

# InterEnerStat

## Harmonisation of Definitions of Energy Products and Flows



## DECISIONS ON FLOWS

IEA, Paris, 28-30 October 2008



## SPECIFIC COMMENTS ON THE FLOWS

### **Supply**

The total flow of a fuel or energy into the economy from its various sources of production, external trade or stock during the statistical reporting period.

### **DECISIONS**

- Elements of supply will be included (list imports and exports separately).
- Use “national territory” instead of “economy”.

## **Production**

### **Primary (or Indigenous)**

The extraction or capture of primary fuels or heat and electricity which are retained for sale or use. Quantities reported exclude amounts of inert matter or impurities removed before sale or use and any amounts returned to the natural reserve. However, amounts of the fuel/energy consumed during the production process are included.

*Identification of the many points of production of biofuels is complicated by the widespread harvesting of biofuels and the, often, absence of commercial agents. Where production data for a certain biofuel are not readily available production is equated to the estimated use.*

### **Secondary**

The generation or manufacture of energy or fuels from other (usually primary) fuels/energy.

## **Production from other sources**

Additions to supply which supplement production but which are not naturally part of production in the reporting period. Examples are coal recovered from waste tips or sea coal, or organic chemicals added to petroleum products to adjust their performance. This flow is included because the supply of the fuel is increased by the practice.

## **DECISIONS**

- A more general definition will be introduced for production, while extending and amplifying definitions for primary and secondary – remove reference to indigenous.
- Include source-specific concepts in the explanatory text.
- The concept of marketable will be maintained, taking into consideration non-marketed fuels.
- Keep a separate definition for ‘Other sources’ - it will not be defined under Production.

## **Imports and Exports**

Imports of fuel and energy commodities are the amounts which have entered the country during the reporting period for use or for an activity which adds to its value before export.

Exports of fuel and energy commodities are the amounts which leave the country after production, manufacture or processing.

*It follows that quantities in transit through the country should not be included. For practical reasons, however, quantities of electricity in transit are difficult to identify and exclude and so are included by default.*

## **DECISIONS**

- Bonded areas, free trade zones, re-exports and such will be included in the main definition.
- The notion of “national territory” will be made consistent with the way it is used in defining ‘Production’;
- Our definitions will be examined to see how they compare with the foreign trade definitions (UN).
- Retain the notion of “adds to its value” if it agrees with the concept of foreign trade.

## **International marine bunkers**

Quantities of fuels delivered to and consumed by ships of all flags that are engaged in international transportation of goods or passengers at sea, on inland lakes and waterways or in coastal waters.

Fuels delivered to ships undertaking domestic transportation or not undertaking transportation (fishing and military vessels) are not included here.

## **DECISIONS**

- Definition will be modified to not include the expression “all flags”.
- International aviation bunkers will be treated the same way as the international marine bunkers, and will be defined separately.
- Military bunkers will continue to be included in non-specified other sectors since the UNFCCC is still using the 1996 IPCC Guidelines. We can reconsider this point later on when countries start to use the 2006 IPCC Guidelines.

## **Stocks and stock changes**

Stocks are reserves of fuels held to maintain service under conditions where the supplies of fuel to the stock and/or deliveries from it are variable in their timing or amounts. Not all stocks are eligible for inclusion in fuel statistics and those which are need to chosen in a manner consistent with the construction of the national fuel statistics.

Stock change over the reporting period is conventionally the difference between the stock level at the beginning of the period (opening stock) and that at the close of the period (closing stock). Consequently a decrease in stock (stock draw) gives rise to a positive stock change and represents an addition to supply. Conversely, an increase in stock (stock build) results in a negative stock change and is considered a withdrawal from supply.

## **DECISIONS**

- Definition of stock change will be changed to read "... difference between stock level at the end of the period (closing stock) and that at the beginning of the period (opening stock)".
- References to the word "reserves" will be replaced with quantities.
- Types of stocks included will be taken into account, however, wording of primary and secondary stocks will be clarified before including this issue in the definition.
- Geographical locations of stocks are sensitive, so national boundaries should be carefully observed.

## **Transfers**

These are divided into two groups and are essentially statistical devices to overcome practical classification issues in the fuel/energy economy.

### **Products transferred**

This flow has been introduced to manage the reclassification (renaming) of petroleum products which is necessary when finished petroleum products are imported for use as feedstock in refineries.

