

# Bilateral JODI Training Workshop

10-11 December 2009, Pretoria, South Africa

## The Extended JODI Questionnaire:

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Energy Working Group



International  
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International Energy Forum



Organización Latinoamericana de Energía  
Latin American Energy Organization  
Organização Latino-Americana de Energia  
Organization Latino - Americane D'Energie



# Decisions of the 6<sup>th</sup> JODI Conference

- Continue improving data completeness, timeliness and reliability
- To work more closely with a wider range of both data providers and users in order to improve the usefulness of the Initiative and the entire database
- **The need to extend the JODI questionnaire by disaggregating existing flows and products.**

# Extended JODI Questionnaire (plan)

- A trial period of six months (data from March to September 2007) to enable organizations to assess how many countries can report more data on a timely and accurate manner;
  - The results of the trial period was evaluated during the JODI ISWG meeting in November 2007 and it was decided that another six-month trial collection (for October 2007 to March 2008 data) should be carried out.
  - In May 2008, it was again decided by the JODI ISWG that the trial collection should continue until the JODI Conference in 2009 by which a decision on whether to use the extended format permanently would be sought.
  - As of October 2009, it was noted that the number of countries that submit the JODI data using the extended questionnaire has increased.
- Countries that cannot report data through the new questionnaire are given the opportunity to submit JODI data using the current format;
- The 6 JODI organizations will start submitting the data from the extended questionnaire to the IEFS in December 2009.

# Current JODI Questionnaire

**42 Data Points**

**Country:** \_\_\_\_\_

**Month:** \_\_\_\_\_

**Unit:** \_\_\_\_\_

		Crude Oil
Production		
Imports		
Exports		
Stocks	Closing	
	Change	
Refinery Intake		

**1 x 6**

		Petroleum Products					
		LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Refinery Output							
Imports							
Exports							
Stocks	Closing						
	Change						
Demand							

**6 x 6**

# Extended JODI Questionnaire

**126 Data Points**

Country \_\_\_\_\_

Month \_\_\_\_\_

Unit : \_\_\_\_\_

	Crude Oil	NGL	Other	Total 1)+(2)+(3)	Petroleum Products								
					LPG	Naphtha	Gasoline	Total Kerosene	Of which Jet Kerosene	Gas/ Diesel Oil	Fuel Oil	Other Products	Total Products (5)+(6)+(7) +(8)+(10) +(11)+(12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
+ Production					+ Refinery Output								
+ From Other sources					+ Receipts								
+ Imports					+ Imports								
- Exports					- Exports								
+ Products Transferred /Backflows					- Products Transferred								
- Direct Use					+ Interproduct Transfers								
- Stock Change					- Stock Change								
- Statistical Difference	0	0	0	0	- Statistical Difference	0	0	0	0	0	0	0	0
= Refinery Intake					= Demand								
Closing stocks					Closing stocks								

**(10 x 4) - 4**

Automatic Checks Petroleum Products

**10 x 9**

- Automatic Checks
- Total sum
  - Statistical Difference
  - Stat. Diff./Refinery Intake
  - Products Transferred
  - Negative Products Transferred
  - Blocked out cells
  - Negative Stock Values
  - Refinery Losses

0

- Total Products sum
- Statistical Difference
- Stat. Diff./Demand
- Negative Products Transferred
- Interproduct transfers
- Jet Kerosene
- Negative Stock Values

# Refinery Inputs Checks

- Total sum is calculated as  $\text{Total} - (\text{Crude Oil} + \text{NGL} + \text{Other})$ .
- Statistical Differences are calculated as  $(\text{Production} + \text{From Other Sources} + \text{Imports} - \text{Exports} + \text{Product Transfers/Backflows} - \text{Direct Use} - \text{Stock Change}) - \text{Refinery Intake}$ .
- 'Products Transferred/Backflows' for Total should be larger than 'Products Transferred' for Total Products.
- 'Products Transferred/Backflows' should be positive.
- No data should be reported in blocked out cells.
- Refinery losses are calculated as  $\text{Total Products Refinery Output} - \text{Total Refinery Intake}$ .



