International Recommendations for Energy Statistics

Environment and Energy Statistics Workshop for the Arab Region

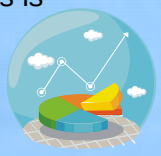
Amman, Jordan 8-12 September 2013

Environment and Energy Statistics Branch
United Nations Statistics Division

Outline

- International Recommendations for Energy Statistics (IRES)
  - Process and content
  - Key elements of IRES
- Other development in energy statistics
  - Energy Statistics Compilers Manual (ESCM)
  - Joint Organizations Data Initiative (JODI)

Why new work on energy statistics?



- Availability of good reliable and timely energy statistics is fundamental for policy making
  - Growing demand for energy, considering limited resources, increases the need for reliable and descriptive statistics
- Development of energy statistics according to international statistical standards is basis for consistency among statistics collected
  - by different agencies within a country
  - for international comparison
- Importance of energy statistics requires better link to economic and other statistics
  - terminology, definitions, concepts, procedures

International Recommendations for Energy Statistics (IRES)

IRES process

- Before the IRES process, international guidance on energy statistics existed in a number of UN publications:
  - Concepts and Methods in Energy Statistics (1982)
    - Focused on Energy Accounts and Balances: A Technical Report
  - Energy Statistics: Definitions, Units of Measure and Conversion Factors (1987)
  - Energy Statistics: A Manual for Developing Countries (1991)

IRES process

- The main provisions from these documents were reflected in country methodologies, regional handbooks and manuals
- They covered many important topics, but needed to be revised and updated to address many new issues and provide guidance on topics not previously covered
- Process to develop IRES started with:
  - a programme review of energy statistics (conducted by Statistics Norway)
  - recommendations of an Ad-Hoc Expert Group on Energy Statistics (May 2005)

IRES process

- Areas where revision and updating were particularly needed:
  - Energy statistics as part of official statistics
  - Scope of energy statistics
  - Standard international energy classification
  - Units of measurement and conversion factors
  - Flows, stocks and related concepts
  - Statistical units and data items
  - Data sources and data compilation strategies
  - Energy balances
  - Data quality and metadata
  - Dissemination
  - Uses of basic energy statistics and energy balances in the compilation of energy accounts and other statistics

IRES revision principles

- Needs of major user groups should be considered
  - data are policy relevant
  - meet the needs of the energy community (both producers and users)
  - provide a solid foundation for integration of energy statistics into a broader accounting framework
- The revision should be conducted in close consultation with national statistical offices, national energy agencies, and the relevant international and supranational organizations
- Recommendations on data items and their definitions should consider:
  - Availability of data sources
  - Reporting burden
  - Feasibility of implementation by most countries to ensure improved cross-country comparability
- The revision should be seen in the context of promoting an integrated approach within the national statistical system
  - use of harmonized concepts, classifications, and standardized data compilation methods
- Provision of additional guidance in an Energy Statistics Compilers Manual

IRES process

- Work carried out in close cooperation with:
  - the Oslo Group on Energy Statistics
    - to contribute to the development of improved methods and international standards for national official energy statistics
  - the Intersecretariat Working Group on Energy Statistics (InterEnerStat)
    - to enhance international collaboration and coordination, harmonization of standards
- IRES has been approved by the UN Statistical Commission in 2011

IRES structure

Ch. 1. Introduction
Ch. 2. Scope of energy statistics
Ch. 3. Standard International Energy Product Classification
Ch. 4. Measurement units and conversion factors
Ch. 5. Energy Flows
Ch. 6. Statistical Units and Data Items
Ch. 7. Data collection and compilation
Ch. 8. Energy balances
Ch. 9. Quality and its dimensions
Ch. 10. Dissemination
Ch. 11. Uses of Basic Energy Statistics and Balances
- SEEA
- Energy indicators
- Greenhouse gas Emissions

Ch. 2. Scope of energy statistics

- Basic energy statistics refers to statistics on
  - energy stocks and flows
  - Energy infrastructure and performance of energy industries
  - Availability of energy resources in the environment

Energy balances and Energy Accounts represent a compilation of the basic energy statistics in an accounting structure

Ch. 3. Standard International Energy Product Classification (SIEC)

- Based on work carried out by InterEnerStat to define energy products
- Introduced in IRES
- Harmonizes previously used definitions by participating agencies
  - Reduces ambiguity
  - Reduces response burden due to conflicting requests
  - Improves comparability of data

