The JODI Questionnaire:
Data Requirements and Schedule, Definitions, Units of Measurement, Conversion

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The JODI Questionnaire

APEC/EUROSTAT/OECD-IEA/OLADE/OPEC/UNSD

JOINT OIL DATA INITIATIVE

Unit _____

Country _____

Month _____

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

Instructions

Instructions

Deadline for submission: 25th of each month

The excel form includes two worksheets: one for month M-1 and one for month M-2.

1. Please do not change the format of the excel form
2. Please make sure that you indicate the correct data month in the cell for month:
3. Do not enter decimal numbers, but only include rounded numbers
4. *Please note:*
   the flows : Refinery Intake and Demand, as well as the product Total Products are not the sum of the previous flows and products
5. For specific details, please see the worksheet on Definitions in this spreadsheet.

When completed, please save the excel file and send to: … (organization)

If you have other questions or wish more information, please contact: *……(organization)*

M-1 and M-2

- What is M-1?
  - One-month old data
  - On August 25th 2008, data to be reported is for July 2008 (M-1)
- What is M-2?
  - Two-month old data
  - On August 25th 2008, data to be reported is for June 2008 (M-2)
- Why M-1 and M-2 data are to be reported?
  - M-2 data comprise of more complete data; for M-1, most countries cannot be expected to be able to collect all the required data from all data sources
- Some countries/economies cannot report M-1 data due to limitations in data collection system in their respective areas. They are therefore allowed to report M-2. However, the organizations strongly encourage submission of M-1 data.

Timetable

- Monthly data are to be submitted preferably every 25th of the month to respective organizations
- Organizations process and evaluate the data until the 15th of the following month
- Organizations submit the data to IEF
- IEFS posts the data to the JODI World Database as soon as the data are received from the Organizations

Data Processing Schedule

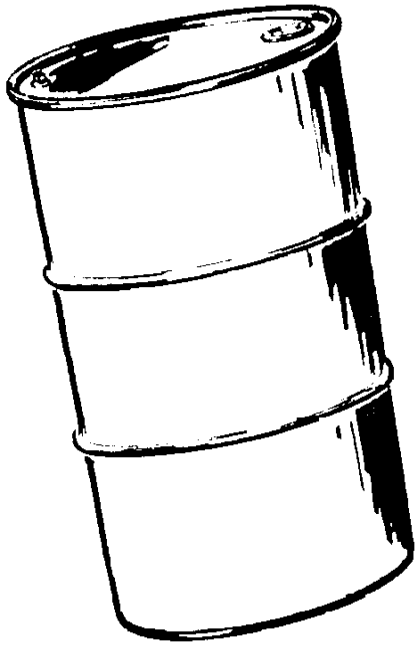
M-1	Last Month	M	Current Month	M+1	Next Month
1		1		1	
2		2		2	
3		3		3	
4		4		4	Organizations receive data from member countries/economies, conducts initial checks and feedback data problems to member countries/economies
5		5		5	
6		6		6	
7		7		7	
8		8		8	
9		9		9	
10		10	1. National Administrations receive data from respective sources, such as: oil companies, custom offices, importers, etc.	10	
11		11		11	1. Organizations evaluate the data by comparison with data from other sources and checking internal consistency.
12		12		12	
13		13		13	
14		14	2. Data are consolidated	14	
15		15		15	2. Data are rated, coded and submitted to IEFS
16		16	3. Data are entered in the JODI questionnaire.	16	1. IEFS receives and posts the data to the JODI World Database and announces the release of the data to organizations.
17		17		17	
18		18	4. Data are verified for accuracy by balance checks, consistency checks, time series checks and visual checks	18	
19		19		19	
20		20		20	2. Organizations inform member countries/economies of the release.
21		21		21	
22		22	5. National administrations feedback problems to data providers, if any.	22	
23		23		23	
24		24		24	
25		25	1. National Administrations receive corrections from data providers and conduct final accuracy checks.	25	
26		26		26	
27		27		27	
28		28		28	
29		29	2. Data are submitted to respective organizations as early as possible.	29	
30		30		30	
31		31			

Notes:

1. While receiving and processing data for M-1, in parallel, national administrations are also receiving and processing M-2 and even older data.
2. The organizations are happy to receive corrections to M-2 data at any time.

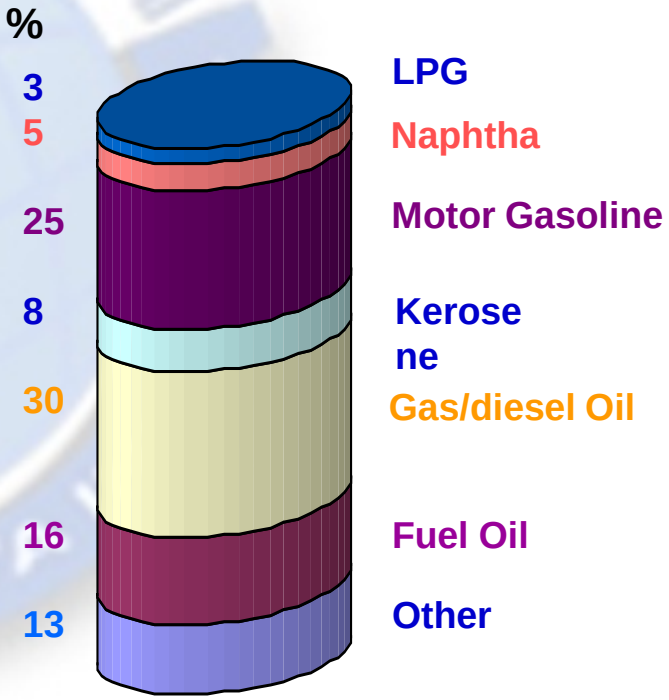
- **What is produced?** · **What is consumed?**

Crude Oil



refining

World - Oil product consumption



Definition of Products

Differences in the definitions: The critical issue is whether the volumes of NGLs, lease or field condensates and oils extracted from bituminous minerals are included. All organisations exclude NGLs from crude oil. Condensates are also excluded, as long as they can be separated from the commercial crude oil stream. Oils extracted from bituminous minerals are included under crude oil only by UNSD.

