COUNTRY PRACTICE
IN ENERGY STATISTICS

Topic/Statistics:

Institution/Organization:
Ministry of Mines and Energy
Secretariat of Energy Planning and Development
Center for Energy Strategic Studies

Country: Brazil

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CONTENTS

Abstract

Key elements	
Name of the statistics	**BEB – Brazilian Energy Balance**
Background and purpose of the statistics	BEB is an annual publication, which is essential for planning activities and monitoring of the Brazilian energy sector. It contains the accounting relative to energy supply and consumption, as well the conversion processes and foreign trade, among other useful informations. It presents, in a single document, historical series of these operations and information about reserves, installed capacities and data from Brazilian states.
Population, sample and data sources	Instituto Brasileiro de Geografia e Estatística – IBGE, for general data about Brazil.; Agência Nacional de Petróleo – ANP; Agência Nacional de Energia Elétrica- ANEEL; Indústrias Nucleares do Brasil – INB; Centrais Elétricas Brasileiras S.A. – Eletrobras; Petróleo Brasileiro S.A. – Petrobras; Alcohol and Sugar Department – Agriculture Ministry; Gas Distribution Companies; Class Entities; Labor Unions and Large Industries; Other Companies and sources.
Main users	Energy policy makers, researchers, teachers, students etc.
Other remarks	BEB is available on line, on the MME's portal, in two different forms: PDF and Excel files.

1. General information

1.1. Name of the statistics/topic

BEB – Brazilian Energy Balance

1.2. History and purpose

BEB was first published in 1976.

The BEB is an reliable, easy, objective way to allow a consultation of Brazilian energy information, containing analytical texts, tables, graphics and particularly energy balances themselves, that are energy matrices composed by energy flows, like supply and consumption, and primary and secondary energy sources.

The main purposes of BEB are:

- ✓ Being a historical collection of the energy physical movement;
- ✓ Subsidizing the MME for management, planning and energy development activities;
- ✓ Support studies of the Brazilian energy matrix projections, mainly for the Brazilian energy outlooks for 2021 and 2050;
- ✓ Support sectorial studies;
- ✓ Subsidizing industrial plannings;
- ✓ Subsidizing academic studies and developments in the energy area;
- ✓ Subsidizing international studies.

1.3. Responsible authorities

Energy Research Company – EPE, under the approval and coordination Ministry of Mines and Energy (MME).

1.4. Reference period

The BEB has energy data **since 1970**.

1.5. Frequency

The frequency of the statistics dissemination is **annually**.

1.6. Dissemination

The BEB is annually published online, in the websites of the MME (www.mme.gov.br) and EPE (www.mme.gov.br), both in the form of digitalized files (PDF), such as Excel spreadsheets, containing tables and matrices of BEB.

The annually **print publication** of the BEB is under the responsibility of EPE since 2004.

In the printed form, the tables with energy flow by source (in commercial units) and with energy consumption by sector (toe) refer to the last 10 years (2000 to 2009), and the energy matrices refer to 1970, 1980, 1990 and the last 10 years.

In the **online form**, spreadsheets provide energy data annually since 1970.

1.7. Regional level

Although the BEB's information is national, it has a chapter only with state energy data. So, the lowest geographical level the statistics are made available to the public is *state*.

1.8. Main users

Internal users (MME): Long term energy planners, Energy policy makers, professionals, of all levels, of energy area.

External users: energy balance makers of some Brazilian states and capitals, researchers, teachers, students, professionals of energy area, like government and non-government institutions, agencies and private companies.

Examples of external users: Brazilian Institute of Geography and Statistics (IBGE), the Ministry of Science and Technology (MCT), the Civil House of the Presidency, the Council national Energy Policy (CNPE)

1.9. Legal basis and legally binding commitments

In terms of legal basis, the Brazilian Energy Balance was instituted by the Ministry of Mines and Energy through the Ordinance ("Portaria") No. 574, of 12 May 1976.

