ENERGY CONSUMPTION DATABASE

2001

INTERNATIONAL ENERGY AGENCY/OECD

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I. INTRODUCTION

I. Introduction

The SSIS[1] Energy Data Pilot Project was launched in 1995 in close collaboration between the Energy Statistics Division of the IEA and the Statistics Directorate of the OECD. Energy consumption data in manufacturing industry are collected as part of (Table 4) the annual SSIS questionnaire "Industrial Statistics". In the 48th meeting of the OECD Statistical Working Party of the Industry Committee in October 1997, the Pilot Phase of the Project came to an end and the collection of energy data has been made a permanent feature of the SSIS questionnaire.

The aims of the SSIS Energy Data Programme are:

- to establish a unified process for the collection of official manufacturing industry energy consumption data at a disaggregated level;
- to pursue review of energy efficiency indicators studies;
- to improve our understanding of where and how energy is used in the OECD Member countries;
- to provide Member countries and researchers data to allow them to make inter-country comparisons;
- to support the Secretariat's programme on energy and environment;
- to provide the information required to track progress on energy efficiency by simplifying analysis of energy efficiency trends and by providing inter-country comparisons.

The energy data presented in this volume have been collected during the Pilot phase of the project. The data contain time series of annual energy consumption in manufacturing industry for most of the OECD Member countries from 1990 to 1999 where available.

Although the consistency of the data with the methodology has been checked, discrepancies that still remain for some sectors and some countries (when known) together with explanatory notes on the collected data have been reported in the country notes section. However, there may still exist some problems which have not been identified. Consequently, we would be grateful if you could contact us about any anomaly you find in order to allow us to make corrections.

The IEA/OECD SSIS Energy Consumption Database is prepared by the Energy Statistics Division of the International Energy Agency in collaboration with the Statistics Directorate of the OECD.

Data are based on submissions from national administrations to the Secretariat.

[1] Initially called ISIS, Information System on Industrial Structures.

The IEA/OECD SSIS Energy Data Service consists two multi-dimensional databases:

1. *Manufacturing industry energy consumption in ISIC Revision 2[2] format (SSIS_ER2)*
2. *Manufacturing industry energy consumption in ISIC Revision 3[3] format (SSIS_ER3)*

Since the data are submitted in either ISIC Revision 2 or Revision 3 format, databases are not complete. Availability of SSIS Energy data by year and by ISIC revision is shown in Table 1. The latest details of these databases and SSIS Energy Data Programme Future Work Plan are described on the World Wide Web at http://iea.org/stats/files/ssis.htm.

The recommended citation for use of the SSIS Energy Data is:
SSIS Energy Data Programme, IEA/OECD, 2000.

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[2] International Standard Industrial Classification of All Economic Activities. Statistical Papers, Series M, No. 4, Rev.2, United Nations, New York, 1968.

[3] International Standard Industrial Classification of All Economic Activities. Statistical Papers, Series M, No. 4, Rev.3, United Nations, New York, 1990.

Table 1. Availability of ISIS Energy Data by Year and by ISIC Revision

	ISIC REVISION 2										ISIC REVISION 3									
	90	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**
AUSTRALIA		✓	✓	✓	✓	✓	✓	✓	✓											
AUSTRIA											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BELGIUM				✓																
CANADA											✓	✓	✓	✓	✓	✓	✓	✓	✓	
CZECH REP.														✓	✓	✓	✓		✓	✓
DENMARK											✓			✓		✓	✓	✓		✓
FINLAND	✓	✓	✓	✓	✓	✓	✓	✓	✓											
FRANCE															✓	✓	✓	✓	✓	✓
GERMANY		✓	✓	✓	✓											✓	✓	✓		
GREECE																				
HUNGARY	✓	✓	✓	✓	✓	✓	✓	✓												✓
ICELAND													✓	✓	✓	✓	✓	✓	✓	✓
IRELAND																				
ITALY																				
JAPAN											✓	✓	✓	✓	✓	✓	✓	✓	✓	
KOREA		✓	✓	✓	✓	✓	✓	✓	✓	✓										
LUXEMBOURG											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MEXICO	✓	✓	✓	✓	✓	✓	✓	✓	✓											
NETHERLANDS														✓	✓	✓				
NEW ZEALAND											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NORWAY			✓											✓	✓	✓	✓			
POLAND															✓	✓	✓	✓	✓	
PORTUGAL					✓															
SPAIN																				
SLOVAK REP.															✓	✓	✓	✓	✓	✓
SWEDEN		✓	✓	✓											✓	✓		✓	✓	
SWITZERLAND	✓	✓	✓	✓	✓	✓														✓
TURKEY			✓			✓	✓	✓												
UK											✓	✓	✓	✓	✓	✓	✓	✓	✓	
USA					✓															

II. DESCRIPTION OF THE ENERGY CONSUMPTION DATABASE

II.1 Manufacturing industry energy consumption in ISIC Revision 2 format (SSIS_ER2)

This database structure has four dimensions:

a) Countries

Country Name	Code
Australia	AUS
Austria	AUT
Belgium	BEL
Canada	CAN
Czech Republic	CZE
Denmark	DNK
Finland	FIN
Germany	DEU
Greece	GRC
Hungary	HUN
Iceland	ISL
Japan	JPN
Korea	KOR
Mexico	MEX
Netherlands	NLD
New Zealand	NZL
Norway	NOR
Poland	POL
Portugal	PRT
Sweden	SWE
Switzerland	CHE
Turkey	TUR
United Kingdom	GBR
United States	USA
Slovak Republic	SVK

b) Industry

Industry	Code
Food Beverages and Tobacco	**S3100**
Food	***S3110***
Slaughtering,preparing and preserving meat	S3111
Dairy products	S3112R
Canning, preserving of fruits and vegetables	S3113
Canning, preserving and processing of fish	S3114
Vegetable and animal oils and fats	S3115

