InterEnerStat

Harmonisation of Definitions of Energy Products and Flows



REVISED DEFINITIONS OF FLOWS BASED ON DECISIONS TAKEN AT THE 29-30 OCTOBER MEETING

IEA, Paris, 13 February 2009

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Harmonisation of definitions of energy commodities and their flows

Introductory Notes by Tim Simmons

Summary

Revisions to definitions are provided and accompanied, where appropriate, by explanations and suggestions as to their nomenclature or use. More general comments and proposals are made for methodological conventions as they influence use of key flows and also a definition for national territory is offered. A number of umbrella product groups are introduced and the activity codes revised to meet the latest ISIC/NACE revisions.

Introduction

The report contains the revised definitions resulting from a review of definitions undertaken following the third InterEnerStat meeting at the end of October 2008. The revisions take into account the decisions reached during the meeting. In some cases simplification of the definitions has taken place where the sentiment of the meeting indicated it as desirable. The report also contains some more general observations on methodological issues which have influenced the proposed definitions and *inter alia* suggests a classification hierarchy for biofuels.

The revised definitions have been placed in the Annexes and the body of the report contains comments on methodological issues raised during the meeting and notes on the definitions where points need commenting.

General points

This section describes the approach taken to the revision of the definitions and also responds to some general issues which have arisen during the meeting or in response to decisions formulated at the close of the meeting.

Definitions

Definitions for products have been framed, to the extent possible, in a manner which describes the product nature. The definition may then be amplified with additional explanatory notes or remarks which clarify its nature, provenance and use where this information is thought useful. Points which relate to reporting have been avoided wherever possible as this is the responsibility of those who prepare the questionnaires.

Definitions for flows follow the same general approach although the distinction between the nature of the activity described by the flow and its reporting is less clear as it is the flow activity which leads to the quantity to be reported. Where a flow in the transformation sector is simply the name of the plant where a product is manufactured this is stated without describing the manufacturing process as this is already described under the product definition.

For a few definitions, where their nature is broad or complex and where good background material exists in a single document, a URL link to the document has been given.

It is envisaged that those preparing questionnaires and using these definitions would firstly present the definition for the product or flow and then add a separate note setting out any additional clarifying points describing the conditions and requirements for data collection.

National territory

Following discussions during the 3rd meeting and during subsequent emails a definition of national territory for the purposes of energy statistics has been drafted.

The national territory for the purposes of energy statistics consists of the geographic territory within the effective economic control of the national government and it comprises:

(a) the land area;

(b) airspace;

(c) territorial waters, including areas over which jurisdiction is exercised over fishing rights and rights to fuels or minerals; and

(d) in a maritime territory, islands that are subject to the jurisdiction of the national government.

Amplifying notes:

The national territory includes any free trade zones, bonded warehouses or factories operated by enterprises under customs control within the areas described above.

Territorial enclaves in the rest of the world (embassies, consulates, military bases, scientific stations, etc.) are part of the national territory where they are physically located.

The definition proposed here results from discussions with the IMF, UNSD and IEA which started from the definition used by the SNA and modified it to reflect the requirements of energy data collection and use. There are two areas of activity which test the definition of national territory for energy statistics and which require support in the definition. The first is the flows of oils through Free Trade Zones and customs controlled areas such as refineries. The second is the definition of a domestic flight or voyage which is of particular importance for countries with distant overseas territories. In both cases the choice of definition has been made in a manner which should minimise the risks of breaks in series and appear consistent with normal usage of the terms.

Movements between products

During the 3rd meeting there was some discussion of whether fuel treatments which simply modified the shape of a fuel (peat briquetting, for example) or blended or separated components without any intrinsic change to them should be regarded as a transformation activities. The question was also raised in the decisions noted for the draft definition for 'Other (transformation)'.

The transformation sector within commodity and energy balances is one of three groups of activities in which input commodities disappear from the balance and new commodities are created. The three groups are:

i. Transfers, in which the products are usually renamed to reflect change of use, change of form or simply for statistical convenience.

ii. Separation, blending, aggregating and upgrading, in which the various products are separated or combined without change to their intrinsic physical qualities or chemical nature. However, the physical characteristics of the resulting product(s) will be different from the inputs.

iii. Transformation, in which products undergo a process or processes during which there are physical or chemical changes into other products whose intrinsic properties differ from those of the input products.

