

Introductory Notes

1. The purpose of the Taiwan Energy Statistics Year Book is to provide the basic energy statistical data of Taiwan, R.O.C.
2. Users are advised to refer to the latest edition of this Year Book owing to the probable revisions on historical figures.
3. The totals might not be equal to the summations of separate items due to rounding.
4. In the Table, “-” stands for the figure being zero or not available, and “0.0” indicates the figure is too tiny to be addressed.
5. The columns of Energy Balances indicate the primary and secondary energy of various energy commodities, including 7 main categories, i.e. Coal and Coal Products, Crude Oil and Petroleum Products, Natural Gas, Biomass and Waste, Electricity, Solar Thermal, and Heat.

1. Coal and Coal Products

Col.1 (Coal & Coal Products)

= Col.2 (Bituminous Coal-Coking Coal) + Col.3 (Bituminous Coal-Steam Coal)+ Col.4 (Anthracite) + Col.5 (Sub-bituminous Coal) + Col.6 (Lignite) + Col.7 (Peat) + Col.8 (Coke Oven Coke) + Col.9 (Patent Fuel) + Col.10 (Coke Oven Gas) + Col.11 (Blast Furnace Gas) + Col.12 (Oxygen Steel Furnace Gas)

- (1) In previous format, coal was divided into indigenous coal, imported coking coal, and imported steam coal. The new format displays 6 categories of coal as illustrated, though some data are not available yet. Oxygen steel furnace gas is a new energy in new format.
- (2) The production of indigenous coal in previous Energy Balances is split into production of bituminous coal-coking coal and bituminous coal-steam coal, respectively, according to the ratio of coking and fuel use.
- (3) The coal imports of steel industry, which was classified into imported coking coal and imported steam coal in previous format, is re-categorized into coking coal, steam coal, anthracite, and sub-bituminous coal according to the quality of coal.
- (4) Volumes of coke oven gas, blast furnace gas, and oxygen steel furnace gas for cogeneration in the steel industry are estimates for early years due to lack of reliable data.

2. Crude Oil and Petroleum Products

Col.13 (Crude Oil & Petroleum Products)

= Col.14 (Crude Oil) + Col.15 (Refinery Feedstocks) + Col.16

(Additives/Oxygenates) + Col.17 (Refinery Gas) + Col.18 (LPG) + Col.20 (Natural Gasoline) + Col.21 (Naphtha) + Col.22 (Motor Gasoline) + Col.24 (Aviation Gasoline) + Col.25 (Jet Fuel-Gasoline Type) + Col.26 (Jet Fuel-Kerosene Type) + Col.27 (Kerosene) + Col.28 (Diesel Oil) + Col.29 (Fuel Oil) + Col.30 (White Spirits) + Col.31 (Lubricants) + Col.32 (Asphalts) + Col.33 (Solvents) + Col.34 (Paraffin Waxes) + Col.35 (Petroleum Coke) + Col.36 (Other Petroleum Products)

- (1) Col.19 (Propane Air, PA): Consumption of PA is included in Col.18 (LPG). This column is for reference only.
- (2) Col.23 (Unleaded Gasoline): Consumption of unleaded gasoline is included in Col.22 (Motor Gasoline) and is intended for reference only.
- (3) Columns of refinery feedstocks, additives/oxygenates, white spirits, and paraffin waxes, are new columns in new format and need to be improved in terms of completeness and accuracy.
- (4) The definition of naphtha varied in previous years. It might mean intermediate products or final products. It indicates final products in recent years.
- (5) The jet fuel is split into gasoline type and kerosene type; columns of olefins and aromatics, which are the basic petrochemical materials rather than energy products, are removed and are not shown in the new format anymore.
- (6) Some of the figures of the lubricants and other petroleum products are estimates due to different definitions by different companies.
- (7) Inter-product transfer of oil products is the quantity for reprocessing or transfer. Hence, that of naphtha is the amount for reformat gasoline; that of diesel oil is the amount transferred to LPG, and other gas oil (FCC); that of fuel oil is for LPG, gasoline, diesel oil, and others (ROC, RFCC).

3. Natural Gas

Col.37 (Natural Gas Total)

= Col.38 (Indigenous Natural Gas) + Col.39 (Imported LNG)

- (1) Natural gas has two origins: Indigenous natural gas and imported LNG with heating values 8,000 Kcal/cubic meter and 9,000 kcal/cubic meters (net heating value), respectively; they are dubbed NG (1) and NG (2) at retail side. A significant portion of NG (1) is the re-gasified part of the LNG with the heating value reduced to 8,000 kcal/cubic meter as the indigenous natural gas, and is shown as the transfers (output) of (indigenous) natural gas.
- (2) Since LNG outnumbered the indigenous natural gas year by year, the summation of indigenous natural gas and imported LNG is measured in metric ton with indigenous natural gas converted from volume to weight by its heat content equivalent to the imported LNG.