Industry	**Code**
Grain meal products	S3116
Bakery products	S3117
Sugar factories and refineries	S3118
Cocoa, chocolate and sugar confectionary	S3119
Other food products	S3121
Prepared animal feeds	S3122
Beverages	***S3130***
Distilling, rectifying and blending of spirits	S3131
Wine industries	S3132
Malt liquors and malts	S3133
Soft drinks	S3134
Tobacco	***S3140***
Textiles, Apparel and Leather	**S3200**
Textiles	***S3210***
Spinning weaving and finishing textiles	S3211
Made-up goods excluding wearing apparel	S3212
Knitting mills	S3213
Carpets and rugs	S3214
Cordage, rope and twine	S3215
Other textiles	S3219
Wearing Apparel, Except Footwear	***S3220***
Leather and Fur Products	***S3230***
Tanneries and leather finishing	S3231
Fur dressing and dyeing industries	S3232
Leather prods. ex. footwear and wearing apparel	S3233
Footwear, Except Rubber and Plastic	***S3240***
Wood Products and Furniture	**S3300**
Wood Products, Except Furniture	**S3310**
Sawmills, planing and other wood mills	S3311
Wooden and cane containers	S3312
Other wood and cork products	S3319
Furniture, Fixtures, Excluding Metallic	***S3320***
Paper, Publishing and Printing	**S3400**
Paper and Products	***S3410***
Pulp, paper and paperboard articles	S3411
Containers of paper and paperboard	S3412
Other pulp, paper and paperboard articles	S3419
Printing and Publishing	***S3420***

Industry	Code
Chemical Products	**S3500**
Industrial Chemicals	***S3510***
Basic industrial chemicals excluding fertilizers	S3511
Fertilizers and pesticides	S3512
Synthetic resins and plastic materials	S3513
Other Chemicals.	***S3520***
Paints, varnishes and lacquers	S3521
Drugs and medicines	S3522
Soap, cleaning preparations, perfumes, cosmetics	S3523
Other chemical products	S3529
Petroleum Refineries	***S3530***
Miscellaneous Petroleum and Coal Products	***S3540***
Rubber Products	***S3550***
Tyres and tubes	S3551
Other rubber products	S3559
Plastic Products	***S3560***
Non-Metallic Mineral Products	**S3600**
Pottery, China, Earthenware	***S3610***
Glass and Products	***S3620***
Other Non-Metal Mineral Products	***S3690***
Structural clay products	S3691
Cement, lime and plaster	S3692
Other non-metallic mineral products	S3699
Basic Metal Industries	**S3700**
Iron and Steel	***S3710***
Non-Ferrous Metals	***S3720***
Metal Products, Machinery, Equipment	**S3800**
Metal Products	***S3810***
Cutlery, hand tools and general hardware	S3811
Furniture and fixtures primarily of metal	S3812
Structural metal products	S3813
Other fabricated metal products	S3819
Non-Electrical Machinery	***S3820***
Engines and turbines	S3821
Agricultural machinery and equipment	S3822
Metal and wood working machinery	S3823
Special industrial machinery	S2824
Office, computing and accounting machinery	S3825
Other non-electrical machinery and equipment	S3829
Electrical Machinery	***S3830***
Electrical industrial machinery	S3831
Radio, TV and communications equipment	S3832
Electrical appliances and housewares	S3833
Other electrical apparatus and supplies	S3839

Industry	**Code**
Transport Equipment	***S3840***
Shipbuilding	S3841
Railroad equipment	S2841
Motor vehicles	S3843
Motorcycles and bicycles	S3844
Aircraft	S3845
Other transport equipment	S3849
Professional and Scientific Equipment	***S3850***
Professional equipment	S3851
Photographic and optical goods	S3852
Watches and clocks	S3853
Other Manufacturing Industries	**S3900**
Jewelery and related articles	S3901
Musical instruments	S3902
Sporting and athletic goods	S3903
Other manufactures	S3909
Unallocated Industry	**UNALL**
Total Manufacturing	**S3000**

c) Variable

Variable	**Code**
Solid Fuels	SOLID
LPG	LPG
Distilated Oil	DISTLOIL
Residual Fuel Oil	RESID
Gas	GAS
Biomass Fuels	BIOMASS
Steam	STEAM
Electricity	ELECTR
Own Use	OWNUSE
Total Fuels	TOTAL

d) Time

Yearly data from 1990 to 1998 where available.

II.2 Manufacturing industry energy consumption in ISIC Revision 3 format (SSIS_ER3)

This database structure has four dimensions:

a) Countries

See Section II.1 a.

b) Industry

Industry	Code
Manufacture of Food products and Beverages	**C1500**
Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	***C1510***
Production, processing and preserving of meat and meat products	C1511
Processing and preserving of fish and fish products.	C1512
Processing and preserving of fruit and vegetables	C1513
Manufacture of vegetable and animal oils and fats	C1514
Manufacture of dairy products	***C1520***
Manufacture of grain mill products, starches and starch products, and prepared animal feeds	***C1530***
Manufacture of grain mill products	C1531
Manufacture of starches and starch products	C1532
Manufacture of prepared animal feeds	C1533
Manufacture of other food products, n.e.c	***C1540***
Manufacture of bakery products	C1541
Manufacture of sugar	C1542
Manufacture of cocoa, chocolate and sugar confectionery	C1543
Manufacture of macaroni, noodles, couscous and similar farinaceous products	C1544
Manufacture of other food products, n.e.c.	C1549
Manufacture of beverages	***C1550***
Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials	C1551
Manufacture of wines	C1552
Manufacture of malt liquors and malt	C1553
Manufacture of soft drinks; production of mineral waters	C1554
Manufacture of Tobacco Products	**C1600**
Manufacture of Textiles	**C1700**
Spinning weaving and finishing of textiles	***C1710***
Preparation and spinning of textile fibres; weaving of textiles	C1711
Finishing of textiles	C1712

