

JOINT ANNUAL ENERGY AND EMISSIONS STATISTICS SURVEY

GENERAL INSTRUCTIONS

1. Values should be provided to the nearest integer in units specified for each section/item. If exact figures are not available, please provide your best estimates.
2. Please read this reporting guide carefully before filling in the form.

REPORTING INSTRUCTIONS AND DEFINITIONS

DEFINITIONS FOR SECTION A

1. Crude Oil

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

2. Natural Gas Liquids (NGL)

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

3. Additives/Oxygenates

Additives are **non-hydrocarbon** compounds added to or blended with a product to modify fuel properties (octane, cetane, cold properties, etc.):

- oxygenates, such as alcohols (methanol, ethanol), ethers (such as MTBE (methyl tertiary butyl ether), ETBE (ethyl tertiary butyl ether), TAME (tertiary amyl methyl ether));
- esters (e.g. rapeseed or dimethylester, etc.);
- chemical compounds (such as TML, TEL and detergents).

Of which Biofuels: Biofuels refer to Biogasoline and Biodiesels.

Biogasoline includes bioethanol (ethanol produced from biomass and/or the biodegradable fraction of waste), biomethanol (methanol produced from biomass and/or the biodegradable fraction of waste), bioETBE (ethyl-tertio-butyl-ether produced on the basis of bioethanol: the percentage by volume of bioETBE that is calculated as biofuel is 47%) and bioMTBE (methyl-tertio-ether produced on the basis of biomethanol: the percentage by volume of bioMTBE that is calculated as biofuel is 36%).

Biodiesels refers to the portion of **Gas/Diesel Oil** that is considered to be derived from biogenic origin (e.g. soy, rapeseed, etc.). This category includes biodiesel (a methyl-ester produced from vegetable or animal oil, of diesel quality), biodimethylether (dimethylether produced from biomass), Fischer Tropsch (Fischer Tropsch produced from biomass), cold pressed biooil (oil produced from oil seed through mechanical processing only) and all other liquid biofuels which are **added to, blended with or used straight** as transport diesel.

Note on reporting of Additives/Oxygenates:

Quantities of additives/oxygenates and biofuels should relate to quantities for blending with fuels or for fuel use only.

4. Refinery Feedstocks

Refinery feedstocks refer to processed oil that undergo further processing (e.g. straight run fuel oil or vacuum gas oil) excluding blending. With further processing, it will be transformed into one or more components and/or finished products. This definition also covers “Backflows to Refineries (From Petrochemical Plants)” (*Item 34*) (e.g. pyrolysis gasoline, C₄ fractions, gasoil and fuel oil fractions).

5. Orimulsion

Orimulsion is an unconventional fossil fuel by mixing the bitumen with about 30% fresh water and a small amount of surfactant that act as diluents. Report all quantities in physical weight of the emulsion (i.e. including the water content).

6. Shale Oil

Shale oil is unconventional oil produced from oil shale by pyrolysis, hydrogenation, or thermal dissolution. The resulting oil can be used as fuel or upgraded to meet refinery feedstock specifications by adding hydrogen and removing impurities such as sulphur and nitrogen.

7. Other Hydrocarbons

This category includes synthetic crude oil from tar sands, etc., liquids from coal liquefaction, output of liquids from natural gas conversion into gasoline, hydrogen and emulsified oils (excluding orimulsion).

Note on reporting of emulsified oils:

All imports of emulsified oils (excluding orimulsion) should be reported as imports of other hydrocarbons. As these oils do not need further processing in a refinery, please report these quantities under "Direct Use/Own Use" (*Item 34*). Report all quantities in physical weight of the emulsion (i.e. including the water content).

8. Natural Gas

Natural gas comprises gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both "non-associated" gas originating from fields producing hydrocarbons only in gaseous form, and "associated" gas produced in association with crude oil as well as methane recovered from coal mines (colliery gas). Manufactured gas (produced from municipal or industrial waste, or sewage) should not be reported in this questionnaire.