# Petroleum Products Checks

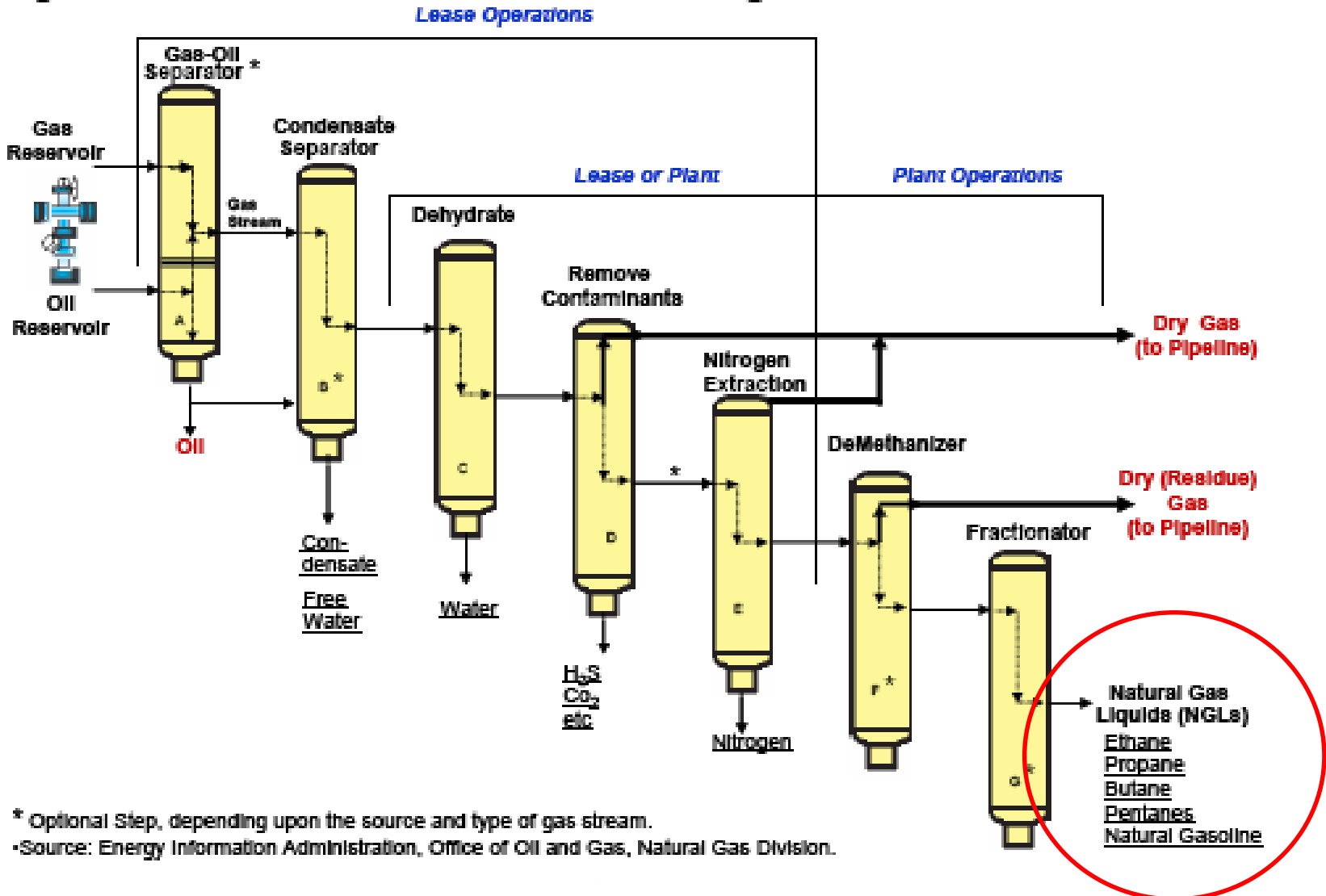
- Total products sum is calculated as Total Products – (LPG + Naphtha + Gasoline + Total Kerosene + Gas/Diesel Oil + Fuel Oil + Other Products).
- Statistical Differences are calculated as (Refinery Output + Receipts + Imports - Exports - Product Transfers + Interproduct Transfers - Stock Change) - Demand.
- Products Transferred should be positive.
- Total Products Interproduct Transfers should be zero.
- Jet Kerosene should be smaller than Total Kerosene.