### **Inter product transfers**

Introduced to manage movements of fuels or energy between product categories because of reclassification of an 'off specification' product or because the product name applies only to the production of the product. For example, hydroelectricity loses its identity when it enters the transmission grid and becomes simply electricity.

## **DECISIONS**

- Umbrella definition will be provided before a breakdown of different transfers (including recycled products).
- Reference to hydroelectricity transfers will be removed and put under remarks.
- No definitive decision was made on whether primary electricity such as hydro should be here or in the transformation sector – see decision under transformation.

## **Statistical difference**

The difference between the total supply of a fuel/energy and the total use of it. It arises from various practical limitations of data collection when the data elements which make up supply and demand may reflect different time periods, different spatial coverage, different specifications and conversion factors.

## **DECISIONS**

- “Different data sources” will be included in the definition.
- The reference to “conversion factors” will be elaborated to give examples (i.e. calorific values, Mm<sup>3</sup> to kt, etc.).

## **Transformation sector**

The transformation sector contains those production activities in which primary or secondary fuels are transformed into fuel products which are better suited to their uses than the fuel from which they are made, or in which fuels are combusted to produce heat for electricity generation or for sale. The transformation sector also includes blending and separation activities in fuel treatment plants.

A few activities are included in the transformation sector, notably within the iron and steel industry, where the transformation into a fuel for combustion is not the principal purpose of the process. They are, however, included in the transformation sector because the by-products of the process are used for combustion and the energy balance would be incomplete without them.

The flow quantities used for each of the sub headings within the transformation sector are the amounts of fuels transformed. If any input fuel is used for combustion to support the transformation activity (but not for transformation itself) this should be considered 'Energy Sector' use (*see below*).

## **DECISIONS**

- Instead of the word “fuels” - “sources” will be used so as not to exclude non-combusted sources such as hydro, etc.
- Second paragraph will be included under remarks, but an explanation referring to industrial production processes (e.g. NGL) that are not considered transformation is thought to be useful.
- Last sentence of the first paragraph referring to blending and separation will be included in the remarks rather than the main definition.
- Types of activities regarded as transformation will be listed in the definition to make it clearer.



### **Electricity plants**

Electricity plants produce electricity only and generate it from steam heated by the combustion of fuels or nuclear fission, or from gas turbine units. If one or more of the generating units in the plant is a CHP unit then the whole plant is designated a CHP plant (*see below*).

### **Combined heat and power plants**

Combined heat and power plants produce both heat and electricity from the fuel input. They are sometimes referred to as ‘co-generation’ power stations. If possible, fuel inputs and electricity/heat outputs are on a generating unit basis rather than on a plant basis as this permits greater accuracy when reporting the fuel used for electricity and heat separately.

### **Heat plants**

Heat plants refers to plants (including heat pumps and electric boilers) designed to produce heat only and which sell heat to a third party (e.g. residential, commercial or industrial consumers) under the provisions of a contract. Heat generated within an industrial establishment entirely for its own use is not a transformation sector activity.

## **DECISIONS**

- Main activity and autoproducer definitions will be introduced here.
- The issue of gross or net production from the activity is a point to be covered in the reporting instructions.
- “Sources” will be used instead of “fuels”.
- The balance treatment of hydro, wind, solar, etc. will be examined and alternatives presented. The individual organizations can then do comparisons and state their preferences. This will also affect the transfers row.

### **Blast furnaces/Gas works**

Blast furnaces are for the production of pig iron from iron ore. Carbon is added (largely in the form of coke) to support and reduce the iron oxide and provide heat.

In order to reduce the demand for coke, pulverised coal and other carbon-rich materials (used lubricants, plastics) may be injected into the blast furnace.

Almost all of the carbon in the blast furnace is partly or completely oxidised and leaves it in the form of large quantities of blast furnace gas (BFG). This gas, by virtue of its partly oxidised carbon, is burned to heat the air blown into the furnace or used as a fuel elsewhere on site, or sold to third parties.

Some carbon is retained in the iron produced. Where this iron is converted to steel on site in a basic oxygen steel furnace (BOSF) most of the carbon in the iron is partly or completely oxidised and collected as BOSF gas. In large, integrated iron and steel plants the gas collection system combines BOSF gas and BFG for dust removal and for use in the plant.

Gas Works produce town gas/gas works gas for distribution to consumers. The plants may do this by carbonisation of coal or gasification of oil products and reforming of petroleum or natural gases.

### **Coke/Patent fuel/BKB-PB plants**

Coke Ovens carbonise coal, principally coking coal, at high temperature. The transformation process produces coke and by-products such as coke oven gas and coal tars and oils.