SIEC scope

Fuels that are produced/generated by an economic unit (including households), and are used or might be used as sources of energy

- All fossil fuels, whether or not used for energy purposes
- Products derived from fossil fuels when they are used (or intended to be used) as fuels
- Products derived from fossil fuels that are used (or intended to be used) for non-energy purposes only if they are the output of energy industries

Electricity that is generated by an economic unit (including households)

Heat that is generated and sold to third parties by an economic unit

Example: lubricants are in scope, plastics are not

SIEC structure

- SIEC groups energy products in 4 levels of successively detailed categories
- Coding system is numerical
- SIEC covers primary and secondary energy products, but this distinction is not embedded in the structure

Top level:

0 Coal
1 Peat and peat products
2 Oil shale / oil sands
3 Natural gas
4 Oil
5 Biofuels
6 Industrial waste
7 Electricity
8 Heat
9 Nuclear fuels and other fuels n.e.c.

SIEC structure

Example of detail:

5	Biofuels
51	Solid biofuels
511	Fuelwood, wood residues and by-products
5111	Wood pellets
5119	Other Fuelwood, wood residues and by-products
512	Bagasse
513	Animal waste
514	Black liquor
515	Other vegetal material and residues
516	Charcoal
52	Liquid biofuels
…	

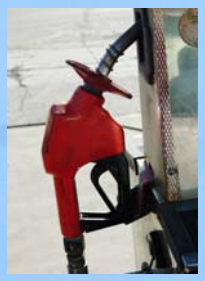
SIEC detail

- Clear and detailed definitions for each product
- Based on work of InterEnerStat
- Reflect consensus based on previously existing definitions
- Based on detail of information currently collected

SIEC definitions (example)

4652 Motor gasoline

- A mixture of some aromatics (e.g., benzene and toluene) and aliphatic hydrocarbons in the C5 to C12 range. The distillation range is 25ºC to 220ºC.
- *Remark*: Additives are blended to improve octane rating, improve combustion performance, reduce oxidation during storage, maintain cleanliness of the engine and improve capture of pollutants by catalytic converters in the exhaust system. Motor gasoline may also contain biogasoline products.



SIEC definitions (example)

5111 Wood pellets

- Wood pellets are a cylindrical product which has been agglomerated from wood residues by compression with or without the addition of a small quantity of binder. The pellets have a diameter not exceeding 25 mm and a length not exceeding 45 mm.

Table 3.1: Standard International Energy Product Classification (SIEC)

SIEC Headings			Correspondences	
Section / Division / Group	Class		CPC Ver.2	HS 2007
0		**Coal**		
01		**Hard coal**		
011	0110	Anthracite	11010*	2701.11
012		Bituminous coal		
	0121	Coking coal	11010*	2701.19
	0129	Other bituminous coal	11010*	2701.12
02		**Brown coal**		
021	0210	Sub-bituminous coal	11030*	2702.10*
022	0220	Lignite	11030*	2702.10*
03		**Coal products**		
031		Coal coke		
	0311	Coke oven coke	33100*	2704*
	0312	Gas coke	33100*	2704*
	0313	Coke breeze	33100*	2704*
	0314	Semi cokes	33100*	2704*
032	0320	Patent fuel	11020	2701.20
033	0330	Brown coal briquettes (BKB)	11040	2702.20
034	0340	Coal tar	33200*	2706
035	0350	Coke oven gas	17200*	2705*
036	0360	Gas works gas (and other manufactured gases for distribution)	17200*	2705*
037		Recovered gases		
	0371	Blast furnace gas	17200*	2705*
	0372	Basic oxygen steel furnace gas	17200*	2705*
	0379	Other recovered gases	17200*	2705*
039	0390	Other coal products	33500*, 34540*	2707, 2708.10*, .20*, 2712.90*
1		**Peat and peat products**		
11		**Peat**		
111	1110	Sod peat	11050*	2703*
112	1120	Milled peat	11050*	2703*
12		**Peat products**		
121	1210	Peat briquettes	11050*	2703*
129	1290	Other peat products	11050*, 33100*, 33200*, 33500*	2703*, 2704*, 2706*, 2712.90*
2		**Oil shale / oil sands**		
20		**Oil shale / oil sands**		
200	2000	Oil shale / oil sands	12030	2714.10
3		**Natural gas**		
30		**Natural gas**		
300	3000	Natural gas	12020	2711.11, .21
4		**Oil**		
41		**Conventional crude oil**		
410	4100	Conventional crude oil	12010*	2709*
42		**Natural gas liquids (NGL)**		

