



# Introduction to energy statistics and to IEA energy statistics

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- Field engineer in oil and gas
- Middle East and Africa Data officer at IEA



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- Bachelors in Oil and Gas Engineering, Masters in Sustainable Development Management
- Business development in solar deployment
- Monthly oil and gas team at IEA



- Why collect energy statistics?
- The IEA
- Data collection at the IEA
- Current issues in energy statistics and IEA support

# **Why collect energy statistics?**

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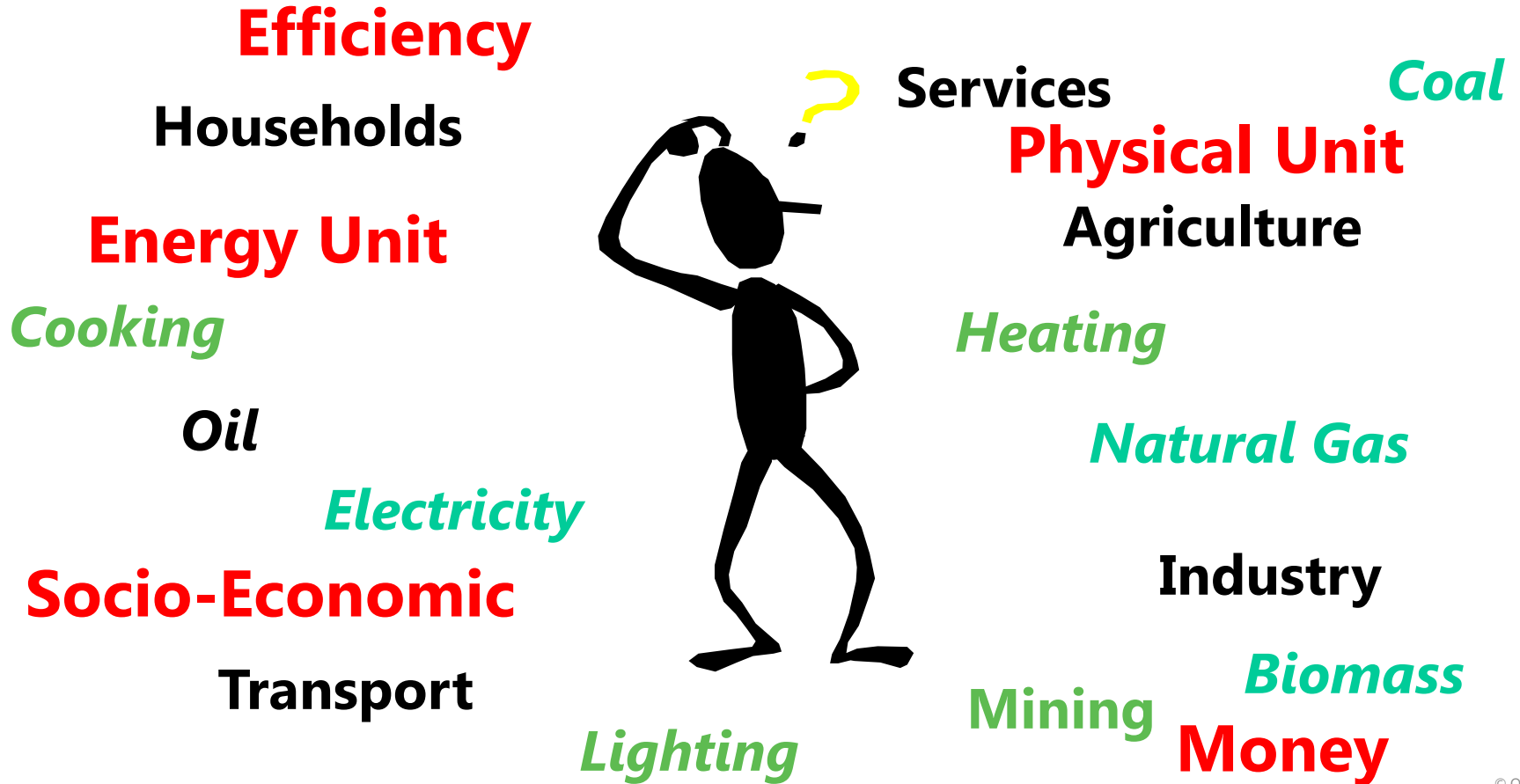
- Energy underpins all economic activity (output and transport)
- Need to ensure adequate security and understand risk to supply – be able to understand all flows and ability to model the future
- Provides clear understanding for investors and business
- Understanding energy use allows for efficiency, greater output at lower cost
- Required to address climate change and identify cost effective steps
- Design, monitor and evaluate policies