Patent Fuel Plants manufacture a composition fuel made of hard coal fines with the addition of a binding agent.

BKB (Brown Coal Briquettes) Plants manufacture a composition fuel made of lignite/brown coal (including dried lignite fines and dust) produced by briquetting under high pressure without the addition of a binding agent. This includes Peat Briquettes (PB) Plants which produce a similar composition fuel using peat.

## **DECISIONS**

- Individual flows will be separately defined, keeping references to products in the definitions.
- Whether peat briquettes will be considered as a secondary product, thus PB plant activity will be reported under transformation, or as a primary product with use in the energy sector is still to be decided. This has implications on whether peat briquettes should be included with peat.
- Will also consider sawdust to pellets and will contact the FAO to find out the scale of this activity.

### **Petroleum refineries**

*Petroleum refineries and petrochemical plants are the two main branches of fluid hydrocarbon processing. The activities are often situated close to each other as the petrochemical plant obtains the majority of its hydrocarbon feedstock from the refinery and may return to the refinery by-products from its processing which it does not need.*

Petroleum refineries are industrial plants which convert (transform) the feedstock of crude oil and other hydrocarbons into finished petroleum products. They may also produce basic organic chemicals as by-products of their refining activities which are incorporated in finished petroleum products or sold as chemicals.

### **DECISIONS**

- The first paragraph will be moved to the explanatory text.
- Last sentence will be moved to the explanatory text.
- Upgrading plants that dilute heavy crude with lighter crude will be examined (similar to blending).
- Add examples of finished products.
- Remove reference to “industrial” so as not to exclude mini-refineries.

### **Petrochemical plants**

Petrochemical plants are a branch of the chemicals industry and convert hydrocarbon feedstock in organic chemicals, intermediate compounds and finished products such as plastics, fibres, solvents and surfactants etc.

Feedstock used by the plant is usually obtained from the refinery and includes naphtha, ethane, propane and middle distillate oils (for example, gas oil). The carbon and hydrogen in the feedstock is largely transferred to the basic chemicals and products subsequently made from them. However, certain by-products are also created and returned to the refinery (such as pyrolysis gasoline) or burned for fuel to provide the heat and electricity required for the cracking and other processes in the petrochemical plant.

### **DECISIONS**

- Second paragraph will be moved into explanatory text.

### **Liquefaction plants**

Liquefaction plants cover diverse liquefaction processes, such as coal liquefaction plants and gas-to-liquid plants.

Coal Liquefaction plants are facilities where coal is used to produce liquid fuels suitable for transportation applications by the removal of carbon or addition of hydrogen, either directly or indirectly.

Note that the gas-to-liquid plants convert natural gas to products and are not LNG plants which convert gaseous natural gas into liquid natural gas.

### **DECISIONS**

- The reference to “transportation application” will be clarified.
- Liquefaction plants and gas-to-liquid plants will be defined as separate flows.

### **Natural gas blending plants**

Plants where the calorific value of natural gas for distribution is adjusted through blending with gases from oil and/or coal. Report quantities of coal and coal products blended with natural gas and the natural gas treated.

### **DECISIONS**

- Add oil and biogas used for blending into the definition.

### **Gas treatment/separation plants**

In treatment plants, natural or associated gas is processed for the primary purpose of recovering compound liquid hydrocarbons such as gasoline and naphthas, pure hydrocarbons such as butane, propane, ethane or a combination thereof, through a process of physical separation of gas components.

### **DECISIONS**

- Rename this to be “gas treatment plants”.

### **Biomass conversion plants**

Plants where vegetal material is converted to fuels in a form better suited to their uses. The processes include carbonisation (charcoal), distillation (ethanol), anaerobic digesters (methane rich gas) or more complex processes such as transesterification (diester).

### **DECISIONS**

- Definition will be limited to charcoal only and called “Charcoal plants”.

### **Other**

Transformation, treatment or blending processes not specified above.

### **DECISIONS**

- The definition will be made self sufficient by replacing the word “above”.
- Blending processes not regarded as transformation and may call for a separate definition, to overcome confusion in specifying an “other” heading.

### **Energy sector**

Consumption by the energy sector is the amount of fuel or energy used to support their extraction, production, manufacturing or transformation processes. It is *not* the amount of fuel transformed into other fuel or energy forms. Fuels or energy used to operate pipelines (oil, gas or coal slurries) should be reported as part of the transport sector.