Country _____
Month _____

	Crude Oil	Petroleum Products					
		LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production							
Imports							
Exports							
Stocks	Closing						
	Change						
Refinery Intake							

Crude Oil: Including lease condensate – excluding NGL

Petroleum is a complex mixture of liquid hydrocarbons, chemical compounds containing hydrogen and carbon, occurring naturally in underground reservoirs in sedimentary rock. Petroleum is normally found at considerable depths beneath the earth's surface, where, under pressure it is essentially liquid. At the surface and atmospheric pressure, petroleum comprises both natural gas and crude oil.

Important: Don't include Natural Gas Liquids (NGL)

Definition of Products

Differences in the definitions: Only UNSD includes ethane under LPG. For all other organisations, LPG comprises merely propane and butane. Volumes of LPG reported in all flows of the JODI questionnaire include LPG from gas plants except for the flow of refinery output.

Country _____

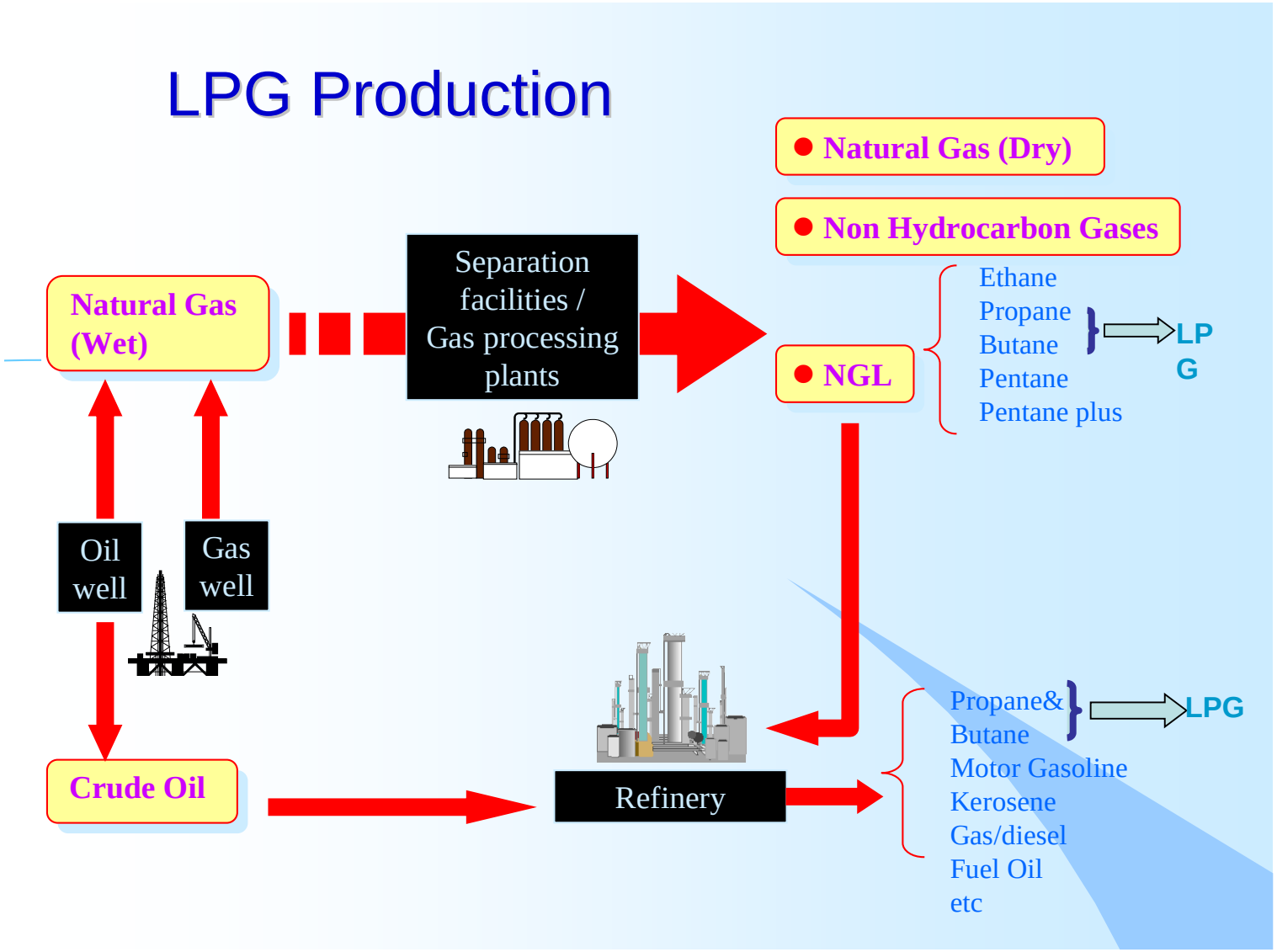
Month _____

		Crude Oil	Petroleum Products					
			LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production								
Imports								
Exports								
Stocks	Closing							
	Change							
Refinery Intake								

LPG: Comprises Propane and Butane

Liquefied Petroleum Gas (LPG) is the generic name for commercial propane and commercial butane – it can be produced from natural gas processing plants or from refineries. LPG naturally occurs as gas at atmospheric pressure. It has the special property of becoming liquid at atmospheric temperature if moderately compressed. They can easily be converted from liquid into gas by releasing them to atmospheric pressure. In order to facilitate transport and storage, LPG are usually bottled in liquid state (they are about 250 times as dense than when they are gases), propane however can also be supplied in bulk for storage tanks at consumers' premises.

LPG


LPG Production
Natural Gas (Dry)
Non Hydrocarbon Gases
Natural Gas (Wet)
Separation facilities / Gas processing plants
NGL
Ethane
Propane
Butane
Pentane
Pentane plus
LPG
Oil well
Gas well
Crude Oil
Refinery
Propane&
Butane
LPG
Motor Gasoline
Kerosene
Gas/diesel
Fuel Oil
etc

Definition of Products

Differences in the definitions: For APEC, Eurostat, IEA and OPEC, gasoline comprises aviation gasoline and motor gasoline (including blending components such as bioethanol) - natural gasoline is classified under NGLs. The UNSD definition includes likewise motor and aviation gasoline but also natural gasoline. For OLADE gasoline comprises aviation gasoline, motor gasoline, natural gasoline and alcohol (ethanol/methanol) used as fuel.