A few examples:

- ❑ Households: mileage of cars, electricity consumption of houses, heating bills, etc.
- ❑ Company managers
  - Energy bills, consumption/tonne, use - where to save
  - Even truer for energy companies
    - Refinery: throughputs, stocks
    - Electricity generation: fuel input, electricity production
- ❑ Analysts of the energy market: oil, gas, etc.
- ❑ Traders, banks, universities, etc.
- ❑ Policy makers

# What statistics to collect?










- Collect only statistics which are needed!
- Explore options for use of Administrative data
- Establish a legal basis
- Establish a proper reporting mechanism:
  - Questionnaires (as user friendly as possible)
  - A network of contacts
  - An agreed timetable
- Establish a regular dissemination mechanism
- Allocate proper resources to collect and process the data
- Review methodology and process to anticipate and adapt to changes in the energy situation

# The IEA

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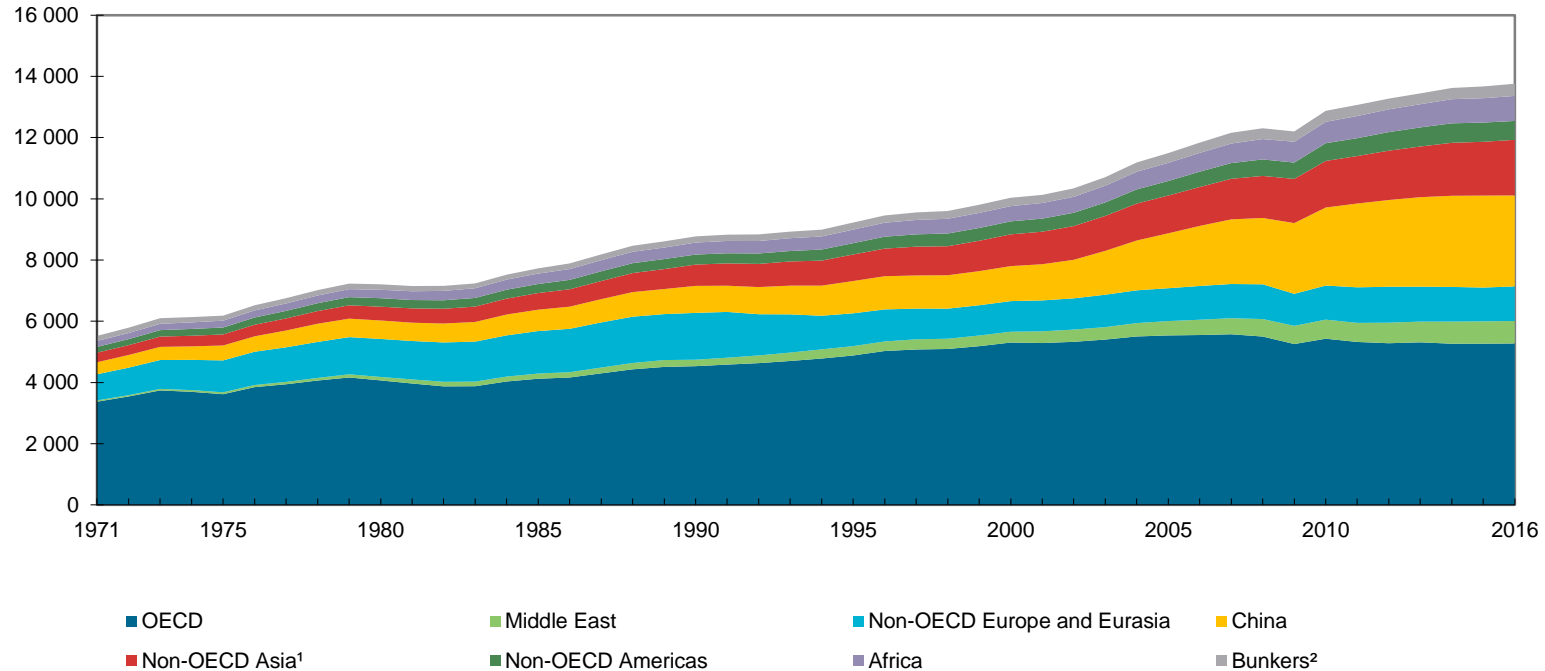
*This map, as well as any data included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.*