### **DECISIONS**

- Add a list of activities and specify the ISIC references where appropriate.

### **Distribution losses**

Distribution losses includes losses during gas distribution, electricity transmission, coal and pipeline transport. Losses may also include theft by consumers.

## **DECISIONS**

- Definition will be made more comprehensive to cover all distribution, transmission and transport of energy.
- Add a remark clarifying that organizations may include flaring from manufactured gases under distribution losses.
- The word “theft” will be replaced with “pilferage”; reference to consumers will be removed.

### **Final consumption**

Final consumption is all fuel and energy that is delivered to the consumption sectors, both for use as for energy needs and non–energy needs. Consumption sectors comprise:

- Industry (excluding the energy industry)
- Commerce
- Public administration
- Agriculture, Forestry and Fishing
- Residential
- Not elsewhere specified (includes military consumption)

Any fuel consumption by consumers which is used for electricity generation or for the production of heat for sale should not be included as final consumption but reported as part of the transformation sector.

## **DECISIONS**

- Transport should be included in the list and the final consumption breakdown should be aligned with the definitions that follow.
- Incorporate wording on national territory.
- Refer to energy sector instead of energy industry.
- Make the last paragraph more general.
- In explanatory notes, add a description of Energy and Non-energy.

## **Industry**

Use of fuels within the manufacturing and construction industries. Use by the fuel and energy industries is excluded as is solid fuel use for coke manufacture and in blast furnaces within the iron and steel sector. Consumption of fuels for transport of goods should be reported as part of the transport sector.

### **Iron and steel**

ISIC Group 271 and Class 2731 (NACE Divisions 27.1, 27.2, 27.3, 27.51, and 27.52). Fuels used in coke ovens and blast furnaces are defined as part of the transformation sector and the energy sector.

### **Chemical and petrochemical**

ISIC Division 24 (NACE Division 24).

### **Non-ferrous metals**

ISIC Group 272 and Class 2732 (NACE Division 27.4, 27.53 and 27.54).

### **Non-metallic minerals**

ISIC Division 26. Report glass, ceramic, cement and other building materials industries (NACE Division 26).

### **Transport equipment**

ISIC Division 34 and 35 (NACE Division 34 and 35).

### **Machinery**

Fabricated metal products, machinery and equipment other than transport equipment. ISIC Division 28, 29, 30, 31 and 32 (NACE Division 28, 29, 30, 31 and 32).

### **Mining and quarrying**

ISIC Divisions 13 and 14 (NACE Divisions 13 and 14). This excludes the fuel extraction industries.

### **Food and tobacco**

ISIC Division 15 and 16 (NACE Divisions 15, 16)

### **Paper, pulp and print**

ISIC Division 21 and 22 (NACE 21, 22). Includes production of recorded media.

### **Wood and wood products**

(Other than pulp and paper) - ISIC Division 20 (NACE Division 20)

### **Textile and leather**

ISIC Divisions 17, 18 and 19. (NACE Divisions 17, 18, 19)

### **Construction**

ISIC Division 45 (NACE Division 45)

### **Industries not elsewhere specified**

ISIC Divisions 25, 33, 36 and 37 (NACE Divisions 25, 33, 36 and 37). This category covers any manufacturing industry not listed above.

## **DECISIONS**

- Some explanatory notes need to incorporate distinction between energy and non energy use.

## **Transport sector**

Fuels and energy used in transport of goods or persons irrespective of the economic sector for which the activity occurs.

### **International aviation**

Comprises deliveries of aviation fuels to aircraft of any nationality for international aviation. Whether a flight is international aviation should be determined on the basis of departure and landing locations and not by the nationality of the airline.

Fuels used by airlines for their road vehicles are excluded.

### **Domestic aviation**

Domestic aviation includes deliveries of aviation fuels to aircraft for domestic aviation whether commercial, private or agricultural, etc. It includes deliveries used for purposes other than flying, e.g. bench testing of engines, but not airline use of fuel for road transport. Whether a flight is domestic aviation should be determined on the basis of departure and landing locations and *not* the nationality of the airline. Note that this may include journeys of considerable length between two airports in a country (e.g. San Francisco to Honolulu).

Military use of aviation fuels should not be included in domestic aviation but under 'not elsewhere specified'.

### **Road**

Fuels consumed in vehicles using public roads. It includes tractors and heavy plant when they using public roads. It excludes military consumption as well as motor gasoline used in stationary engines.