Country _____
Month _____

		Crude Oil	Petroleum Products					
			LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production								
Imports								
Exports								
Stocks	Closing							
	Change							
Refinery Intake								

Gasoline: Comprises motor gasoline and aviation gasoline

Motor gasoline is the principal fuel used in the transport/road sector and accounts for some 25% of total oil use in the world. In some countries, for example in the US, motor gasoline consumption is almost half of total oil consumption (around 9 Mb/d out of 20).

Aviation gasoline which is principally used for aviation piston engines, is also a mixture of many different hydrocarbon compounds. The specification requirements for aviation gasoline, especially antiknock, volatility, fluidity, stability, non-corrosivity, and cleanliness impose severe limitations on the compounds that can be used.

Definition of Products

Differences in the definitions: Kerosene comprises of kerosene type jet fuel and other kerosene for all organisations.

JOINT OIL DATA INITIATIVE

Unit _____

Country _____

Month _____

	Crude Oil		Petroleum Products					
			LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production								
Imports								
Exports								
Stocks		Closing						
		Change						
Refinery Intake								

Kerosene: Comprises jet kerosene and other kerosene

Jet kerosene is a middle distillate fuel, generally produced to exact the stringent specifications of international civil specifications, for use as civil aviation fuel. For JODI definition, jet kerosene includes also naptha or gasoline type jet fuel.

Other kerosene, which is of lower quality specification kerosene or a dual purpose grade, is used in some regions as domestic heating oil, especially in Asia, notably in Japan and Korea. This is also used for lighting in remote areas in many developing countries.

Definition of Products

Differences in the definitions: All organisations include diesel used for transport as well as heating oil and other gas oil.

JOINT OIL DATA INITIATIVE

Unit _____

Country _____

Month _____

		Crude Oil		Petroleum Products					
				LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production									
Imports									
Exports									
Stocks	Closing								
	Change								
Refinery Intake									

Gas/Diesel Oil: For automotive and other purposes

Gas/diesel oil is a lighter fuel oil distilled off during the refining process and used primarily for heating, for automotive purposes in diesel engines and for power generation.

Two main types are distinguished by their use:

Transport diesel: Fuel used for internal combustion in on-road diesel engines, cars and trucks etc., usually of low sulphur content.

Heating Oil and Other Gas oil: This is a distillate fuel oil used mainly in stationary or marine diesel engines. It includes light heating oil which is used for residential or commercial space heating, or in industrial plants. It also includes marine diesel which is used for barge and boat engines and other heavier gas oils which may be used as petrochemical feedstocks.

Definition of Products

Differences in the definitions: Definitions given are generally comparable and uniformly refer to a high kinematic viscosity, flash point and density of this product. APEC, Eurostat and IEA differentiate additionally according to the sulphur content of this product, whereas OLADE, OPEC and UNSD differentiate in relation to its use.

Country ____
Month ____

		Crude Oil		Petroleum Products					
				LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production									
Imports									
Exports									
Stocks	Closing								
	Change								
Refinery Intake									

Fuel Oil: Heavy residual oil / boiler oil, including bunker oil

Heavy fuel oil is a blended product based on the residues from various refinery distillation and cracking processes. It is a viscous liquid with a characteristic odour and it requires heating for storage and combustion.
Heavy fuel oil is used in medium to large industrial plants, marine applications and power stations in combustion equipment such as boilers, furnaces and diesel engines.
Heavy fuel oil is a general term and other names commonly used to describe this range of products include: residual fuel oil, bunker fuel, bunker C, fuel oil No 6, industrial fuel oil, marine fuel oil and black oil. Moreover, terms such as heavy fuel oil, medium fuel oil and light fuel oil are used to describe products for industrial applications to give a general indication of the viscosity and density of the product.

Definition of Products

Country _____
Month _____

Production	
Imports	
Exports	
Stocks	Cl… / Change
Refinery Intake	

Differences in the definitions: The definition of Total Oil Products should include all the other oil products not included in the major product categories. Care however should be taken not to double count certain products. For example: as ethane is already included under LPG for UNSD, it should not be separately added again in Total Oil Products. Furthermore if additives and oxygenates (e.g. ethanol or bio-fuels) are included with gasoline (APEC, Eurostat/IEA and OLADE) then these products do not have to be added again to the Total Oil Products category. This is similar to the treatment of natural gasoline, if it was already accounted for under gasoline.

However, as specified above, crude oil for direct use should be added to the Total Oil Product category.

Finally in refinery output, all organisations exclude secondary products, except APEC, OPEC and OLADE, i.e. Naphtha from other products. For APEC, Naphtha is excluded only when it is re-processed into a new finished product. The amount of Naphtha that is delivered to final consumers is included in "Others".

are reported. However to obtain a full picture, it is essential to know what the total oil produced, traded, delivered etc is on the market.