-  IEA
-  Accession countries
-  Association countries

- **Autonomous Agency of the OECD**
- **Established in 1974 after 1<sup>st</sup> Oil Crisis**
- **30 Members Countries (vs. 35 for OECD); 8 Association countries; 1 Accession**
- **4 Es: Energy security, Economy, Environment and Engagement**

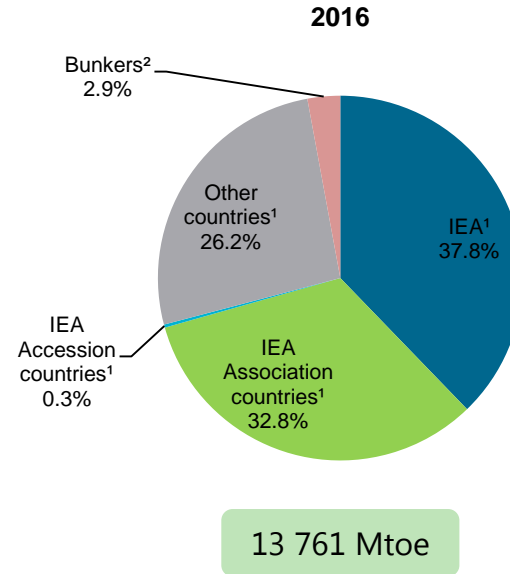
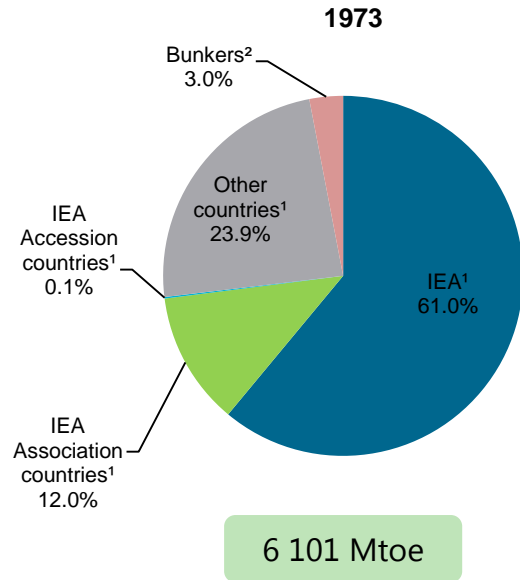
# Total primary energy supply (TPES) by region

World TPES from 1971 to 2016  
by region (Mtoe)