Industry	Code
Manufacture of other textiles	***C1720***
Manufacture of made-up textile articles, except apparel	C1721
Manufacture of carpets and rugs	C1722
Manufacture of cordage, rope, twine and netting	C1723
Manufacture of other textiles, nec	C1729
Manufacture of knitted and crocheted fabrics and articles	***C1730***
Manufacture of Wearing Apparel, Dressing and Dyeing of Fur	**C1800**
Manufacture of wearing apparel, except fur apparel	***C1810***
Dressing and dyeing of fur; manufacture of articles of fur	***C1820***
Tanning and Dressing of Leather, Manufacture of Luggage, Handbags, Saddlery Harness and Footwear	**C1900**
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	***C1910***
Tanning and dressing of leather.	C1911
Luggage, handbags and the like, saddlery and harness	C1912
Manufacture of footwear.	***C1920***
Manufacture of Wood and of Products of Wood and Cork, Except Furniture, Manufacture of Articles of Straw and Plaiting Materials	**C2000**
Sawmilling and planing of wood	***C2010***
Manufacture of products of wood, cork, straw and plaiting materials	***C2020***
Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board and other panels and boards.	C2021
Manufacture of builders' carpentry and joinery.	C2022
Manufacture of wooden containers	C2023
Manufacture of other products of wood; articles of cork, straw and plaiting materials	C2029
Manufacture of Paper and Paper Products	**C2100**
Manufacture of pulp, paper and paperboard	C2101
Manufacture of corrugated paper and paperboard and containers of paper and paperboard	C2102
Manufacture of other articles of pulp and paperboard	C2109
Publishing, Printing and Reproduction of Recorded Media	**C2200**
Publishing	***C2210***
Publishing of books, brochures, musical books and other publications	C2211
Publishing of newspapers, journals and periodicals.	C2212
Publishing of recorded media	C2213
Other publishing	C2219
Printing and service activities related to printing	***C2220***
Printing	C2221
Service activities related to printing	C2222
Reproduction of recorded media	***C2230***
Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	**C2300**
Manufacture of coke oven products	***C2310***
Manufacture of refined petroleum products	***C2320***
Processing of nuclear fuel	***C2330***

Industry	Code
Manufacture of Chemicals and Chemical Products	**C2400**
Manufacture of basic chemicals	***C2410***
Manufacture of basic chemicals, except fertilizers and nitrogen compounds	C2411
Manufacture of fertilizers and nitrogen compounds	C2412
Manufacture of plastics in primary forms and synthetic rubber	C2413
Manufacture of other chemical products	***C2420***
Manufacture of pesticides and other agro-chemical products.	C2421
Manufacture of paints, varnishes and similar coatings, printing ink and mastics	C2422
Manufacture of pharmaceuticals, medicinal chemicals and botanical products	C2423
Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations.	C2424
Manufacture of other chemical products, n.e.c	C2429
Manufacture of man-made fibres	***C2430***
Manufacture of Rubber and Plastics Products	**C2500**
Manufacture of rubber products	***C2510***
Manufacture of rubber tyres and tubes; retreating and rebuilding of rubber tyres	C2511
Manufacture of other rubber products	C2519
Manufacture of plastic products	***C2520***
Manufacture of Other Non-Metallic Mineral Products	**C2600**
Manufacture of glass and glass products.	***C2610***
Manufacture of non-metallic mineral products, n.e.c	***C2690***
Manufacture of non-structural non-refractory ceramic ware (Pottery, china and earthenware)	C2691
Manufacture of refractory ceramic products	C2692
Manufacture of structural non-refractory clay and ceramic products	C2693
Manufacture of cement, lime and plaster.	C2694
Manufacture of articles of concrete, cement and plaster	C2695
Cutting, shaping and finishing of stone	C2696
Manufacture of other non-metallic mineral products, nec.	C2699
Manufacture of Basic Metals	**C2700**
Manufacture of basic iron and steel.	***C2710***
Manufacture of basic precious and non-ferrous metals	***C2720***
Casting of metals.	***C2730***
Casting of iron and steel	C2731
Casting non-ferrous metals.	C2732
Manufacture of Fabricated Metal Products Except Machinery and Equipment	**C2800**
Manufacture of structural metal products, tanks, reservoirs and steam generators	***C2810***
Manufacture of structural metal products	C2811
Manufacture of tanks, reservoirs and containers of metal.	C2812
Manufacture of steam generators, except central heating hot water boilers	C2813
Manufacture of other fabricated metal products; metal working service activities	***C2890***
Forging, pressing, stamping and roll-forming of metal; powder metallurgy.	C2891
Treatment and coating of metals; general mechanical engineering on a fee or contract basis	C2892
Manufacture of cutlery, hand tools and general hardware.	C2893
Manufacture of other fabricated metal products, n.e.c.	C2899

Industry	Code
Manufacture of Machinery and Equipment, n.e.c	**C2900**
Manufacture of general purpose machinery	***C2910***
Manufacture of engines and turbines, except aircraft, vehicle and cycle engines.	C2911
Manufacture of pumps, compressors, taps and valves.	C2912
Manufacture of bearings, gears, gearing and driving elements	C2913
Manufacture of ovens, furnaces and furnace burners	C2914
Manufacture of lifting and handling equipment	C2915
Manufacture of other general purpose machinery	C2919
Manufacture of special purpose machinery	***C2920***
Manufacture of agricultural and forestry machinery	C2921
Manufacture of machine-tools	C2922
Manufacture of machinery for metallurgy	C2923
Manufacture of machinery for mining, quarrying and construction.	C2924
Machinery for food, beverage and tobacco processing	C2925
Manufacture of machinery for textile, apparel and leather production	C2926
Manufacture of machinery for weapons and ammunition.	C2927
Manufacture of other special purpose machinery.	C2929
Manufacture of domestic appliances, n.e.c	***C2930***
Manufacture of Office, Accounting and Computing Machinery	**C3000**
Manufacture of Electrical Machinery and Apparatus, n.e.c.	**C3100**
Manufacture of electric motors, generators and transformers	***C3110***
Manufacture of electricity distribution and control apparatus	***C3120***
Manufacture of insulated wire and cable.	***C3130***
Manufacture of accumulators, primary cells and primary batteries	***C3140***
Manufacture of electric lamps and lighting equipment	***C3150***
Manufacture of other electrical equipment, n.e.c.	***C3190***
Manufacture of Radio, Television and Communication Equipment and Apparatus	**C3200**
Manufacture of Electronic valves and tubes and other electronic components	***C3210***
Manufacture of television & radio transmitters, apparatus for line telephony and line telegraphy	***C3220***
Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods	***C3230***
Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	**C3300**
Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments.	***C3310***
Manufacture of medical and surgical equipment and orthopaedic appliances.	C3311
Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment.	C3312
Manufacture of industrial process control equipment.	C3313
Manufacture of optical instruments and photographic equipment	***C3320***
Manufacture of watches and clocks	***C3330***