The transformation activities may be:

- Chemical or physical changes to the input product(s) resulting in the creation of products containing new chemical compounds. (For example, refining)
- Physical changes to the input which involve separation into several different products with intrinsic physical properties which are different from those of the input material. (For example, Coke oven carbonisation of coal).
- Conversion of thermal energy (heat) into electricity.
- Production of heat for distribution to third parties.

Of these three groups only (ii) and (iii) lead to secondary products. The separation and blending group, (ii) , does not include simple reshaping operations, such as peat briquetting, and where the product is recognised and input and output data exist, this and similar operations could be handled by a transfer. Nevertheless, in view of the small size of the activity and to keep things simple, briquetting without a binder will be included in group (ii) above.

The revised definitions in the Annexes have been divided and grouped to align with the transformation activities and those of separation and blending. However, it is not suggested that the balance be divided further to create a new sector to accommodate 'separation and blending'. It might be helpful to those using balances to simply place the transformation activities before those for separation and blending.

Primary Energy Form

Discussions of the presentation of electricity from renewable sources leads to questions as to the most appropriate form for the primary energy in the statistics system. Some of the ideas used are applicable elsewhere where *new* energy commodities enter the statistics.

Production of electricity requires a device and process which convert the thermal, kinetic or electromagnetic energy into electricity. One may therefore consider all electricity to be a secondary energy commodity with the thermal, kinetic or electromagnetic energy flows as the primary inputs. This would then lead naturally on to questions as to the amounts of primary energy input and the measurement points. For example, the annual amount of kinetic energy passing through the swept area of a wind turbine. Unfortunately, for many of the renewable energy sources answers to the questions are available only in qualitative terms and measurements of amounts not practicable. Estimates would be based on the basic physics of the process or laboratory tests.

A more pragmatic approach is proposed for energy statistics which leads to a convention classifying electrical energy into primary and secondary commodities. The primary commodities are the electricity from wind, wave, tide, hydro and photovoltaic. For example, using this convention, the amount of wind energy available is the amount of electricity produced by the wind generators. Secondary electricity is simply that produced from inputs already recognised and present in the statistics system. This is usually electricity produced from steam or gas turbines or internal combustion engines and may also be called thermal electricity.

The choice of primary energy form (electricity in this case) is not only influenced by the practicalities of measurement and data gathering but also by the needs for energy statistics as

well as a desire to keep things simple. It is unlikely, for example, that we, as energy statisticians or users of the energy statistics, shall need data for the annual total kinetic energy of the wind flowing through the area swept out by the turbine blades of a wind generator, nor the total kinetic energy of the rotating alternator driven by the turbine over the year. Only if this flow of mechanical energy is put to uses before it is used to generate electricity do we need to take it into account. Fortunately, amongst the types of primary electricity listed only wind and water mills are used for mechanical tasks as well as electricity and their contribution to mechanical energy requirements is too small to be recognised in the statistics at present.

The argument in the preceding paragraph can be generalised to provide a rule for choice of the primary energy form for fuel and energy sources namely, "*for statistical purposes, follow a fuel or energy commodity no further upstream than is necessary to capture all of its uses"*.

Presentation of primary electricity in balances

The various sources of primary electricity may be identified as individual products or commodities with their own commodity balances. Alternatively, they may be shown within a breakdown of total electricity production in a single commodity balance for all electricity. If the former presentation is used then the primary electricity may be moved into the electricity balance through the transfers flow and its consumption will be included in the consumption figures for all electricity. Although it is possible to use a flow in the transformation sector for the transfer purpose the activity is not a transformation and to the extent possible flows within it should be seen as flows within the groups (ii) and (iii) described above.

Similar points arise in relation to primary heat namely, solar heat, geothermal heat, nuclear heat and heat from chemical processes (other than combustion). Production should be defined and measured before their first use and only the quantity used for electricity generation and heat for sale will pass through the transformation sector.

Losses

Two suggestions have been received on the decisions taken at the 3rd meeting which relate to distribution losses or losses generally. One proposes a general taxonomy for losses which distinguishes between conversion (transformation) losses, losses during production and losses in distribution/transmission. The other comment points out that flared gases are not losses in its pejorative sense but more accurately technical losses required to maintain safe operating conditions.

The statistical use of the 'distribution losses' flow is simply to maintain the commodity balance between supply and use of a commodity already present in the balance. It assumes independent estimates of the losses and failing such estimates it risks becoming a 'statistical difference'. It would be possible to introduce a new flow to cover flaring of manufactured gases but the group would need to assess the benefits and costs of doing so.