SIEC links to other classifications

- Links to other classifications facilitate comparison with data from other programs and sources, e.g.
  - Trade
  - Environmental accounting
  - Industry statistics
- Links to CPC and HS are shown in the classification (in IRES)
- Categories do not always match
  - Specific use/needs of energy statistics (SIEC) compared to more general use of product statistics (CPC)
  - Different requirements for detail
    - Agricultural products
  - Existing agreements on product detail
    - Oil products in HS

SIEC-CPC/HS

SIEC			CPC	HS
01		**Hard coal**		
011	0110	Anthracite	11010*	2701.11
012		Bituminous coal		
	0121	Coking coal	11010*	2701.19
	0129	Other bituminous coal	11010*	2701.12
02		**Brown coal**		
021	0210	Sub-bituminous coal	11030*	2702.10*
022	0220	Lignite	11030*	2702.10*

SIEC – CPC/HS

- Links are being discussed in the Expert Group on International Classifications
  - Intent is to improve relationship between SIEC and CPC
  - Link at most detailed level not always possible
  - Suitable aggregates are sought
  - Future proposals for HS are possible
  - Example for recent progress: biodiesel

Ch. 4. Measurement units and conversion factors

- IRES provides an overview of different measurement units and their applicability
  - Mass
  - Volume
  - Energy
- While IRES does not give recommendations for units to be used for national data collection, it ***recommends*** units for dissemination

Calorific values

- **Calorific values** (or ***heating values***) express the heat obtained from one unit of the fuel (e.g. TJ/ton, TJ/m3)
- Important because
  - they vary across products and also within the same product
  - They are used to compare products using a common scale

- Gross vs net calorific values
  - Latent heat

IRES ***recommends*** the use of the net calorific values, however it encourages countries to report both if available

- Specific vs default calorific values

IRES ***recommends*** that countries collect data in original units (e.g. tons) and specific calorific values. Default values should only be used in absence of specific values

- IRES provides default calorific values in line with those in the 2006 IPCC guidelines

Ch. 5. Energy Flows

- This chapter describes the main energy flows
  - Production
  - imports/exports
  - Stock levels and stock changes
  - Transfers
  - Transformation
  - Losses
  - Energy industry own use
  - Non-energy uses
  - Final Consumption
- Energy industries
- Energy consumers
- Transformation processes

Energy industries

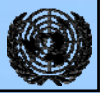
- Definition: Economic units whose principal activity is the primary energy production, transformation of energy and distribution of energy
- IRES provide a list of energy industries together with the correspondence to ISIC Rev. 4

Energy industries

Energy industry	ISIC Rev. 4
Electricity and heat plants[a]	Division: 35 - Electricity, gas, steam and air conditioning supply
Pumped storage plants	
Coal mines	Division: 05 - Mining of coal and lignite
Coke ovens	Group: 191 - Manufacture of coke oven products
Coal liquefaction plants	Group: 192 - Manufacture of refined petroleum products
Patent fuel plants	Group: 192 - Manufacture of refined petroleum products
Brown coal briquette plants	Group: 192 - Manufacture of refined petroleum products
Gas works[b] (and other conversion to gases)	Group: 3520 - Manufacture of gas: distribution of gaseous fuels through mains
Gas separation plants	Division: 06 – Extraction of crude petroleum and natural gas
Gas to liquid (GTL) plants	Group: 192 – Manufacture of refined petroleum products
LNG plants / regasification plants	Group: 091 - Support activities for petroleum and natural gas extraction
	Class: 5221 - Service activities incidental to land transportation
Blast furnaces	Group: 241 - Manufacture of basic iron and steel
Oil and gas extraction	Division: 06 - Extraction of crude petroleum and natural gas
	Group: 0910 – Support activities for petroleum and natural gas extraction
Oil refineries	Division: 19 - Manufacture of coke and refined petroleum products
Charcoal plants[c]	Class: 2011 - Manufacture of basic chemicals
Biogas production plants[d]	Group: 352 - Manufacture of gas; distribution of gaseous fuels through mains
Nuclear fuel extraction and fuel processing	Class 0721 - Mining of uranium and thorium ores
	Class: 2011 - Manufacture of basic chemicals
Other energy industry not elsewhere specified[e]	Class: 0892 – Extraction of peat
	….