Industry	Code
Manufacture of Motor Vehicles, Trainers and Semi-Trailers	**C3400**
Manufacture of motor vehicles	***C3410***
Manufacture of bodies (coachwork) for motor vehicles; manuf. of trailers and semi-trailers	***C3420***
Manufacture of parts and accessories for motor vehicles and their engines	***C3430***
Manufacture of Other Transport Equipment	**C3500**
Building and repairing of ships and boats	***C3510***
Building and repairing of ships.	C3511
Building and repairing of pleasure and sporting boats	C3512
Manufacture of railway and tramway locomotives and rolling stock	***C3520***
Manufacture of aircraft and spacecraft.	***C3530***
Manufacture of transport equipment, n.e.c.	***C3590***
Manufacture of motorcycles	C3591
Manufacture of bicycles and invalid carriages	C3592
Manufacture of other transport equipment, nec.	C3599
Manufacture of Furniture, Manufacturing, n.e.c.	**C3600**
Manufacture of furniture.	***C3610***
Manufacturing, n.e.c.	***C3690***
Manufacture of jewelery and related articles	C3691
Manufacture of musical instruments	C3692
Manufacture of sports goods.	C3693
Manufacture of games and toys.	C3694
Other manufacturing, n.e.c.	C3699
Recycling	**C3700**
Recycling of metal waste and scrap	***C3710***
Recycling of non-metal waste and scrap	***C3720***
Unallocated Industry	**UNALL**
Total Manufacturing	**C15_37**

c) Variable

See Section II.1 c.

d) Time

See Section II.1 d.

III. DEFINITIONS

III.1 Methodology

The type of energy data collected by the International Energy Agency (IEA) since it was established in 1974 has largely reflected the energy security concerns of its Member countries. IEA collects data on energy consumption in industry in five annual questionnaires (*Oil, Solid Fuels, Natural Gas, Renewables and wastes,* and *Electricity and Heat*) in a format designed to facilitate the construction of national energy balances. In these questionnaires, the use of fuels by industrial enterprises for transport, for the production of other fuels (i.e. for transformation), and for own consumption in energy producing industries, is not included in final consumption and allocated to the specific industry, but combined and reported separately as Transport, Transformation, Energy Sector etc. The SSIS energy data programme overcomes this shortcoming by requiring all uses of fuels to be reported by the actual consuming industry.

In addition, the SSIS Energy Data Programme has other advantages: By allowing for detailed analyses of energy demand in industry, it reveals opportunities for improving energy efficiency, as well as providing the information required to track progress on the energy efficiency front. Since it has a unified data collection methodology, the data are consistent and internationally comparable. Consistency of the SSIS energy data with OECD economic statistics provides a key tool to link economic and energy variables. Finally, its structure allows for energy efficiency studies in disaggregated manufacturing industry. IEA data are available in 2 digit ISIC level for manufacturing industry; SSIS data are available in 4 digit (in ISIC Revision 2 and/or Revision 3). It is therefore possible to calculate energy efficiency indicators for a number of manufacturing industry groups that can be classified according to different aggregation schemes, e.g., based on technology, wages, orientation, skills and environmental pollution.

A comparison of the IEA and SSIS approaches is illustrated in a schematic representation set out below.

SSIS Methodology:

Energy consumption in a manufacturing industry (in ISIS)	=	Energy consumption for	the actual ***production*** activity + energy ***transformation*** activity + ***own use*** (of energy in transformation processes) + ***transportation*** activity	in the industry

IEA Methodology:

Energy consumption in a manufacturing industry (in IEA)	=	Energy consumption for	the actual ***production*** activity	in the industry

Production *activity* comprises the use of purchased primary and secondary fuels that are not transformed (i.e. disappear) in the production activity.

Transformation comprises the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke; crude oil to petroleum products; heavy fuel oil to electricity; PCI coal, coke oven coke; natural gas and oil to blast furnace gas or coke oven gas; fuel inputs to electricity/heat etc.).

Own use refers to the primary and secondary energy consumed during transformation. It covers energy consumed for: heating; lighting; operation of all equipment used in the extraction process; traction; and distribution.

Transportation (on-site) relates to the movement of materials by pipeline, road, railway, air and internal navigation.

In other words, the energy data in the SSIS Energy Database covers the amount of primary and secondary fuels purchased to support the activity of the industry in question. Moreover, if the transformation output is sold to third parties (including electricity and steam) then the corresponding inputs are reduced accordingly if known. In addition, the quantity of electricity consumed and the quantity of electricity produced on-site for its own use are asked for separately. Therefore, "Electricity" refers to purchased electricity plus electricity that is generated and is consumed on-site, whereas "steam" refers to purchased steam only.

III.2 Non-Energy Use

SSIS Energy Data excludes the quantities of fuels used for non-energy purposes[4] and quantities of fuels purchased but resold. Non-energy use includes the use of energy products as raw materials (such as white and industrial spirits, lubricants, bitumen and petroleum waxes) in different sectors; that is, those not consumed as a fuel or transformed into another fuel.

III.3 Units

The energy content of a fuel can be measured as the heat released on complete combustion. This energy content is referred to as a fuel's calorific value (or heat content), and it can be expressed as a gross (or higher) value, or a net (or lower) value. The burning of fossil fuels includes a loss of energy through the combination of hydrogen and oxygen and the vaporisation of water. The heat value of fossil fuels before vaporisation is the Gross Calorific Value (GCV). The Net Calorific Value (NCV) is the amount of heat which is actually available from the combustion process for capture and end use, after the evaporation of moisture. Except electricity, the data are expressed in terms of **Terajoules** (TJ**) using Net Calorific Values** (NCV) of individual fuel types. The unit of electricity is Megawatt hours (MWh). 1 MWh = 0.0036 TJ.