Web adress: http://www.jusbrasil.com.br/diarios/3275537/dou-secao-1-20-05-1976-pg-20

1.10. International reporting

MME has monthly and annual energy information exchange commitments with international institutions, such as the G20 group of countries, Latin American Energy Organization (OLADE), International Energy Agency (IEA), United Nations (UN), World Energy Council (WEC), Southern Common Market (MERCOSUR), Union of South American Countries (UNASUR), the Regional Energy Integration Commission (CIER), among others.

1.11. Contracting entity

The Ministry of Mines and Energy.

1.12. Resource requirements

In Energy Research Company (EPE) for about four technicians who are responsible for collection, clearance of primary data and preparation of final data from the national energy balance.

About 70% of total energy demand in Brazil is obtained from the collection of data from about 10 primary agents. These agents have a regulation that allows manufacturers, distributors and retailers of energy supply data on their activities. The activities of oil, gas, electricity and ethanol are covered in this list.

About 25% of total energy demand of Brazil is obtained from the collection online at hundreds of businesses large energy consumers. It is energy produced and consumed at the establishment itself. In this role, are collected and cleaned the data of sugarcane bagasse, black liquor, industrial gases, coal coke, wood, charcoal, among others).

Finally, other 5% of total energy demand, is obtained by estimation. It is the energy consumed in a very large number of consumers, and small quantities. This list includes the consumption of firewood in the residential sector, agriculture, food industry, ceramic industry and commercial.

Statistical concepts, methodology, variables and classifications

1.13. Scope

The Balance (BEB) covers historical series of energy supply and consumption, foreign trade, reserves, installed capacities, indicators – like energy intensity, useful energy, Self-Generation of Electricity etc., including conversion processes.

The efficiencies are taken from the three studies of the Useful Energy Balance (MME), made on national level. The studies are published every 10 years, and those already published are: 1984, 1994 and 2004. Each study contains a report in Word format, and various Excel spreadsheets.

All data are national, some of which, state and international data.

There is a specific chapter dedicated to Energy Consumption by Sector. It presents the final energy consumption classified by primary and secondary source, for each sector of the economy: Residential Energy, Commercial, Transportation and Industrial sectors. The last two sectors has its respective subsectors.

1.14. Definitions of main concepts and variables

General Description
The Brazilian Energy Balance – BEB has been prepared according to a methodology adopted to an energy structure sufficiently general in nature to give a proper configuration of the physical variables of the energy sector.

The Matrix Energy Balance summarizes the methodology and expresses the balance of every stage in the energy process: production, transformation and consumption.

The general structure of the balance is divided into four parts, described below.

Primary Energy
Energy products found in nature in an immediately available form, such as natural gas, coal, animal and vegetable residues, solar and wind energy etc.

Primary Energy Sources: Petroleum, Natural Gas, Steam Coal, Metallurgical Coal, Uranium (U3o8), Hydraulic Energy, Firewood and Sugar-cane Products (Molasses, Juice and Bagasse).

Other Primary Sources: Vegetable and Industrial Residues Used for Steam Generation, Heat etc.

Secondary Energy
Energy products obtained from the various transformation centers and channeled to the different consumption sectors or to other transformation centers.

Secondary Energy Sources: Petroleum Derivatives that, while having considerable energy content, are employed for other purposes (Greases, Lubricants, Paraffin Wax etc.).

Tar: Energy Source Produced from Metallurgical Coal Transformation.

Consolidated Total
All the energy produced, transformed and consumed in the country.

Supply
The amount of energy available for transformation and/or for final consumption.

Production: Primary Energy obtained from mineral, plant and animal resources (Biogas), Hydraulic, Geothermal Reservoirs, Sun, Wind, Seas, and Tides. These entries have a positive sign.

Imports: Primary and Secondary energy coming into the country from overseas. These entries have a positive sign.

Variation Inventories: Annual Difference between initial stock and final stock. A Stock Increase in any given year means a reduction in Total Supply. In the BEB, stock entries have a negative sign while withdrawals have a positive sign.

