.

- Foreign Trade Statistics (Statistics Austria, Metadata report available in German only)

  Foreign Trade Statistics is a main data source for solid fuels (coal, wood and biofuels) and natural gas imports.

- Form III (BMWFJ)

  Basing on the "Oil stockholding and reporting (amendment) act" this survey conducted by BMWFJ includes foreign trade, transformation, stock keeping and putting into circulation at the first trade level. Therefore Form III provides a comprehensive and consistent data set for crude oil and oil products. Furthermore the fuel definition in Form III is identically with the balances needs and the survey is the exclusive data source for compiling refinery balances. Petrol coke which is of increasing importance in manufacturing of other non-metallic mineral products is excluded and has to be amended from Foreign Trade Statistics.

- Coal Statistics (BMWFJ)

  This survey is an important complement to Foreign Trade Statistics and gives additionally information on supply of solid fossil fuels on a sectoral base. Although the data are rough and not always comprehensive it is an important source for estimating stock changes.

- Survey based on Electricity Statistics Directive (E-Control GmbH)

  This survey is the bases for implementing electricity and the fuel electricity is generating from into the Energy Balances. Since 2002 power plants with capacities lower than 1MWe are excluded from the survey. Some difficulties occur in linking the plant based data with data from Material Input Statistics which is collected on establishment level.

- CHP-Statistics (E-Control GmbH)

  Since 2001 this survey conducted by E-Control is a main data source for district heat production that includes corresponding transformation input figures, too. E-Control does not apply the 75% criterion for transformation efficiency. All electricity production is displayed as CHP production. Therefore the electricity generation data provided has to be split into CHP and electricity generation only figures by applying the 75% efficiency criterion. Some difficulties occur in linking the plant based data with data from the Material Input Statistics which is collected on establishment level.

- Green Electricity Statistics (E-Control GmbH)

  This data set was released by E-Control 2003 firstly and includes most power plants < 1MWe that are excluded by the Electricity Act (ELWOG) from the two surveys mentioned above. For the reporting period 2006 the data are available on a regional base, too.

- Survey based on Gas Statistics Directive (E-Control GmbH)

  Since the reporting period 2003 this survey is the main data source for extraction, stock changes and overall consumption of natural gas as well as for calculation of export figures. Until 2002 BMWFJ was responsible for this survey.

- Survey on number and installed capacities of district heat plants (Chamber of Agriculture)

  Basing on this survey and together with production characteristics - surveyed in 1996 by the Austrian Biomass Association and 2005 by Statistics Austria- and heating degree days annually production of district heat is estimated.

  The results of this annual survey are the core element of the model for extrapolating the district heat production as well as the corresponding transformation inputs.

- Survey on Fuel Input and Heat Production of Biomass Lighted District Heat Plants (Statistics Austria, Metadata report available in German only)

  This survey was conducted the first time in 2005. All plant operators were asked to report the annual heat production and the corresponding transformation input broken down by fuel types. The next survey is planned for the year 2010.

- Characteristics of District Heat Industries (Austrian Natural Gas and District Heat Association)

  Up to and including the year 2001 this annually release was the main data source for district heat production and corresponding transformation inputs. Since 2002 the detailed data is not available any more

- Characteristics of gas industries (Austrian Natural Gas and District Heat Association)

  Up to and including the year 2001 this annually release was the main data source for regional natural gas supply. Since 2002 the detailed data is not available any more

- Statistics on windmill based electricity generation (IG Windkraft)

  This dataset is the basis for the regionalisation of overall annual wind power figures provided by E-Control GmbH.

- Survey on Annually Installed Numbers and Capacities of Heat Pumps, Solar- and PV-Panels (IFF Klagenfurt, since 2008 TU-Wien)

  Basing on this survey the annually production of ambient and solar heat as well as not grid connected PV based electricity generation is estimated. The disadvantage of the survey is that it contains no hint whether an installation is a new one or a replacement. Details one can find using the following link

  http://www.nachhaltigwirtschaften.at/nw_pdf/1015_marktstatistik_09.pdf (available in German only)

Table 3 displays the main characteristics of the 8 most important surveys for regionalisation.

Table 3: Characteristics of main surveys for transformation and final consumption

2.1.4 Reporting unit and respondents

For compiling the Energy Balances not relevant but because the observed units are of high relevance for regionalisation table 4 displays the characteristics of the main surveys for transformation and final consumption.

Detailed information one can find in the following standard documentations:

- Sample Survey on Energy Consumption of Small to Medium-Sized Establishments in Manufacturing Industries
- Sample survey on energy consumption of the public and private services
- Sample survey on energy consumption of households
- Survey on fuel input and heat production of biomass lighted district heat plants (Metadata report available in German only)
- Short term statistics (Metadata report available in German only)
- Material input statistics (Metadata report available in German only)
- Foreign trade statistics (Metadata report available in German only)

2.1.5 Survey format

Not a survey in the conventional sense (for detailed information see chapter *Reporting unit and respondents*).

2.1.6 Sample characteristics

Not a survey in the conventional sense (for detailed information see chapter *Reporting unit and respondents*).

2.1.7 Survey techniques / data transmission

Survey techniques

Not a survey in the conventional sense (for detailed information see chapter *Reporting unit and respondents*).

Data transmission

Not relevant (not a survey in the conventional sense)

2.1.8 Survey questionnaire (including explanatory notes)

Not a survey in the conventional sense (for detailed information see chapter *Reporting unit and respondents*).

2.1.9 Survey participation

Not a survey in the conventional sense (for detailed information see chapter *Reporting unit and respondents*).

2.1.10 Variables surveyed and derived, indicators (including definitions)

Variables surveyed

Not a survey in the conventional sense (for detailed information see chapter *Reporting unit and respondents*).

Variables derived

Displayed is each of the balance fuels for each balance aggregate. The aggregates transformation input and output are broken down to eight transformation processes, plant operators and fuels used for transformation[13] and the final energy consumption is broken down to 21 IEA sectors. The fuels are presented in fuel specific physical units (t, m³, MWh) and for comparability reasons in TJ. The conversions are based on the current average fuel specific heating values. So the maximum data matrix includes 63 fuels[14] x 28 sectors x 9 Laender x 121 balance items x 7 useful energy categories by year.

In additional sheets the efficiencies of the displayed transformation processes and, starting with the reporting period 2005, the shares of the renewable charging to the RES directive are presented.

2.1.11 Classifications used

The breakdown by economic activities (economic sectors) follows the IEA/EUROSTAT classification system.

2.1.12 Regional breakdown of the results

Laender (NUTS 2)

2.2 Production of Statistics, Processing, Quality assurance measures

2.2.1 Data capture

Not relevant (not a survey in the conventional sense)

2.2.2 Coding

Not relevant (not a survey in the conventional sense)

2.2.3 Editing and verification of data sources used

In preparing these statistics for the Energy Balances, care has constantly been taken to ensure the best possible utilisation of existing/available data sources. However, the data sources used have some unavoidable inconsistencies. In addition, in external trade there are parallel surveys with, in some cases, contradictory results (e.g. Foreign Trade Statistics by Statistics Austria in accordance with the Federal Statistics Act and the FORM III survey by the Federal Ministry of Economics and Family and Youth in accordance with the Oil stockholding and reporting (amendment) act). In other areas, gaps in the data, which would require enormous time and effort to fill (if at all possible), necessitate qualified estimates. The resolution of such contradictions and/or the selection of the most suitable source necessitate the use of internal or external expertise that corresponds to the "state of the art". Changing requirements and new sources – even where the definitions remain the same – inevitably lead to the need for revisions that must be made to the entire time series in order to avoid discontinuities as far as possible. The Energy Balances represent a living system that requires on-going revision.

[13] This deep disaggregation leads to 11 items for transformation input and 101 items for transformation output

[14] This number is given since 1980 and was calculated back to 1970 only on demand.

In addition, the sources and calculations used for the balances have been (and still are) continuously coordinated with each other and checked for inconsistencies.

The data from all sources is checked for consistency with supply and consumption information and, if relevant, complemented with non-recorded stock movements, particularly in the household and service sectors. In order to avoid systematic errors, a careful check by means of a time series analysis is made to ensure that these stock additions are not continuously in one direction.

2.2.4 Imputation (where responses are missing or data incomplete)

Not relevant (not a survey in the conventional sense)

2.2.5 Grossing up procedures (weighting)

Not relevant

2.2.6 Compilation of the final data set, (other) models and statistical estimation techniques used

During preparation of the balance, each energy sub-source is assigned to ten balance items/units and to the relevant federal provinces. Final Energy Consumption is also subdivided into sectors as classified by the IEA/EU. A wide range of data sources is used, and these sources have very varied origins with different survey aims. If the survey does not allow the data to be clearly assigned to a sector or Land, it is sectorised[15]/regionalised on the basis of the Business Register and assigned to the given Laender.

From reporting year 2003 onward, there are current surveys for all sectors with the exception of agriculture. This has made it possible to significantly improve both the sectoral and the regional classification. In addition, direct annually surveyed information from large companies (e.g. VOEST and OMV) is also taken into account. From reporting year 2005 onward, the allocation data of the Austrian Environment Agency has been available for inclusion in the sectoral breakdown of the Energy Balances. The problem here lays in the clear identification of the NACE classification of plant operators as well as comparison with Statistics Austria and E-Control (CHP Statistics) respondents. Furthermore, a comparison of the total values of the sectors at Laender level must be carried out to ensure that the Energy Balances record all these plants in the relevant sector and Land.

Up to and including reporting year 2002, the basis for the sectoral and regional classification of Final Energy Consumption (of the energy source volumes in those (sub-)sectors for which no current information was available) was the structure of the Final Energy Consumption for 1998. "Excess" energy source volumes were distributed iteratively to the sectors in accordance with this structure. This structure is based on the Economic Survey 1998 for Manufacturing Industries and Construction, the Household Energy Consumption Sample Survey, a Sample Survey of the Service Sector 1998, the Useful Energy Analysis 1998 and extrapolation of the Agricultural Sample Survey 1997. This structural extrapolation applied to small and medium-sized enterprises in manufacturing industries and construction, the service sector and agriculture with the exception of diesel use.
Depending on the relevant energy source and balance item, different additional data sources like small telephone interviews or direct information of single (big) companies are used to calculate the balance items in the Energy Balances.

Foreign trade (imports/exports)

Foreign Trade Statistics are an important source of data for solid fossil fuels and natural gas. They are not suitable for foreign trading in electrical energy as, instead of documenting physical electricity imports and exports, they document contractual agreements, which do not correspond to real

[15] In this context the sector is not based on the National Accounts but on the business sectors as defined by the IEA.

electricity flows. The E-Control GmbH survey is the data source here according to the Electricity Statistics Directive.

The survey (FORM III) of the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ) is preferred for crude oil and its derivatives as the required definitions of energy sources already exist there, the export data has been coordinated with the supply data and this data has been reported by the BMWFJ to the IEA on a monthly basis.

Stocks

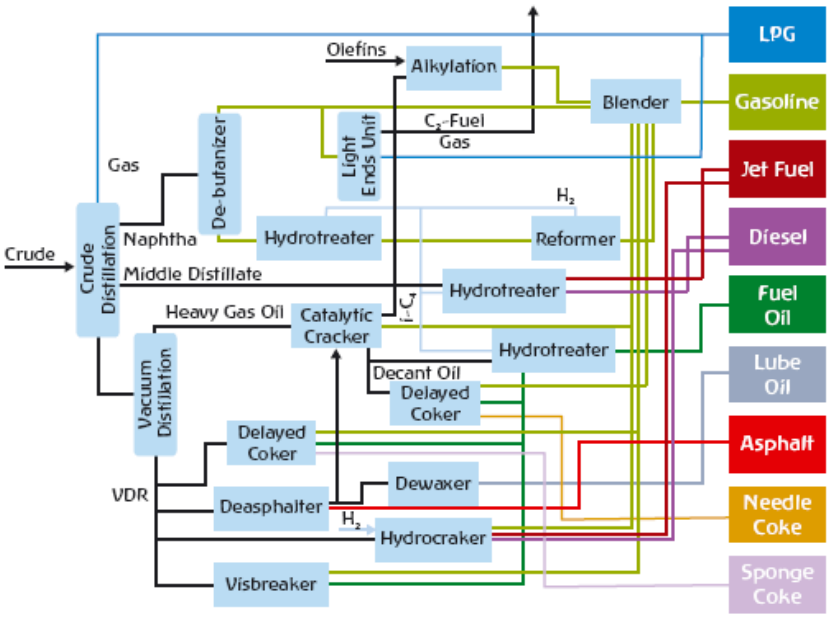
Statistics Austria conducts a telephone survey to record the stocks and stock movements of large industrial enterprises. Additional information for the stocks of energy supply companies comes from E-Control GmbH and, for statutory stocks of oil derivatives (Oil stockholding and reporting (amendment) act), from the survey of the BMWFJ (FORM III).