Definition of Flows

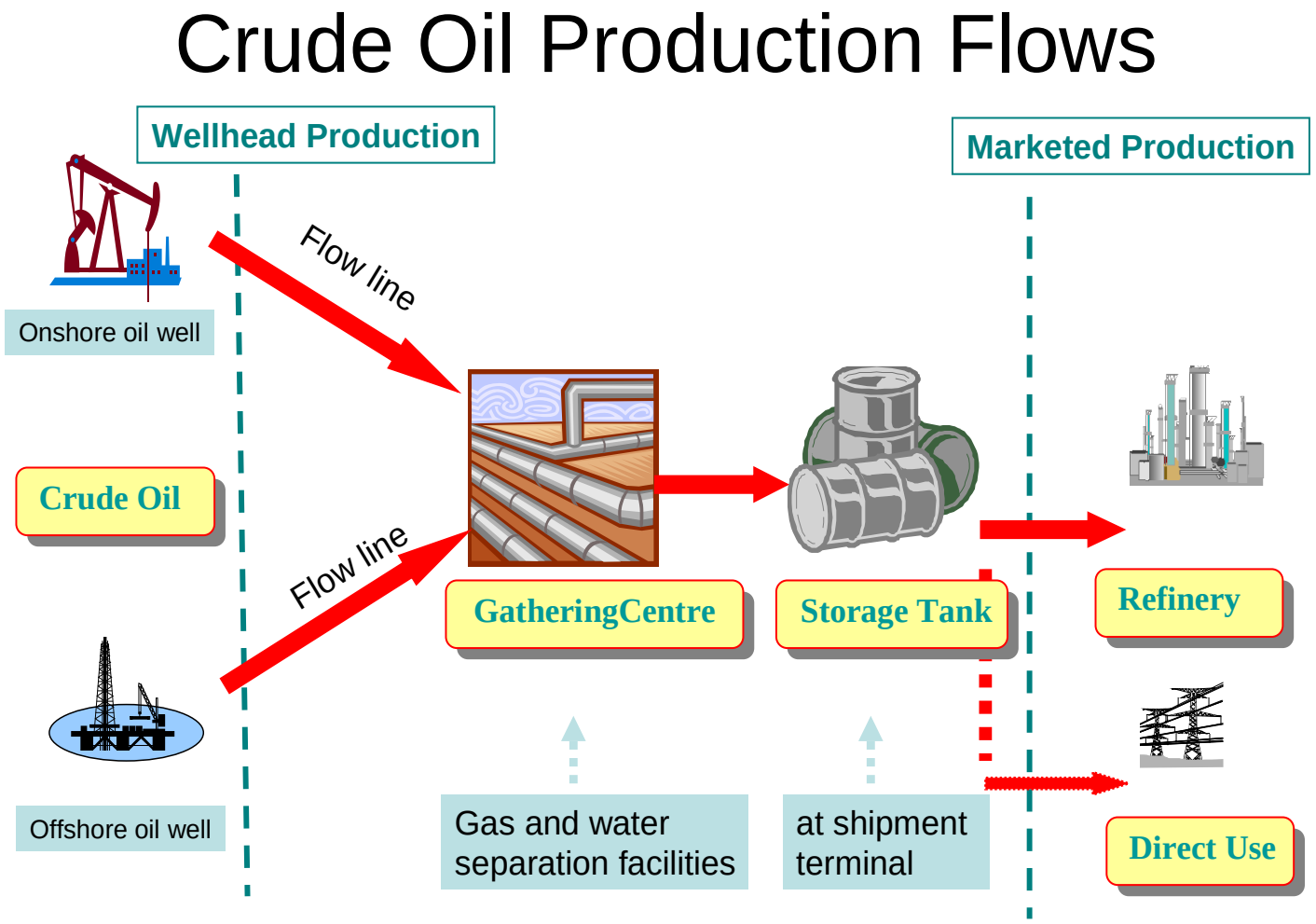
Differences in the definitions: The term production is defined differently by the 6 organisations according to either more general or more specific energy or fuel reporting. APEC, Eurostat and IEA, use the term for all liquid production i.e. crude oil, NGL's, condensates and oil from shale and tar sands as well as additives/ oxygenates. The definition of production in OLADE is used for all energy production, for UNSD it is used for all energy as well as more specifically for crude oil and refined products, while OPEC's definition is only related to crude oil production excluding NGLs and condensates, if they can be separated in the commercial crude oil stream. In the JODI questionnaire the term production applies only to crude oil.

Country
Month

Productio		
Imports		
Exports		
Stocks	Closing	
	Change	
Refinery Intake		

Wellhead production is all oil which exits the ground (wellhead). When the crude oil has been brought to the surface, it will need further treatment so that it can be sent to refineries for processing. The oil produced at the wellhead varies considerably from field to field, due not only to the physical characteristics, but also due to the amount of gas and water which it contains. Before the oil can be sold, the remaining gas, water and other impurities need to be removed. Once this is done, the oil is stored at the terminal before transport to refineries. It is at this point that the produced oil becomes *marketable (production).*

Crude Oil Production



Definition of Flows

Differences in the definitions: Trade definitions are common to all organisations, and emphasize the crossing of national territory whether or not customs clearance has taken place and the exclusion of oil in transit quantities. Crude oil and NGLs are reported as coming from the country of ultimate origin. Refinery feedstocks and finished products are reported as coming from the country of last consignment. International bunkers are excluded from exports and are reported in oil demand.

Country _____

Month _____

Production		Goods having physically crossed the international boundaries, excluding transit trade, international marine and aviation bunkers
Imports		Both imports and exports should reflect amounts of oil having crossed the national territorial boundaries. It is therefore essential that there is a clear definition of what the statistical national boundary of the country is.
Exports		
Stocks	Closing	Trade figures should report physical flows of oil and oil products. To that extent, customs clearance which sometimes is delivered much after the goods have crossed the national frontier should not be taken as the point of registering the import.
	Change	
Refinery Intake		

Important: products in transit should not be included.

Definition of Flows

Differences in the definitions: For all the organisations, the definition for stocks is defined "geographically" or "by territory" except for OPEC whish is characterized by the "ownership".

APEC, Eurostat, IEA and OLADE report stock build as negative and stock draw as positive. OPEC and UNSD report stock build as positive and stock draw as negative.

Country _____
Month _____

		LPG	Gasoline	Kerosene	Oil	Fuel Oil	Oil
Production							
Imports							
Exports							
Stocks	Closing						
	Change						
Refinery Intake							

Closing Stocks represents the primary stock level at the end of the month within national territories; includes stocks held by importers, refiners, stock holding organisations and governments

Closing Stocks = Closing minus opening level.
A positive number corresponds to a stock build;
A negative number corresponds to a stock draw.

What Comprise Stocks Data?

*What should be included? **	*What should not be included?*
✓ Oil held at production facilities e.g. stocks on platforms or in partly loaded tankers moored at platforms	⌦ in pipelines
✓ Stocks held for strategic purposes owned by governments or stockholding organisations	⌦ in rail tank cars
✓ Oil in refinery tanks,	⌦ in truck tank cars,
✓ In bulk terminals,	⌦ in sea-going ships bunkers
✓ Pipeline tankage (buffer stocks at pipelines)	⌦ in retail stores and service stations
✓ Barges and coastal tankers (when port of departure and destination are in the same country)	⌦ in bunkers at sea
✓ Tankers in port **	⌦ military stocks
✓ In inland ship bunkers	

* Please note that there is a distinction between oil stocks and reserves. Reserves of oil (oil not yet produced) are not included

** Stocks held on board incoming ocean vessels in port or at mooring should be included irrespective of whether they have been cleared by customs or not. Exclude stocks on board vessels at high seas.