The concept of losses in production is different from use of the commodity during its production. Material (with or without energy content) removed from an extracted fuel before it is reported as produced will not be in the balance, consequently, it is not clear what activity or event losses in production might cover. For secondary fuels, flared or vented gases could be reported under this heading rather than a specific 'flaring' flow as mentioned in the preceding paragraph.

Conversion losses is essentially a mass/energy balance concept reflecting the difference in energy or mass between the input and output commodities. It is conceptually different from the energy consumed to support the transformation process. It is not possible to ascribe the difference in energy to the input commodities nor discriminate realistically between the amounts of input commodities lost in transformation and the amounts appearing in the outputs.

Classification of economic activities

The 3rd InterEnerStat meeting decided that any references to NACE or ISIC codes for the classification of economic activities should be brought up to date. The latest NACE revision is Rev.2 and that for ISIC is Rev. 4. A list of the relevant codes and their correspondences to the earlier ISIC/NACE revisions was provided by the IEA and the updating performed.

The decisions on the draft definitions for the energy sector requests the addition of ISIC codes to activities identified as belonging to the energy sector. There are, however, certain activities within the sector which are not explicitly identified within ISIC/NACE but either form part of an identified activity or are absent. Examples are gas to liquids transformation, briquette manufacture, gas separation/treatment plants and blast furnaces. The codes are given only for listed economic activities which define closely the energy sector activity.

Notes on Flows and Products

In this section comments, explanations or suggestions are provided which are specific to the definitions or sectors. Only those flows or products are mentioned which require a note.

Flows

Supply
The formula for supply is given which subtracts international aviation bunkers as well as international marine bunkers. The balancing change has been made to final consumption by omitting international aviation from the transport sector.

Production
The revised definition has been kept brief but relies heavily on the supporting explanation and remarks as it draws on other important distinctions in use which should be immediately available to the reader. The definition covers both production of primary and secondary commodities in two separate statements. Note the important difference in the treatment of venting, flaring and losses for secondary fuels.

Production from other sources
The use of this flow needs review. Ideally the underlying principle that it catches additions to supply from production in previous periods should be retained. Existing reporting notes show that it is being used for transfer and reclassification as well. As there are flows which exist for these purposes it is recommended to limit the flow to the activity described in the definition.

Transformation sector
Electricity plants

This definition has been framed to make clear that only thermal electricity plants using steam or gas turbines or internal combustion engines are included. The name suggests that all electricity plants would be covered including, for example, hydro electricity plants. To remove this ambiguity a better name would be ‘Thermal electricity plants’.

The reference to the preferred use of generating units rather than plants for the collection of CHP data is really a reporting point and should be omitted.

Energy sector
See the comments above under Classification of economic activities.

Final consumption
See the comments above under Classification of economic activities.

Domestic navigation and aviation
These have been framed to make reference to the national territory but have not introduced the detailed definitions for international and domestic flights set out in the IPCC’s Guidelines for National Inventories of GHG emissions.

Products

Oils and Natural Gas

Crude oil
The distinction between conventional and non-conventional has been maintained and defined on the basis of the oil recovery practice.

Condensate from gas condensate fields is included under NGL as a more satisfactory location on technical grounds. However, it is often included in Crude oil production figures and so it may be necessary to place it under the definition for conventional crude oil.

Additives/Oxygenates
Following advice that some additives are hydrocarbons the reference to non-hydrocarbons has been removed from the draft definition. There are, in principle, risks associated with this although in practice their effects are likely to be small. The risks arise from the uncertainty surrounding the origin of hydrocarbon based additives and whether they are, in reality, already accounted for in the fuel statistics under 'Other oil products'.

Liquefied Petroleum Gas
It was decided not to include ethane in LPG as marketed to consumers. A more general definition LPG is in use where ethane is included with liquefied gases from separation plants but the physical characteristics of ethane and its value as a petrochemical feedstock favour its separation from the liquefied gases further downstream.

Aviation fuels and motor gasoline
Definitions for these products have been considerably amplified.

Kerosene
An umbrella definition has been introduced.

Gas Oil/Diesel Oil and Fuel oil
The revised data presented here were taken from CONCAWE product dossiers 107 (Gas Oils) and 109 (Heavy Fuel Oils). A URL is provided with the definition.

Bitumen
Investigation of the possible heat raising use of bitumen (as a secondary product) revealed Japan as the primary user in power generation. It does not appear to be their use of Orimulsion as that is separately reported. There is also use in other countries of much smaller quantities in patent fuel plants and in refineries. The use in the former is likely to be as a binder for patent fuel and may also be a coal product (coal tar) rather than an oil product. The nature of the use in refineries is not clear and it may be solid residue from crude distillation reported as bitumen.