Transformation processes (transformation input/output)

- ***Refinery (transformation of crude oil into crude oil derivatives)***

  The (closed) refinery balance comes from a comparison of the refinery's input and output volumes surveyed by the BMWFJ pursuant to the Oil Stockholding Act. The provided data is checked for consistency and may be corrected in consultation with experts from the BMWFJ and OMV.

  Figure 3 _ Operation of a Typical Refinery (Source Energy Statistics Manual



- ***Coking plant (transformation of coal into coke and coke oven gas)***

  All required data is provided to Statistics Austria by VOEST. New knowledge was gained during talks held with representatives of VOEST in 2004, which led to a revision of the coking plant and blast furnace process back to 1990.

  The coal/coke/heating oil flow chart (Fig. 4) and the gas flow diagram (Fig. 5) show the energy flows and the assignment of energy input and output broken down by energy source to coking oven and blast furnace processes as well as to Final Energy Consumption.

Fig. 4 Coal/Coke/Fuel oil material flow for steel production

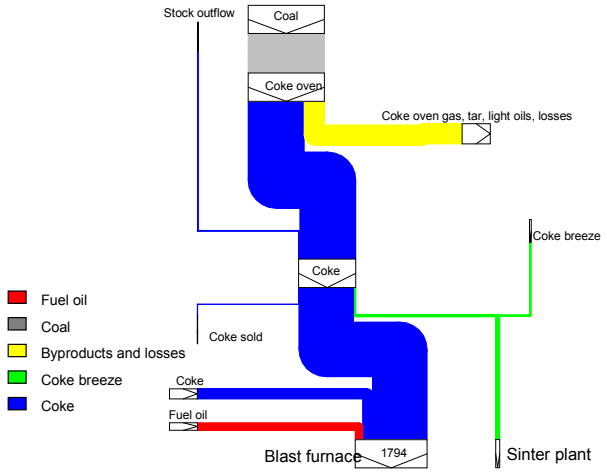


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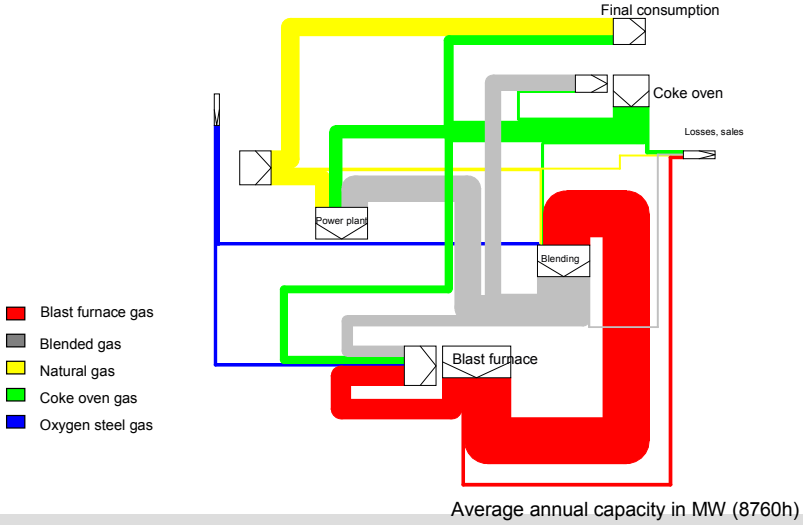
Figure 5:Gas flow diagram steel production



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- ***Blast furnace (transformation of coke into blast furnace gas)***

  In terms of the coke used by VOEST in the blast furnace process, a differentiation is made between the volume of metallurgic coke (56.3% according to investigations by the University of Leoben: Comparison of metallurgic and thermally related CO_2 emissions; Hiebler/Gamsjäger/God), the Transformation Input for blast furnace gas and the volume of coke required for generating process heat. The volume of metallurgic coke is included in the balance as Non-Energy Use. The Transformation Input from blast furnace gas output (blast furnace gas output + 3.4% transformation losses) is estimated and the amount required for process heat is assigned to "Consumption of Energy Industries".

  The total use of heavy fuel oil in the blast furnace for the reduction of pig iron is also metallurgic and is therefore defined as Non-Energy Use.

- ***Hydropower, wind power, photovoltaic (primary electricity)***

  According to the EU/IEA methodology, the Transformation Input is equated to the Transformation Output of electrical energy. The data comes from E-Control GmbH and Arge Windkraft. The generation from wind mills for which no data is available (recording lower limit of 1MWe) is estimated based on their nominal output and the production of comparable plants.

  The electricity generation from pumped storage is not taken into account. The electricity losses for pumping (=electricity consumed for pumping minus electricity generated from pumped storage) is assigned to "Consumption of Energy Industries". In accordance with the IEA/EU concept, hydropower is also equated to the electricity (= primary electricity) produced from hydropower.

- ***Thermal power (secondary electricity production by combustion of fossil and renewable fuels)***

  Main producers

  The individual data for transformation input and output for power plants ≥ 1MWe comes from E-Control GmbH. The data is checked against efficiency levels for plausibility and, if necessary, corrected at plant level.

  Autoproducers

  From reporting year 1993 onward, the individual data for drawing up the input and output structure of companies with their own plants was taken from the Federal Dispatcher and as of 2001 from E-Control GmbH. From reporting year 2002 onward, there is only data available for power plants with a maximum capacity of ≥ 1MWe. The data is checked against efficiency levels for plausibility and, if necessary, corrected at plant level. Missing input areas are added, if necessary, based on the assumption that the same input structure (source of energy and specific input value) applies for identical or similar areas of the economy. After corrections and additions at plant level, the data is aggregated to the economic sectors identified in the Energy Balances. This procedure has led to an improvement in the data situation both at sectoral and Laender level.

- ***Heating plants (district heat production by combustion of fossil and renewable fuels)***

  Member organisations of the Austrian Natural Gas and District Heat Association

  Up to reporting year 2001, the individual data for Transformation Input and Output came from the Characteristics of District Heat Industries, which was compared with the results of the Short Term Statistics (at enterprise/plant level) and, if necessary, further data was added. From reporting year 2002 onward, this information was no longer available. This is problematic, particularly because of the lack of information on Transformation Input for non-CHP district heating, because Short Term Statistics (in contrast to Characteristics and CHP Statistics) does not include such information. It has only been possible to estimate both the fuel types and the input quantities based on the 2001 input structure.

  Biomass heating plants (excluding member organisations of the Association)

  The estimate of annual district heat production from biomass heating plants (at Laender level) is based on:

  1. The annual Austria-wide survey of installed plants and their capacity by the Lower Austria Chamber of Agriculture.
  2. The annual heating degree totals (for method see Annex 3).
  3. A study of the Austrian Biomass Association on behalf of Statistics Austria on district heating production and corresponding transformation inputs of representative plants for reporting year 1997/1998. An average district heating production figure of **a = 0.7658 MWh/MW_{inst}* Heating Degree Days** was calculated from this data.
  4. The district heating produced calculated from Installed Capacity x Heating Degree Days x 0.7658. The corresponding transformation inputs are modelled using the structure of the study results.

5. The "Energy Input and District Heating Production of Biomass District Heating Suppliers 2004/2005". The formula derived from this survey for district heating production in Austria is: **a = 0.4002 MWh/MW_{inst}* Heating Degree Days**.
6. The "Energy Input and District Heating Production of Biomass District Heating Suppliers 2009/2010". The formula derived from this survey for district heating production in Austria is: **a = 0.5338 MWh/MW_{inst}* Heating Degree Days**.

   The following table 4 shows the coefficients calculated for 2005 and 2010 for district heating production/transformation input broken down by energy source per installed MW and heating degree day at Laender level.

Table 4: coefficients calculated for 2005 and 2010 for district heating production/transformation input broken down by energy source per installed MW and heating degree day at Laender level.

2005	heat MWh/ MW*HDD	bark (t / MW*HDD)	IHG (t/ MW*HDD)	SNP (t/ MW*HDD)	WHG (t/ MW*HDD)	Other biomass. (t/ MW*HDD)	Straw (t/ MW*HDD)	Natural gas (1 000 m³/ MW*HDD)	Fuel oil (t/ MW*HDD)
B	0.480549	0.0218	0.0160	0.0042	0.1282	0.0036	0.0000	0.0009	0.0005
K	0.341577	0.0275	0.0337	0.0047	0.0536	0.0008	0.0000	0.0000	0.0017
N	1.005390	0.0315	0.1167	0.0108	0.1543	0.0021	0.0038	0.0003	0.0017
O	0.411656	0.0348	0.0372	0.0056	0.0641	0.0014	0.0000	0.0003	0.0002
S	0.452185	0.0400	0.0503	0.0067	0.0591	0.0016	0.0000	0.0006	0.0002
ST	0.370835	0.0477	0.0317	0.0120	0.0456	0.0046	0.0024	0.0013	0.0020
T	0.319479	0.0177	0.0447	0.0032	0.0527	0.0005	0.0000	0.0000	0.0007
V	0.469412	0.0024	0.0806	0.0018	0.0647	0.0048	0.0000	0.0001	0.0005
2010	**heat MWh/ MW*HDD**	**bark (t / MW*HDD)**	**IHG (t/ MW*HDD)**	**SNP (t/ MW*HDD)**	**WHG (t/ MW*HDD)**	**Other biomass. (t/ MW*HDD)**	**Straw (t/ MW*HDD)**	**Natural gas (1 000 m³/ MW*HDD)**	**Fuel oil (t/ MW*HDD)**
B	0.6298	0.0002	0.0104	0.0000	0.2411	0.0015	0.0000	0.0000	0.0000
K	0.4889	0.0259	0.0310	0.0001	0.1516	0.0035	0.0000	0.0001	0.0002
N	0.5242	0.0063	0.0339	0.0014	0.1703	0.0051	0.0053	0.0002	0.0001
O	0.5113	0.0047	0.0309	0.0044	0.1642	0.0011	0.0011	0.0000	0.0001
S	0.5321	0.0065	0.0438	0.0016	0.1543	0.0060	0.0000	0.0006	0.0002
St	0.5084	0.0047	0.0253	0.0061	0.1715	0.0021	0.0010	0.0006	0.0001
T	0.4142	0.0013	0.0132	0.0000	0.1421	0.0077	0.0000	0.0002	0.0004
V	0.6268	0.0133	0.0692	0.0036	0.1927	0.0147	0.0000	0.0000	0.0003

7. The district heating produced between the two survey years calculated based on currently installed capacity, the current Heating Degree Days and the moving average between the two calculated production performance figures a (in order to avoid time series discontinuities).

District heating production from district heating plants based on the Short Term Statistics

The data on district heating production surveyed annually as part of the Short Term Statistics has the advantage that the plants defined by the plant code can easily be assigned to the relevant NACE category and therefore to the economic sectors identified in the Energy Balances.

The disadvantage of Economic Survey data is that, in terms of the reported district heating output, there is no corresponding data for transformation input. After comparing the reporting units with those from other sources in order to avoid double counting, the type and volume of the energy source used for district heating production is estimated based on inputs of these plants according to Material Input Statistics (using the previous year's information) or on known transformation inputs from similar plants.

- ***Cogeneration (Combined Heat and Power [CHP] production from the combustion of fossil and renewable fuels)***

  Up to 2000, the cogeneration calculation was based on original data (at plant level) from the Federal Dispatcher; from reporting year 2001 it has been based on plant-level data from E-Control GmbH. In a first step, this data is linked with Statistics Austria's information (balance fuels, NACE classification, IEA sectors, district heating) and data from the Austrian Natural Gas and District Heat Association (district heating, up to and including reporting year 2001).

  According to the definition, the overall efficiency of the cogeneration process must be at least 75%. If this level is not reached, the volume of power generated and the required transformation input of primary and secondary fuels are reduced continuously until this threshold is reached. The volume of generated power by which the cogeneration process was reduced is defined as power from electricity only plants. Exceptions here are waste incineration plants because of the low energy content of the primary fuel used and old plants of main producers, where the heat efficiency is less than 75%.

The plant-specific and fuel-specific individual data is processed in five steps for calculation of the CHP process using the following method.

1. Determination of the thermal efficiency level (currently 90%) and calculation of the power efficiency level.
2. Determination of the target efficiency level of the cogeneration process. This value is used for auto producer plants with overall efficiency levels of under 75%. Main producers with thermal efficiency levels <75% and overall efficiency levels >75% remain unchanged for all plants.
3. Calculation of correction factor a for breaking down electricity production into CHP and electricity only according to the following formula:

   $a = (W(t)_{actual} * E(t)_{tot} - E(t)_h * W(t)_{target} - S_{tot}) / (W(t)_{target} * E(t)_p - S_{tot})$

   $W(t)_{actual}$ = Average annual efficiency of the plant for fuel t
   $W(t)_{target}$ = Average annual minimum efficiency of the plant for fuel t in order to define the power produced as cogeneration power.
   $E(t)_{total}$ = Total input of fuel t
   E(t)h = Input of fuel t for heat production
   $E(t)_p$ = Input of fuel t for power production
   S_{tot} = Total gross power generation
4. Breakdown of power and heat generation into cogeneration (CHP) and electricity only process as follows:

   $S_{tot} * a = S_{chp}$ and $S_{he} = S_{tot} - S_{chp}$
   S_{tot} = Total gross power generation
   S_{chp} = Calculated cogeneration gross power generation
   S_{he} = Calculated electricity only gross power generation (condensation power generation)
5. Based on this, the total output of the cogeneration process is recalculated and the transformation inputs and efficiency levels are correspondingly reassigned for the overall process (power + total heat) and the transformation process (power + district heating).