[4] Non-energy uses of fuels covers their use i) as raw material for the manufacture of, for example, plastics or fertilizers, ii) for their specific physical properties (such as white spirit, paraffin waxes, lubricants and bitumen) as lubricants or roofing materials, iii) for their chemical properties (petrochemical feedstocks).

III.4 Variables

- ***Solid Fuels*** **(Solid)** include anthracite, steam coal, coking coal, sub-bituminous coal, lignite, peat, gas coke, coke oven coke, patent fuel, BKB (Braunkohlenbrikettes), petroleum coke.
- ***Liquefied Petroleum Gas*** **(LPG)** includes ethane, propane, and butane.
- ***Distillate Oils and Others*** **(Distiloil)** include naphtha, gasolines (motor, aviation), kerosene, jet fuel (gasoline or kerosene type), gas oil/diesel oil, other petroleum products.
- ***Gas*** **(Gas)** includes natural gas, coke oven gas, blast furnace gas, refinery gases, gas works gas, oxygen steel furnace gas.
- **B*iomass fuels*** **(Biomass)** include wood and wood wastes, ethanol, black liquor, sludge/sewage gases, landfill gas, animal products and waste, industrial waste, and municipal waste.
- ***Steam*** **(Steam)** includes heat.
- ***Electricity*** **(Electr)** includes production from solar, hydro, wind and geothermal on-site)
- *of which generated on site for* ***own use*** **(own use)**
- ***Total*** = Solid + LPG + Distiloil + RFO + Gas + Biomass + Steam + (Electr - Own use)

Note that the original unit of the term (Electr - Own use) is MWh. In calculating the equation above this term is converted into TJ. 1 MWh = 0.0036 TJ.

III.5 Country Notes

SSIS Energy Data are collected in 4-digit ISIC Revision 2 and/or ISIC Revision 3.

The first character in the industry sector code specifies to which ISIC Revision that sector belongs. The industry sector codes beginning with the letter "S" in the database indicates ISIC Revision 2 and "C" indicates ISIC Revision 3.

AUSTRALIA

• General notes on collected data

Data are available from 1991 to 1998 in ISIC 2.

Australian data submission to the IEA refers to the fiscal year July to June. Therefore, July 1994 to June 1995, for example, is considered as 1995.

Ethane is classified as GAS.

No available data for transportation in manufacturing industry.

Biomass includes bagasse.

ISIC Sector S3119, S3122, S3114 are included in S3118.

• Source of SSIS energy data

Australian Bureau of Statistics using FES (fuel and electricity survey).

• Publications

Australian energy consumption and production; historical trends and projections to 2009/10. Reports data collected in *FES*. Historical data set: 1973-1994, 1994-2010 (forecast). Data refer to fiscal year.

AUSTRIA

• General notes on collected data

Data are available from 1990 to 1999 in ISIC 3.

C15 includes C16.
C17 includes C18 from 1996 onward.
C20 includes C36 up to 1996.
C24 includes C25 up to 1996.
C29 includes C369.
C28 includes C273, C33 up to 1996.
C30 includes C31, C32, C33 (from 1996 onward).
C34 includes C35.
C36 includes C37 from 1996 onward.

Except refining industry, transformation input is added to the final consumption. The assumption made is that establishments do not sell their transformed outputs to other establishments.

From 1996 onward, the industrial classification system was changed from Betriebsystematik 68 to NACE: some breaks may occur between 1995 and 1996.

• Source of SSIS energy data

Austrian Central Statistics Office (ÖSTAT)

Concordance between Austrian Classification System (Betriebsystematik 68) and ISIC rev 3.

(10) manuf. of food, beverages and tobacco	ISIC 15,16
(11) manuf. of textiles, textile products	ISIC 17
(12) manuf. of wearing apparel and bedding	ISIC 18
(13) manuf. of leather, leather substitutes and footwear	ISIC 19
(14) manuf. of wood and wooden sheets	ISIC 20
(15) manuf. and processing of paper and paper prod.	ISIC 21
(16) printing and reproduction	ISIC 22
(17) manuf. of chemicals, rubber and plastic products	ISIC 24, 25
(18) manuf. of derivatives of oil and natural gas	ISIC 23
(19) manuf. of glass and glass products	ISIC 26(1)
(20) iron and non-iron basic industry, semi-final products	ISIC 271, 272
(21) metal processing, steel and light metal construction	ISIC 273
(22) manuf. of metallic products	ISIC 28
(23) manuf. of measurement and control equipment, medical and optical goods	ISIC 33
(24) manuf. of machinery except electrical	ISIC 29,369
(25) manuf. of electrotechnik apparatus	ISIC 30-32
(26) manuf. of transport equipment	ISIC 34,35

• Publications

Energieversorgung Österreich: Entgültige Energiebilanz 19XX, ÖSTAT

BELGIUM

• General notes on collected data

Data are available for 1993 in ISIC 2.

Refinery gas is included in Distillate oils.

• Source of SSIS energy data

Bilans Annuels Detaillés, Ministère des Affaires Economiques

• Publications

Energie en Belgique 19XX, Ministère des Affaires Economiques

CANADA

• General notes on collected data

Data are available from 1990 to 1998 in ISIC 3. In 2000, the time series have been updated from 1990.

Coke oven gas is included in Solid fuels.

• Source of SSIS energy data

Office of Energy Efficiency - Natural Resources Canada

• Publications

Quarterly Report on Energy Supply - Demand in Canada, Natural Resources Canada.

CZECH REPUBLIC

• General notes on collected data

Data are available from 1993 to 1996 and from 1998 to 1999 in ISIC 3.

The coding of ISIC rev. 3 and CZ-NACE is identical down to the 2nd digit. The ISIC may differ from the 3rd digit down. The CZ-NACE is more detailed than ISIC and several CZ-NACE codes are usually embraced in one ISIC code.