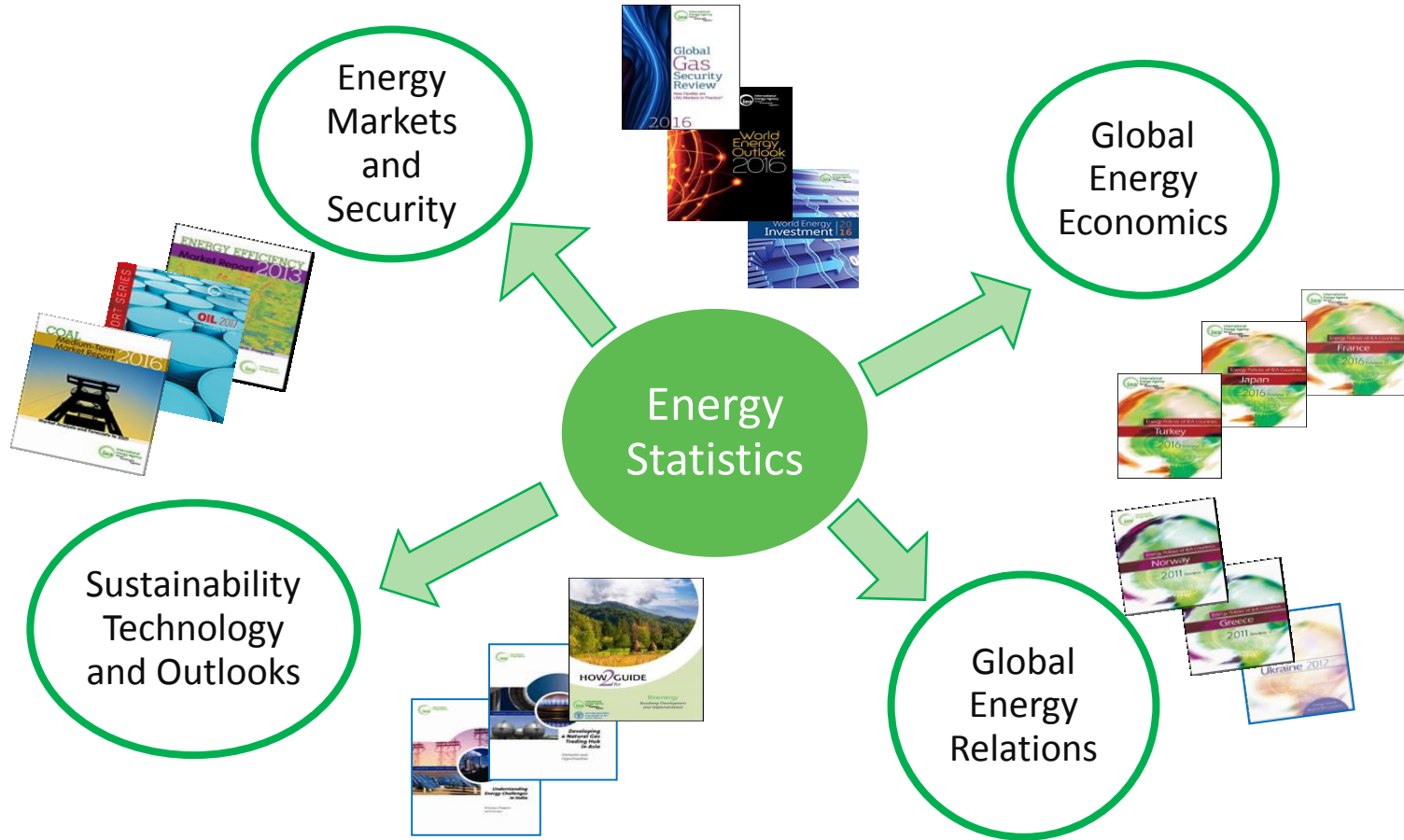
Source: IEA, Key World Energy Statistics, 2018