   The differences in the definition of the transformation input in the Energy Balances and cogeneration statistics in case of autoproducers are shown in the following:

Energy balances	***CHP statistics***
• *All inputs for electricity generation*	• *All inputs for electricity generation*
• *only inputs for district heat production*[16]	• *all inputs for heat production*
• *Inputs for heat used by the plant operator itself are final energy consumption and not transformation inputs*	

In opposition to the energy balances table 5 shows the overall electricity and heat production from CHP plants by type of cycle and broken down to completely CHP units and units with a non CHP component for 2010.

Table 5: Electricity and heat production from CHP plants by type of cycle and broken down to completely CHP units and units with a non CHP component for 2010

Completely CHP Units (Efficiency ≥ 75%)							
Type of cycle	Maximum capacity			Production			Fuel for CHP
	Electricity		Heat	Electricity		Heat	
	CHP	Gross	Net	CHP	Gross	CHP	
	MW	MW	MW	GWh	GWh	TJ	TJ (NCV)
Combined cycle (eff ≥ 80%)	1076	1076	2658	4053	4053	23195	43929

[16] District heat is defined as heat sold to a third party.

Gas turbine with heat recovery	155	155	233	438	438	2119	4478
Internal Combustion engine	52	52	183	186	186	3676	5005
Steam: backpressure turbine	467	467	1843	1722	1722	27990	40304
Steam: condensing turbine (eff ≥ 80%)	696	696	676	1117	1117	8784	13631
Subtotal	**2445**	**2445**	**5593**	**7516**	**7516**	**65765**	**107347**
Units with a non-CHP component (Efficiency < 75%)							
Type of cycle	Maximum capacity			Production			Fuel for CHP
	Electricity		Heat	Electricity		Heat	
	CHP	Gross	Net	CHP	Gross	CHP	
	MW	MW	MW	GWh	GWh	TJ	TJ (NCV)
Combined cycle (eff ≥ 80%)	543	1798	1366	2632	8713	24954	43034
Gas turbine with heat recovery	1	3	5	5	15	100	157
Internal Combustion engine	44	117	290	245	654	4726	7476
Steam: backpressure turbine	32	66	288	220	452	6154	9262
Steam: condensing turbine (eff ≥ 80%)	92	1213	1061	348	4596	8914	12707
Subtotal	**712**	**3197**	**3010**	**3449**	**14429**	**44848**	**72636**
Total	**3157**	**5642**	**8603**	**10964**	**21945**	**110612**	**179982**
of which Autoproducers	1229	2176	6658	4400	7919	65137	96543

In addition table 6 shows the fuel consumption in CHP plants broken down by fuel types and by main activity producer and autoproducer plants.

Table 6: Fuel consumption in CHP plants 2010

2010	Units	MAIN ACTIVITY PRODUCER PLANTS	AUTOPRODUCERS PLANTS	TOTAL
HARD COAL	10^3 t	144	149	**293**
	TJ (NCV)	3795	4283	**8078**
BROWN COAL	10^3 t	0	0	**0**
	TJ (NCV)	0	0	**0**
COKE OVEN GAS	TJ (GCV)	0	756	**756**
	TJ (NCV)		756	**756**
BLAST FURNACE AND OXYGEN STEEL FURNACE GAS	TJ (GCV)	0	2643	**2643**
	TJ (NCV)		2643	**2643**
RESIDUAL FUEL OIL	10^3 t	144	19	**163**
	TJ (NCV)	5799	770	**6569**
REFINERY GAS	10^3 t	0	64	**64**
	TJ (NCV)	0	1968	**1968**
OTHER LIQUID FOSSIL FUELS	10^3 t	2	233	**235**
	TJ (NCV)	68	9317	**9385**
NATURAL GAS AND GAS WORKS GAS	TJ (GCV)	52940	36763	**89703**
	TJ (NCV)	48126	33421	**81547**
SOLID BIOMASS	TJ (NCV)	19005	38129	**57134**
INDUSTRIAL WASTE	TJ (NCV)	916	4548	**5464**
MUNICIPAL WASTE (RENEWABLE)	TJ (NCV)	2595	56	**2651**
MUNICIPAL WASTE (NONRENEWABLE)	TJ (NCV)	2566	58	**2624**
BIOGAS	TJ (NCV)	309	535	**844**
OTHER RENEWABLES AND WASTES	10^3 t	12	2	**14**
	TJ (NCV)	260	59	**319**
TOTAL	TJ (NCV)	**83439**	**96543**	**179982**

Consumption of Energy Industries and Non-Energy Use

The own use of energy production companies (coal mining (up to 2004), crude oil and natural gas exploitation), of energy transformation companies and plants (refineries, coke ovens, blast furnaces) and of energy supply companies and installations (electricity,[17] natural gas and district heating suppliers) is entirely assigned to "Consumption of Energy Industries" apart from the fuel used for traction. Based on a study by the University of Leoben, the input of coke in blast furnaces is assumed to be 56.3% as it is metallurgic rather than energy-related. Of the remaining 43.7%, the transformation input for blast furnace gas is deducted and the remainder is assigned to "Consumption of Energy Industries".

With natural gas there may occur metering based differences. These are assigned to "Consumption of Energy Industries". Since these can also be negative – because of time delays, more gas apparently comes out of the line than can be pumped in – this balance item for natural gas as exclusive fuel can also be negative.

With oil derivatives, the following items – lubricants, bitumen, calcined petroleum coke and hydrocarbons for the petrochemical industry – are all shown under Other Products of oil processing and are assigned completely to Non-Energy Use. With coke, 56.3% of metallurgic input in blast furnaces is assigned to Non-Energy Use. All other volumes of coke, coal, petroleum and natural gas are surveyed by telephone in the relevant production sectors.

Final Energy Consumption

For manufacturing industries and construction, the (provisional) sectoral final consumption figures in the regional balances are based on the Material Input Statistics and on the Sample Survey of Energy Consumption in Medium-sized Enterprises in Manufacturing Industries and Construction 2002, 2004, 2006 and 2008; for households they are based on the Sample Survey on Household Energy Consumption 2003/2004, 2005/2006 and 2007/2008; and for the public and private service sector they are based on the Sample Survey of Energy Consumption in the Service Sector 2003 and 2008.

- ***Final Energy Consumption in manufacturing industries and construction***

  In order to calculate Final Energy Consumption in manufacturing industries and construction, the figures from the Material Input Statistics are used. The data for Transformation Input is subtracted from these and the figures from the Survey of Energy Consumption in Small and Medium-sized Enterprises in Manufacturing Industries and Construction are added.

- ***Final Energy Consumption for households***

  The energy consumption of private households in the survey years is calculated primarily from the Sample Survey on Household Energy Consumption (evaluated at Laender level) and extrapolated for the following years with the aid of the heating degree totals weighted by resident and household numbers at Laender level. When a new survey becomes available, the extrapolated years are corrected with the aid of moving averages in order to assign the structural changes to the extrapolation period.

  In detail, the calculation of household energy consumption is based on the following data sources:

  1. "Household Energy Consumption" sample survey for wood, biofuels, coal, brown coal, brown coal briquettes, coke, gas oil (fuel oil), heating oil and liquid gas. The sample is extrapolated to Laender level. The breakdown into consumption for space heating/hot water and cooking is performed using fuel-specific and activity-specific coefficients.

  In general, the "Household Energy Consumption" sample survey provides a homogeneous time series from 1980 onward. This means that it depicts the real situation correctly with a high level of probability and, even if there may be systematic errors, the trend at least is depicted accurately.

17 Including the own use of auto producer plants.

2. Annual figures from Wiengas (natural gas supplier) regarding natural gas sales to households in Vienna (up to 2002).
3. Annual figures from Wienstrom (electricity supplier) regarding electricity sales in Vienna at normal household tariff and at night power tariff (electrical storage heating) and 20% of sales at agricultural tariff (= agricultural households) up to 2002.
4. District heating sales of Fernwaerme Wien and other heat suppliers to Viennese households according to "Characteristics of the heat supply companies", published by the Austrian Natural Gas and District Heat Association (annual publication) up to 2002.
5. Heat pumps and solar collectors (= ambient heat) according to Prof. Fanninger at IFF Carinthia; from reporting year 2007: Technical University of Vienna (annually surveyed market data for thermal solar systems, photovoltaic systems and heat pump systems).

Model calculations used:

Up to 2004, the survey frequency varied between two and five years. Since 2004, the survey frequency has been two years. The survey years, which can be assumed de facto as being from the beginning of July of the previous year to the end of June of the survey year, are converted to calendar years using Heating Degree Days (Methodology for calculating heating degree days see Annex 3). In terms of the interim years, the annual weather variations are taken into account by including the Heating Degree Days in the calculation of the space heating percentage. The structural changes are ascertained using the moving average method as follows:

$$\mathbf{KM_{x0+i} = ((K_{x0}+M_{x0}/T_{x0}*T_{xi})*(n-i)+(K_{xn}+M_{Xn}/T_{xn}*T_{xi})*i)/n} \quad \text{for i =1 to n-1 and n= } X_n\text{-}X_o,$$

K_{x0} = Amount of consumption of an energy source for cooking and hot water in X_0
K_{xn} = Amount of consumption of an energy source for cooking and hot water in X_n
KM_{x0+i} Total amount of consumption of an energy source in interpolation year X_{0+i}
M_{xo} = Amount of consumption of an energy source for heating purposes in X_0
M_{xn} = Amount of consumption of an energy source for heating purposes in X_n
T_{x0} = Total heating degree days in X_0, T_{xn} = Total heating degree days in X_n, T_{xi} = Total heating degree days in X_{0+i}
X_0 = Survey year period start, X_n = Survey year period end, X_{0+i} = Interpolation year
With the integration of the results 2003/2004, all data shown in the Energy Balances for household energy consumption is now based on this survey.

The regional and national diesel use in agriculture and forestry is based on cultivation-type and area relations that have been agreed with the Federal Institute of Agricultural Engineering in Wieselburg and the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) and were calibrated with the Useful Energy Analysis in Agriculture 1997. The formula is as follows:

Diesel use = (99.62*reduced agricultural useful area +66.35)*0.000762.

- ***Final Energy Consumption in public and private services***

  All services are grouped together into the Public and Private Services sector. The regional breakdown is based on the number of enterprises per federal province; and for sources of heat energy on the weighted heating degree totals. Exceptions here are grid-bound energy sources natural gas, district heating and electrical power (up to 2002) and ambient heat for which sector-independent data for Laender is available. For these energy carriers the residual sector at Laender level are the services.

- ***Final Energy Consumption in transport***

  For national and international aviation and international shipping the data is provided by BMWFJ (FORM III). The consumption for pipeline transport is directly asked from the pipeline operators and the consumption for national shipping is currently adjusted since 1988.

  All fuels taken into account in the five functionally defined transport sectors (railways, other land traffic, navigation, aviation and pipeline transportation) are used for traction exclusively but they

are listed completely and independently from its initiator. The data source for splitting the relevant fuels (e.g. diesel and gasoline) into traction and other consumption purposes is the Useful Energy Analyses 2005 (metadata report available in German only).

- ***Regionalisation and sectorisation of Final Energy Consumption***

  Whereas since 2002 the majority of data can be clearly assigned to a Land and to a sector, in the past a great deal of data had to be classified using models.

  The sectoral and regional assignment of Final Energy Consumption for 1988 – 2001 to those sectors for which there was no current data is based on the 1998 structure. This structure is based on the Economic Survey 1998 for Manufacturing Industries and Construction, the Household Energy Consumption Survey, a Sample Survey of the Service Sector 1998, the Useful Energy Analysis 1998 (metadata report available in German only) and extrapolation of the Agricultural Sample Survey 1997.

  The basis for households 1980 – 1988 continues to be the Household Energy Consumption Survey; for agriculture the basis is the Household Energy Consumption Survey and the area-based calculation of diesel use. The remaining Final Energy Consumption is assigned proportionally to the other sectors for this period in accordance with the assignment of WIFO Energy Balances.

  For 1970 – 1980 the structure primarily corresponds to the Energy Balances compiled by the Austrian Institute of Economic Research. Exceptions here are agriculture (apart from diesel use, which continues to be calculated based on area), households and the service sector. Their final consumption levels were added up and assigned in accordance with the 1980 structure in order to even out implausible, contradictory jumps between these sectors in particular years.