Without further clarification of the apparent nature and uses of bitumen for heat raising the definition has been left as describing a non-energy product only.

Catalytic coke (Petroleum coke)
A remark has been added to the definition explaining the nature of catalytic coke. As it is not a recoverable product it is not identified as a finished petroleum product from refineries. It does, however, form part of total petroleum coke production.

Natural gas
This definition has been revised to take into account the contributions from Marcogaz and the work done by the International Standards Organization.

Solid fossil fuels and derived products

The hierarchy covering the various coals is set out in the definition. Calorific values of coals are given prominence as a means of differentiating between coal types except when heating is not the primary use. Calorific values are expressed in SI units (MJ/kg) and the values have been taken from UNECE data or Perrys Chemical Engineers' Handbook.

Anthracite
It has been particularly difficult to find an authoritative source for the range of calorific values for anthracite. The fuel has a calorific value considerably above the lower bound given in the definition for hard coal and it was felt that this higher quality should be reflected in the anthracite definition. A suitable lower value has been chosen from the ranges found for anthracite.

Coke
An umbrella definition for coke has been introduced.

Patent fuel
The possibility of other patent fuel processes in the US which involve chemical sprays on coal fines seems to be more closely associated with synthetic coal manufacture involving chemical change to the coal. The extent of the practice is unclear and as it benefits from a subsidy its continuation is uncertain. The draft definition has therefore not been changed.

Other recovered gases
This definition covers a wide group of *waste* or *off gases* from industrial processes which use cokes as sources of carbon for reduction processes. The definition is a general one and naturally covers similar gases produced from the processing of oil feedstock in the chemical industry. At present the use of these oil-derived gases in industry does not form part of the regular data collection by energy statisticians but in anticipation of the eventual collection of data for this important fuel use the group may wish to consider adding it to the oil product definitions.

Renewable energy, fuels and wastes

The definitions for the definitions of primary electricity and heat have been considerably simplified by removing elements which explained the origins of the energy and limiting the definition to saying just what distinguishes an individual source from others.

Geothermal heat
The definition for geothermal heat has been drafted to avoid the implication that the source of heat is the earth's crust. A URL is given to an excellent review of the geothermal energy by the International Geothermal Association which makes clear that more of the earth is involved in the production of the heat than the crust region.

Biomass
The biomass definition has been extended to make clear that animal residues and by-products are included. It also recognises that biomass is not only available in solid form.

Bioenergy
The Bioenergy title was proposed by the meeting but the definition describes only biofuels as biomass cannot cover primary heat or electricity sources. Use of the word bioenergy suggests more than the definition covers. The title 'Biofuels' is preferable.

By-products and residues
The terms 'by-products'and residues has been taken from the FAO's Unified Terminology. The use of the 'residues' is preferred to 'wastes' as the latter implies some value judgement.

Residues has been used where it's use is unlikely to supplant long-established terminology. The term 'by-products' has been used when the by-products are the result of transforming something. For example, animal droppings, extracted fats and black liquor are produced as by-products of natural or technical processes but chips, sawdust and bagasse as residues from processes. Consequently the word 'by-products' may be omitted from the 'Fuelwood, wood residues and by-products' heading as the essential woody character is retained.

A classification hierarchy for biofuels is proposed in Annex 8. It corresponds well with the scope of the existing definitions with two exceptions. Only the biomass component of Industrial and Municipal wastes can be included and, a new definition for the production of synthesis gas from biomass, Biosyngas, is required. Marcogaz already has a definition for Biosyngas taken from an ISO standard, for example. If required this could be used.

Electricity and heat

The two 'definitions' here simply set out the sources for electricity and the types of heat sources. The definitions of plant types and relevant flow activities are given under flows.

The 3rd meeting requested a definition for nuclear energy. This proposal for nuclear heat as the primary energy form should be read after the note on primary energy form in the 'General Points'.

Nuclear energy

The choice of primary energy form for nuclear energy follows from the application of the general rule for choice of energy form to the energy flow. There have been and are cases where the steam produced from reactors is used for heating in addition to its far wider use for electricity. Nuclear CHP is also being discussed. The possibility of going upstream beyond the heat production to measures of nuclear fuel consumption has not been entertained by statisticians for two reasons. It is not clear that this leads to a practical benefit and, secondly, it is a technically difficult procedure and sometimes a sensitive matter to obtain figures for the nuclear fuel consumption. It is evident then that a better choice for the primary energy form is the heat from the reactor measured at a convenient point before first use. The quantity produced will, in general, enter the transformation sector for generation of electricity or heat for sale.