# Definition of Products

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



# Definition of Products (NGL)



Source: EIA-USDOE, Office of Oil and Gas, "Natural Gas Processing: The Crucial Link Between Natural Gas Production and Its Transportation to Market", [http://www.eia.doe.gov/pub/oil\\_gas/natural\\_gas/feature\\_articles/2006/ngprocess/ngprocess.pdf](http://www.eia.doe.gov/pub/oil_gas/natural_gas/feature_articles/2006/ngprocess/ngprocess.pdf), January 2006

# Definition of Products

## ● OTHERS 1/2

- A **refinery feedstock** is a processed oil destined for further processing (e.g. straight run fuel oil or vacuum gas oil) excluding blending. With further processing, it will be transformed into one or more components and/or finished products. This definition also covers returns from the petrochemical industry to the refining industry (e.g. pyrolysis gasoline, C4 fractions, gas oil and fuel oil fractions).
- **Additives/Oxygenates:** Additives are non-hydrocarbon compounds added to or blended with a product to modify fuel properties (octane, cetane, cold properties, etc.):
  - oxygenates, such as alcohols (methanol, ethanol), ethers (such as MTBE (methyl tertiary butyl ether), ETBE (ethyl tertiary butyl ether), TAME (tertiary amyl methyl ether));
  - esters (e.g. rapeseed or dimethylester, etc.);
  - chemical compounds (such as TML, TEL and detergents).

# Definition of Products

## About Additives and Oxygenates

- Lead was added to gasoline to greatly simplify blending for octane number. Lead, in the form of tetraethyl lead (TEL) or tetramethyl lead (TML), increases the octane number of gasoline without affecting any other properties, including vapour pressure.
- TEL is a very toxic chemical, and even in low concentration in the vapour form can induce violent illness or death. That's why national administrations quickly set a maximum amount of TEL allowed in gasoline.

# Definition of Products

## About Additives and Oxygenates

- When national administrations required the lead content to be reduced to meet environment requirements, refiners looked for other octane enhancers. From petrochemicals industry came several alternatives: methanol, ethanol, tertiary butyl alcohol (TBA), and methyl tertiary butyl ether (MTBE).
- The two classes of compounds to be considered here are alcohols and ethers. Since the 1970s, alcohols (methanol and ethanol) and ethers have been added to gasoline to increase octane levels, reduce carbon monoxide generation and reduce negative impact on atmospheric ozone layer due to the lower reactivity of resulting VOC emissions.
- As a result of the lead additives withdrawal, a number of different ethers are currently added to the gasoline and are better able to meet both the new oxygen requirements and the vapour pressure limits. The most common ethers being used as additives are MTBE, ethyl tertiary butyl ether (ETBE), and tertiary amyl methyl ether (TAME). Some refineries manufacture their own supplies of those ethers.

# Definition of Products

## About Additives and Oxygenates

- Isobutylene and/or isoamylene and methanol (or ethanol) are necessary to produce MTBE (or ETBE) and/or TAME. Isobutylene is obtained from a number of refinery sources including: the light naphtha from the FCC and coking units; conversion of TBA recovered as a by-product in the manufacture of propylene oxides...
- Methanol ( $\text{CH}_3\text{OH}$ ) is commonly called wood alcohol because the early commercial source was the destructive distillation of fresh-cut lumber from hardwood trees. Now methanol has been made commercially from methane or naphtha. The source of the methane is usually natural gas, which is predominately methane. However, the ability to produce methanol from non-petroleum feedstocks such as coal or biomass is of interest for reducing petroleum needs.
- Ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ ), or ethyl alcohol, is the alcohol most intimately familiar to everyone, the primary constituent of whiskey. Like methanol, ethanol had natural beginnings; the fermentation of sugar in grapes (wine), potatoes (vodka), and grain and corn (whiskey). Now synthetic ethanol is produced either by the direct or indirect hydration of ethylene.