  The Final Energy Consumption breakdown of gas oil to diesel and gas oil for heating purposes, which was only available as an aggregate figure for 1970 – 1983, is based on the 1984 fuel structure. Appropriate adjustments were made for those years in which this structure was falsified with the results from the "Household Energy Consumption Survey". The assignment of the other balance aggregate figures to the two fuels was performed in accordance with the Final Energy Consumption ratio.

  The assignment of diesel and gasoline to transport (total traction) and other sectors (all other useful energy categories) is based on the sectoral breakdown of Useful Energy Analyses 1998 and 2005.

  In contrast to all other energy sources, renewable energy sources and waste are solely calculated on the usage side as trading only involves a small percentage of their usage volume and non-traded volumes are not recorded statistically on the supply side. This means that these fuels tend to be under-recorded.

Regionalisation of the other balance items

This section deals solely with the balance items for those energy sources in which model-based regionalisation is required because of a lack of Laender data.

The section does not document the regionalisation of balance items such as Primary Production of fossil fuels and Transformation Inputs (with the exception of small-scale hydro production and the inputs for district heating and outputs) that are directly based on reported data and do not require further modifications. For a general discussion of the data quality of the underlying primary surveys and the reasons for the decision in favour of specific sources where there were several alternatives, see Section 3 "Data sources".

Small-scale hydro production is a problem area for which there is now no data owing to the introduction of the 1MWe lower recording limit in the Electricity Act (ELWOG) for 2002. According to E-Control GmbH, this however largely corresponds to the production of small-scale hydro power from certified plants published on its website. This data, which is only for Austria, was regionalised in accordance with the 2001 structure.

All transformation balances from 1980 onward were also revised in this process and, where necessary, corrected on the basis of realistic efficiency levels and additional sources. Furthermore, the stock movements of producers and large-scale consumers were examined from 1970 and negative stocks were corrected. These revisions were also notified to the IEA and EUROSTAT to ensure that the time series for national and regional balances correspond with international energy reporting.

- ***Non-grid-bound energy sources***

  The regional breakdown of Final Energy Consumption to Manufacturing Industries and Construction is based not only on the Material Input Statistics for the around 2000 largest enterprises up to 1998 but also on the Short Term Statistics (for small and medium-sized enterprises), which however no longer contained questions on energy use from 1999 onward. 1998 was used as the reference year for the Short Term Statistics as there was also a sample survey of the entire service sector available for this year, thus enabling the survey-related under-recording in the Short Term Statistics to be quantified and the affected fuels to be assigned iteratively to the relevant sectors using the data from the Business Register. Information for individual fuels and sectors that came from various sources, e.g. the CHP statistics of E-Control GmbH (use for the generation of process heat in cogeneration plants) or the steam boiler database of Austrian Umweltbundesamt, was of course also taken into account, as was data on Stock Changes and Non-Energy Use of fossil fuels surveyed directly from key plants. This means that, for all affected Laender, the Gross Inland Consumption is higher or equal to the sum of the available regional data, and/or the regional Final Energy Consumption of the relevant sectors is higher or equal to the sum of the data available sectorally at regional level.

  The regionalisation of the five functionally defined transport sectors is based on railway statistics (railways, trams, buses, ski lifts), the sample survey of "Household Energy Consumption" (private cars), extrapolation of the Short Term Statistics (works traffic) and the Sample Survey of Energy Consumption in the Service Sector 1998 in combination with the Business Register (haulage companies). This 1998 structure was applied to Final Energy Consumption for the subsequent reporting years. Naturally, care was taken to ensure that the extrapolated data did not contradict existing partial information from transport services, the Household Energy Consumption Survey, Material Input Statistics and railway statistics. This model approach was preferred to the regionalisation method used by the Austrian Petroleum Industry Association (Table 4) based on invoice addresses, since the latter approach results in extremely high annual fluctuations in diesel use for which there is no plausible explanation (e.g. from 1999 to 2000: Vienna +48.5%, Lower Austria -3.1%). The regionalisation approach of Statistics Austria (Table 5) on the other hand shows much more harmony between the Laender, as shown by the following comparison of the two approaches. However, it must be pointed out that the phenomenon of "fuel tourism" as a result of lower diesel prices in comparison to neighbouring countries, which has probably been intensified by the direct comparability of prices since the introduction of the Euro, has not been taken into account in this approach.

Table 4: Annual changes in regional diesel sales following the regionalisation method used by the Austrian Petroleum Industry Association

	VIE	LA & Bn (until 2002)	ST &. Bs (until 2002)	Car & oT (until 2002)	UA	S	T - oT (until 2002)	V	
88/89	2.3%	7.6%	1.9%	9.1%	6.1%	9.8%	14.9%	9.3%	ı
89/90	12.4%	2.5%	3.8%	11.9%	9.2%	2.1%	27.3%	6.8%	ı
90/91	18.0%	5.5%	11.8%	17.0%	-2.3%	17.6%	37.3%	9.5%	ı
91/92	19.7%	4.0%	-1.6%	-5.0%	3.0%	-6.9%	25.9%	0.0%	ı
92/93	6.7%	-4.1%	0.5%	1.6%	12.2%	18.8%	3.5%	0.0%	ı
93/94	23.1%	15.3%	17.8%	17.7%	15.8%	21.7%	15.7%	39.6%	ı
94/95	-14.1%	5.6%	-0.2%	-7.4%	-4.3%	-4.7%	-15.0%	-11.7%	ı
95/96	31.5%	-5.4%	6.1%	1.9%	11.7%	-0.8%	-4.2%	2.9%	ı
96/97	18.0%	9.1%	-1.8%	3.9%	14.4%	4.3%	2.6%	4.0%	ı
97/98	5.4%	16.4%	-2.9%	0.0%	8.7%	11.7%	14.4%	6.6%	ı

	VIE	LA & Bn (until 2002)	ST &. Bs (until 2002)	Car & oT (until 2002)	UA	S	T - oT (until 2002)	V	
98/99	-8.3%	20.8%	5.5%	20.9%	3.3%	9.6%	32.4%	3.8%	ı
99/00	48.5%	-3.1%	-6.7%	1.2%	9.9%	16.1%	5.0%	-4.8%	ı
00/01	13.8%	1.3%	10.9%	3.4%	15.5%	12.3%	9.6%	3.8%	ı
01/02	1.8%	7.3%	8.6%	14.2%	8.2%	19.6%	28.7%	25.5%	ı
02/03	-21.1%	n. a.	n. a.	n. a.	21.0%	11.5%	n. a.	58.5%	ı
03/04	1.7%	3.8%	3.3%	3.4%	3.0%	2.9%	4.7%	4.5%	6
04/05	5.0%	4.2%	1.8%	7.0%	8.2%	4.2%	4.3%	8.7%	12
05/06	-3.2%	-1.7%	-0.6%	-2.9%	-2.3%	-0.8%	-0.9%	+ 1.8%	-3
06/07	-5.4%	8.1%	3.9%	3.0%	1.1%	8.4%	-1.7%	3.1%	3
07/08	-6.5%	-1.2%	47.4%	2.6%	-8.0%	-10.8%	26.0%	2.8%	-6
08/09	-0.8%	1.6%	-0.8%	13.6%	-0.8%	-7.0%	-27.8%	-2.5%	2

Table 5: Annual changes in regional diesel sales following the regionalisation method used by the Statistics Austria

	VIE	LA	ST	Car	UA	S	T	V	B	A
88/89	7.8%	6.2%	6.5%	6.4%	7.0%	7.0%	7.1%	7.6%	6.3%	6.8%
89/90	9.8%	7.8%	8.1%	8.3%	8.5%	8.8%	9.1%	9.0%	7.6%	8.5%
90/91	12.6 %	10.1%	10.5%	10.3 %	11.1 %	11.0 %	11.3%	12.1%	10.1 %	10.9%
91/92	5.6%	4.8%	5.0%	5.0%	5.2%	5.4%	5.5%	5.8%	4.8%	5.2%
92/93	11.5 %	8.3%	1.1%	7.6%	3.9%	8.5%	10.6%	-12.5%	8.2%	6.4%
93/94	4.8%	4.1%	4.1%	4.2%	4.3%	4.4%	4.5%	4.5%	4.0%	4.3%
94/95	6.6%	5.6%	5.7%	5.7%	6.0%	6.1%	6.2%	6.0%	5.7%	6.0%
95/96	26.8 %	23.1%	23.3%	23.7 % -	24.4 % -	24.9 % -	25.4%	24.2%	22.8 % -	24.4%
96/97	-5.7%	-5.1%	-5.2%	5.2%	5.3%	5.4%	-5.5%	-5.3%	5.1%	-5.3%
97/98	17.5 %	15.4%	15.6%	15.9 % -	16.2 % -	16.6 % -	16.9%	16.3%	15.3 % -	16.2%
98/99	0.3%	-1.4%	-1.0%	1.0%	1.1%	1.0%	-1.4%	-7.3%	0.9%	-1.2%
99/00	10.5 %	9.3%	9.1%	10.1 %	9.4%	9.6%	9.6%	9.6%	8.7%	9.5%
00/01	9.0%	9.3%	9.4%	10.0 %	9.8%	9.5%	10.3%	9.4%	9.1%	9.5%
01/02	11.7 %	10.6%	10.3%	11.6 %	10.5 %	11.3 %	11.6%	10.3%	11.0 %	11.0%
02/03	10.6 %	9.6%	9.5%	9.1%	9.7%	10.1 %	9.9%	9.3%	9.3%	9.8%
03/04	4.9%	4.3%	4.1%	4.5%	4.4%	4.2%	4.5%	4.1%	4.3%	4.4%
04/05	4.8%	4.8%	4.6%	4.9% -	4.6% -	4.5% -	4.5%	6.6%	4.6% -	4.7%
05/06	-4.2%	-4.1%	-3.8%	3.9%	3.9%	3.8%	-4.1%	-3.5%	3.6%	-3.9%
06/07	1.5%	1.3%	1.3%	1.5% -	1.4% -	1.7% -	1.2%	1.1%	1.1% -	1.4%
07/08	-3.5%	-3.4%	-3.4%	2.9% -	3.2% -	3.1% -	-3.7%	-3.0%	3.4% -	-3.4%
08/09	-4.1%	-3.9%	-4.0%	5.1%	3.7%	4.0%	-3.9%	-3.0%	4.0%	-4.0%

Source: Statistics Austria

This sales-oriented regionalisation of Final Energy Consumption for diesel, which is in line with IEA specifications, is not suitable for assessing the development of road traffic. In contrast to gasoline, only approximately 50% of diesel sales are made at the fuel pump. The other 50% is delivered to large-scale customers, e.g. haulage and construction companies, and is mainly not used within the delivery region; in the case of haulage companies it may even be used outside Austria.

A significantly more realistic picture of traffic trends is obtained by looking solely at the volumes of fuel sold at service stations (Table 6). This shows that the significant trend from gasoline to diesel continues unabated. This massive rise is probably due primarily to the increase in fuel tourism in the past few years, as described above. Since reference year 2008 these sales are not released any more. For gasoline later years can be further displayed because it's share sold via service stations is some 98%.