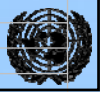
Energy consumers

- Definition: *economic units (enterprises and households) in their capacity as final users of energy*
  - i.e. use of energy products for energy purposes (heat raising, transportation and electrical services) and/or for non-energy purposes
  - Excludes: economic units belonging to the energy industries that use energy in order to produce other energy products
- Groupings defined on the basis of ISIC
- Excludes units categorized as Energy industries
- IRES recommends minimum set of groupings
- **However:** Data at detailed ISIC level would be important for all industries and collection is encouraged



Energy consumers

Energy consumers	**Correspondence to ISIC Rev. 4**
Manufacturing, construction and non-fuel mining industries	
Iron and steel	ISIC Group 241 and Class 2431. Note that the consumption in coke ovens and blast furnaces are defined as part of Transformation Processes and Energy Industry Own Use.
Chemical and petrochemical	ISIC Divisions 20 and 21, excluding ISIC 2011. Note that the consumption by plants manufacturing charcoal or enrichment/production of nuclear fuels (found in ISIC 2011) is excluded, as these plants are considered part of the energy industries.
Non-ferrous metals	ISIC Group 242 and Class 2432
Non-metallic minerals	ISIC Division 23.
Transport equipment	ISIC Divisions 29 and 30
Machinery	ISIC Divisions 25, 26, 27 and 28. Fabricated metal products, machinery and equipment other than transport equipment.
Mining and quarrying	ISIC Divisions 07 and 08 and Group 099, excluding the mining of uranium and thorium ores (Class 0721) and the extraction of peat (Class 0892).
Food and tobacco	ISIC Divisions 10, 11 and 12
Paper, pulp and print	ISIC Divisions 17 and 18. Includes production of recorded media.
Wood and wood products (Other than pulp and paper)	ISIC Division 16
Textile and leather	ISIC Divisions 13, 14 and 15
Construction	ISIC Divisions 41, 42 and 43
Industries not elsewhere specified	ISIC Divisions 22, 31, 32
Household	ISIC Divisions 97 and 98
Commerce and public services	ISIC divisions:33, 36-39, 45-96 and 99, excluding ISIC 8422
Agriculture, Forestry	ISIC Divisions 01 and 02
Fishing	ISIC Divisions 03
Defence activities	ISIC Class 8422



Energy use

- Energy can be used
  - As input into the production of secondary products (transformation)
  - For energy purposes (light, transportation heat etc.)
  - For non-energy uses
- IRES provides detail breakdown for transport

Ch. 6. Statistical units and data items

- A *statistical unit* is an entity about which information is sought and for which statistics are ultimately compiled
- Different choices of unit can be made:
  enterprise, establishment, kind-of-activity unit, unit of homogeneous production and household
- For energy statistics, the establishment ***is recommended*** because it is the most detailed unit for which the range of data required is normally available.

- **Data items** provide a reference list: it contains all generally desirable data items for compilation and dissemination of energy statistics as part of official statistics
- IRES ***recommend*** that countries use the reference list of data items for selecting the data items for use in their national energy statistics programmes, in accordance with
  - their own circumstances
  - respondent load
  - available resources.

The list consists of five parts:

(i) data items on the characteristics of statistical units;

(ii) data items on energy stocks and flows;

(iii) data items on production and storage capacity;

(iv) data items for assessment of the economic performance of the energy industries; and

(v) data items on reserves of underground resources

Ch. 7 Data collection and compilation

- Legal framework
- Institutional arrangements
- Data collection strategies
  - Scope and coverage of data collection
  - Organization of data collection
- Data Sources

  Statistical data sources

  Administrative data sources
- Data compilation methods

Ch. 8. Energy balances

- General principles of the energy balances
- Template for the energy balances
  - Detailed form
  - Aggregated form

Ch. 9. Data quality assurance

- Data quality an important dimension of the statistical production process
- The chapter describes:
  - Different dimension of quality
  - Quality measures and indicators
  - Metadata in energy statistics

Ch. 10. Dissemination

- Importance of a dissemination policy which cover
  - (a) scope of data for public dissemination
  - (b) reference period and data dissemination timetable
  - (c) data revision policy
  - (d) dissemination format
  - (e) dissemination of metadata and data quality reports
- Importance of statistical confidentiality
- IRES ***encouraged*** countries to release:
  - monthly data within 2 calendar months
  - quarterly data within 3 calendar months
  - annual data within 15 calendar months

Energy Statistics Compilers Manual (ESCM)

