Annex 1
Definitions of Myanmar's Energy Balance Table

Column: Energy Products

Column 1: Coal includes all coal, i.e., solid fossil fuel consisting of carbonised vegetal matter such as hard coal (coking coal, other bituminous coal, sub-bituminous coal); anthracite; lignite; and peat.

Column 2: Coal products include those derived directly or indirectly from the various classes of coal by carbonisation or pyrolysis processes, or by the aggregation of finely divided coal or by chemical reactions with oxidising agents, including water, such as coke, coke oven gas, blast furnace gas, oxygen steel furnace gas, patent fuel, coal tar, and brown coal briquette/peat briquette (BKB/PB).

Column 3: Crude oil and natural gas liquid comprise crude oil, natural gas liquids, refinery feedstocks, and additives as well as other hydrocarbons (including emulsified oils, synthetic crude oil, mineral oils extracted from bituminous minerals such as oil shale, bituminous sand, etc., and oils from coal liquefaction).

Column 4: Petroleum products comprise motor gasoline, aviation gasoline, naphtha, jet fuel, kerosene, gas/diesel oil, fuel oil, liquefied petroleum gas, refinery gas, ethane, white spirit, lubricants, bitumen, paraffin waxes, petroleum coke, and other petroleum products.

Column 5: Gas includes natural gas (excluding natural gas liquids) and gas works gas. The latter appears as a positive figure in the 'gas works' row but is not part of production.

Column 6: Hydro shows the energy content of the electricity produced in hydropower plants. Hydro output excludes output from pumped storage plants.

Column 7: Nuclear show the primary heat equivalent of the electricity produced by a nuclear power plant with an average thermal efficiency of 33%.

Column 8: Geothermal, solar, etc. show production of geothermal, solar, wind, and tide/wave/ocean energy and the use of these energy forms for electricity and heat generation. Unless the actual efficiency of the geothermal process is known, the quantity of geothermal energy entering electricity generation is inferred from the electricity production at geothermal plants assuming an average thermal efficiency of 10%. For solar, wind and tide/wave/ocean energy, the quantities entering electricity generation are equal to the electrical energy generated. Other uses shown in this column relate to geothermal and solar thermal heat.

Column 9: Other (combustible renewables and waste) comprises solid biomass, liquid biomass, biogas, industrial waste and municipal waste. Biomass is defined as any plant matter used directly as fuel or converted into fuels (e.g., charcoal) or electricity and/or heat. Included here are fuelwood and wood waste, bagasse, charcoal, other biomass, and biogas.

Municipal waste comprises wastes produced by the residential, commercial, and public service sectors that are collected by local authorities for disposal in a central location to produce heat and/or power. Hospital waste is included in this category.

Column 10: Electricity shows final consumption and trade in electricity, which is accounted at the same heat value as electricity in final consumption (i.e., 1 MWh = 0.086 toe.)

Column 11: Heat shows the disposition of heat produced for sale. Most of the heat included in this column results from the combustion of fuels although small amounts are produced from electrically powered heat pumps and boilers. Any heat extracted from ambient air by heat pumps is shown as production.

Column 12: Total equals the total of Columns 1 to 11.

Row: Energy Flow

Row 1: Indigenous production is the production of primary energy, i.e., hard coal, lignite/brown coal, peat, crude oil, natural gas liquid, natural gas, combustible renewables and waste, nuclear, hydro, geothermal, solar, and the heat from heat pumps that is extracted from the ambient environment. Indigenous production is calculated after removal of impurities (e.g., sulphur from natural gas).

Row 2/3: Imports and exports comprise amounts having crossed the national territorial boundaries of the country, whether customs clearance has taken place.

For coal: Imports and exports comprise the amount of fuels obtained from or supplied to other countries, whether an economic or customs union exists between the relevant countries. Coal in transit should not be included.

For oil and gas: Quantities of crude oil and oil products imported or exported under processing agreements (i.e., refining on account) are included. Quantities of oil in transit are excluded. Crude oil, natural gas liquid, and natural gas are reported as coming from the country of origin; refinery feedstocks and oil products are reported as coming from the country of last consignment. Re-exports of oil imported for processing within bonded areas are shown as exports of product from the processing country to the destination.