Table 6: Fuel sales on service stations (gasoline from 2008 overall sales[18])

	B since 2003	VIE	LA until 2002 inclusive Bn	UA	S	STYRIA until 2002 inclusive Bs	CAR. until 2002 inclusive oT	TYROL until 2002 without oT	V	A
Gasoline – Sales at service stations in 1000 t (from 2008 overall sales)										
1988	-	400.0	590.5	392.9	155.7	416.4	241.7	211.5	86.2	2 494.9
1989	-	400.8	592.3	394.0	176.1	428.4	239.8	224.4	92.6	2 548.4
1990	-	394.7	595.0	402.3	172.7	431.8	244.8	220.1	90.1	2 551.5
1991	-	403.1	636.1	443.1	200.6	432.4	256.1	261.7	100.5	2 733.6
1992	-	391.5	631.6	435.9	197.0	416.4	245.2	253.6	90.8	2 662.0
1993	-	367.6	593.9	419.2	191.5	391.1	226.6	241.8	93.9	2 525.6
1994	-	347.1	563.8	414.2	193.4	365.6	210.4	252.0	95.6	2 442.1
1995	-	338.8	545.7	405.9	184.4	357.4	188.9	226.9	91.9	2 339.9
1996	-	316.2	512.3	376.1	170.3	315.3	167.7	214.0	84.4	2 156.3
1997	-	298.1	480.9	359.3	161.9	307.4	158.5	201.7	77.9	2 045.7
1998	-	308.3	483.1	356.7	159.8	312.3	166.0	202.3	78.3	2 066.8
1999	-	301.9	455.5	344.9	156.5	290.6	166.4	211.7	77.2	2 004.7
2000	-	289.3	448.6	333.2	147.1	270.4	148.5	213.9	74.7	1 925.7
2001	-	273.0	430.3	324.6	153.4	266.6	158.2	215.3	76.8	1 898.2
2002	-	258.9	427.1	338.6	212.8	279.5	172.2	283.0	109.9	2 082.0
2003	60.4	273.5	413.9	360.4	224.0	233.1	167.3	309.6	124.6	2 166.9
2004	60.0	245.0	393.0	351.0	210.0	230.0	161.0	314.0	116.0	2 080.0
2005	59.0	235.0	388.0	356.0	198.0	217.0	154.0	306.0	109.0	2 022.0
2006	60.0	236.0	385.0	349.0	197.0	218.0	150.0	292.0	105.0	1 992.0
2007	59.0	205.0	392.0	342.0	215.0	215.0	146.0	284.0	100.0	1 958.0
2008	65.0	213.0	330.0	384.0	181.0	200.0	114.0	271.0	77.0	1835.0
2009	66.0	206.0	365.0	350.0	155.0	230.0	124.0	256.0	90.0	1842.0
Diesel - Sales at service stations in 1000 t										
1988		95.8	183.1	101.5	58.9	129.2	71.9	64.2	21.5	726.1
1989		104.8	194.7	109.6	66.5	147.0	81.7	75.6	25.6	805.5
1990		111.9	215.9	130.7	74.6	171.8	99.2	110.5	27.9	942.5
1991		121.9	249.3	154.7	84.0	187.0	119.0	160.8	30.6	1 107.3
1992		132.5	270.3	168.9	90.9	197.2	129.2	206.9	31.4	1 227.3
1993		135.5	292.2	191.6	102.4	209.8	136.8	219.3	34.9	1 322.5
1994		148.2	324.9	217.6	115.4	231.1	147.5	253.5	41.4	1 479.6
1995		149.9	328.3	214.9	110.8	235.3	139.0	190.2	41.5	1 409.9
1996		164.4	351.2	230.5	116.4	248.9	144.6	177.7	44.2	1 477.9

[18] This can be displayed for gasoline because some 98% of it are sold at filling stations, in case of diesel it is only around 50%

	B since 2003	VIE	LA until 2002 inclusive Bn	UA	S	STYRIA until 2002 inclusive Bs	CAR. until 2002 inclusive oT	TYROL until 2002 without oT	V	A
1997		173.0	380.4	248.6	130.5	261.3	157.6	197.9	47.1	1 596.4
1998		191.0	432.3	270.2	148.2	296.5	192.4	202.4	53.0	1 786.0
1999		205.9	448.9	318.2	146.5	318.4	202.5	237.8	58.6	1 936.8
2000		213.2	457.5	330.2	153.8	311.0	196.3	249.3	63.2	1 974.5
2001		228.4	477.8	357.2	177.3	311.3	211.8	294.7	71.3	2 129.8
2002		247.4	539.4	428.9	245.6	356.7	254.9	404.0	97.5	2 574.4
2003	87.6	283.7	566.7	480.7	272.7	330.0	263.3	467.5	118.6	2 870.8
2004	95.0	299.0	584.0	510.0	279.0	354.0	272.0	529.0	125.0	3 047.0
2005	96.0	293.0	606.0	605.0	270.0	349.0	283.0	536.0	131.0	3 169.0
2006	97.0	306.0	631.0	631.0	283.0	365.0	281.0	551.0	140.0	3 285.0
2007	106.0	327.0	722.0	677.0	342.0	305.0	305.0	549.0	151.0	3 586.0
All fuels - Sales at service stations in 1000 t										
1988		**495.8**	**773.6**	**494.4**	**214.6**	**545.6**	**313.6**	**275.7**	**107.7**	**3 221.0**
1989		**505.6**	**787.0**	**503.6**	**242.6**	**575.4**	**321.5**	**300.0**	**118.2**	**3 353.9**
1990		**506.6**	**810.9**	**533.0**	**247.3**	**603.6**	**344.0**	**330.6**	**118.0**	**3 494.0**
1991		**525.0**	**885.4**	**597.8**	**284.6**	**619.4**	**375.1**	**422.5**	**131.1**	**3 840.9**
1992		**524.0**	**901.9**	**604.8**	**287.9**	**613.6**	**374.4**	**460.5**	**122.2**	**3 889.3**
1993		**503.1**	**886.1**	**610.8**	**293.9**	**600.9**	**363.4**	**461.1**	**128.8**	**3 848.1**
1994		**495.3**	**888.7**	**631.8**	**308.8**	**596.7**	**357.9**	**505.5**	**137.0**	**3 921.7**
1995		**488.7**	**874.0**	**620.8**	**295.2**	**592.7**	**327.9**	**417.1**	**133.4**	**3 749.8**
1996		**480.6**	**863.5**	**606.6**	**286.7**	**564.2**	**312.3**	**391.7**	**128.6**	**3 634.2**
1997		**471.1**	**861.3**	**607.9**	**292.4**	**568.7**	**316.1**	**399.6**	**125.0**	**3 642.1**
1998		**499.3**	**915.4**	**626.9**	**308.0**	**608.8**	**358.4**	**404.7**	**131.3**	**3 852.8**
1999		**507.8**	**904.4**	**663.1**	**303.0**	**609.0**	**368.9**	**449.5**	**135.8**	**3 941.5**
2000		**502.5**	**906.1**	**663.4**	**300.9**	**581.4**	**344.8**	**463.2**	**137.9**	**3 900.2**
2001		**501.4**	**908.1**	**681.8**	**330.7**	**577.9**	**370.0**	**510.0**	**148.1**	**4 028.0**
2002		**506.3**	**966.5**	**767.5**	**458.4**	**636.2**	**427.1**	**687.0**	**207.4**	**4 656.4**
2003	**148.1**	**557.2**	**980.6**	**841.2**	**496.7**	**563.1**	**430.7**	**777.1**	**243.2**	**5 037.7**
2004	**155.0**	**544.0**	**977.0**	**861.0**	**489.0**	**584.0**	**433.0**	**843.0**	**241.0**	**5 127.0**
2005	**155.0**	**528.0**	**994.0**	**961.0**	**468.0**	**566.0**	**437.0**	**842.0**	**240.0**	**5 191.0**
2006	**155.0**	**532.0**	**1012.0**	**973.0**	**479.0**	**581.0**	**430.0**	**841.0**	**244.0**	**5 247.0**
2007	**165.0**	**532.0**	**1114.0**	**1019.0**	**557.0**	**622.0**	**451.0**	**833.0**	**251.0**	**5 544.0**

Source: Austrian Petroleum Industry Association Committee for Statistics and market research

Aviation includes all aircraft that refuel within Austria, i.e. fuel used for international and national aviation. Regionalisation is based on the number of take-offs.

Pipeline transport was allocated to the Laender based on the length of the respective pipeline network. All other fuels previously assigned to institutional transport are now assigned to the Public and Private Services sector.

Diesel use in agriculture is calculated at Laender level based on cultivated area. The area data used in the Laender come from the Censuses of Agriculture and Forestry Holdings. The regional breakdown of other fuels used in agriculture follows that used for private households, based on the assumption that the agricultural holding is closely linked to the agricultural household and that, to a large extent, the same energy sources are used.

Up to 2003, the service sector was the residual sector in the Austrian balances. Regionalisation for non-grid-based energy sources was based on the structure of the Energy Balance 1998.

Sample Surveys of Energy Use in the Service Sector 2003 was conducted in May 2004. Incorporation of the results of the survey gave an up-to-date basis for regionalisation. In 2009 a second survey for 2008 was conducted and leaded to a further improvement.

- ***Grid-based energy sources***

  Natural gas

  Up to reporting year 2001, regionalisation was based on the flow chart of the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ) (supra-regional and regional gas suppliers) and the Characteristics published by the Austrian Natural Gas and District Heat Association (regional and local gas supply companies). The sum of this reported data was of great significance, particularly for the consumption of the energy industries (own consumption of gas supply companies, transport losses and measurement differences).

  For reporting year 2002, only a flow chart released by BMWFJ is available, the accuracy of which decreased as a result of the increasing sensitivity of data from regional gas suppliers owing to the impending liberalisation of the gas markets.

  The quality of the regional gas balances from 2002 onwards is therefore lower than that of previous years since, although transformation inputs and reported inputs from the Material Input Statistics and the sample surveys referred to under the data sources in Section 3 are available on a regional basis, there is, however, no regional supply data available for the regional assignment of the residual amount to the Austrian supply. The provisional sectoral final consumption figures in the regional balances for the most recent reporting year are modelled by extrapolation of the regional consumption breakdown of business sectors for the previous year. However, the quality of the regional and sectoral breakdown is significantly improved by the inclusion of the final values of the Material Input Statistics, which are normally not available at the time of completion of the Regional Energy Balances.

  Electricity

  In terms of electricity (as a grid-based energy source), the following steps were necessary up to reporting year 2001 for correct regionalisation:

1. Correction of regional supply area displacements: None of the nine regional supply areas correspond to the relevant Land. The correction of the regional displacements in the data provided by the Federal Dispatcher was performed by comparing the Federal Dispatcher population figures by regional supply areas with the residential population by the respective Land. The figures of the Wiener Stadtwerke utility company are only used for correction of the regional displacement between Vienna and Lower Austria because of their significance.
2. Austrian Railway Company regionalisation: Federal Dispatcher data is used for generation; regionalisation of consumption – particularly the calculation for Burgenland, which is not shown separately in the internal regionalisation used by the Federal Dispatcher based on measurements in Austrian Railway Company substations – is based on data from Austrian Railway Company.
3. Regionalisation of "trans-regional losses": For the regionalisation of trans-regional network losses, an assignment code was developed based on conducted energy volumes in liaison with the Federal Dispatcher: The proportion of each federal province in the trans-regional losses corresponds to the proportion of its export total (sum of receipts and payments from/to Laender) in terms of the overall total of trans-regional intra-Austrian transits.

   This approach applies for reporting years 1988 to 2001.

   From reporting year 2002 onward, regional information is no longer available due to the liberalisation of the electricity markets. The available sectoral final consumption figures in the federal province balances are modelled (as with natural gas) using the Material Input Statistics, the Sample Survey of Medium-sized Enterprises in Manufacturing Industries and Construction and the regional assignment of residual amounts based on extrapolation of the consumption breakdown of business sectors for the previous year.

   District heating

At national level in Austria, the data situation for the energy balance has also significantly deteriorated with the loss of heating key data from the Trade Association of Gas and Heat Supply Companies from reporting year 2002 onward. However, this has had no additional

effects on the regionalisation of district heating production since all production information is available in regionalised form from the Economic Survey and cogeneration statistics. Nevertheless, the loss of information relating to transformation input for non-cogeneration district heating is problematic since the Economic Survey (in contrast to the key data and cogeneration statistics) has not included any relevant information since reporting year 1999. It has only been possible to estimate both the energy sources and the input volumes based on the 2001 input structure.

2.2.7 Other quality assurance measures

For assessing the cumulated overall uncertainty of the Gross Inland Consumption five error types are taken into account. They are included hierarchically into the final equation following the sequence of their listening

- Statistical Differences
- Measurement Errors (Weighing Errors)
- Reporting Errors
- Statistical Errors
- Uncertainty of Conversion factors

The detailed methodology is given in Uncertainty assessment of gross inland consumption of the energy balances (see Annex 2).

2.3 Publication (accessibility)

2.3.1 Preliminary results

The international reporting obligations cause a finalization of the Energy Balances on 30th of September of the following year.

2.3.2 Final results

Together with the publication of the preliminary results the final results of the previous year are released.

2.3.3 Revisions

The Austrian Energy Balances do not follow invariable rules but are adapted continuously to increasing demands, changing data availability and new findings. An increase in knowledge and/or additional data sources cause even under constant definitions necessary revisions.

2.3.4 Published in:

The results of the Energy Balances can be viewed on Statistics Austria's website.

2.3.5 Treatment of confidential data

Information from individual reporting units is treated in strict confidence and used solely for the purposes of producing official statistics. Since the data is aggregated at federal province or Austria-wide level, no anonymised items of data exist once the Energy Balances are

prepared, except in the case of OMV (refinery) and VOEST. Both companies have given their permission for publication of the data.

3. Quality

3.1 Relevance

On national level the Energy Balances are used to generate the "Energy report of the Austrian government" and on national and regional level they are used to calculate the energy based CO_2 emissions.

The relevance on international level is secured because the Austrian Energy Balances are using the same data sources that are used to fill in the five Joint IEA/EUROSTAT/UNECE Questionnaires. That fact guarantees that national and international energy reports as well as greenhouse gas emission calculations are harmonised.

3.2 Accuracy

3.2.1 Sampling effects

Sampling effects appear on regional and sectoral level because of the implementation of sample surveys. A detailed description one can find in the standard methodological reports of the respective surveys. Relevant for main balance aggregates on national level they are only in case of biofuels for which only consumption and no supply is surveyed. In these cases an underestimation can happen by trend.