### **Rail**

All fuel consumption for use in rail traffic, including industrial railways.

### **Domestic navigation**

Fuels delivered to vessels of all flags not engaged in international navigation (see International marine bunkers). Whether a voyage is domestic navigation should be determined on the basis of port of departure and port of arrival and not by the flag or nationality of the ship. Note that this may include journeys of considerable length between two ports in a country (e.g. San Francisco to Honolulu).

### **Pipeline transport**

Pipeline transport includes fuel and energy used in the support and operation of pipelines transporting gases, liquids, slurries and other commodities. It comprises the consumption at pumping stations and for maintenance of the pipeline. Losses occurring during the transport between distributor and final users should be reported as distribution losses.

### **Transport not elsewhere specified.**

Consumption of fuels used for transport activities not included elsewhere in the other transport sub-sectors.



## DECISIONS

- Text should be added to say that International aviation and marine bunkers are excluded.
- Re-phrase explanation on Road – may exclude mention about tractor and public roads.
- Need to add references to ISIC codes for the pipelines and clarify why there is a different treatment of types of pipelines.
- Include a note on domestic navigation that fishing is excluded.

## **Other sectors**

### **Residential (Households)**

Fuels and energy consumed by all households including "households with employed persons." ISIC Division 95 (NACE Division 95). Exclude fuel used for transport.

### **Commercial and public services**

Fuels consumed by business and offices in the public and private sectors. ISIC Divisions 41, 50, 51, 52, 55, 63, 64, 65, 66, 67, 70, 71, 72, 73, 74, 75, 80, 85, 90, 91, 92, 93 and 99 (NACE Divisions 50, 51, 52, 41, 55, 63, 64, 65, 66, 67, 70, 71, 72, 74, 75, 80, 85, 90, 91, 92, 93, 99).

### **Agriculture/Forestry**

Deliveries to users classified as agriculture, hunting and forestry by the ISIC. It therefore includes fuels and energy consumed by such users whether for traction (excluding agriculture highway use), power or heating (agricultural and domestic) (ISIC Divisions 01 and 02) (NACE 01 and 02).

### **Fishing**

Report fuels consumed in ocean, coastal and inland fishing, irrespective of the flag of the vessel, as well as aquaculture and fisheries (ISIC Division 05 and NACE 05). Include also fuel and energy use in processing and preserving of fish; gathering of marine materials: natural pearls, sponges, coral and algae; and service activities incidental to fishing.

### **Not elsewhere specified**

Activities not included elsewhere. This category includes 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 nation's military services or for the military services of another country.

## **DECISIONS**

- Will consider using "Government" instead of "Public" services based on ISIC codes.
- Transport consumption should be excluded explicitly from each of the definitions in this section.
- Give the headings from the ISIC codes in the explanatory text.
- Need to check ISIC definition on Agriculture to see if it includes residential consumption of farms in agriculture.
- Remove the umbrella group "Other Sectors" and list the sub-sectors separately. Organizations are free to continue using "other sectors" as long as they define what is included.

## Non-energy use

The final use of fuels for purposes other than combustion. Note that the carbon and hydrogen contained within fuels used for non-energy purposes may eventually be combusted at a point beyond the declared final use of the fuels or in an eventual waste stream.

The non-energy use of fuels is broken into three categories

- Feedstock  
During the feedstock use of fuel the hydrogen and/or carbon are used as raw materials for the manufacture of other chemicals, compounds or finished goods which contain the hydrogen or carbon. Typical examples are the use of naphtha to make ethylene (C<sub>2</sub>H<sub>4</sub>) or the use of natural gas (mostly CH<sub>4</sub>) to make ammonia (NH<sub>3</sub>).
- Reductants  
Coke, which is mostly carbon, is used to reduce metal oxides to obtain the metal. The electrical heating and reduction of metals uses carbon electrodes made from petroleum cokes. The oxidation of the coke may also provide necessary heat to the process.
- Non-energy products  
These are fuel derived products used for their physical properties. Such as solvents (white spirit, industrial spirits), waxes, lubricants and bitumen.

## DECISIONS

- First sentence will be modified to “The final **consumption** of fuels for purposes other than combustion” this will be spelled out that this does not include fuel transformation.
- Will consider adding a new heading “Final Energy Consumption” .
- Redraft paragraph on reductants.

## **Additional definitions suggested by IEA:**

### **DECISIONS**

- Some additional definitions will be developed and circulated for comments in a future draft of the definitions.