• Source of SSIS energy data

Czech Statistical Office

• Publications

The Fuel and Energy Annual consumption data are published in an internal working CSO publication Consumption of fuels in XXXX (year).

DENMARK

• General notes on collected data

Data are available for 1990, 1993, 1995, 1996, 1997, 1999 in ISIC 3 (Statistics Denmark makes industry surveys every 2 or 3 years).

C1511 includes C1552
C1549 includes C1544
C2222 includes C2230
C2429 includes C2430 and 2421
C2519 includes C2511
C2691 includes C2692
C271 includes C2731
C272 includes C2732
C2912 includes C2911
C2929 includes C2923 and C2927
C3599 includes C3520
C2699 includes C2693

The data include sold electricity and steam which corresponds to less than five percent of total electricity and steam consumption.

• Source of SSIS energy data

Danmarks Statistik

• Publications

Statistiske Efterretninger, Industri og Energi, Statistics Denmark

FINLAND

• General notes on collected data

Data are available from 1990 to 1998 in ISIC 2.

The data in Energy and Emissions, Statistics Finland, have been converted to the SSIS format by making some adjustments (the fuel inputs have been adjusted to the electricity and steam sold to third parties).

• Source of SSIS energy data

Statistics Finland

• Publications

Yearbook of Industrial Statistics Volume 1, Statistics Finland.

Energy and Emissions, Statistics Finland.

FRANCE

• General notes on collected data

Data are available from 1994 to 1999 in ISIC 3.

Consumption of combustible fuels is not calculated from primary fuels.

The energy consumption in the following sectors is confidential: basic chemicals and non-ferrous metals.

• Source of SSIS energy data

Ministère de l'Economie, des Finances et de l'Industrie, Secrétatriat d'Etat à l'Industrie.

• Publications

Tableaux des consommations d'énergie en France et Les Consommations d'énergie dans l'industrie

GERMANY

• General notes on collected data

Data are available from 1991 to 1994 in ISIC 2 and from 1995 to 1997 in ISIC 3.

For 1991, only electricity consumption is available.

S3211 is included in S3215 for 1994
S3219 is included in S3214 for 1992, 1993, 1994
S3419 is included in S3412 for 1993, 1994
S3540 is included in S3530 for 1992, 1993, 1994
S3529 is included in S3521 for 1992, 1993, 1994
S3819 and S3845 are included in S3800 for 1992
S3829 is included in S3821 for 1993, 1994
S3901 is included in S3909 for 1993, 1994

Data for LPG, Biomass, Steam and Own use are not available.

Heavy Fuel Oil includes medium fuel oil.

• Source of SSIS energy data

Monthly Report on Mining and Manufacturing, Central Statistical Office

• Publications

Energie Daten, Bundesministerium fuer Wirtschaft

Produzierendes Gewerbe, Statistisches Bundesamt

Ausgewaelte Zahlen zur Energiewirtschaft, Statistisches Bundesamt

HUNGARY

• General notes on collected data

Data are available from 1990 to 1997 in ISIC 2 and for 1999 in ISIC 3.

TEOR (Hungarian industry classification system) was changed in 1992. The new system TEOR 92 is compatible with ISIC but the old system, TEOR 87, is not. Moreover, there is no direct concordance between TEOR 87 and TEOR 92.

Peat is reported in LPG.

• Source of SSIS energy data

Energy Information Agency

• Publications

Statistical Yearbook

ICELAND

• General notes on collected data

Data are available from 1992 to 1999 in ISIC 3.

In 2000, the time series have been updated from 1992. Only electricity consumption for ISIC breakdown is available.

• Source of SSIS energy data

National Energy Authority

JAPAN

• General notes on collected data

Data are available from 1990 to 1998 in ISIC 3.

In 2000, the time series have been updated from 1990, as they revised the source material of 'the structural survey of Energy Consumption in Commerce and Manufacturing': some breaks may occur with the last publication of SSIS.

Crude oil and Oil produced by conversion are added to 'Distillate oils and others'.

Natural gas liquid is added to 'Gas'.

Collected black liquor is added to 'Biomass Fuels'.

The amount of steam generated in the establishment by the steam boiler, which is converted into the calorific value, is applied to 'Steam'.

The amount of consumption electric power in the establishment is applied to 'Electricity'. As for 'Electricity of which generated on site for own use', all the electric power of private power generation such as heat, waterpower, co-generation system and others (the electric power generated inside the establishment such as geothermal generation) is included.

• Source of SSIS energy data

MITI

• Publications

Handbook of Energy & Economic Statistics in Japan, The Energy Conservation Centre.

Structural Survey of Energy Consumption in Commerce, Mining and Manufacturing

Overall Energy Statistics Yearbook, called the Red Book "AKAHON".

KOREA

• General notes on collected data

Data are available from 1991 to 1999 in ISIC 2.

Electricity figures are only given for 2 digit sectors.

The other energy variables are given for 2 digit sectors from 1997 onwards.

Until 1996, feedstocks consumption is not available.

• Source of SSIS energy data

Korea Energy Economics Institute (KEEI)

• Publications

Yearbook of Energy Statistics

LUXEMBOURG

• General notes on collected data

Data are available from 1990 to 1999 in ISIC 3.

In 2000, the time series have been updated from 1990.

Only the total energy consumption is available for: Steel, Metal transformation, Chemical, Non-Metallic mineral, Food beverages and tobacco.

• Source of SSIS energy data

Fédération des Industries Luxembourgeoises

• Publications

Rapport d'activité, Ministère de l'Energie

MEXICO

• General notes on collected data

Data are available from 1990 to 1998 in ISIC 2.

The figures for own use in sector S3909 prior to 1993 include mining & construction.

Own use figures are not available before 1993.

Consumption figures reported for the years 1990-1993 in petroleum refineries (S3530) should be reported in S3511.

• Source of SSIS energy data

Table: Consumo de energia en el sector industrial por rama de actividad (net TJ), Ministry of Energy and Public Industry

• Publications

Balance Nacional de Energia

NETHERLANDS

• General notes on collected data

Data are available from 1993 to 1995 in ISIC 3.