Definition of Flows

Differences in the definitions: Refinery Intake definitions are common to all organisations, comprising crude, NGL, condensates, feedstocks and additives.

Unit _____

Country _____

Month _____

	Crude Oil		Petroleum Products					
			LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production								
Imports								
Exports								
Stocks		Closing						
		Change						
Refinery Intake								

Refinery Intake are the observed refinery throughputs

In this flow should be reported the quantities of crude oil inputs entering the refinery. Although there are several other inputs to refineries e.g. Natural Gas Liquids (NGL), refinery feedstocks, additives, biofuels and other hydrocarbons, currently the questionnaire is not collecting any other inputs than crude oil.

Please also note that the amounts of crude oil reported as refinery intake should reflect the real quantities of inputs to the refinery process and not the deliveries of crude oil to the refinery. The difference between the two measures is the stock changes of crude oil at the refinery.

Definition of Flows

Differences in the definitions: APEC, Eurostat, IEA and UNSD exclude refinery loss but include refinery fuel. OPEC excludes both. The OLADE definition does not mention anything about refinery fuel or loss. Inter-product transfers are excluded by all organisations except OPEC and OLADE.

Country _____
Month _____

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

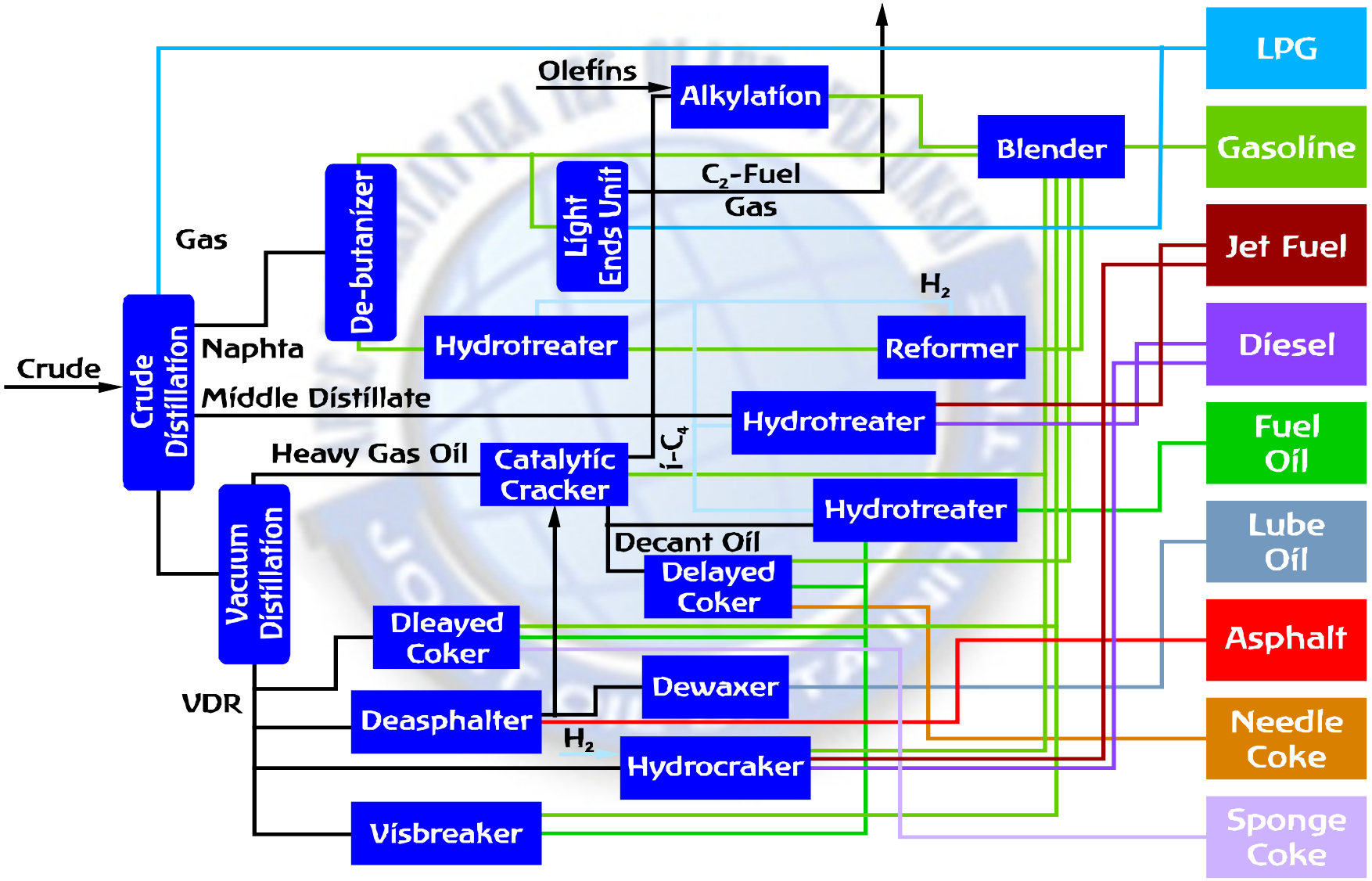
Refinery Output: is the Gross output (including refinery fuel)

This is the production of finished petroleum products at a refining or blending plant. Production equals the Input into the refinery minus the Refinery Losses.