# Definition of Products

## ● OTHERS 2/2

- ❑ **Biofuels** such as biogasoline and biodiesel that are blended into gasoline and diesel at oil refineries.
  - Biogasoline: a gasoline quality liquid fuel produced from biomass or used cooking oils, consists of bioethanol, biomethanol, BioETBE and bioMTBE
  - Biodiesel: a diesel quality liquid fuel produced from biomass or used cooking oils, consists of Biodiesel, bio-dimethylether, Fischer-Tropsh and cold pressed biooil.
  - Bioethanol: ethanol produced from biomass and/or the biodegradable fraction of waste;
  - Biomethanol: methanol produced from biomass and/or the biodegradable fraction of waste;
  - Biodimethylether: a diesel quality fuel produced from biomass and/or the biodegradable fraction of waste;
  - Biooil: a pyrolysis oil fuel produced from biomass
- ❑ **Other Hydrocarbons:** This category includes synthetic crude oil from tar sands, shale oil, etc., liquids from coal liquefaction, output of liquids from natural gas conversion into gasoline, hydrogen and emulsified oils (e.g. Orimulsion).



# Definition of Products

- NAPHTHA

- Naphtha is a feedstock destined for the petrochemical industry (e.g. ethylene manufacture or aromatics production). Naphtha comprises material in the 30°C and 210°C distillation range or part of this range. Naphtha imported for blending is reported as an import of naphtha, then shown on the interproduct transfer row, as a negative entry for Naphtha, and a positive entry for the corresponding finished product.

# Definition of Products

## ● TOTAL KEROSENE

- This category includes kerosene type Jet Fuel and Other Kerosene as defined below:
  - **Kerosene Type Jet Fuel:** This is a distillate used for aviation turbine power units. It has the same distillation characteristics between 150°C and 300°C (generally not above 250°C) and flash point as kerosene. In addition, it has particular specifications (such as freezing point) which are established by the International Air Transport Association (IATA). This category includes kerosene blending components.
  - **Other Kerosene:** Kerosene comprises refined petroleum distillate and is used in sectors other than aircraft transport. It distills between 150°C and 300°C.

# Definition of Products

## ● OTHER PRODUCTS 1/2

- Other Products is the sum of Refinery Gas (not liquefied), Ethane, Petroleum Coke, Lubricants, White Spirit & SBP, Bitumen, Paraffin Waxes and Other products as defined below:
  - **Refinery Gas (not liquefied)** includes a mixture of non-condensable gases mainly consisting of hydrogen, methane, ethane and olefins obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. This also includes gases which are returned from the petrochemical industry.
  - **Ethane:** A naturally gaseous straight-chain hydrocarbon, (C<sub>2</sub>H<sub>6</sub>) extracted from natural gas and refinery gas streams.
  - **Petroleum coke** is a black solid by-product, obtained mainly by cracking and carbonising petroleum derived feedstock, vacuum bottoms, tar and pitches in processes such as delayed coking or fluid coking. It consists mainly of carbon (90 to 95%) and has a low ash content. It is used as a feedstock in coke ovens for the steel industry, for heating purposes, for electrode manufacture and for production of chemicals. The two most important qualities are "green coke" and "calcinated coke". This category also includes "catalyst coke" deposited on the catalyst during refining processes; this coke is not recoverable and is usually burned as refinery fuel.
  - **Lubricants** are hydrocarbons produced from distillate by product; they are mainly used to reduce friction between bearing surfaces. This category includes all finished grades of lubricating oil, from spindle oil to cylinder oil, and those used in greases, including motor oils and all grades of lubricating oil base stocks.