3.2.2 Non-sampling effects

3.2.2.1 *Quality of data sources used*

The quality of data sources used is high in general. For primary production except fuel wood and non purchased biofuels and wastes the quality is excellent. Concerning latter the reported production is much lower than the corresponding consumption figures. Therefore these fuels can be implemented only by using their consumption figures and they tend to result in undercoverage.

Import/export figures for oil and oil products, natural gas and electricity are well documented, in case of coal a high number of small import quantities – especially in the border area to Czech Republic – which are not reported as well as non reported stock changes tend to result in undercoverage.

Data on stock changes of large industries is collected by conducting a small telephone survey.

3.2.2.2 *Coverage (misclassifications, undercoverage/overcoverage)*

Undercoverage by trend in case of fuels surveyed on supply side only

3.2.2.3 *Missing responses (unit non-response, item non-response)*

Not relevant

3.2.2.4 *Measurement errors (entry errors)*

Not relevant

3.2.2.5 *Processing errors*

Not relevant

3.2.2.6 *Model assumption effects*

Due to the extrapolation of heating fuels with heating degree days blurring can occur on sectoral and regional level because structural changes can be taken into account ex post (after the follow up survey). Relevant for main balance aggregates on national level they are only in case of biofuels for which only consumption and no supply is surveyed. Such revisions are possible up to six years after because of the low survey frequency in case of public and private services as well as in biomass lighted district heating pants.

3.3 Timeliness and punctuality

The Energy Balances are prepared on an annual basis and released in November of the following year together with the submission of the 5 Joint Questionnaires.

3.4 Comparability

3.4.1 Comparability over time

The comparability in time is secured for the whole time series by continuous revisions.

3.4.2 International and regional comparability

The spatial and sectoral comparability within Austria is guaranteed by harmonising the regional balances with the national one and the international comparability is given by applying the IEA/EUROSTAT/UNECE methodology to the Austrian energy balance with two exceptions.

3. Non energy consumption of coke oven coke, hard coal an heavy fuel oil that are displayed in the Austrian energy balances are defined as final energy consumption on international level.
4. In opposition to EUROSTAT and IEA no transformation losses appear in the national balances in case of electricity and heat production from geothermal energy. That is analogue to the treatment of hydro- and wind power, PV, solar and ambient heat.

The quality of the Energy Balances is constantly checked and assured by means of consistency checks conducted by the IEA and EUROSTAT.

Annual Energy Questionnaires Report Card; Austria 2006 Data Cycle

How to Read a Report Card

Comparative assessment of the annual reporting
On 22 June 2007 there was an audit of the Energy Department at Statistics Austria (as the most important supplier of data for the calculation of CO2 emissions) by the Umweltbundesamt (in its function as “Accredited Inspection Agency No. 241 as per EN ISO/IEC 17020 (Type A) by resolution of the Austrian Federal Ministry of Economy, Family and Youth (BMWFJ, formerly the BMWA) of 25 January 2006 GZ BMWA-92.715/0036-I/12/2005”).

All the improvement measures recommended in this audit have since been implemented. For example, an estimate of the overall uncertainty of the energy balance at Austrian level was carried out for the first time for reporting year 2006, resulting in a relative error of +/-2.5% with 95% statistical

dependability. The methodology and detailed results are included in this report as Annex 1. It is planned to carry out this estimate of uncertainty every five years.

When preparing the Energy Balances, one is constantly confronted not just with increasing requirements. The constantly changing political and economic conditions, e.g. energy market liberalisation, result among other in serious restrictions of data availability. New models need to be developed and implemented to fill these data gaps.

These developments mean that the preparation of the Energy Balances cannot be viewed as a routine task and that fundamental revisions need to be made almost every year in order to meet all requirements. These revisions are applied to the whole time series to avoid methodological breaks.

As the results of the Material Input Statistics since reporting year 2005 have been largely provided on time (approx. 85% of the surveyed data), this has enabled a considerable improvement in the quality of the provisional Energy Balances.

A further improvement in quality compared with previous years was also achieved 2006 by the inclusion of updated individual power plant data from E-Control GmbH for the years 1999, 2000, 2001 and 2003.

Since 2006, sectoral transformation balances have been prepared for the Laender and transmitted electronically to the Austrian Umweltbundesamt (Austrian Environment Agency) as the basis for calculating sector-relevant emissions. These are compatible/harmonised with the currently applicable version of the Energy Balances. With this fundamental regional modification of the transformation processes, incorrectly reported data in individual years has been identified and corrected by checking the individual data. This has enabled the correction of annual fluctuations within individual sectors.

3.4.3 Comparability over other domains

To be able to fulfill the reporting obligations of the RES-directive an additional aggregate – Gross Final Energy Consumption – had to be implemented. It is the sum of Final Energy Consumption + Own Consumption of electricity and district heat suppliers[19] + Transport Losses of electricity and heat for district heating +Non Energy Use in blast furnaces[20].

Chargeable Renewable Energy Sources according the directive are:

3. Final Energy consumption of:
    a. Biomass
    b. Solar-, geothermal- and ambient heat
    c. Biofuels for transport[21]
4. Production of electricity and heat for district heating from:
    a. Biofuels
    b. Solar-, geothermal- and ambient heat
    c. Normalised hydropower except production from pumped storage
    d. Normalised wind power
    e. PV

The calculation of the chargeable RES follows the methodology given in the directive – especially Annex 2 in case of normalizing hydropower (15 years) and wind power (4 years) – and the specifications by EUROSTAT. Latter focus on implementation of hydropower plants with mixed storage and ambient heat.

[19] In the energy balances part of Consumption of the Energy Sector

[20] Necessary because this consumption is defined as Final Energy Consumption on EU level

[21] Provided that they are produced under sustainable conditions to be defined on EU level during the next years

The calculation of the current version assumes 83.5% efficiency of the pumps used and therefore a production from pumped storage as 83.5% of the electricity used for pumping. This share is significantly higher than the EU average of some 70% and a future adaptation seems meaningful.

The currently proposed methodology for implementation of heat pumps meets the one used for compiling the national balances. Therefore only small adaptations, if any, have to be expected.

Starting with reporting year 2009 and back to 2005 – the base year for the RES directive – the renewable fuels as well as the transformation processes for electricity and heat sold to third parties are displayed much more in detail. Last but not least an additional sheet calculating the shares of chargeable RES by applying the most recent methodology from 2005 onwards has been implemented.

3.5 Coherence

The sectoral breakdown of Final Energy Consumption does not correspond to the breakdown in the National Accounts was consciously taken into account. However, with the growing requirement over recent years for harmonised data, Energy Accounts that are formally aligned to the framework of the National Accounts were calculated for the first time in 2008. The harmonisation, though, is not restricted to the sectoral breakdown. Rather, the Energy Accounts are calculated on the "national treatment" principle, as opposed to the Energy Balances, which are calculated on the "territorial" principle. The trigger for compiling these energy accounts were the needs of for energy data fully consistent to the Energy Balances but following the National Accounts framework. To ensure the coherence with National Accounts bridge tables between Energy Balances and Input/Output tables of National Accounts are under development for the time being.

To avoid any misunderstandings the differences between these two frameworks are explained in detail in the following.

- The term sector like it is used in this report follows the economic sectors defined by IEA and EUROSTAT and is different to the definition in National Accounts.
- The term territory principle like it is used in this report means that all fuels placed into circulation in Austria are taken into account independently who is purchasing and consuming these fuels.
- Traction and the respective fuel consumption are in opposition to the National Accounts taken into account in five functionally defined transport sectors and not in the sectors operating it.
- Energy suppliers and energy transformation establishments are pictured in the Energy Balances separately and their fuel consumption is defined as energy sector use and not as final energy consumption
- Imports and exports focus on the national territory strictly.
- The private households (as consumers) are treated equally like all other sectors.
- In opposition to National Accounts in Energy Balances all fuels (even the cost free) and all transformation activities even those which are operated for own purposes only are taken into account.
- National Accounts include energy services which are excluded in energy balances.

Concerning the last two aspects the energy accounts follow the energy balance framework.

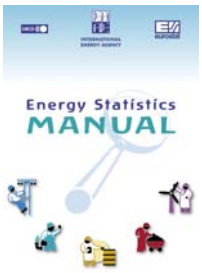
4. Outlook

The current version of the energy balances is the deepest breakdown allowed by database and confidentiality rules A more detailed display will not be able without changing the rules.

List of abbreviations

A	Austria
B	Burgenland
Bn	Burgenland north
Bs	Burgenland south
BMLFUW	Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management
BMWA	Austrian Federal Ministry of Economic Affairs and Labour
BMWFJ	Austrian Federal Ministry of Economy, Family and Youth
Car	Carynthia
CHP	Combined heat and power
EU	European Union
Fig	Figure
Form III	Monthly survey of BMWFJ on crude oil and oil derivates
HDD	Heating degree day
IEA	International Energy Agency
LA	Lower Austria
m³	Cubic meter
MW	Megawatt
MWe	Megawatt electric
MWh	Megawatt hour
oT	East Tyrol
PV	Photovoltaic
RES	Renewable Energy Sources
S	Salzburg
ST	Styria
t	metric ton
T	Tyrol
TJ	Terajoule
UA	Upper Austria
UNECE	United Nations Economic Commission for Europe
UNSD	United Nations Statistics Division
V	Vorarlberg
VIE	Vienna
WIFO	Austrian Institute of Economic Research

Reference to supplementary documentation/publications



Annex

- Fuel definitions (**Annex 1**)
- Annual Energy Questionnaires Report Card; Austria 2006 Data Cycle
- Uncertainty assessment of Gross Inland Consumption of the energy balance 2006 (**Annex 2**)
- Energy flow chart
- Standard documentation, Meta information: Energy consumption of Small to Medium-sized Establishments in Manufacturing Industries and construction (reporting periods 2002, 2004 and 2006)
- Standard documentation, meta information: Energy Consumption in the Service Sector (reporting period 2003)
- Standard documentation, Meta information: Energy Consumption of Households
- Methodology for calculating heating degree days (see Annex 3)
- Standard documentation, Meta information: Fuel Input and Heat Production of Biomass Lighted District Heat Plants (Standard-Dokumentation zur Erhebung zum Energieträgereinsatz und Fernwärmeausstoß in biomassegefeuerten Fernwärmeanlagen – available in German only)
- Standard documentation, Meta information: Useful Energy Analysis 1998 (Standard-Dokumentation zur Nutzenergieanalyse 1998 – available in German only)
- Standard documentation, Meta information: Useful Energy Analysis 2005 (Standard-Dokumentation zur Nutzenergieanalyse 2005 – available in German only)

Annex 1: Fuel definitions

IEA PRODUCT DEFINITIONS

1. ***Hard Coal:*** *Hard Coal refers to coal of gross calorific value greater than 23 865 kJ/kg (5 700 kcal/kg) on an ash-free but moist basis and with a mean random reflectance of vitrinite of at least 0.6. Hard coal comprises:*

   A. *Coking Coal***:** Coal with a quality that allows the production of a coke suitable to support a blast furnace charge. The following coal classification codes cover those coals which would fall in this category:

   - International classification codes (UN, Genève, 1956) 323, 333, 334, 423, 433, 434, 435, 523, 533 534, 535, 623, 633, 634, 635, 723, 733, 823

   B. *Steam Coal (Other Bituminous Coal and Anthracite): Steam coal is coal used for steam raising and space heating purposes and includes all Anthracite coals and Bituminous coals not included under Coking coal.*

2. ***Sub-Bituminous Coal:*** *Non-agglomerating coals with a gross calorific value between 17 435 kJ/kg (4 165 kcal/kg) and 23 865 kJ/kg (5 700 kcal/kg) containing more than 31% volatile matter on a dry mineral matter free basis.*

3. ***Lignite/Brown Coal:*** *Non-agglomerating coals with a gross calorific value less than 17 435 kJ/kg (4 165 kcal/kg) and greater than 31% volatile matter on a dry mineral matter free basis.*

   Oil shale and tar sands produced and combusted directly in power and heat plants should be reported in this category. Oil shale and tar sands used as inputs for other transformation processes should also be reported in this category. This includes the portion of the oil shale or tar sands consumed in the transformation process. Shale oil and other products derived from liquefaction should be reported on the Annual Oil Questionnaire.