ESCM

- Intended to:
  - provide practical guidance on compilation of energy statistics, balances and accounts
  - provide more detailed guidance on recommendations contained in IRES
  - reflect successful country practices
- Prepared by UNSD in cooperation with Oslo Group and other expert groups
- Is part of the implementation of IRES as approved by the UN Statistical Commission

ESCM outline

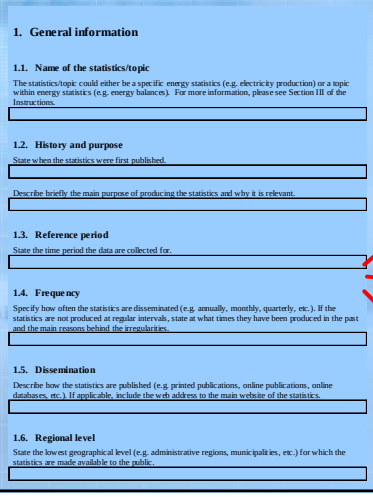
Ch. 1 Conceptual framework
Ch. 2 Legal foundations and institutional arrangements
Ch. 3 Classifications
Ch. 4 Data sources and data collection
Ch. 5 Compilation of energy balances
Ch. 6 Compilation of energy accounts
Ch. 7 Energy indicators and greenhouse gas emissions
Ch. 8 Data quality and metadata
Ch. 9 Data dissemination

ESCM process

- Work carried out by UNSD with strong support from the Oslo Group
  - Structure and contributions discussed at Oslo Group meeting 2011
  - Input sought also from other expert groups, e.g. London Group
- Country practice template
  - Developed to provide a standardized way of describing country practices
  - Used to provide input into ESCM
  - All countries should participate !! (contact UNSD)
- Publication
  - Reflect updated country practices
  - Country practices will be part of Knowledge base

Collection of country practices

A template was developed by the Oslo Group in cooperation with UNSD



1. General information

1.1. Name of the statistics/topic

The statistics/topic could either be a specific energy statistics (e.g. electricity production) or a topic within energy statistics (e.g. energy balances). For more information, please see Section III of the Instructions.

1.2. History and purpose

State when the statistics were first published.

Describe briefly the main purpose of producing the statistics and why it is relevant.

1.3. Reference period

State the time period the data are collected for.

1.4. Frequency

Specify how often the statistics are disseminated (e.g. annually, monthly, quarterly, etc.). If the statistics are not produced at regular intervals, state at what times they have been produced in the past and the main reasons behind the irregularities.

1.5. Dissemination

Describe how the statistics are published (e.g. printed publications, online publications, online databases, etc.). If applicable, include the web address to the main website of the statistics.

1.6. Regional level

State the lowest geographical level (e.g. administrative regions, municipalities, etc.) for which the statistics are made available to the public.

common format for countries to report and share their practices energy statistics