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”.

REVISED DEFINITION

Definition: The total flow of fuel or energy into the national territory for its use there.

Explanation: The activities which make up supply are production, external trade and stock movements. Supply is calculated using the formula:

Supply = Production + Imports - Exports - International Bunkers ± Stock Change.

where International Bunkers = International Marine and Aviation Bunkers

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.

REVISED DEFINITION

Production

Definition: Production covers

- the extraction or capture, within the national territory, of primary fuels (including biofuels) or heat and electricity which are retained for sale or use, and
- the manufacture of secondary fuels or energy from the primary (or secondary)sources.

Explanation: Production of primary fuels excludes amounts of separated fuels, inert matter or impurities which are removed before sale or use and any amounts flared, vented or returned to the natural reserves. However, the amounts of the fuel/energy consumed during the production process are included.

Production of secondary fuels *includes* any amounts vented, flared or lost before use.

Note that a ‘secondary’ fuel may be, in reality, a tertiary or more distant descendant of the original primary fuel. The use of the word secondary is simply a shorthand description for all commodities descending from the primary.

Remark: Production quantities are those which are marketable or used at the production site. Quantities of a fuel which are removed during production and then returned to the fuel before its initial disposal are included.

For example, lease or field condensate, which is formed in condensing plant during the extraction of crude oil and which is then put into the crude oil stream for disposal, is part of production. However, when components of fuels are permanently removed from a primary fuel stream they are excluded from the production quantity. For example, the production of natural gas excludes the natural gas liquids (NGL) which are removed from the wet gas after extraction. The dry gas and the NGL are considered separate primary marketable products.

Production of biofuels is rarely measured close to the point of production but inferred from measurement of consumption or surveys of consumption.

Production from other sources

Definition: Additions to the supply of the fuel which supplement production but which are not naturally part of the production of the fuel in the reporting period.

Explanation: This flow is included because the supply of the fuel is increased by the practice. Examples are coal recovered from waste tips or sea coal, or chemicals added to petroleum products to modify their characteristics.

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.

REVISED DEFINITION

Definition: Imports of fuel and energy commodities are the amounts which have entered the national territory during the reporting period for use, processing or storage. Exports of fuel and energy commodities are the amounts which leave the national territory after production, manufacture or processing. Exports also include re-exports which are foreign goods exported from the national territory in the same state as previously imported.

Remark: The above definition implies 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.

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.

REVISED DEFINITION

Definition: Quantities of fuels delivered to and consumed by all ships during international voyages transporting goods or passengers. Quantities of fuels consumed by ships during domestic transportation, fishing or military use are not included here.

Explanation: International voyages take place when the ports of departure and arrival are in different national territories.

NEW ADDITIONAL DEFINITION

International aviation bunkers

Definition: Quantities of aviation fuels delivered to all civil aircraft for consumption during international flights transporting passengers or goods.

Explanation: An international flight occurs when take off and landing occur in different national territories.

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.

REVISED DEFINITION

Definition: Stocks are quantities of fuels held on national territory to maintain service under conditions where the production and net imports of fuels and the demands for them are variable in their timing or amounts. 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).

Remark: Not all stocks are eligible for inclusion in fuel statistics and those which are chosen need to be chosen in a manner consistent with the construction of the national fuel statistics. Stocks which are not in a position to satisfy the requirement of balancing supply and demand in the market under normal market conditions are usually excluded. Examples are, stocks held by final consumers, oil or gas in pipelines, or fuels being transported by other means.

Whether stock change is calculated as 'Opening - Closing' or 'Closing - Opening' will depend on the convention chosen for presentation of the data in commodity balances.

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.

REVISED DEFINITION

Definition: These are divided into three groups and are essentially statistical devices to overcome practical classification and presentation issues resulting from changes in use or identity of a product.

- 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.
- Recycled products
  Non-energy products which are recovered after use and used again, usually after treatment.

  Remark: They may be reused for their original function (for example, lubricating oil, cleaned, treated and reused for lubrication) or as a fuel.

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^3 to kt, etc.).

REVISED DEFINITION

Definition: The numerical difference between the total supply of a fuel/energy and the total use of it.