9. Steam/Heat

Steam/heat purchased from power sector refers to those purchased from utility plants owned by companies in the power generation sector. Steam/heat purchased from industry sector refers to those purchased from utility plants owned by companies in the manufacturing sector.

The steam/heat used by the installation for direct use/own use includes heat produced from Combined Heat Power Plants (CHP) and autoproducers and used by the installation's auxiliaries that uses a hot fluid (for activities such as space heating). Steam/heat losses refers to losses in the installation/network heat exchange and heat used in the primary form from chemical processes.

10. Liquefied Petroleum Gases (LPG)

LPG are light paraffinic hydrocarbons derived from the refinery processes, crude oil stabilisation and natural gas processing plants. They consist mainly of propane (C_3H_8) and butane (C_4H_{10}) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene. LPG is normally liquefied under pressure for transportation and storage.

Propylene is an unsaturated organic compound having the chemical formula C_3H_6 . It is a flammable gas obtained by cracking petroleum and used in organic synthesis.

11. Naphtha

Naphtha is a feedstock for either the petrochemical industry (e.g. ethylene manufacture or aromatics production) or for gasoline production by reforming or isomerisation within the refinery. Naphtha comprises material in the 30°C and 210°C distillation range or part of this range.

Note on reporting of Naphtha:

Naphtha imported or locally purchased for refining processes is reported as “Imports” (*Item 28*) or “Net Inland Transfers” (*Item 30*) respectively, before showing under “Interproduct Transfers” (*Item 39*), a negative entry for naphtha and a positive entry for the corresponding finished product.

12. Motor Gasoline (i.e. petrol)

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

This category includes motor gasoline blending components (excluding additives/oxygenates), e.g. alkylates, isomerase, reformate, cracked gasoline for use as finished motor gasoline.

Of which Biogasoline: Please refer to “Additives/Oxygenates” (*Item 3*).

13. Aviation Gasoline

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

14. Jet Kerosene

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

15. Other Kerosene

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

16. Gas/Diesel Oil

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

- **Transport Diesel:** This category includes on-road diesel oil for diesel compression ignition (cars, trucks, etc.), usually of low sulphur content.
- **Heating and Other Gasoil:** This category includes light heating oil for industrial and commercial uses, marine diesel and diesel used in rail traffic, other gas oil including heavy gas oils which distil between 380°C and 540°C and which are used as petrochemical feedstocks. Blending components are also included in this category.

This category includes blending components.

Of which Biodiesels: Please refer to “Additives/Oxygenates” (Item 3).

17. Fuel Oil

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

Low Sulphur Content: Heavy fuel oil with sulphur content lower than 2%.

High Sulphur Content: Heavy fuel oil with sulphur content of 2% or higher.

18. Refinery Gas (not liquefied)/Fuel Gas

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

19. Ethane

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

20. White Spirit and Specific Boiling Point (SBP) Spirits

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

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

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

21. Lubricants

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

22. Bitumen

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

23. Paraffin Waxes

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

24. Petroleum Coke

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

25. Other Oil Products

Other oil products refer to all oil products not previously specified. This category includes tar, acetylene, sulphur, slop oil, aromatics (e.g. BTX or benzene, toluene, paraxylene and xylene) and olefins (e.g. ethylene, propylene and octene). Please specify the list of products in Section C – Remarks.

PRODUCT FLOW DEFINITIONS

26. Physical Opening Stocks/Inventory

This refers to total stocks held by your company on Singapore national territory as at 1 January of the reporting year. This figure should correspond to the total closing stock as at 31 December of the previous year. Please exclude stocks owned by your company held in third party storages. These figures should be reported under “Net Inland Transfers” (*Item 31*).