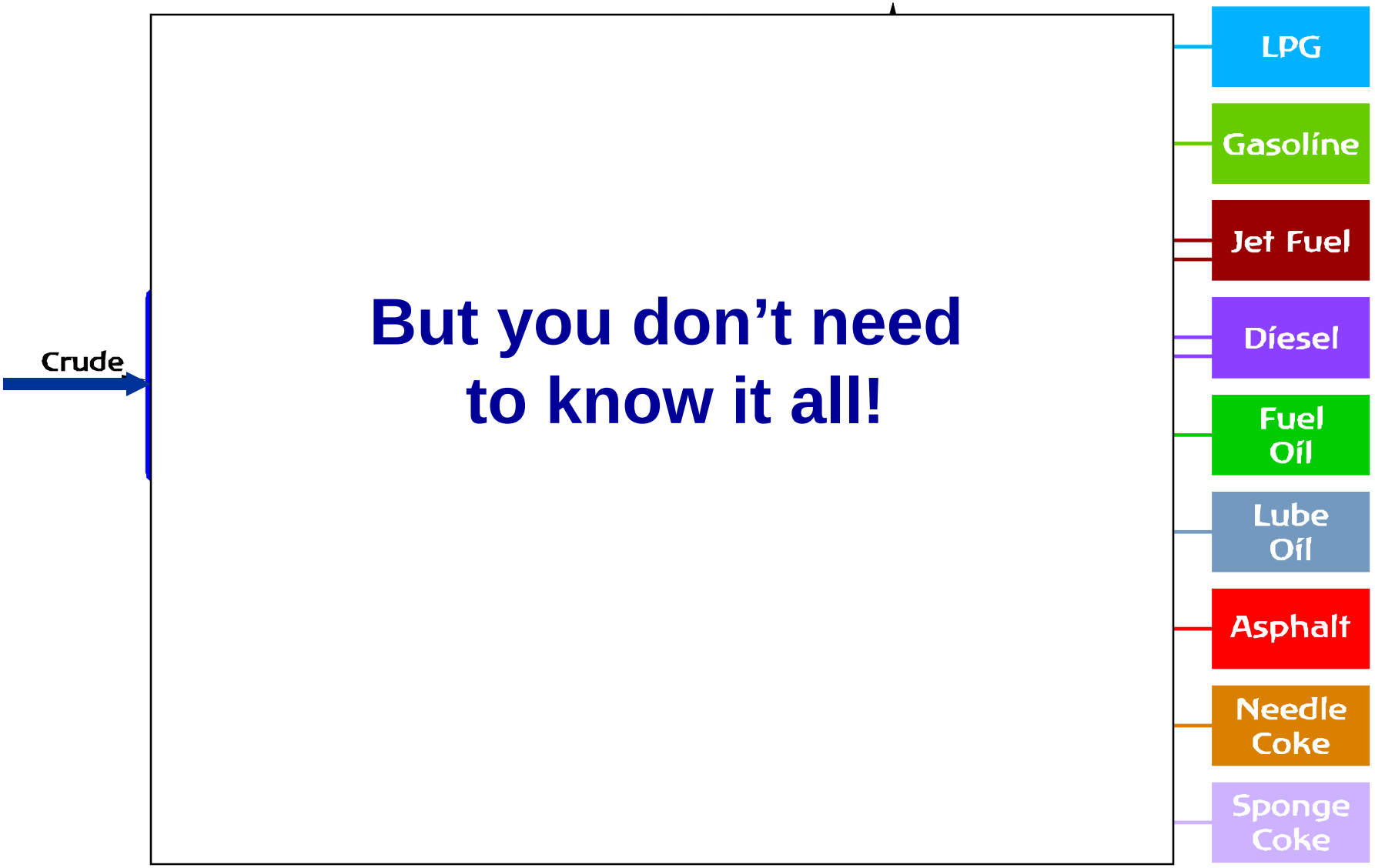
The terms Net and Gross production are frequently used when referring to refinery output. *Gross production* comprises the amount of fuel which is used in the refinery in support of the operation of the refinery (refinery fuel). *Net refinery production* excludes the refinery fuel.

Important: There should be no double-counting. Double-counting may occur when handling data of products produced from intermediate products, e.g. gasoline produced from naptha.

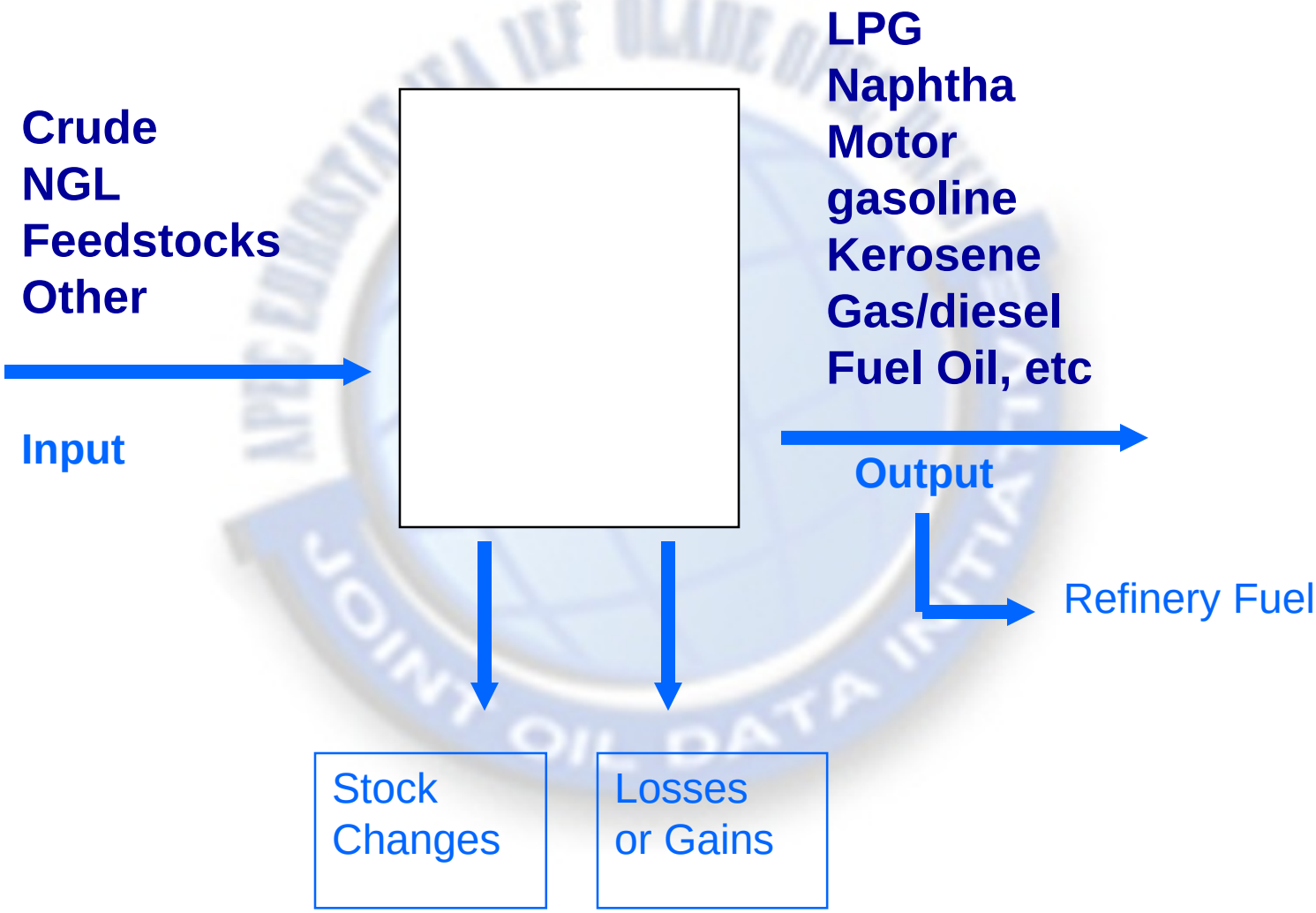
Oil Refining: It is complicated !