4. ***Peat:*** *Combustible soft, porous or compressed, fossil sedimentary deposit of plant origin with high water content (up to 90 per cent in the raw state), easily cut, of light to dark brown colour. Only peat used for energy purposes should be reported here.*

5. ***Patent Fuel:*** *A composition fuel manufactured from hard coal fines by shaping with the addition of a binding agent. Note that the amount of patent fuel produced can be slightly higher than the amount of coal consumed in the transformation process because of the addition of a binding agent.*

6. ***Coke Oven Coke:*** *The solid product obtained from carbonization of coal, principally coking coal, at high temperature, it is low in moisture and volatile matter. Coke oven coke is used mainly in the iron and steel industry acting as energy source and chemical agent. Coke breeze and foundry coke are included in this category. Semi-coke, the solid product obtained from carbonization of coal at low temperature, should be included in this category. Semi-coke is used as a domestic fuel or by the transformation plant itself. This heading also includes coke, coke breeze and semi-coke made from lignite/brown coal.*

7. ***Gas Coke:*** *A by-product of hard coal used for production of town gas in gas works. Gas Coke is used for heating purposes.*

8. ***BKB (Braunkohlenbriketts) (Includes peat briquettes):*** *A composition fuel manufactured from lignite/brown coal. The lignite/brown coal is crushed, dried and moulded under high pressure into an even-shaped briquette without the addition of binders. German production of lignite dust is included in this category.*

9. ***Gas Works Gas:*** *Covers all types of gases including substitute natural gas produced in public utility or private plants, whose main purpose is manufacture, transport and distribution of gas. It includes gas produced by carbonization (including gas produced by coke ovens and transferred to gas works gas) reported under the "production" row, by total gasification with or without enrichment with oil products (LPG, residual fuel oil, etc.), by cracking of natural gas, and by reforming and simple mixing of gases and/or air, reported under the "from other sources" row. Substitute natural gas is a high calorific value gas, manufactured by chemical*

conversion of a hydrocarbon fossil fuel. It is chemically and physically interchangeable with natural gas and is usually distributed through the natural gas grid. The main raw materials for manufacture of substitute natural gas are: coal, oil and oil shales. Substitute natural gas is distinguished from other manufactured gases by its high heat value (above 8 000 kcal/m^3) and by its high methane content (above 85%). Substitute natural gas produced by synthesis from fuels other than coal based should also come under "from other sources". The quantity of fuel should be reported on a gross calorific value.

10. ***Coke Oven Gas:*** *Obtained as a by-product of solid fuel carbonisation and gasification operations carried out by coke producers and iron and steel plants which are not connected with gas works and municipal gas plants. The quantity of fuel should be reported on a gross calorific value.*

11. ***Blast Furnace Gas:*** *Obtained as a by-product in operating blast furnaces; it is recovered on leaving the furnaces and used partly within the plant and partly in other steel industry processes or in power stations equipped to burn it. The quantity of fuel should be reported on a gross calorific value.*

12. ***Oxygen Steel Furnace Gas:*** *Obtained as a by-product of the production of steel in an oxygen furnace; it is recovered on leaving the furnace. The gas is also known as converter gas, ~~or~~ LD or BOS gas. The quantity of fuel should be reported on a* ***gross*** *calorific value.*

IEA DEFINITIONS OF CRUDE OIL AND PRODUCTS

Crude Oil

Crude oil is a mineral oil of natural origin comprising a mixture of hydrocarbons and associated impurities, such as sulphur. It exists in the liquid phase under normal surface temperature and pressure and its physical characteristics (density, viscosity, etc.) are highly variable. This category includes field or lease condensate recovered from associated and non-associated gas where it is commingled with the commercial crude oil stream.

Natural Gas Liquids (NGL)

NGL are liquid or liquefied hydrocarbons recovered from natural gas in separation facilities or gas processing plants. Natural gas liquids include ethane, propane, butane (normal and iso-), (iso) pentane and pentanes plus (sometimes referred to as natural gasoline or plant condensate).

Refinery Feedstocks

A refinery feedstock is a processed oil destined for further processing (e.g. straight run fuel oil or vacuum gas oil) excluding blending. With further processing, it will be transformed into one or more components and/or finished products. This definition also covers returns from the petrochemical industry to the refining industry (e.g. pyrolysis gasoline, C4 fractions, gasoil and fuel oil fractions).[22]

Other Hydrocarbons

This category includes synthetic crude oil from tar sands, shale oil, etc., liquids from coal liquefaction, (see the Joint IEA/UN-ECE/EUROSTAT Annual Coal Questionnaire), output of liquids from natural gas conversion into gasoline (see the Joint IEA/UN-ECE/EUROSTAT Annual Natural Gas Questionnaire), hydrogen and emulsified oils (e.g. Orimulsion).[23]

Refinery Gas (not liquefied)

Refinery gas includes a mixture of non-condensible gases mainly consisting of hydrogen, methane, ethane and olefins obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. This also includes gases which are returned from the petrochemical industry.

Ethane

[22] Please note: in the definitions, petrochemical feedstocks refer to all oil products which are used as raw material in the petrochemical industry for steamcracking, aromatics plants, e.g. naphtha, LPG, light and heavy gasoil, reformate, etc.

[23] Note on the reporting of emulsified oils: All imports of emulsified oils (e.g. Orimulsion) should be reported as imports of 'Other Hydrocarbons'. As these oils do not need further processing in a refinery, report these quantities as Direct Use and Primary Product Receipts in the 'Bitumen' category of the Supply of Finished Products report. Any production of emulsified oils should appear as indigenous production of 'Other Hydrocarbons'. Report all quantities in physical weight of the emulsion (i.e. including the water content). Note on the reporting of shale oil: Oil shale production and direct use should be reported in the Annual Coal Questionnaire. The production of shale oil (secondary product) is to be reported as "From other Sources" in the other hydrocarbons category.

A naturally gaseous straight-chain hydrocarbon, (C2H6) extracted from natural gas and refinery gas streams.

Liquefied Petroleum Gases (LPG)

LPG are light paraffinic hydrocarbons derived from the refinery processes, crude oil stabilisation and natural gas processing plants. They consist mainly of propane (C3H8) and butane (C4Hl0) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene. LPG are normally liquefied under pressure for transportation and storage.

Naphtha

Naphtha is a feedstock destined for either the petrochemical industry (e.g. ethylene manufacture or aromatics production). Naphtha comprises material in the 30oC and 2l0oC distillation range or part of this range.[24]

Motor Gasoline

Motor gasoline consists of a mixture of light hydrocarbons distilling between 35oC and 215oC. It is used as a fuel for land based spark ignition engines. Motor gasoline may include additives, oxygenates and octane enhancers, including lead compounds such as TEL (Tetraethyl lead) and TML (tetramethyl lead).

*- **Unleaded Motor Gasoline:** motor gasoline where lead compounds have not been added to enhance octane rating. It may contain traces of organic lead.*

*- **Leaded Motor Gasoline:** motor gasoline with TEL (tetraethyl lead) and/or TML (tetramethyl lead) added to enhance octane rating. This category includes motor gasoline blending components (excluding additives/oxygenates), e.g. alkylates, isomerate, reformate, cracked gasoline destined for use as finished motor gasoline.*

Aviation Gasoline

This is motor spirit prepared especially for aviation piston engines, with an octane number suited to the engine, a freezing point of -60oC and a distillation range usually within the limits of 30oC and 180oC.

Gasoline Type Jet Fuel (Naphtha type Jet Fuel or JP4)

This includes all light hydrocarbon oils for use in aviation turbine power units, distilling between 100oC and 250oC. They are obtained by blending kerosenes and gasoline or naphthas in such a way that the aromatic content does not exceed 25% in volume, and the vapour pressure is between 13.7kPa and 20.6kPa.

Kerosene Type Jet Fuel

This is a distillate used for aviation turbine power units. It has the same distillation characteristics between 150oC and 300oC (generally not above 250oC) and flash point as kerosene. In addition, it has particular specifications (such as freezing point) which are established by the International Air Transport Association (IATA). This category includes kerosene blending components.

Other Kerosene

Kerosene comprises refined petroleum distillate and is used in sectors other than aircraft transport. It distils between 150oC and 300oC.

Gas/Diesel Oil (Distillate Fuel Oil)

Gas/diesel oil is primarily a medium distillate distilling between 180oC and 380oC. Several grades are available depending on uses:

*- **Transport Diesel:** • on road diesel oil for diesel compression ignition (cars, trucks etc.), usually of low sulphur content;*

*- **Heating and other • light heating oil** for industrial and commercial uses;*

[24] Naphtha imported for blending is reported as an import of naphtha, then shown on the interproduct transfer row, as a negative entry for Naphtha, and a positive entry for the corresponding finished product.

Gasoil: *• marine diesel and diesel used in rail traffic;• other gas oil including heavy gas oils which distil between 380oC and540oC and which are used as petrochemical feedstocks. This category includes blending components.*

Fuel Oil

This covers all residual (heavy) fuel oils (including those obtained by blending). Kinematic viscosity is above 10 cSt at 80oC. The flash point is always above 50oC and density is always more than 0.90 kg/l.

- ***Low sulphur content****: heavy fuel oil with sulphur content lower than 1%.*

- ***High sulphur content:*** *heavy fuel oil with sulphur content of 1% or higher.*

White Spirit and SBP

White Spirit and SBP are defined as refined distillate intermediates with a distillation in the naphtha/kerosene range. They are sub-divided as:

i. Industrial Spirit (SBP): Light oils distilling between 30° and 200°C. There are 7 or 8 grades of industrial spirit, depending on the position of the cut in the distillation range. The grades are defined according to the temperature difference between the 5% volume and 90% volume distillation points (which is not more than 60°C).

ii. White Spirit: Industrial spirit with a flash point above 30°C. The distillation range of white spirit is 135° to 200°C.

Lubricants

Lubricants are hydrocarbons produced from distillate by product; they are mainly used to reduce friction between bearing surfaces. This category includes all finished grades of lubricating oil, from spindle oil to cylinder oil, and those used in greases, including motor oils and all grades of lubricating oil base stocks.

Bitumen

Bitumen is a solid, semi-solid or viscous hydrocarbon with a colloidal structure, being brown to black in colour, obtained as a residue in the distillation of crude oil, by vacuum distillation of oil residues from atmospheric distillation. Bitumen is often referred to as asphalt and is primarily used for construction of roads and for roofing material. This category includes fluidized and cut back bitumen.

Paraffin Waxes

These are saturated aliphatic hydrocarbons. These waxes are residues extracted when dewaxing lubricant oils. They have a crystalline structure which is more-or-less fine according to the grade. Their main characteristics are as follows: they are colourless, odourless and translucent, with a melting point above 45°C.

Petroleum Coke

Petroleum coke is a black solid by-product, obtained mainly by cracking and carbonising petroleum derived feedstock, vacuum bottoms, tar and pitches in processes such as delayed coking or fluid coking. It consists mainly of carbon (90 to 95%) and has a low ash content. It is used as a feedstock in coke ovens for the steel industry, for heating purposes, for electrode manufacture and for production of chemicals. The two most important qualities are "green coke" and "calcinated coke". This category also includes "catalyst coke" deposited on the catalyst during refining processes; this coke is not recoverable and is usually burned as refinery fuel.

Other Products

All products not specifically mentioned above, for example: tar and sulphur. This category also includes aromatics (e.g. BTX or benzene, toluene and xylene) and olefins (e.g. propylene) produced within refineries.

PRODUCT DEFINITIONS AND UNITS

Natural gas comprises gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both "non-associated" gas originating from fields producing hydrocarbons only in gaseous form, and "associated" gas produced in association with crude oil as well as methane recovered from coal mines (colliery gas).

Data should be reported in Terajoules (TJ) on the basis of gross calorific values (GCV) and in million cubic metres (at 15°C and 760 mm Hg, i.e. Standard Conditions)

IEA Definitions of renewable energy and waste sources and associated technologies

While there are a limited number of Renewable Energy Sources (RES) and Waste Sources, there are a large number of technologies allowing their exploitation, most of which are still at the research/development stage or have not yet reached commercial maturity. The renewable energy and waste sources and associated technologies listed below are those which are considered to be economically viable or approaching economic viability.

1. ***Hydro-power:*** *Potential and kinetic energy of water converted into electricity in hydroelectric plants. Pumped storage should be included. Detailed plant sizes should be reported net of pumped storage. The sum of < 1 MW, 1-10 MW, 10+ MW and production from pumped storage should equal 'Hydro, all plants'.*

2. ***Geothermal energy:*** *Energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It is exploited at suitable sites:*
   * for electricity generation using dry steam or high enthalpy brine after flashing
   * *directly as heat for district heating, agriculture etc.*

3. ***Solar energy:*** *Solar radiation exploited for hot water production and electricity generation, by:*[25]
   * *flat plate collectors, mainly of the thermosyphon type, for domestic hot water or for the seasonal heating of swimming pools*
   * *photovoltaic cells*
   * *solar thermal-electric plants*

4. ***Tide/Wave/Ocean energy:*** *Mechanical energy derived from tidal movement or wave motion and exploited for electricity generation.*

5. ***Wind energy:*** *Kinetic energy of wind exploited for electricity generation in wind turbines.*

6. ***Solid Biomass:*** *Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation. It comprises:*
   * ***Charcoal****: Covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.*
   * ***Wood, wood wastes, other solid wastes****: Covers purpose-grown energy crops (poplar, willow etc.), a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor etc.) as well as wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs etc. Combustion is the preferred technology for these solid wastes. The quantity of fuel used should be reported on a net calorific value basis.*

7. ***Biogas:*** *A gas composed principally of methane and carbon dioxide produced by anaerobic digestion of biomass, comprising:*
   * *Landfill gas, formed by the digestion of land filled wastes*

[25] Note: Passive solar energy for the direct heating, cooling and lighting of dwellings or other buildings is not included.