# Definition of Products

## ● OTHER PRODUCTS 2/2

- **White Spirit and SBP** are defined as refined distillate intermediates with a distillation in the naphtha/kerosene range. They are sub-divided as:
  - Industrial Spirit (SBP): Light oils distilling between 30° and 200°C. There are 7 or 8 grades of industrial spirit, depending on the position of the cut in the distillation range. The grades are defined according to the temperature difference between the 5% volume and 90% volume distillation points (which is not more than 60°C).
  - White Spirit: Industrial spirit with a flash point above 30°C. The distillation range of white spirit is 135° to 200°C.
- **Bitumen** is a solid, semi-solid or viscous hydrocarbon with a colloidal structure, being brown to black in colour, obtained as a residue in the distillation of crude oil, by vacuum distillation of oil residues from atmospheric distillation. Bitumen is often referred to as asphalt and is primarily used for construction of roads and for roofing material. This category includes fluidized and cut back bitumen.
- **Paraffin Waxes**: These are saturated aliphatic hydrocarbons. These waxes are residues extracted when dewaxing lubricant oils. They have a crystalline structure which is more-or-less fine according to the grade. Their main characteristics are as follows: they are colourless, odourless and translucent, with a melting point above 45°C.
- **Other Products**: All products not specifically mentioned above, for example: tar and sulphur. This category also includes aromatics (e.g. BTX or benzene, toluene and xylene) and olefins (e.g. propylene) produced within refineries.  
This should not be confused with "OTHER PRODUCTS" above.

# Definition of Flows

- FROM OTHER SOURCES
  - These refers to supplies of **Additives, Biofuels and Other Hydrocarbons** that are produced from non-oil sources such as: coal, natural gas and renewable energy such as biofuels.



# Definition of Flows

- **PRODUCTS TRANSFERS/BACKFLOWS** (Sum of Products Transfers and Backflows from Petrochemical Industry)
  - **Products Transferred** are imported petroleum products which are reclassified as feedstocks for further processing in the refinery, without delivery to final consumers. For example, naphtha imported for upgrading would be first reported as imports of naphtha, and then appear also as products transferred of naphtha.
  - **Backflows from Petrochemical Industry** are finished or semi-finished products which are returned from final consumers to refineries for processing, blending or sale. They are usually by-products of petrochemical manufacturing. For integrated petrochemical industries this flow should be estimated. Transfers from one refinery to another within the country should be excluded.



# Definition of Flows

- DIRECT USE

- It refers to Crude oil, NGL and other hydrocarbons which are used directly without being processed in oil refineries are reported as Direct use. This includes, for example, crude oil burned for electricity generation.

# Definition of Flows

## ● STATISTICAL DIFFERENCES

- ❑ These are calculated as (Production + From Other Sources + Imports - Exports + Product Transfers/Backflows - Direct Use - Stock Change) - Refinery Intake.
- ❑ These are calculated as (Refinery Output + Receipts + Imports - Exports - Product Transfers + Interproduct Transfers - Stock Change) – Demand.