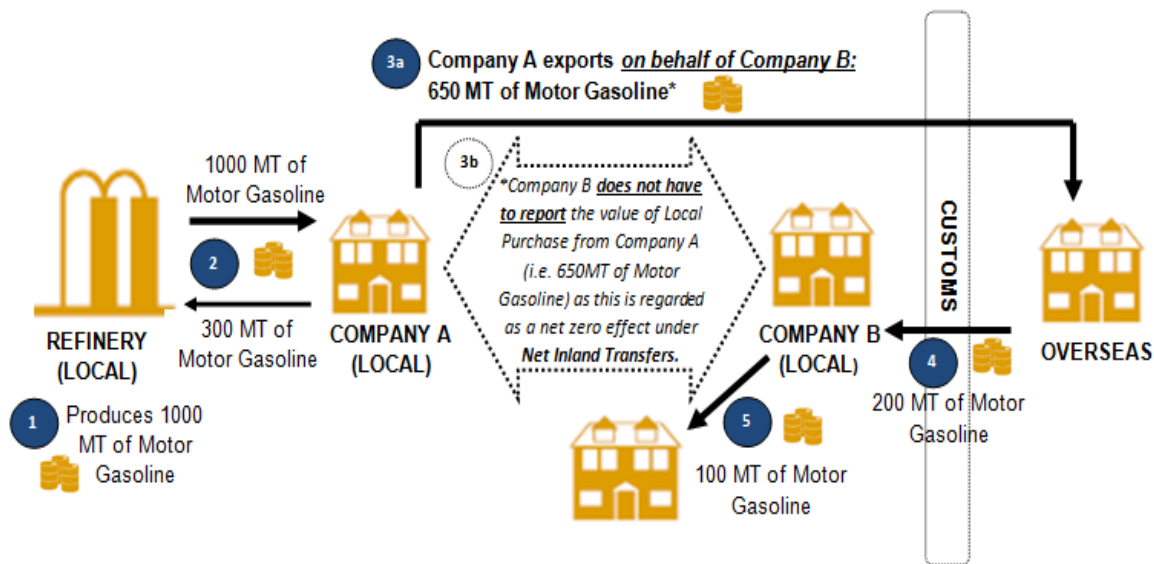
27. Physical Closing Stocks/Inventory

This refers to total stocks held by your company on Singapore national territory as at 31 December of the reporting year. Please exclude stocks owned by your company held in third party storages. These figures should be reported under “Net Inland Transfers” (*Item 31*).

28. Imports and Exports

Imports and exports of petroleum products refer to amount of petroleum products that enter and leave the national territory respectively. Only company **performing customs clearance** should report the transaction under this category. Imports and exports should be distinguished from “Net Inland Transfers” (*Item 31*).

Refer to example below:



	Opening Stock	Refinery Output	Imports	Net Inland Transfers	Exports	Closing Stock
Company A	0		0	$(1000 - 300) = 700^2$	650 ^{3a}	50
Company B	0		200 ⁴	$0^{3b} - 100^5 = -100$	0	100
Refinery	0	1000 ¹	0	$-1000 + 300 = -700^2$	0	300

Quantities of crude oil and products imported or exported under processing agreements (i.e. refining on account) should be included.

Any gas liquids (e.g. LPG) extracted during the re-gasification of imported liquefied natural gas should be included as imports in this questionnaire.

Re-exports of oil imported for processing within bonded areas should be included as an export of product from the processing country to the final destination.

29. Recycled Products

These are finished products which pass a second time through the marketing network, after having been once delivered to **final consumers**. For example, delivery of used lubricants from Company A to Company B for repurification after lubricants has been spent by Company A for its original intended purpose. Company A should have reported this usage under “Direct Use/Own Use: Processing” (*Item 35*) while Company B should report the receipt of used lubricants under “Recycled Products”. Recycled products should be distinguished from “Backflows to Refineries (From Petrochemical Plants)” (*Item 34*).

30. Plant Output

This is the output of finished products from the petrochemical or blending plant. This category excludes losses from the petrochemical or blending process.

31. Net Inland Transfers

These are the observed deliveries of crude and finished petroleum products to/from enterprises (e.g. refineries, blending plants etc.) **within the domestic market**.