* *Sewage sludge gas, produced from the anaerobic fermentation of sewage sludge*
* *Other biogas, such as biogas produced from the anaerobic fermentation of animal slurries and of wastes in abattoirs, breweries and other agro-food industries.*

8. Liquid biofuels: *Cover the fuels listed below:*

* *Bioethanol: ethanol produced from biomass and/or biodegradable fraction of waste;*
* *Biodiesel: a diesel quality liquid fuel produced from biomass or used fried oils;*
* *Biomethanol: methanol produced from biomass and/or the biodegradable fraction of waste;*
* *Biodimethylether: a diesel quality fuel produced from biomass and/or the biodegradable fraction of waste;*
* *Biooil: a pyrolysis oil fuel produced from biomass.*

9. Wastes:

* ***Industrial Wastes****: Report under this category wastes of industrial non-renewable origin (solids or liquids) combusted directly for the production of electricity and/or heat. The quantity of fuel used should be reported on a net calorific value basis. Renewable industrial waste should be reported in the Solid biomass, Biogas and/or Liquid biofuels categories.*
* ***Municipal solid waste (renewables)****: Waste produced by households, industry, hospitals and the tertiary sector which contains renewable materials which are incinerated at specific installations. The quantity of fuel used should be reported on a net calorific value basis.*
* ***Municipal solid waste (non-renewables)****: Waste produced by households, industry, hospitals and the tertiary sector which contains non-renewable materials which are incinerated at specific installations. The quantity of fuel used should be reported on a net calorific value basis.*

Annex 2: Uncertainty assessment of Gross Inland Consumption of the energy balance 2006

For assessing the cumulated overall uncertainty of the Gross Inland Consumption five error types are taken into account. They are included hierarchically into the final equation following the sequence of their listening

1. **Statistical Differences**: They are only taken into account if supply and consumption side are of equal data quality. If one side is known or assumed as more complete e.g. due to higher or more complete number of respondents – normally this is the case for the supply side - no statistical difference is taken into account.

   It is always negative, because the philosophy behind AEB does not allow a statistical difference and higher reported quantities are interpreted as the more complete dataset. The "excessive" quantities are allocated iteratively to all sectors.

   In 2006 statistical differences are observed in Coal – **-931 TJ** or -0.55% - in Oil – **-1 064 TJ** or -0.17% and in Natural Gas – **-188 TJ** or -0.06% - auf.

2. **Measurement Errors**: Measurement errors include weighing errors and errors of flow meters. For the year 2006 for scales a relative accuracy of ± 1% und for flow meters of ±0.5% is assumed. The maximum errors in 2006 are for:

   Coal + 1 703 TJ / - 1 694 TJ,
   Oil + 6 085 TJ / - 6 075 TJ und
   Gas + 1 577 TJ / - 1 576 TJ

3. **Reporting errors (to a minor degree)**: This limitation is because big deviations on fuel and respondent level in time series are analysed and clarified. The potential range of reporting errors is checked by applying a Monte Carlo Analysis with the assumption that 5% of the reported quantities are deranged up to +/- 10%. The minima and maxima given in Tab. 1 are Worst-Case Scenarios out 1 000 simulation cycles. As reference survey the material and energy consumption survey is used, because this survey includes a high share of used quantities is covered by a high number of respondents. The reporting error is applied to primary fuels only that are calculated in the energy balance framework from supply data primarily. Those are coal, oil and natural gas.

   For 2006 the maximum Gross Inland Consumption interval due to potential reporting errors is +2.7% and -3.1% and gives the following picture in detail:

   Coal + 5 386 TJ / - 4 463 TJ,
   Oil + 19 246 TJ / - 16 007 TJ and
   Gas + 9 926 TJ / - 8 348 TJ

   On 95% statistical confidentiality the interval is +0.4% and -0.3% and gives the following absolute for

   Coal + 1 801 TJ / - 1 816 TJ,
   Oil + 6 437 TJ / - 6 512 TJ und
   Gas + 3 320 TJ / - 3 396 TJ

4. **Statistical Errors (on 95% confidential level)**: It is only taken into account with fuels calculated from the consumption side and surveyed with sample surveys only. At the moment this is the case for final consumption of biofuels and heat for district heating. Because heat for district heating is of no relevance for the supply side based calculation of Gross Inland Consumption this potential error is taken into account (in the same relation) for corresponding transformation input (for district heating) of biofuels

   Table 2 shows the statistical error of the domestic energy survey 2004

Tab. 2: statistical error of the domestic energy survey 2004with 95% confidential level

Fuels	Overall sum	
	Quantities	rel. error
	in kg, kWh, m³	in %
Fuel wood	4 061 766 191	4.0
Pellets	201 779 961	16.4
Wood chips	294 571 501	18.1
Heat for district heating	7 103 511 378	4.5

   In 2006 the confidence belt is for:

   Fuel wood **± 2 475 TJ** (4.0%), Pellets **± 2 591 TJ** (16.4%),
   Wood chips **± 1 619 TJ** (18.1%), Bark **± 1 215 TJ** (18.1%)
   Transformation input of biofuels for district heating purposes **± 558 TJ** (4.5%)

5. **Uncertainty of Conversion factors:** This is taken into account for fuels with inhomogeneous material shares (municipal waste) or varying water content (wood based biofuels) only, of which the calorific value was not metered but calculated with default values

   For 2006 the following variations of the calorific values (kJ/kg) are assumed:

   Municipal wastes 9.6 ± 0.4 (4%)[26] → **± 443 TJ**
   Fuel wood 14.4 ± 1.4 (10%) → **+ 6 434 TJ / - 5 939 TJ**
   Wood chips 12.8 ± 1.3 (10%) → **+ 1 057 TJ / - 733 TJ**
   Bark 7.5 ± 0.8 (10%) → **+ 793 TJ / - 550 TJ**

The results for fuel classes and the overall Gross Inland Consumption are given in Tab. 4. Sectoral uncertainties and uncertainties due to a modelled breakdown of Gross Inland Consumption to other balance aggregates are not included into this uncertainty assessment.

[26] Source: L. Morf, E. Ritter, P. Brunner: Goods- und Material Balance of a Waste Incineration Plant in Wels, TU Vienna 1999.

Tab. 1: Results of a Monte Carlo Analysis of all relevant fuels of Material and Energy Input Survey 2006 assuming that 5% of the reported quantities are disturbed within a range of +/- 10% after 1 000 simulation cycles on 100% and 95% security level

	TJ 100%			TJ 95%		Divergence 100%		Divergence 95%	
Fuel type	Reported Value	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Gasoline	**595**	592	600	593	597	-0.6%	0.8%	-0.3%	0.3%
Bio-/sewage sludge-/landfillgas	**215**	204	226	212	217	-5.3%	4.8%	-1.3%	1.2%
Browncoalbriquettes	**0**	0	0	0	0	-10.7%	9.1%	-0.6%	0.0%
Lignite	**15 624**	15 035	16 208	15 280	15 831	-3.9%	3.6%	-2.2%	1.3%
Dieselkraft	**14 674**	14 604	14 742	14 647	14 704	-0.5%	0.5%	-0.2%	0.2%
Natural gas	**165 200**	162 831	168 565	164 391	166 093	-1.5%	2.0%	-0.5%	0.5%
LPG	**1 512**	1 495	1 529	1 503	1 519	-1.1%	1.2%	-0.6%	0.5%
Fuel oil, light	**5 855**	5 815	5 904	5 831	5 879	-0.7%	0.8%	-0.4%	0.4%
Fuel oil, medium	**343**	328	360	340	345	-4.6%	4.7%	-0.8%	0.7%
Fuel oil, heavy	**23 189**	22 268	24 174	22 983	23 398	-4.1%	4.1%	-0.9%	0.9%
Coke oven coke	**60 677**	57 057	64 665	59 195	61 926	-6.3%	6.2%	-2.5%	2.0%
Gas oil for heating purposes	**753**	746	764	748	757	-0.9%	1.4%	-0.7%	0.6%
Kerosene	**9**	9	9	9	9	-3.5%	2.8%	-1.6%	1.4%
Biodiesel	**0**	0	0	0	0	-5.0%	4.0%	-2.1%	2.1%
Hard coal	**51 245**	49 861	52 789	50 515	52 114	-2.8%	2.9%	-1.4%	1.7%
Overall sum	**339 891**	**330 844**	**350 534**	**336 250**	**343 488**	**-2.7%**	**3.0%**	**-1.1%**	**1.0%**

Following the given description the Worst Case Interval looks like as follows:

$$\sum_{i=1}^{n}(x_i - s_i)*(1-a_i)*(1-b_-)*(1-c_i)*(1-d_i) \le \sum_{i=1}^{n} x_i \le \sum_{i=1}^{n}(x_i*(1+a_i)*(1+b_+)*(1+c_i)*(1+d_i)$$

i =all fuels of the EB, xi = CIG of the fuel i in TJ, si = statistical difference of the fuel i in TJ, ai =Measurement error of the fuel i in %, b+/- = Reporting error in %, ci = Statistical Error of the fuel i in %, di = Variation of the calorific value of the fuel i in %

Table 4: Cumulated uncertainty of Gross Inland Consumption 2006 Worst Case

	Coal		Oil		Gas		Renewables		Overall fuels	
	minus	plus	minus	plus	minus	plus	minus	plus	minus	plus
CIG in TJ	170 293		608 522		315 391		323 384		1 442 251	
Stat. Difference in TJ	-931	0	-1 064	0	-188	0	0	0	-2 183	0
Measurement Error in TJ	-1 694	1 703	-6 075	6 085	-1 576	1 577	0	0	-9 344	9 365
Reporting Error in TJ	-4 463	5 386	-16 007	19 246	-8 348	9 926	0	0	-28 818	34 557
Stat. Error in TJ	0	0	0	0	0	0	-8 459	8 459	-8 459	8 459
Variance of CV in TJ	0	0	0	0	0	0	-7 665	8 727	-7 665	8 727
Sum	-7 087	7 089	-23 146	25 331	-10 112	11 503	-16 124	17 186	-56 468	61 108
CIG-extreme value in TJ	163 206	177 382	585 376	633 853	305 279	326 894	307 260	340 570	1 385 783	1 503 359
Tolerance	*-4.2%*	*4.2%*	*-3.8%*	*4.2%*	*-3.2%*	*3.6%*	*-5.0%*	*5.3%*	*-3.9%*	*4.2%*

Table 5: Cumulated uncertainty of Gross Inland Consumption 2006 on 95% confidential level (with statistical and reporting error)

	Coal		Oil		Gas		Renewables		Overall fuels	
	minus	plus	minus	plus	minus	plus	minus	plus	minus	plus
CIG in TJ	170 293		608 522		315 391		323 384		1 442 251	
Stat. Difference in TJ	-931	0	-1 064	0	-188	0	0	0	-2 183	0
Measurement Error in TJ	-1 694	1 703	-6 075	6 085	-1 576	1 577	0	0	-9 344	9 365
Reporting Error in TJ	-1 816	1 801	-6 512	6 437	-3 396	3 320	0	0	-11 723	11 558
Stat. Error in TJ	0	0	0	0	0	0	-8 459	8 459	-8 459	8 459
Variance of CV in TJ	0	0	0	0	0	0	-7 665	8 727	-7 665	8 727
Sum	-4 440	3 504	-13 651	12 522	-5 160	4 897	-16 124	17 186	-39 374	38 108
CIG-extreme value in TJ	165 853	173 797	594 871	621 044	310 231	320 288	307 260	340 570	1 402 877	1 480 359
Tolerance	*-2.6%*	*2.1%*	*-2.2%*	*2.1%*	*-1.6%*	*1.6%*	*-5.0%*	*5.3%*	*-2.7%*	*2.6%*

Annex 3: Methodology for calculating heating degree days

To take into account the influence of weather conditions the seasonal temperature gradient is calculated as heating degree days is calculated for Austria and it's Laender following the methodology of ÖNORM B 8135 by applying the formula

$$\mathbf{HDD = \Sigma(BT_n - Tn)}$$

Heating degree day (HDD) = Sum of differences between a given indoor temperature (BT = 20° C) and the daily average outdoor temperature (Tn), if latter is lower than an assumed limit for heating of 12° C (Model 20-12).
Heating degree total = Sum of HDD of a given period.

This model „12-20" means that days with an average temperature (in a 24 hours period) over 12.0° C are not taken into account, but days with an average up to and including 12.0° C are included with their difference to 20.0° C.

In the following examples for four days are displayed:

1st day: ∅ temperature of – 6.0° C: 26.0 points
2nd day: ∅ temperature of + 1.5° C: 18.5 points
3rd day: ∅ temperature of +12.0° C: 8.0 points
4th day: ∅ temperature of +12.1° C: 0 points