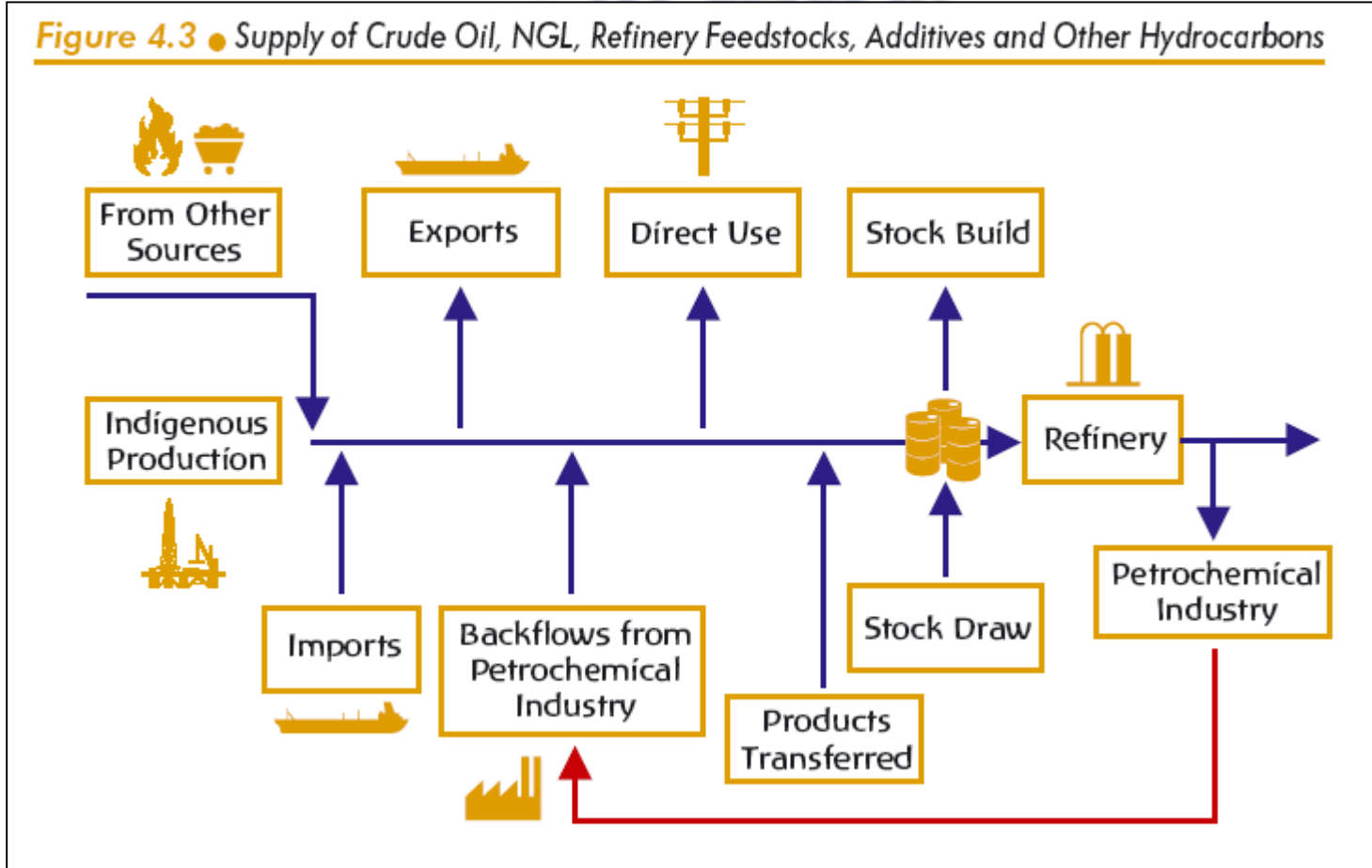
# Definition of Flows

- **RECEIPTS** (Includes primary product receipts and recycled products)
  - **Primary Product Receipts:** Quantities of indigenous or imported crude oil (including condensate) and indigenous NGL which are used directly without being processed in an oil refinery. For example, crude oil used to generate electricity should be placed in primary product receipts of crude oil. Quantities of indigenous NGL which are not included in refinery intake should be reported in primary product receipts of NGL, then transferred through the Interproduct transfers line to the allocated product type. Please note that this flow includes the amounts of backflows from the petrochemical industry which, although not primary fuel, are used directly.
  - **Recycled Products:** These are finished products which pass a second time through the marketing network, after having been once delivered to final consumers (e.g. used lubricants which are reprocessed). These quantities should be distinguished from petrochemical Backflows.