Explanation: It arises from various practical limitations of data collection when the data elements, which make up supply and demand, may be taken from different data sources which may use different time periods, different spatial coverage, different specifications or conversions from volume to mass or from mass to energy content.

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.

REVISED DEFINITION

Definition: Activities in which products undergo a process or processes during which there are physical or chemical changes into other products whose intrinsic properties differ from those of the input products.

Explanation: The activities may be:

- Chemical or physical changes to the input product(s) resulting in the creation of products containing new chemical compounds. (For example, refining)
- Physical changes to the input which involve separation into several different products with intrinsic physical properties which are different from those of the input material. (For example, Coke oven carbonisation of coal).
- Conversion of thermal energy (heat) into electricity.
- Production of heat for distribution to third parties.

Transformation includes the following activities: Electricity plants, Combined Heat and Power plants, Heat plants, Main activity producers, Autoproducers, Coke Ovens, Patent Fuels Plants, Blast Furnaces, Gas Works, Petroleum refineries, Petrochemical plants, Coal Liquefaction plants, Gas to Liquid (GTL) plants, Charcoal plants, Other transformation.

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.

REVISED DEFINITION

Electricity plants

Definition: Electricity plants produce only electricity from thermal energy. They generate it from turbines driven by steam or gas turbines or internal combustion engines. The steam may be produced from the combustion of fuels or from nuclear reactors.

Remark: 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).

Plants or units producing electricity from turbines or other mechanical devices driven by wind or water are not included.

Combined Heat and Power plants

Definition: Combined heat and power (CHP) plants produce both heat and electricity from at least one generating unit.

Remark: They are sometimes referred to as ‘co-generation’ plants. Where 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 separately the quantities of fuel used for electricity and heat.

Heat plants

Definition: 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.

Remark: Heat generated within an establishment entirely for its own use is not a transformation sector but a final consumption activity.

Main activity producers

Definition: Enterprises which produce electricity or heat for supply to third parties as their main activity.

Remark: Formerly known as *public utilities* the enterprises may be privately or publicly owned companies.

Autoproducers

Definition: Enterprises which produce electricity or heat as an activity which is secondary to their main business.

Remark: Autoproduction refers to all electricity generated by the enterprises whether or not it is supplied to third parties. However, autoproduction of heat is limited to the quantity produced and supplied to third parties..

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.

REVISED DEFINITION

Blast Furnaces

Definition: 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.

Remark: Blast furnace activity forms part of the transformation sector because most of the the carbon it consumes leaves the blast furnace as blast furnace gas which is used for energy purposes, namely, to heat the air entering the blast furnace or for other heat/power raising.

Gas Works

Definition: Plants which produce town gas/gas works gas for distribution to consumers.

Coke Ovens

Definition: Large ovens within which metallurgical coke and by-products such as coke oven gas and coal tars and oils are produced.

Patent Fuels Plants

Definition: Plants manufacturing patent fuels.

NOTE

Definitions for BKB and Peat Briquettes plants can be found later under Separation and Blending.

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.

REVISED DEFINITION

Definition: Petroleum refineries are plants which convert (transform) the feedstock of crude oil and other hydrocarbons into finished petroleum products.

Explanation: Typical finished products are Liquefied Petroleum Gases, Naphtha, Motor Gasoline and Gas Oils for diesel engines and heating, Aviation fuels and other kerosenes and Fuel Oils for heating.

Remark: 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.

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.

REVISED DEFINITION

Definition: 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.

Explanation: 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.

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.

REVISED DEFINITION

Coal Liquefaction plants

Definition: Coal Liquefaction plants are facilities where coal is used to produce liquid fuels (usually for vehicles) by hydrogenisation or carbonization.

Remark: See <http://en.wikipedia.org/wiki/Coal> for a full explanation.

Gas to Liquid (GTL) plants

Definition: Plants in which natural gas is used as feedstock for the production of vehicle fuels, usually motor gasoline.

Remark: Note that the gas-to-liquid plants are quite different from LNG plants which convert gaseous natural gas into liquid natural gas.

See also <http://en.wikipedia.org/wiki/Gas_to_liquids>

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”.

REVISED DEFINITION

Charcoal plants

Definition: Plants in which charcoal is made.

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.

REVISED DEFINITION

Other transformation

Definition: Transformation activities not elsewhere specified.

NEW ADDITIONAL DEFINITION

Separation and blending

Definition: Separation, blending, aggregating and upgrading, in which the various products are separated or combined without change to their intrinsic physical qualities or chemical nature.