Total Supply: Production (+) Imports (+) or (-) Variation Inventories.

Exports: Amount of Primary and Secondary Energy sent overseas. These entries have a negative sign.

Non-utilized: Amount of energy that is not presently being used because of technical or economic constraints. These entries have a negative sign.

Re-injetion: Natural Gas reinjected into oil wells to obtain a better yield. This entry has a negative sign.

Gross Domestic Suplly: Or Gross Energy Supply, is the amount of energy made available in the country for transformation and/or for Final Consumption. Equivalent to the Algebric Sum of Total Supply, Exports, Non-Utilized and Re-injection (only for natural gas).

Transformation
The transformation sector includes all transformation centers where primary and/or secondary energy is processed by modification of its properties or original state.

Transformation Centers: Oil Refineries, Natural Gas Plants, Gasification Plants, Cooking Plants, Nuclear Fuel Cycle, Public utilities and self-production Power Plants, Charcoal Plantsand Distilleries.

Other Transformations: Refers to Gasoline and LPG produced when the Chemical Industry processes Naphtha and Oil Products or Raw Materials.

Total Transformation is the sum of Transformation Centers and Other transformations.

Losses

Losses in Distribution and Storage: Losses occurring during Production, Distribution and Storage of Energy. For example: Losses in Gas and Oil Pipelines, Electricity Transmission Lines and Electrical and Gas Distribution Networks. This line does not include Losses in Transformation Centers.

Final Consumption
Listed below are the different economic sectors to which primary and secondary energy flows, making up total final energy consumption.

Final Non-energy Consumption: Amount of energy contained in products utilized by different sectors For Non-energy Purposes.

Final Energy Consumption: Final Consumption in the following sectors: Energy Sector, Residential, Commercial, Public, Agricultural, Transportation, Industrial and Unidentified Consumption.

Final Consumption by Energy Sector: Energy consumed by transformation centers and/or by energy extraction and transportation processes, when the energy products are in their final form. The Energy Sector is broken down into: oil exploration and production, petroleum refining, alcohol, electricity sector, coal sector and others.

Final Residential Consumption: Energy consumed by residential sector for all class.

Final Commercial Consumption: Energy consumed by commercial sector for all class.

Final Public Consumption: Energy consumed by public sector for all class.

Final Agricultural Consumption: Total energy consumed in agriculture and cattle-raising segments.

Total Transportation Consumption. Sum of the energy consumed by all the Transportation subsectors: Highways, Railroads, Airway and Waterway.

Total Industrial Final Consumption. Sum of the energy consumed by all the Industrial subsectors: Cement, Pig Iron and Steel, Iron Alloys, Mining and Pelletizing, Non-ferrous and Other Metals, Chemical, Foods and Beverages, Textile, Paper and Pulp, Ceramics and Other Segments.

Unidentified Consumption: Consumption that cannot be classified in any of the previously listed sectors.

Statistical Adjustments: Device used to facilitate comparability of energy supply and consumption data from different statistical sources.

Adjustments: Quantifies the apparent deficits and surpluses, which result from statistical, information and measurement errors.

Secondary Energy Production
Equivalent to the sum of positive values of Transformation Centers and Other transformations.

1.15. Classification scheme

Sector Classification
The classification for the sector consumption of Brazilian Energy Balance follows the Activities Code of Federal Revenue Bureau (Decrees N. 907, 08/28/1989, and n. 962, 12/29/1998).

1.16. Population

The Brazilian energy statistical population is composed of industrial, public and services organisms, regulated agents, government agencies e other partner companies.

The *reporting units* are energy companies and the *observational units* are energy facilities.

The *analytical units* are the economic sectors, whose structure is:

Energy Sector
Commercial
Public
Agricultural And Livestock
Transportation – Total
- Highways
- Railroads
- Airways
- Waterways

Industrial - Total
- Cement
- Pig-Iron And Steel
- Iron-Alloys
- Mining and Pelletization
- Non-Ferrous And Other Metals
- Chemical
- Food And Beverages
- Textiles
- Paper And Pulp
- Ceramics
- Others

1.17. Data sources

Demographic Source
Brazilian Institute for Geography and Statistics – IBGE.