easier review and comparisons of country practices

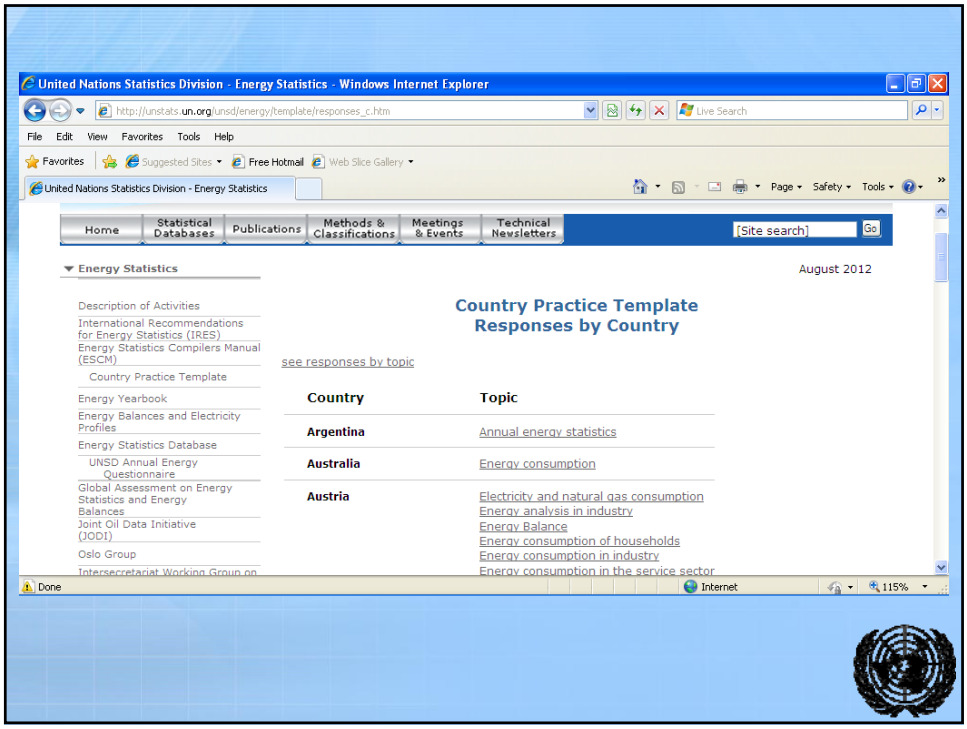
Provides input into the ESCM

Country practice template

- 45 countries submitted their practices
  - more than 80 practices submitted
- Country practices are available on the web at:

http://unstats.un.org/unsd/energy/template.htm

- To contribute, please contact us at **energy_stat@un.org**



Additional work

- Implementation of IRES
  - Revision of the energy questionnaire according to IRES
  - Harmonization of the questionnaire with IEA, Eurostat and ECE
  - Technical cooperation
    - Regional workshops
    - Training materials / modules (in addition to ESCM)
- Development of SEEA-Energy
  - Energy accounts
  - Also addressed in ESCM (and in IRES)

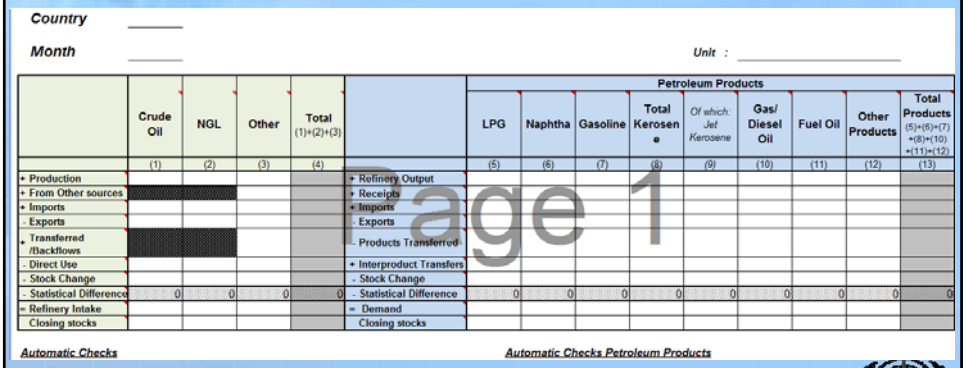
Joint Organizations Data Initiative (JODI)

JODI

- Formerly: Joint Oil Data Initiative
  Partners:
  - APEC
  - Eurostat
  - IEA
  - IEF
  - OLADE
  - OPEC
  - UNSD
- Website: www.jodidata.org
- JODI Oil conference in Beijing (Oct. 2011) marked the 10th anniversary of JODI

JODI Oil

- Data collection on a monthly basis
- Covers key indicators for oil statistics



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									
+/- 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	0
= Refinery Intake					= Demand									
Closing stocks					Closing stocks									

Automatic Checks *Automatic Checks Petroleum Products*

JODI Oil

UNSD currently collecting data from

- Azerbaijan
- Bahrain
- Egypt
- India
- Kazakhstan
- Morocco
- Myanmar
- Oman
- South Africa
- Sudan
- Tunisia
- Yemen

JODI Gas

Given the growing importance of natural gas statistics, JODI is expanding to Natural Gas statistics

Participating countries:
Over 60 countries already participating

We invite others to join!

Contact us at:
energy_stat@un.org

JOINT GAS DATA INITIATVE QUESTIONNAIRE

Country
Month
Year

		Natural Gas million m^3 (at 15°C, 760 mm hg)	Natural Gas Terajoules
		A	B
Indigenous Production		0	0
Imports		0	0
of which: LNG	in 1000 tons	0	0
Pipeline			
Exports		0	0
of which: LNG	in 1000 tons	0	0
Pipeline			
Stock Change		0	0
Gross Inland Deliveries (Calculated)		0	0
Statistical Difference		0	0
Gross Inland Deliveries Observed		**0**	**0**
of which: Power Generation		0	0
Closing level of stocks held on national territory		0	0

Mass to volume conversion factor of LNG (if you have a specific figure)

m^3/ton	LNG
Conversion factor	

Thank you!