Explanation: Examples are:

- Separation of gas streams into their component gases,
- mixing of gas streams to produce a gas with characteristics suitable for distribution and use,
- briquetting processes with binders,
- mixing light with heavy oils to obtain a product which meets specification.

Separation and blending includes the following activities: BKB (Braunkohlenbriketts) Plants, Peat Briquette plants, Natural gas blending plants, Gas treatment plants, Other separation and blending,

BKB-PB plants

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

- 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.

REVISED DEFINITION

BKB (Braunkohlenbriketts) Plants

Definition: Plants manufacturing brown coal briquettes.

Peat Briquette plants

Definition: Plants manufacturing peat briquettes

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.

REVISED DEFINITION

Definition: Plants where the calorific value and density of natural gas for distribution is adjusted through blending with nitrogen, gases from oil and/or coal, or with biogases.

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”.

REVISED DEFINITION

Gas treatment plants

Definition: 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 mixtures of them, through a process of physical separation of gas components.

Remark: These plants may also be called *Gas separation 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.

REVISED DEFINITION

Other separation and blending

Definition: Separation and blending activities not elsewhere specified.

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.

REVISED DEFINITION

Definition: Consumption by the energy sector companies is the amount of fuel or energy used to support their extraction, production, manufacturing or transformation processes.

Remark: This consumption should be distinguished from the amount of fuel transformed into other fuel or energy forms which is part of the transformation sector use. Fuels or energy used to operate pipelines (oil, gas or coal slurries) should be reported as part of the transport sector.

Activities comprising the energy sector are identified in the table below and, where available, the corresponding ISIC/NACE codes are given.

Branch	**ISIC/NACE code**
Coal Mines	Division 5
Oil and Gas extraction	Division 6
Patent fuel plants	
Coke Ovens	Group 1910, 19.1
Gas Works	Group 3520, Class 35.21
Gasification plants for biogas	
Blast furnaces	
BKB plants	
Petroleum refineries	Group 1920, 19.2
Coal liquefaction plants	
LNG/Regasification plants	
GTL plants	
Own use in electricity/CHP and heat plants	Group 3510, Class 35.11
Use for pumped storage	
Nuclear fuel industry	Class 0721, 7.21 (mining only)
Charcoal plants	

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.

REVISED DEFINITION

Definition: Losses during the transmission, distribution and transport of fuels and electricity. Distribution losses also include flaring of manufactured gases and pilferage of fuels or electricity.

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.

REVISED DEFINITION

Definition: Final consumption is all fuel and energy that is delivered to the consumption sectors for both energy and non–energy needs within the national territory. Consumption sectors comprise:

- Industry (excluding the energy sector)
- Transport
- Commerce and public services
- Agriculture, Forestry
- Fishing
- Residential
- Not elsewhere specified (includes military consumption)

Explanation: Energy needs are for heat raising, transportation and electricity. Non-energy needs are those for fuels used for chemical feedstocks and non-energy products.

- *Chemical feedstocks* are fuels used as raw materials for the manufacture of products which contain the hydrogen and/or carbon taken from the fuel.
- *Non-energy products* are fuel products used for their physical and chemical properties. Examples are lubricants, paraffin waxes, coal tars and oils as timber preservatives, etc.

Remark: Any fuel consumption which is used for activities listed as part of the transformation sector should not be included as final consumption but reported as part of the transformation sector.

Studies of the non-energy use of fuels also classify reductants as non-energy use.

- *Reductants* are carbon from fuels (usually cokes) which are heated with metal oxides. During the process the carbon monoxide is formed which removes the oxygen from the metal oxides and produces the pure metal.

This use is considered as use for energy purposes within energy statistics because the gases created by the reduction process, and which contain most of the carbon from the reductant, are used as fuels to sustain the process or for other heat raising purposes.

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 is 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.

REVISED DEFINITION

Definition: Use of fuels within the manufacturing and construction industries.