Net Inland Transfers includes:

- **Local Purchases** of petroleum products purchased from local suppliers (i.e. Singapore suppliers).
- **Local Sales** of petroleum products to local distributors (i.e. Singapore distributors).
- **Stock movements between third party storages and your company**. Stocks drawn from third party storages should be reported as a positive figure. Stocks deposited with third party storages should be reported as a negative figure.
- Other transfers of petroleum products within the domestic market that are not mentioned above. For example, transfer of finished petroleum products from primary sources (e.g. refineries) to its subsidiaries (e.g. blending plants) for further processing or marketing purposes.

This excludes backflows to refineries from petrochemical plants. This should be reported under “Backflows to Refineries (From Petrochemical Plants)” (*Item 34*).

Refer to example under “Imports and Exports” (*Item 28*).

Note on reporting of Net Inland Transfers:

A negative value under “Net Inland Transfers” represents a net outflow of a corresponding product from your company to the domestic market, while a positive value represents a net inflow of a corresponding product to your company from the domestic market.

32. Plant Input

Includes raw and intermediate materials that enter the petrochemical or blending process to produce the finished products. This category excludes losses from the petrochemical or blending process.

33. International Bunkers

Report quantities of fuel/petroleum products delivered to:

- Vessels of all flags engaged in international navigation; and
- Aircraft for international aviation.

This excludes:

- Vessels engaged in domestic navigation (Report in Section B under “Water Transport”)
- Aircraft for domestic aviation (Report in Section B under “Air Transport”)
- Military vessels (Report in Section B under “Other Transport”)
- Fishing vessels (Report in Section B under “Other Transport”)
- Fuels used by airlines for their road vehicles (Report in Section B under “Other Transport”)
- Military use of aviation fuels (Report in Section B under “Other Transport”)

34. Backflows from Petrochemical Sector to Refineries

These are crude or finished/semi-finished products which are returned from processes in the petrochemical plants to refineries for refining, processing or blending. They are usually by-products of petrochemical manufacturing. The refinery may use the backflows as fuel or include them in finished products. For integrated petrochemical industries, this flow should be estimated. Transfers from one refinery to another within the country should be excluded. This should be distinguished from “Recycled Products” (*Item 29*) and “Net Inland Transfers” (*Item 31*).

Note on reporting of Backflows to Refineries:

For companies that are surveyed for both the **Refineries and Petrochemicals forms**, sum of values reported under “Backflows to Refineries (From Petrochemical Plants)” across all products in **Section A-1** of the **Refineries form** should relate to the sum of all values reported under “Backflow to Refineries (From Petrochemical Plants)” across all petroleum products in **Section A-1** and **Section A-2** of the **Petrochemicals form**.

35. Direct Use/Own Use

Direct use refers to the direct consumption of crude oil, NGL and other hydrocarbons without being processed in petroleum refineries, petrochemical and blending plants. These are all petroleum products consumed in support of the operation of a plant's processing activities. This category includes crude oil used for electricity generation.

- **Direct Use/Own Use for Autoproduction:** Use of the fuel products for the generation of secondary energy such as electricity and steam/heat. This includes burning of fuel oil in boilers and co-generation plants and electricity plant's own consumption (which includes gross electricity consumed for pumped storage).
- **Direct Use/Own Use for Processing:** Direct use of fuel products as a primary energy source and/or other usages in support of the manufacturing process. This includes usage of lubricants for machineries, burning of fuel in the firing of furnaces, primary and secondary energy consumption for heating, traction, and lighting purposes by transformation industries.

36. Losses

This refers to losses during distribution, electricity transmission and transportation, excluding refinery losses and losses from the petrochemical and blending process.

37. Net Calorific Value (NCV)

This is the quantity of heat released by unit quantity of fuel, when it is burned completely with oxygen, and the products of combustion are returned to ambient temperature. This quantity of heat will **not** include the heat of condensation of the water vapour formed by the combustion of the hydrogen in the fuel, as it cools to ambient conditions (gross).

END