For electricity: Amounts are considered as imported or exported when they have crossed the national territorial boundaries of the country. If electricity is 'wheeled' or transited through a country, the amount is shown as both an import and an export.

Row 4: International marine bunkers cover those quantities delivered to ships of all flags that are engaged in international navigation. The international navigation may take place at sea, on inland lakes and waterways, and in coastal waters. Consumption by ships engaged in domestic navigation is excluded. The domestic/international split is determined based on the port of departure and

port of arrival, and not by the flag or nationality of the ship. Consumption by fishing vessels and by military forces is also excluded.

Row 5: International aviation bunkers include deliveries of aviation fuels to aircraft for international aviation. Fuels used by airlines for their road vehicles are excluded. The domestic/international split should be determined based on the departure and landing locations and not by the nationality of the airline. For many countries, this incorrectly excludes fuel used by domestically owned carriers for their international departures.

Row 6: Stock changes reflect the difference between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers, energy transformation industries, and large consumers. A stock build is shown as a negative number, and a stock draw as a positive number.

Row 7: Total primary energy supply (TPES) is made up of indigenous production (Row 1) + imports (Row 2) – exports (Row 3) - international marine bunkers (Row 4) - international aviation bunkers (Row 5) ± stock changes (Row 6).

Row 8: Transfers include inter-product transfers, products transferred, and recycled products (e.g., used lubricants which are reprocessed).

Row 9: Total transformation sector. Transformation is the process where the movement of part or all the energy content of a product entering a process to one or more different products leaving the process (e.g., coking coal to coke, crude oil to petroleum products, and heavy fuel oil to electricity). Total transformation sector is the sum of transformation input (negative number) and transformation output (positive number) of various energy industries.

Row 9.1: Main activity producer generates electricity and/or heat for sale to third parties as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid. Columns 1 through 9 show the use of primary and secondary fuels to produce electricity and/or heat as negative entries. Heat from chemical processes used to generate electricity will appear in Column 11. Gross electricity and/or heat produced (including power stations' own consumption) appears as a positive quantity

in the electricity and heat column. Transformation losses appear in the total column as a negative number.

Row 9.2: Auto producer undertakings generate electricity and/or heat, wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned. Columns 1 through 9 show the use of primary and secondary fuels to produce electricity and/or heat as negative entries. Heat from chemical processes used for electricity generation will appear in Column 11. Gross electricity and/or heat produced (including power stations' own consumption) appears as a positive quantity in the electricity and heat column. Transformation losses appear in the total column as a negative number.

Row 9.3: Gas processing is treated similarly to electricity generation, with the quantity produced appearing as a positive figure in the gas column, inputs as negative entries in the coal, petroleum products and gas columns, and conversion losses appearing in the total column.

Row 9.4: Refineries show the use of primary energy for the manufacture of finished petroleum products and the corresponding output. Thus, the total reflects transformation losses. In certain cases, the data in the total column are positive numbers. This can be due either to problems in the primary refinery balance, or to the fact that the International Energy Agency uses regional net calorific values for petroleum products.

Row 9.5: Coal transformation contains losses in transformation of coal from primary to secondary fuels and from secondary to tertiary fuels (hard coal to coke, coke to blast furnace gas, lignite to BKB, etc.). It is often difficult to correctly account for all inputs and outputs in energy transformation industries, and to separate energy that is transformed from energy that is combusted. As a result, in certain cases, the data in the total column are positive numbers, indicating a problem in the underlying energy data.

Row 9.6: Petrochemical Industry includes backflows from the petrochemical sector. Backflows from oil products that are used for non-energy purposes (i.e., white spirit and lubricants) are not included here, but in non-energy use.

Row 9.7: Biofuel Processing records the transformation input and output of biofuel plants, of which the input is recorded as negative and the output as positive.

Row 9.8: Charcoal Processing records the transformation of fuelwood or other vegetal matter to produce charcoal. The quantity of fuelwood or other vegetal matter input is recorded as negative, while the output of charcoal is recorded as positive number.

Row 9.9: Other Transformation covers non-specified transformation not shown elsewhere, such as the blending of other gases with natural gas.