4. Biomass and Waste

Col.40 (Biomass and Waste)

= Col.41 (Biomass) + Col.45 (Waste)

Col.41 (Biomass)

= Col.42 (Solid Biomass) + Col.43 (Liquid Biomass) + Col.44 (Biogas)

- (1) Solid biomass includes bagasse, black liquor, and rice husks, which are used as fuel in CHP plants.
- (2) Liquid biomass includes biodiesel, bioethanol, and bio-fuel oil.
- (3) Biogas is formed by the digestion of landfilled and sewage waste, and used as fuel in CHP plants.
- (4) Waste includes municipal solid waste and industrial waste, which are used as fuel in CHP plants.

5. Electricity

- (1) In the latest revision, the calorific value of electricity adopted the physical energy content method (860 kcal/kWh) instead of partial substitution method.
- (2) The primary electricity, including nuclear, hydro, geothermal, solar PV and wind, are presented independently. The column of electricity only records transformation output of electricity generation and its consumption.

6. Solar Thermal

- (1) Col.52 (Solar Thermal) is the estimated energy from the installed capacity of solar heat collectors for domestic hot water or swimming pools.
- (2) The solar water heater survey has been conducted to estimate solar heat generation since 2018 due to the phase out of subsidy for solar water heating systems, however, considering that solar heat no longer meets the principle of statistical significance, its compilation has been discontinued since 2022.

7. Heat

Col.53 (Heat) shows the flow of heat produced by public cogeneration plants and that produced and sold by auto-producer cogeneration plants.

6. The rows of the Energy Balances are composed of three major parts, i.e. Supply side, Transformation side and Consumption side (including energy sector own use and total final consumption).

1. Supply side

Row1 (Indigenous Production)

- (1) This only refers to the domestic production of the primary energy.
- (2) The primary energy refers to the energy that has not been put to any conversion or transformation process, e.g. crude oil, natural gas, biomass and waste, hydro, geothermal, solar and wind power.
- (3) Overseas production of primary energy such as crude oil by domestic energy enterprises should not be included in Indigenous Production.

Row2 (Imports)

- (1) This indicates the primary and secondary energy imported from abroad.
- (2) Though the OECD/IEA considers nuclear power quasi-indigenous and therefore classifies it into indigenous production, nuclear power is deemed imports in this

Balances.

- (3) While the summation of indigenous production and imports is titled Total Energy Supply in other publications of this Bureau, it is dubbed Total Primary Energy Supply (TPES) in Japanese energy statistics. The OECD/IEA has not named the summation of indigenous production and imports.

Row3 (Exports)

This indicates the primary and secondary energy shipped to abroad.

Row4 (International Marine Bunkers)

This reflects quantities of fuel supplied to sea-going ships at the domestic harbors for destination port in foreign countries whatever their flags and category. The international marine bunkers are different from exports.

Row5 (International Civil Aviation)

This reflects quantities of fuel supplied for international civil aviation.

Row6 (Change in Stocks)

- (1) This by definition indicates the fluctuation in stocks of the primary and secondary energy between ends of two consecutive years.
- (2) The stock changes for bituminous coal-coking coal, bituminous coal-steam coal, anthracite, sub-bituminous coal, coke, crude oil, refinery feedstocks, liquefied petroleum gas (LPG), naphtha, motor gasoline, jet fuel, kerosene, diesel oil, and fuel oil, and liquefied natural gas (LNG) are basically the actual changes in stocks in recent years. For other energy products, the change in stocks is in fact the residual to balance supply and demand of that energy, as was in previous format.
- (3) Since the bituminous coal and sub-bituminous coal could not be split at the stages of storage and combustion for power industry before June 2016, they are estimates according to the ratio of imports, but are reported number thereafter. Thus, uncertainty exists in change in stocks and statistical differences for these two coals. However, the statistical difference shrinks when these two coals combined.

Row7 (Total Primary Energy Supply, TPES)

As in OECD/IEA energy statistics and equivalent to Domestic Primary Energy Supply (DPES) in Japanese energy statistics, TPES is derived by the formula:
$$\text{Row7} = \text{Row1} + \text{Row2} - \text{Row3} - \text{Row4} - \text{Row5} - \text{Row6}.$$

2. Transformation side

Row8 (Transfers(Input))

- (1) This refers to the inter-product transfer among the petroleum products. The figures reflect quantities transferred to other oil products. As for LNG, the figure reflects the quantity of LNG re-gasified to produce NG (2), and the re-gasified LNG used to produce NG (1).
- (2) Due to the complexity of the refining and petrochemical processes, and the lack of complete and accurate data as a result, some figures in this row are estimates.

Row10 (Transformation Input)

- (1) This row represents the primary and secondary energy transformed into other types of the secondary energy, such as coals transformed into cokes, coal and fuel oil into thermal power etc.
- (2) The row "Coke and Gas" in the previous format is divided into "Coke Ovens" and "Blast Furnaces".
- (3) Power generation and cogeneration are detailed into public and auto-producers. While public producers refer to the electricity plants and cogeneration plants generating for sale as main business, the auto-producers are plants generating basically for own use.
- (4) The PCI coal used in the blast furnaces, which was considered as fuel and categorized into Energy Sector Own Use in 2006 to 2008 editions, is reclassified into Transformation Input starting 2009 edition.
- (5) Fuels for auto-cogeneration producers are derived by subtracting the input equivalent of the useful heat from total fuel input.
- (6) Electricity to pump up is classified into the "Energy Sector Own Use."