Oil Refining: It is complicated !



Oil refining: What you do need to know!



Definition of Flows

APEC/EUROSTAT/OECD-IEA/OLADE/OPEC/UNSD

JOINT OIL DATA INITIATIVE

Unit _____

Country _____

Month _____

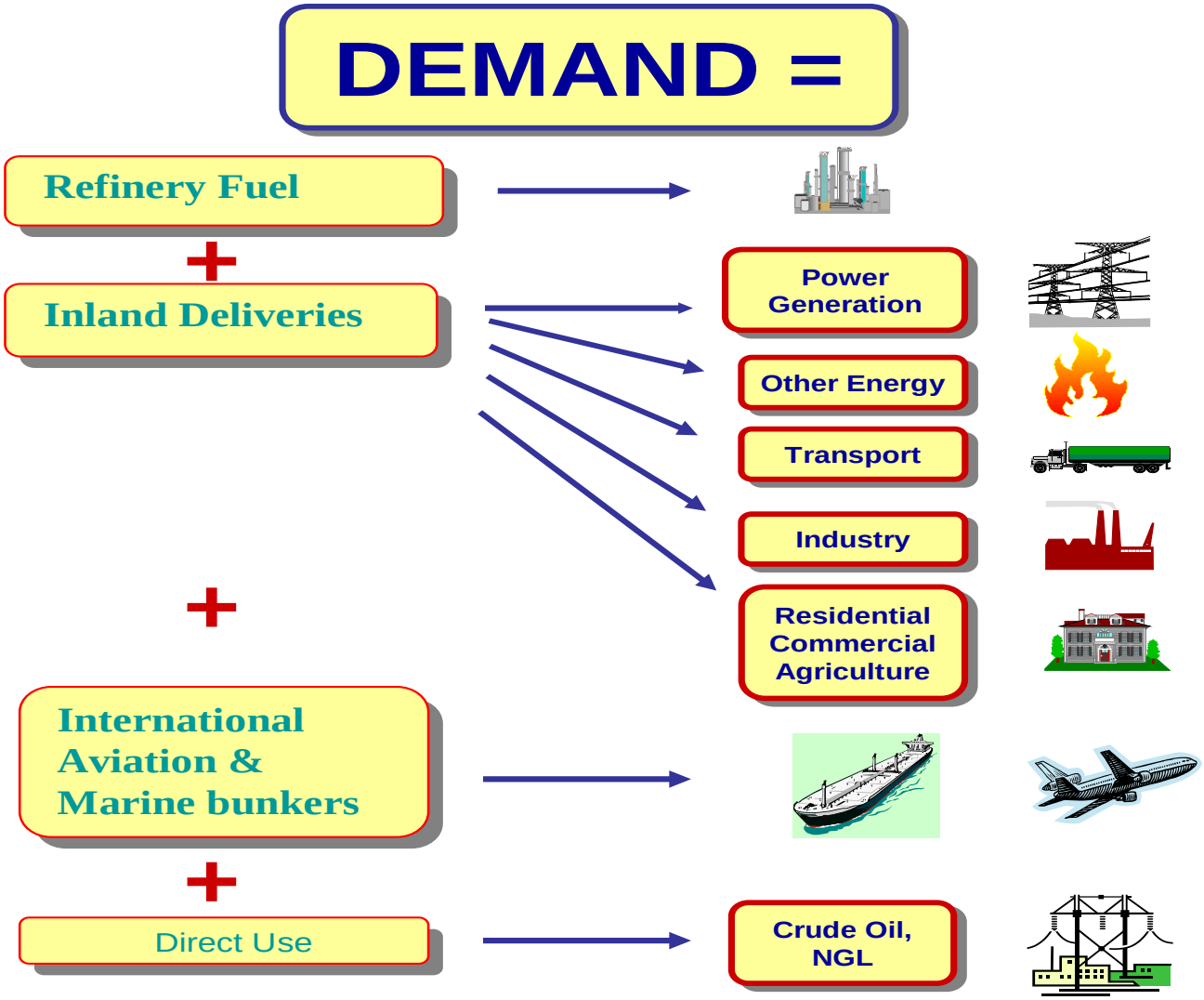
		Crude Oil		Petroleum Products					
				LPG	Gasoline	Kerosene	Gas/Diesel Oil	Fuel Oil	Total Oil
Production									
Imports									
Exports									
Stocks	Closing								
	Change								
Refinery Intake									

Demand are the deliveries or sales to the inland market (domestic consumption) plus Refinery Fuel plus International Marine and Aviation Bunkers. Demand for Total Oil includes Crude Oil

The total demand of oil in a country includes all the amounts of oil which are needed in a country, on the one hand to supply all final consumers, energy transformation units (including refineries), energy producers within the country and on the other hand to provide all the national and foreign customers with fuels which they will use for international navigation and aviation (e.g. international aviation, marine bunkers, fishing etc.).