Data are taken from column 17 of "de nederlandse energihuishouding deel 1" of the Central Bureau of Statistics. Own use electricity consumption is taken from column 13.

Table 3.1.1 Food, beverages and tobaccoC15 (ISIC Rev3)
Table 3.1.2 Textile, clothes and leather industryC17
Table 3.1.3 Paper industry, printing and publishing C21
Table 3.1.4 Fertilizer industry C2412
Table 3.1.5 Organic Chemicals industry C2411

Table 3.1.6 Anorganic Chemicals industry C2411
Table 3.1.7 Other basic chemicals industry C2420
Table 3.1.8 Chemical products industry C2411
Table 3.1.9 Building materials industry C26
Table 3.1.10 Iron and steel industry C271
Table 3.1.11 Non-ferro metals industry C272
Table 3.1.12 Metal products industry C28
Table 3.1.13 Plastics, rubber C25
Table 3.1.19 Non specified manufacturing C3699
Table 2.2.2 Refineries C2320

• Source of SSIS energy data

Survey on the production (conversion) and consumption of energy, Statistics Netherlands

• Publications

The data of the first survey are published in "Energy supply in the Netherlands" part 1, chapters 2, 3 (energy balances) and part 2, chapter 5, tables 5.3 through 5.6. Part 1 gives energy consumption figures sector by sector in a very detailed form (including transformation and production activity, and identifies non-energy use) .

NEW ZEALAND

• General notes on collected data

Data are available from 1990 to 1999 in ISIC 3.

Electricity used in the manufacturing sector is reported for fiscal years running from April to March.

The updated "Own Use" data cover what is called "co-generation" or Combined Heat Power (CHP). A more detailed database on this from 1995 onwards is now available which provides comparable data for the period 1995-1999. Similar data is not available prior to 1995.

In C2320, Gas contains the loss of natural gas to synthetic petrol conversion. It is related to synthetic gasoline production since February 1997.

In C2411, Gas includes the loss of natural gas to AA methanol conversion.

The figures for activities that can not be correctly allocated to the appropriate industry were put in CERR1 in the database. These figures were submitted as "unallocated" by New Zealand Officials.

Several missing values for the sectors C2890 and C3310 are included in "CERR1" which is unallocated industry.

The data for 1990 to 1994, which were in ISIC Revision 2 in previous publication, are converted to ISIC Revision 3 by the Secretariat.

• Source of SSIS energy data

Statistics New Zealand

• Publications

*Energy Data File, Ministry of Commerce***:** Energy consumption figures for 9 industries (including construction) are given in gross PJ in energy supply and demand balance tables.

NORWAY

• General notes on collected data

Data are available for 1992 in ISIC 2 and from 1993 to 1997 in ISIC 3.

Steam data are available after 1995.

Transformation is not included. Own use is included only for petroleum refineries.

• Source of SSIS energy data

Statistics Norway. The consumption figures for the most of the products are taken from NOS (official statistics of Norway) Industry/Manufacturing and Electricity statistics.

• Publications

Manufacturing Statistics, Statistics Norway.

Energy Statistics, Statistics Norway.

POLAND

• General notes on collected data

Data are available from 1994 to 1998 in ISIC 3.

Consumption refers to direct consumption and transformation input.

• Source of SSIS energy data

Central Statistical Office

• Publications

Gospodarka paliwowo-energetyczna

PORTUGAL

• General notes on collected data

Data are available for 1994 in ISIC 2.

Biomass and electricity in 1994: S3220 includes S3240, S3510 includes S3520 and S3560

• Source of SSIS energy data

Instituto Nacional de Estatistica

SLOVAK REPUBLIC

• General notes on collected data

Data are available from 1994 to 1999 in ISIC 3.

Disggregated sectors may not add up to aggregated sectors since some 3 or 4 digit sectors are included in 2 or 3 digit sector totals.

• Source of SSIS energy data

Annual Industrial Survey, Statistical Office of the Slovak Republic.

SWEDEN

• General notes on collected data

Data are available from 1991 to 1994 in ISIC 2 and from 1994 to 1998 in ISIC 3.

LPG: Ethane is not included.

Distillate oils: Only kerosene, motor gasoline, and diesel/gas oil are included in manufacturing statistics.

Refinery gas is not included in gas.

All fuels used in transformation (and also for own use) were included for electricity but not for other energy producing industries where only purchased fuels are included, e.g. refinery gases and coke are not included for refinery industries.

Only fuels used for road transport are included.

For natural gas it is likely that gross calorific values were used.

NACE 1592 and 1597 are included in ISIC 1552

• Source of SSIS energy data

Manufacturing 19XX, official statistics of Sweden, Statistics Sweden

• Publications

Industri 19XX, Del 1, Branschdata fordelade enligt Svensk standard for naringsgrensindelning (*Manufacturing Part 1: Data by industry*), Official Statistics of Sweden (SOS), Statistics Sweden: Energy consumption data by industry and fuel type are presented in quantities and purchase values.

SWITZERLAND

• General notes on collected data

Data are available from 1990 to 1995 in ISIC 2 and for 1999 in ISIC 3.

In 1994 and 1995, S3800-S3810 are allocated to S3820-S3829.

Since the Swiss EKV survey covers up to 70% of the total energy consumption in industry, there may be some big differences between the figures reported in SSIS and *Schweizerische Gesamtenergiestatistik.*

The industry survey has changed for 1999 data. So, some breaks may occur in the series. From 1999 onwards, only fuel consumption in 10 industry sectors is available:

C15 includes C16.
C17 includes C18, C19.
C21 includes C22.
C28 includes C30, C31, C32.
C36 includes C20, C25, C33-C37.

• Source of SSIS energy data

Union suisse des consommateurs d'énergie de l'industrie et des autres branches économiques.

• Publications

Schweizerische Gesamtenergiestatistik (yearly), Bundesamt f. Energiewirtschaft

Energieverbrauch in der schweizerischen Industrie, EKV (yearly, from 1978 to 1990)

TURKEY

• General notes on collected data

Data are available for 1992 and from 1995 to 1997 in ISIC 3.