Petroleum, Natural Gas, Biofuels, and Oil Shale
- Agência Nacional de Petróleo, Gás e Biocombustíveis - ANP
- Petróleo Brasileiro S.A. - Petrobras
- Derivative Distribution Companies
- Class Entities and Large Industries

Steam Coal And Metallurgical Coal
- Sindicato Nacional da Indústria de Extração do Carvão
- Large Industries

Hydraulic Energy and Electricity
- Agência Nacional de Energia Elétrica - ANEEL
- Empresa de Pesquisa Energética - EPE
- Centrais Elétricas Brasileiras S.A. - Eletrobras
- Electrical Energy Concessionaries
- Large Industries

Firewood and Charcoal

- Fundação Instituto Brasileiro de Geografia e Estatística - IBGE
- Large Industries
- Projeto Matriz Energética Brasileira – MEB - MME / IPEA

Sugar Cane, Alcohol and Sugar Cane Bagasse

- Alcohol and Sugar Department – Agriculture Ministry
- Class Entities
- Sector Industries

Gas

- Gas Distribution Companies
- Large Industries

Nuclear Energy

- Indústrias Nucleares do Brasil - INB

Other Information Sources

- Associação Brasileira de Celulose e Papel - BRACELPA
- Sindicato Nacional da Indústria de Cimento – SNIC
- Associação Brasileira dos Produtores de Ferro-ligas – ABRAFE
- Instituto Brasileiro de Siderurgia – IBS
- Associação Brasileira de Fundição – ABIFA
- Sindicato Nacional da Indústria e Extração de Estanho – SNIEE
- Associação Brasileira de Alumínio – ABAL
- Sindicato da Indústria de Ferro no Estado de Minas Gerais – SINDIFER
- Fundação IBGE, for general data about Brazil.

1.18. Registers and frames (BEB)

Administrative registers are used in collection and compilation of the statistics.

Forms are used for specific information on energy-related activities, such as total consumption, electricity generation and other transactions involving energy transformations.

Different forms are available, depending on the economic activity of the facility and represent the potential energy activities it performs.

1.19. Measurement units

The data is collected in their respective physical units, e.g. m^3, tonnes and GWh.

The BEB is published both in physical units and a basic unit (toe).

1.20. Sample characteristics

1.21. Collection method

About 70% of supply and demand for Brazil's energy is obtained through administrative records (systematic reports). 25% are determined via online poll with more than 500 energy self-producers establishments, and the others 5% are inferred with statistical methods.

1.22. Survey participation/response rate

2. The statistical production process

2.1. Data Capture and storing

The respondent company, part of 25% of total energy data, accesses Internet-based questionnaires, using forms corresponding to the economic activity of each energy facility. Thus, the number of forms is the number of facilities and not the number of companies surveyed.

2.2. Data editing

An often used routine is comparing data from one year to the same data from previous years.

Another method is the analysis of data consistency within the energy matrix, in the same year. For example, statistical adjustments in less significant data of energy supply and demand and thermal efficiency compatibility in transformation centers.

2.3. Imputation

The criteria for quality control of data are variable and may not be greater or less than 10% for the most representative figures of the energy matrix.

2.4. Analytical methods

3. Dissemination

3.1. Publications and additional documentation

The BEB is disseminated on a free printed publication and on line, on the websites of MME and EPE, in two different forms: PDF and Excel files.