Demand

Demand


DEMAND =
Refinery Fuel
+
Inland Deliveries
+
International Aviation & Marine bunkers
+
Direct Use
Power Generation
Other Energy
Transport
Industry
Residential
Commercial
Agriculture
Crude Oil, NGL

Reporting Unit

- Unit of Mass, Thousand Metric Tons, is the preferred unit
- Volume units such as barrels, kiloliters, cubic meters are also accepted
- National administrations should however provide the specific gravities such as kg/liter or kilogram/barrel of each of the products, including Total Oil, in order to convert the data to common units

Conversion Factors

- 1 barrel = 158.897 liters
- 1 cubic meters = 1,000 liters
- 1 ton = 1,000 kilograms
- No direct conversion from barrels to tons; this requires specific gravity or density data which varies for every product and country
- Conversion factor for Total Oil should be the weighted average of all included products

Conversion Factors

Decimal System Prefixes

10^{1}	deca (da)	10^{-1}	deci (d)
10^{2}	hecto (h)	10^{-2}	centi (c)
10^{3}	kilo (k)	10^{-3}	milli (m)
10^{6}	mega (M)	10^{-6}	micro (µ)
10^{9}	giga (G)	10^{-9}	nano (n)
10^{12}	tera (T)	10^{-12}	nico (p)
10^{15}	peta (P)	10^{-15}	femto (f)
10^{18}	exa (E)	10^{-18}	atto (a)

Conversion Factors

Units of Volume

To:	US gal	UK gal	bbl	ft^3	l	m^3
From:	multiply by:					
US gallon (gal)	1	0.8327	0.02381	0.1337	3.785	0.0038
UK gallon (gal)	1.201	1	0.02859	0.1605	4.546	0.0045
Barrel (bbl)	42	34.97	1	5.615	159.0	0.159
Cubic foot (ft^3)	7.48	6.229	0.1781	1	28.3	0.0283
Litre (l)	0.2642	0.22	0.0063	0.0353	1	0.001
Cubic metre (m^3)	264.2	220.0	6.289	35.3147	1000	1

Conversion Factors
Units of Mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	0.001	9.84×10^{-4}	1.102×10^{-3}	2.2046
tonne (t)	1000	1	0.984	1.1023	2204.6
long ton (lt)	1016	1.016	1	1.120	2240.0
short ton (st)	907.2	0.9072	0.893	1	2000
pound (lb)	0.454	4.54×10^{-4}	4.46×10^{-4}	5.0×10^{-4}	1

Conversion Factors
Energy Units

To:	TJ	Gcal	Mtoe	Mbtu	GWh
From:	**multiply by:**				
Terajoule (TJ)	1	238.8	2.388×10^{-5}	947.8	0.2778
Gigacalories (Gcal)	4.1868×10^{-3}	1	10^{-7}	3.968	1.163×10^{-3}
Million tonnes of oil equivalent (Mtoe)	4.1868×10^{4}	10^{7}	1	3.968×10^{7}	11630
Million BTU	1.0551×10^{-3}	0.252	2.52×10^{-8}	1	2.931×10^{-4}
GWh	3.6	860	8.6×10^{-5}	3412	1

Typical Densities, Conversion Factors and Calorific Values for Crude Oil and Petroleum Products

Product	Density kg/m³	Litres per metric ton	Barrel per metric ton	Gross Calorific Value (GJ/t)	Net Calorific Value (GJ/t)(3)
Crude Oil	853	1172	7.37	47.37	45.00
Ethane	366	2730	17.17	51.90	47.51
Refinery Gas	786	1272	8.00	52.00	47.60
Propane	508	1969	12.38	50.32	46.33
Butane	585	1709	10.75	49.51	45.72
LPG(1)	539	1856	11.67	50.08	46.15
Naphtha	706	1416	8.91	47.73	45.34
Aviation Gasoline	707	1414	8.90	47.40	45.03
Motor Gasoline(2)	741	1350	8.49	47.10	44.75
Kerosene Type Jet Fuel	803	1246	7.84	46.93	44.58
Other Kerosene	810	1235	7.76	46.05	43.75
Gas/Diesel Oil	844	1186	7.46	45.66	43.38
Fuel Oil Low Sulphur	925	1081	6.80	43.75	41.56
Fuel Oil High Sulphur	975	1026	6.45	42.00	39.90
Fuel Oil	944	1059	6.66	42.82	40.68
White Spirit	743	1346	8.46	46.32	44.00
Paraffin Waxes	801	1248	7.85	42.00	39.90
Lubricants	887	1127	7.09	44.00	41.80
Bitumen	1035	966	6.08	42.10	40.00
Petroleum Coke	1150	870	5.47	34.80	33.06
Other Products	786	1273	8.00	42.30	40.19

(1) Assumes a mixture of 60% propane and 40 % butane by mass.
(2) An average for motor gasolines with RON between 91 and 95.
(3) For Naphtha and heavier oils the net calorific value is assumed to be 95% of gross.

Example

- How many metric tons is 100 thousand barrels of motor gasoline?
- The problem is converting a volume unit to mass (barrels to tons)
- Use **Density** of motor gasoline to convert the unit from barrel to tons
- From previous slide, the density of motor gasoline is 8.49 bbl/ton
- 100 kbbl ÷ 8.49 bbl/ton = 11.78 kton
- **Note:** The density of motor gasoline in your country may be different from the typical values shown in the previous slide

Other Useful Conversion Factors

Imports	Reported data in barrel* per day (volume)	Number of days in Month	Density: Mass/ Volume (ton/m^3 - Average)	Volume/Mass Barrel per Ton Conversion Factor	Conversion into Metric Tons (Mass)
Crude Oil	1020	31	0.853	(1/0.853)/0.159*=7.37	(1020x31)/7.37=4290
Motor Gasoline	546	28	0.741	(1/741)/0.159*=8.49	(546x28)/8.49=1801

(*) 1 barrel = 159 litres

Thank you

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