The survey for the year 1992 covers the manufacturing establishments with 25+ employees. The survey from 1995 onwards, covers only establishments with energy consumption of 500+ tonnes oil equivalent, which represents 90% of the total manufacturing industry.

• Source of SSIS energy data

State Institute of Statistics

• Publications

Energy Consumption in Manufacturing Industry.

UNITED KINGDOM

• General notes on collected data

Data are available from 1990 to 1998 in ISIC 3.

Very detailed data have been provided for 1997 and 1998.

No breakdown of the biomass figures can yet be provided and the breakdown of electricity produced on-site is very limited.

The figure for total manufacturing includes the figure for activities that can not be correctly allocated to the appropriate industry (they are put in ERR1). The fuels used in transformation activity are put in ERR1 except for the sectors C1500, C2400 and C2700. Therefore in those sectors the sum of subsectoral data may not match the figures in the main sectors.

Fuels used in transformation activity in sector C1600 are included in C1500.

Fuels used in transformation activity in sector C2200 are included in C2100.

Fuels used in transformation activity in sector C2800-C3400 are included in C3500.

• Source of SSIS energy data

Department of Trade and Industry (DTI)

• Publications

Digest of United Kingdom Energy Statistics, DTI.

USA

• General notes on collected data

Estimates for some 4-digit ISIC categories are subject to error due to low sample coverage in some population subgroups.

The data are based on Table A4 (total inputs of energy for heat, power and electricity generation) of the US Manufacturing Energy Consumption Survey (MECS).

Sector S3300 includes SIC sector 2411.

Except for sectors S3411, S3530 and S3710 petroleum coke, blast furnace and coke oven gas are included in Biomass.

Biomass includes net steam as well.

Confidential qualifier "c" includes W (withheld to avoid disclosing data for individual establishments) and Q (withheld because relative standard error is greater than 50 percent) in MECS.

• Source of SSIS energy data

Energy Information Administration

• Publications

Manufacturing Energy Consumption Survey, Energy Information Administration.

	SOLID	LPG	DISTOIL	RESID	GAS	BIOMASS	ELECTR
S3100	X	X	X		X	X	
S3112	X	X	X	X		X	X
S3112R	X	X					
S3114		X		X		X	
S3115		X					
S3116	X	X	X	X			
S3117				X		X	
S3118	X	X	X	X			X
S3119		X	X	X			
S3121	X	X					
S3122	X	X					
S3130		X	X	X		X	X
S3131		X	X	X		X	X
S3132		X	X			X	
S3133		X	X				
S3134	X	X	X			X	
S3140		X			X	X	
S3200		X				X	
S3210	X	X	X	X	X	X	
S3212	X	X	X	X		X	
S3214		X	X			X	
S3215		X	X		X	X	
S3219	X	X	X	X		X	
S3220	X	X	X	X			
S3230		X	X	X		X	
S3231		X	X			X	
S3233		X	X	X		X	
S3240		X	X	X	X		
S3300	X			X			
S3310	X	X	X	X			
S3311	X		X	X			
S3312		X	X				
S3319		X					
S3320			X	X			
S3400	X	X					
S3410	X	X					
S3419	X	X					
S3420				X			
S3500	X		X				
S3510	X	X		X	X	X	
S3511	X					X	
S3512		X					
S3513	X			X	X	X	

	SOLID	LPG	DISTOIL	RESID	GAS	BIOMASS	ELECTR
S3520	X	X	X	X	X	X	
S3521		X	X	X	X	X	
S3522		X					
S3523	X	X		X		X	
S3529		X					
S3530	X	X					
S3540	X	X					
S3550		X				X	
S3551		X					
S3559		X				X	
S3610		X	X			X	
S3620	X	X				X	
S3690	X	X		X		X	
S3691	X	X		X			
S3692		X					
S3699		X		X		X	
S3800	X	X					
S3810	X	X	X	X		X	
S3811	X	X	X			X	
S3812	X	X	X	X		X	
S3813	X		X	X		X	
S3819	X			X			
S3820	X	X	X	X		X	X
S3821	X	X		X		X	
S3822	X		X	X		X	X
S3823		X	X	X		X	
S3824	X	X		X			
S3825		X	X	X		X	
S3829	X			X			
S3830	X	X	X	X		X	X
S3831	X	X	X	X			
S3832	X	X				X	
S3833	X	X	X	X		X	X
S3839	X		X			X	
S3840	X	X	X	X	X	X	X
S3841		X			X	X	
S3842	X	X	X			X	X
S3843	X		X				
S3844		X	X	X		X	X
S3845	X	X					
S3850	X	X	X	X	X	X	X
S3851	X	X				X	
S3852	X	X	X	X		X	
S3853		X	X		X	X	X
S3900	X	X	X	X	X	X	
S3901		X	X	X	X	X	
S3902			X	X	X	X	
S3903		X	X	X	X	X	
S3909	X	X	X	X		X	

Totals are given only for the sectors where data for all fuels are available.

III.6 General Conversion Factors

General Conversion Factors for Energy

To:	**TJ**	**Gcal**	**Mtoe**	**MBtu**	**GWh**
From:	multiply by:				
TJ	1	238.8	2.388×10^{-5}	947.8	0.2778
Gcal	4.1868×10^{-3}	1	10^{-7}	3.968	1.163×10^{-3}
Mtoe	4.1868×10^{4}	10^{7}	1	3.968×10^{7}	11630
MBtu	1.0551×10^{-3}	0.252	2.52×10^{-8}	1	2.931×10^{-4}
GWh	3.6	860	8.6×10^{-5}	3412	1

Decimal Prefixes

10^{1}	deca (da)	10^{-1}	deci (d)
10^{2}	hecto (h)	10^{-2}	centi (c)
10^{3}	kilo (k)	10^{-3}	milli (m)
10^{6}	mega (M)	10^{-6}	micro (µ)
10^{9}	giga (G)	10^{-9}	nano (n)
10^{12}	tera (T)	10^{-12}	pico (p)
10^{15}	peta (P)	10^{-15}	femto (f)
10^{18}	exa (E)	10^{-18}	atto (a)