The Brazilian energy data, since 1970, are available on the following roots:

MME
www.mme.gov.br / Publicações / Balanço Energético Nacional

PDF Version (Portuguese and English): “2 - BEN 2011 - Ano Base 2010 (PDF)” / Buscar / 2.1 - BEN 2011 - Completo em Português/Inglês

Excel Files (Portuguese): “4 - Séries Históricas” / Buscar / 4.10.3 - Tabelas Completas - Séries Históricas

EPE
PDF Version: https://ben.epe.gov.br/BENRelatorioFinal2011.aspx / Click in “Versão em PDF”

Excel Files: https://ben.epe.gov.br/BENSeriesCompletas.aspx

3.2. Revisions

In 1980 it was adopted an international methodology proposed by the International Organization of Latin American Energy -OLADE (related data), retroactively to 1970.

From 1975 to 1992, were set up working groups and committees to coordinate the BEB activities, and technical notes have been prepared with the criteria of debugging data.

From 1993 to 2004 the MME fully assumes the development of BEB and are instituted consultations to administrative records from the primary agents, direct data collection from self-producers and methods of statistical estimations.

3.3. Microdata

The microdata are stored in Excel spreadsheets, and are available on line for free scientific and/or public use.

3.4. Confidentiality

The data obtained from industrial and commercial establishments are released only in aggregate form. This is the only limitation of the data published in the Brazilian Energy Balance.

4. Quality

4.1. Relevance

The high level of disaggregation of energy sources and the activities of Brazil's energy matrix allows you to answer very satisfactorily to the interests of users.

4.2. Accuracy

For the survey data 95% of energy demand in Brazil may be said that the error statistics are virtually nonexistent. For the remaining 5% is estimated that there may be errors around 20%.

4.3. Timeliness and punctuality

The Brazilian Energy Balance is disclosed in the second half of the year following the year of reference.

In the first quarter of the year following the year of reference is prepared a review of energy to preliminary data of the main variables

4.4. Accessibility

4.5. Comparability

When it identifies any non-compliance statistics are seeking to address the entire series in order to avoid structural break. The changes are accompanied by a technical note.

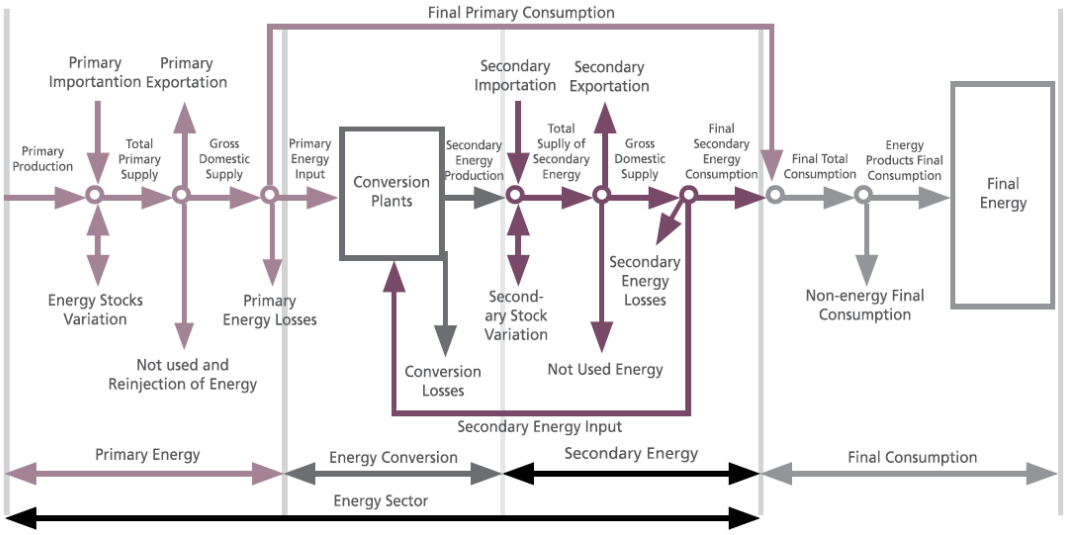
4.6. Coherence and consistency

In general, monthly data are always revised in order to preserve consistency with the data annualized.