Row 10: Loss and Own Use. Losses includes distribution and transmission losses in gas distribution, electricity transmission, and coal transport. Own use contains the primary and secondary energy consumed by transformation industries for heating, pumping, traction, and lighting purposes [ISIC4 Divisions 10-12, 23 and 40]. These quantities are shown as negative figures. Included here are, for example, own use of energy in coal mines, own consumption in power plants (which includes net electricity consumed for pumped storage) and energy used for oil and gas extraction.

Row 11: Discrepancy includes the sum of the unexplained statistical differences for individual fuels, as they appear in the basic energy statistics. It also includes the statistical differences that arise because of the variety of conversion factors in the coal and oil columns.

Row 12: Total final energy consumption (TFEC) is the sum of consumption by the different end-use sectors. Backflows from the petrochemical industry are not included in final consumption.

Row 13: Industry sector consumption is specified in the following sub-sectors (energy used for transport by industry is not included here but is reported under transport):

Row 13.1: Iron and steel industry [ISIC Group 271 and Class 2731];
Row 13.2: Chemical (incl. Petrochemical) industry [ISIC Division 24] excluding petrochemical feedstocks;

Row 13.3: Non-ferrous metals basic industries [ISIC Group 272 and Class 2732];
Row 13.4: Non-metallic minerals such as glass, ceramic, cement, etc. [ISIC Division 26];
Row 13.5: Transport equipment [ISIC Divisions 34 and 35];
Row 13.6: Machinery comprises fabricated metal products, machinery, and equipment other than transport equipment [ISIC Divisions 28 to 32];
Row 13.7: Mining (excluding fuels) and quarrying [ISIC Divisions 13 and 14];
Row 13.8: Food, beverages, and tobacco [ISIC Divisions 15 and 16];
Row 13.9: Paper, pulp, and printing [ISIC Divisions 21 and 22];
Row 13.10: Wood and wood products (other than pulp and paper) [ISIC Division 20];
Row 13.11: Construction [ISIC Division 45];
Row 13.12: Textile and leather [ISIC Divisions 17 to 19];
Row 13.13: Other industry (any manufacturing industry not included above) [ISIC Divisions 25, 33, 36 and 37].

Note: The other industry row is also used when breaking down industrial sub-sectors is difficult. This number should be treated with caution.

Rows 14: Transport sector includes all fuels used for transport [ISIC Divisions 60 to 62] except international marine bunkers and international aviation bunkers. It includes transport in the industry sector and covers domestic aviation, road, rail, pipeline transport, domestic navigation, and non-specified transport. Domestic aviation includes deliveries of aviation fuels to aircraft for domestic aviation – commercial, private, agriculture, etc. It includes use for purposes other than flying, e.g., bench testing of engines, but not airline use of fuel for road transport.

The domestic/international split should be determined based on departure and landing locations and not by the nationality of the airline. Fuel used for ocean, coastal, and inland fishing (included under fishing), and military consumption (included in other sectors non-specified) are excluded from the transport sector.

Rows 15: Other sectors cover residential, commercial, and public services [ISIC Divisions 41, 50–52, 55, 63–67, 70–75, 80, 85, 90–93, 95, and 99]; agriculture [ISIC Divisions 01 and 02]; fishing [ISIC Division 05]; and others. Others include military fuel use for all mobile and stationary consumption (e.g., ships, aircraft,

road and energy used in living quarters) regardless of whether the fuel delivered is for the military of that country or for another.

Row 16: Non-energy use covers those fuels that are used as raw materials in the different sectors and are not consumed as a fuel or transformed into another fuel. Non-energy use is shown separately in final consumption under the heading non-energy use.

Row 17: Electricity generated shows the total number of gigawatt-hours generated by thermal power plants separated into electricity plants and combined heat and power (CHP) plants, as well as production by nuclear and hydro (excluding pumped storage production), geothermal, etc. (see, however, the notes on Rows 10 and 11). Electricity produced by heat from chemical processes is shown in the heat column.

Row 18: Heat generated shows the total amount of terajoules generated by power plants separated into CHP plants and heat plants. Heat produced by electric boilers is shown in the electricity column. Heat produced by heat pumps, heat from chemical processes, and heat from non-specified combustible fuels is shown in the heat column.