Row20 (Transformation Output)

- (1) This indicates the domestic production of the secondary energy, such as the coke transformed from coking coal in coke ovens.
- (2) The efficiency of refinery is roughly obtained as the ratio of Transformation Output plus the Transfer of the Column "Crude Oil and Petroleum Products" to the Transformation Input of "Crude Oil". Theoretically, the closer to 100% the ratio, the higher the refinery efficiency.
- (3) The transformation output of the hydro power is the pumped storage power generation.
- (4) The transformation output of the electricity is the gross power generation.

Row21 (Transfers(Output))

- (1) This refers to the inter-product transfer among the petroleum products. The figures reflect quantities transferred into this oil product from other oil products.
- (2) As for (domestic) natural gas, the figure reflects the quantity of NG (1) transferred from re-gasified LNG. As for imported LNG, the figure reflects the quantity NG (2) transferred from re-gasified LNG.

3. Consumption side

【 In line with the 11th industrial classification of the Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, the classification applied in Energy Balance have been revised from 2018 to present. 】

Row22 (Energy Sector Own Use)

- (1) This indicates the quantity of own-use in each energy transformation unit or energy industry, for example, the own use or station service of coal mining, coke ovens, blast furnaces, oil & gas mining, oil refineries, electricity plants, electricity to pump up, and gas supply industry.
- (2) Since refining companies in Taiwan also operate naphtha cracking plants,

energy data of petroleum refineries contains data which should have been classified into petrochemical materials in the industrial sector.

Row33 (Total Final Consumption, TFC)

- (1) This row is the sum of energy consumption and non-energy use, that is Row 33 = Row 34 + Row 102. The energy consumption is the summation of five final consuming sectors, namely industrial, transportation, agricultural, service, and residential sectors.
- (2) The non-energy use is the quantity for use other than energy purpose.
- (3) The estimated naphtha and LPG for petrochemical feedstocks are included in industrial sector. However, the petrochemical feed stocks are classified as non-energy use starting with 2007 edition of the OECD/IEA energy statistics.

Row34 (Energy Consumption)

Energy Consumption is classified by Industrial Sector, Transportation Sector, Agricultural Sector, Service Sector, and Residential Sector. Row 34 = Row 35 + Row 73 + Row 80 + Row 83 + Row 101.

Row35 (Industrial Sector)

- (1) This includes mining (excluding coal mining, oil and gas mining), manufacturing industries (except for coal products, oil refineries), water supply, sewerage, waste management and remediation activities, and construction.
- (2) Due to industrial transformation, business diversification and collective purchasing, the industrial classification of major energy users exists uncertainty. The industry level energy consumption data should be used with caution.
- (3) Due to the lack of detailed petroleum product data, the data for the sub-industry under Chemical Materials is incomplete.

Row73 (Transportation Sector)

- (1) This includes basically the energy consumption for transport in domestic air, road, railroad, pipeline, and internal navigation (excluding international marine bunkers and international civil aviation).
- (2) Therefore, the electricity for tracks, for example, is shown in railroad while that for platform lighting and office use is included in "Services Sector\Transport Services".
- (3) The international civil aviation which appears between "International Marine Bunkers" and "Stocks Changes" starting with 2009 edition of OECD/IEA Energy Balances remains in Transportation Sector in these Balances.

Row80 (Agricultural Sector)

This includes agriculture, animal husbandry and forestry, fishing and aquaculture, as was in the old format.

Row83 (Service Sector)

This sector includes the energy consumption of the wholesale and retail, transport and storage, accommodation and food service, information and communication, finance and insurance, real estate, professional, scientific and technical, support service, public administration and defence, education, human

health and social work, arts, entertainment and recreation, etc.

Row101 (Residential Sector)

This indicates the energy consumption of households (of non-commercials).

Row102 (Non-Energy Use)

- (1) This includes the energy products for non-energy purpose such as lubricants, asphalts, and solvents, etc. Anthracites for industrial catalyst and filtering, cokes for enforcement of carbon content, are the examples of non-energy use of energy products.
- (2) Due to lack of detailed data, feedstock of Chemical Materials is for reference only.

4. Independent items

Row9 (Statistical Differences)

This row is derived by the formula: $R9=R7-R8-R10+R19-R22-R32-R33$ for those columns with actual stock changes; it is zero for columns if the stock change is the residual to keep that column balanced.

Row32 (Loss)

- (1) This represents the actual emission as waste of coke oven gas, blast furnace gas, and oxygen steel furnace gas in steel mill, and the line loss of the power transmission and distribution system.
- (2) Figures starting 2001 of line losses are actual losses and were estimated from line loss rate before 2001.

5.Memo

Row1 (Electricity Generated)

This shows the gross electricity generation split into Electricity Plants and Cogeneration Plants, as well as generation of hydro (including pumped storage production), coal, oil, natural gas, nuclear, geothermal, solar photovoltaic, and wind.

Row6 (Heat Generated)

This shows the heat generated by public cogeneration plants and that sold by auto-producer cogeneration plants.