5. Outlook

⇨ Annexes

Illustrations and flowcharts



Example of publication tables

	Automotive Gasoline	Aviation Gasoline	LPG	Naphta	Lighting Kerosene	Jet Fuel	Coke Gas	Coal Coke	Uranium (Contained in UO_2)	Electricity
	mil m^3	mil m^3	mil m^3	mil m^3	mil m^3	mil m^3	milh m^3	mil t	t	GWh
Production	0	0	0	0	0	0	0	0	0	0
Imports	505	6	3,123	6,714	0	1,923	0	1,801	48	35,906
Stock Variations	-50	-16	-70	-140	-9	-284	0	-1,900	-61	0
Total Supply	455	-10	3,053	6,574	-9	1,639	0	-99	-13	35,906
Exports	-762	-11	-8	0	0	-2,405	0	0	0	-1,257
Non-Utilized	0	0	0	0	0	0	0	0	0	0
Reinjection	0	0	0	0	0	0	0	0	0	0
Gross Domestic Supply	-306	-21	3,045	6,574	-9	-766	0	-99	-13	34,648
Total Transformation	23,067	90	9,570	3,036	24	4,665	3,435	9,189	13	509,223
Oil Refineries	21,506	90	7,680	7,354	24	4,665	0	0	0	0
Natural Gas Plants	0	0	1,790	0	0	0	0	0	0	0
Gasification Plants	0	0	0	0	0	0	0	0	0	0
Coke Plants	0	0	0	0	0	0	3,717	9,189	0	0
Nuclear Cycle	0	0	0	0	0	0	0	0	64	0
Public Service Power Plants	0	0	0	0	0	0	0	0	-51	445,519
Self-Producers Power Plants	0	0	0	0	0	0	-282	0	0	63,704
Charcoal Power Plants	0	0	0	0	0	0	0	0	0	0
Distilleries	0	0	0	0	0	0	0	0	0	0
Other Transformations	1,561	0	99	-4,317	0	0	0	0	0	0
Losses in Distribution and Storage	0	0	-10	-30	0	-20	-130	-15	0	-88,211
Final Consumption	22,760	70	12,604	9,583	15	3,878	3,290	9,073	0	455,660
Non-Energy Final Consumption	0	0	0	9,583	7	0	0	0	0	0
Energy Final Consumption	22,760	70	12,604	0	8	3,878	3,290	9,073	0	455,660
Energy Sector	0	0	25	0	0	0	427	0	0	21,517
Residential	0	0	10,307	0	5	0	0	0	0	108,457
Commercial	0	0	487	0	0	0	0	0	0	68,192
Public	0	0	623	0	0	0	0	0	0	37,016
Agricultural And Livestock	0	0	13	0	0	0	0	0	0	17,572
Transportation - Total	22,760	70	0	0	0	3,878	0	0	0	1,662
Highways	22,760	0	0	0	0	0	0	0	0	0
Railroads	0	0	0	0	0	0	0	0	0	1,662
Airways	0	70	0	0	0	3,878	0	0	0	0
Waterways	0	0	0	0	0	0	0	0	0	0
Industrial - Total	0	0	1,149	0	3	0	2,862	9,073	0	201,243
Cement	0	0	8	0	0	0	0	69	0	5,008
Pig-Iron And Steel	0	0	116	0	0	0	2,862	8,547	0	16,637
Iron-Alloys	0	0	0	0	1	0	0	156	0	7,201
Mining And Pelletization	0	0	31	0	1	0	0	82	0	8,886
Non-Ferrous And Other Metals	0	0	130	0	0	0	0	220	0	39,158
Chemical	0	0	104	0	0	0	0	0	0	25,017
Food And Beverages	0	0	173	0	0	0	0	0	0	25,455
Textiles	0	0	17	0	0	0	0	0	0	8,308
Paper And Pulp	0	0	50	0	0	0	0	0	0	19,253
Ceramics	0	0	270	0	0	0	0	0	0	3,714
Others	0	0	250	0	1	0	0	0	0	42,607
Adjustments	-1	0	0	2	0	0	-15	-2	0	0