Branch	Activity Classification
Iron and steel	ISIC Group 241 and Class 2431 (NACE Groups 24.1, 24.2, 24.3, and Classes 24.51, and 24.52). Consumption in coke ovens and blast furnaces are defined as part of the transformation sector and the energy sector.
Chemical and petrochemical	ISIC/NACE Divisions 20 and 21
Non-ferrous metals	ISIC Group 242 and Class 2432 (NACE Group 24.4, and Classes 24.53 and 24.54).
Non-metallic minerals	ISIC/NACE Division 23. Report glass, ceramic, cement and other building materials industries.
Transport equipment	ISIC/NACE Divisions 29 and 30.
Machinery	ISIC/NACE Divisions 25, 26, 27 and 28. Fabricated metal products, machinery and equipment other than transport equipment.
Mining and quarrying	ISIC/NACE Divisions 7 and 8 and Group 09.9. This excludes the fuel extraction industries and extraction of peat, Class 08.92.
Food and tobacco	ISIC/NACE Divisions 10, 11 and 12.
Paper, pulp and print	ISIC/NACE Divisions 17 and 18. Includes production of recorded media.
Wood and wood products (Other than pulp and paper)	ISIC/NACE Division 16.
Textile and leather	ISIC/NACE Divisions 13, 14 and 15.
Construction	ISIC/NACE Divisions 41, 42 and 43.
Industries not elsewhere specified	ISIC/NACE Divisions 22, 31, 32. This category covers any manufacturing industry not listed above

Remark: Use by the energy industry 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.

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.

REVISED DEFINITION

Transport

Definition: Fuels and electricity used in transport of goods or persons within the national territory irrespective of the economic sector within which the activity occurs.

Remark: Part of the deliveries of fuels to vehicles undertaking transport of goods or persons beyond the national territory are covered under the definitions for International Marine and Aviation Bunkers and are therefore excluded from this definition. However, deliveries of fuels to road vehicles going beyond national borders cannot be readily identified and by default are included here.

Domestic aviation
Definition: Deliveries of aviation fuels to civil aircraft undertaking a domestic flight and for purposes other than flying such as the bench testing of aero engines.

Explanation: A domestic flight takes place when the departure and landing airports are on national territory and the aircraft makes no intermediate stops. In cases where distant islands form part of the national territory this may imply long flights through the air space of other countries but the flights are, nevertheless, part of domestic aviation.

Remark: Military use of aviation fuels should not be included in domestic aviation but under 'not elsewhere specified'. It also excludes the use of fuel by airlines for ground transport.

Road
Definition: Fuels and electricity delivered to vehicles using public roads.

Remark: It excludes military consumption, fuels for road vehicles dedicated for use on roads not open to the public and fuels used in stationary engines.

Rail
Definition: Fuels and electricity delivered for use in rail vehicles, including industrial railways.

Domestic navigation
Definition: Fuels delivered to vessels transporting goods or people and undertaking a domestic voyage

Explanation: A domestic voyage is between two ports in the same national territory without intermediate ports of call in another. Note that this may include journeys of considerable length between two ports in a country (e.g. San Francisco to Honolulu).

Fuels delivered to fishing vessels are excluded.

Pipeline transport
Definition: Fuel and electricity 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.

Remark: Pipelines carrying fuels may use some of the fuel carried to provide the energy required for the transport. Any losses occurring during the transport by pipeline between supplier and final users should be reported as distribution losses.

Pipeline transport is classified as NACE Group 49.5 and ISIC Group 4930.

Transport not elsewhere specified.
Deliveries of fuels or electricity used for transport activities not elsewhere specified.

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.

REVISED DEFINITION

Commerce and public services
Definition: Fuels consumed by business and offices in the public and private sectors.

Explanation: The Divisions for ISIC and NACE are identical and as follows:

ISIC/NACE Divisions 33, 36, 37, 38, 39, 45, 46, 47, 52, 53, 55, 56, 58, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74, 75, 78, 79, 80, 81, 82, 84, 85, 86, 87, 88, 91, 92, 93, 95, 96, 99.

Agriculture/Forestry
Definition: Deliveries of fuels and energy for agriculture, hunting and forestry.

Remark: It therefore includes fuels and energy consumed for traction (excluding use by agricultural vehicles on public roads) and for power or heating (agricultural and domestic) (ISIC/NACE Divisions 01 and 02).

Fishing
Definition: Deliveries for all vessels engaged in ocean, coastal and inland fishing as well as for aquaculture and fisheries (ISIC/NACE Division 03). 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.

Residential (Households)
Definition: Fuels and energy consumed by all households including households with employed persons or producing undifferentiated goods and services. ISIC/NACE Divisions 97 and 98.

Remark: Exclude fuels and electricity used by households for transport.

Not elsewhere specified
Definition: Activities not included elsewhere.

Remark: This category includes fuels and electricity delivered to military services based in the national territory. The energy consumption is 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 based in the national territory.

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_2H_4) or the use of natural gas (mostly CH_4) to make ammonia (NH_3).
- 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.