# Definition of Flows

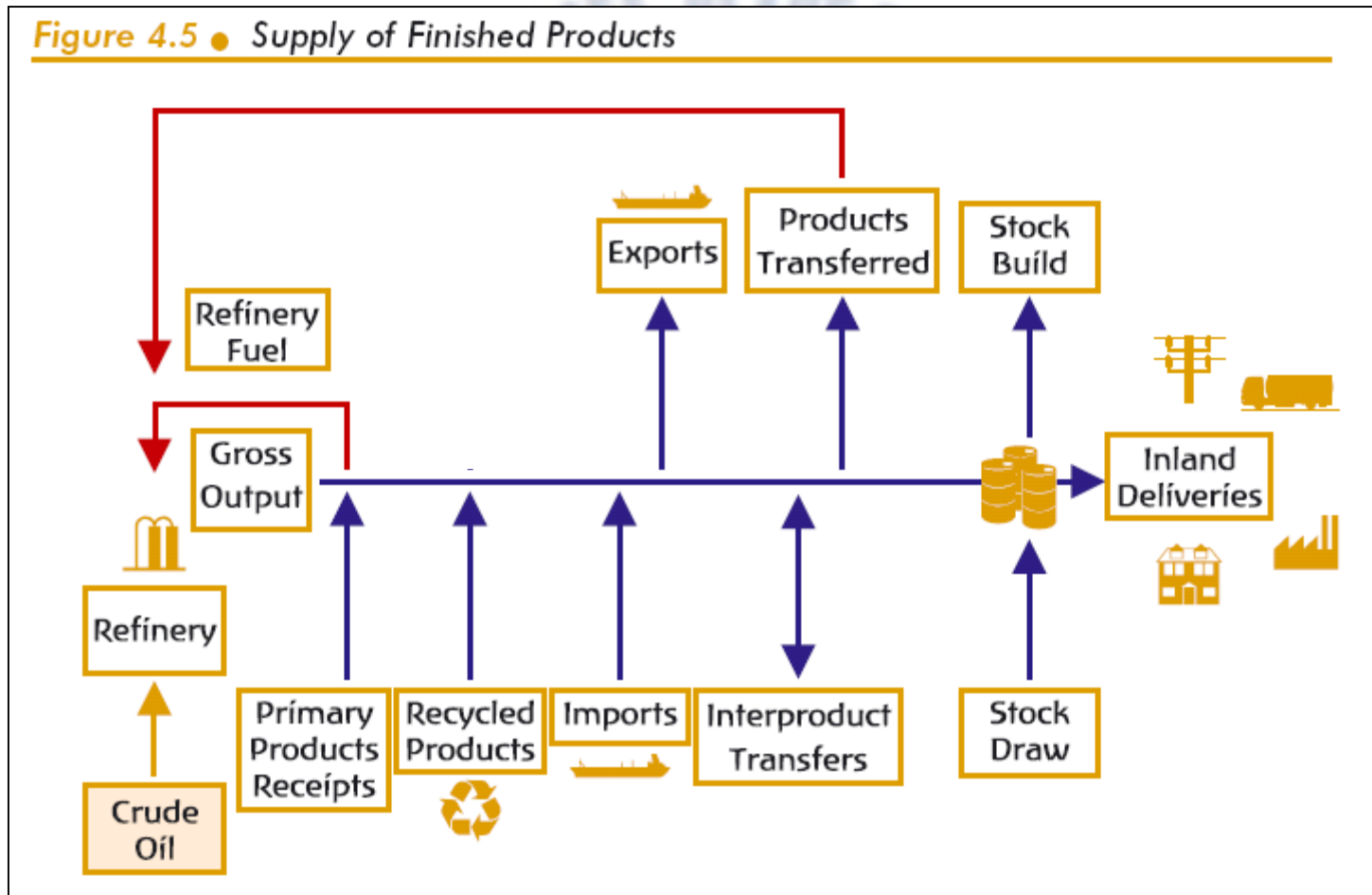
- **INTERPRODUCT TRANSFERS**
  - **Interproduct Transfers** result from reclassification of products either because their specification has changed, or because they are blended into another product. For example, quantities of kerosene may be reclassified as gasoil after blending with the latter in order to meet its winter diesel specification. A negative entry for one product must be compensated by a positive entry (or several entries) for one or several products and vice versa. The total net effect should be zero.

# Feedstocks from Production to Refinery Input



Source: IEA

# Supply Chain from the Refinery to the End-User



Source: IEA



**Thank you**

For more information at  
[www.jodidata.org](http://www.jodidata.org)



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