# Total primary energy supply in the world



Source: IEA, Key World Energy Statistics, 2018

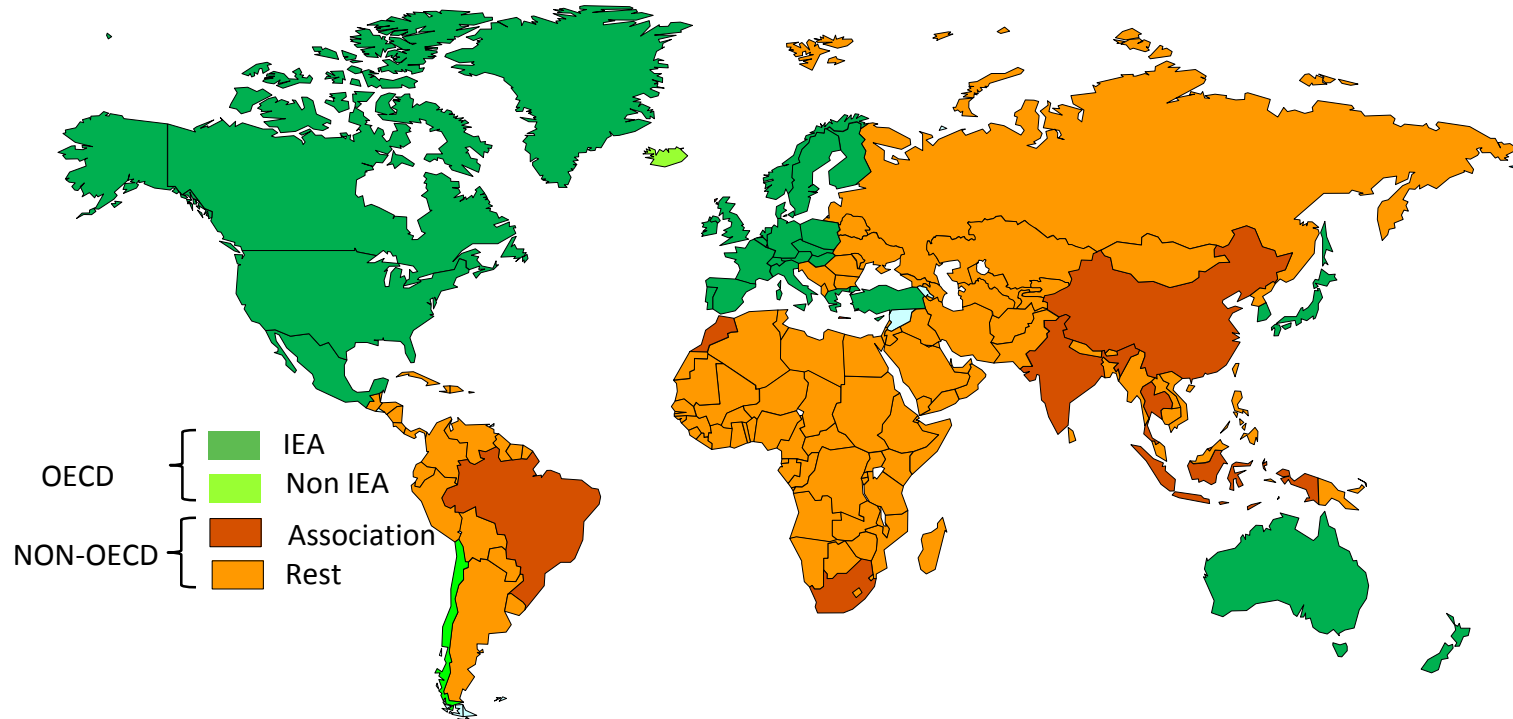
**IEA and association countries use around 70% of energy, now unlike in 1973, the share between them is more equal**



# Data collection at the IEA

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- IEA collects data from 150 countries, on a voluntary basis for all non-OECD countries



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## OECD

- 5 annual Joint questionnaires
- Annual collection on Energy efficiency, RD&D and forecasts
- Quarterly questionnaire on prices and taxes
- Monthly questionnaire
  - Electricity
  - Oil and gas (M-2)
  - Oil and gas (M-1)
- Emergency questionnaires



## Non-OECD

- Voluntary
- Joint IEA/UNECE/Eurostat questionnaires used by some and growing
- Network of statistics contacts in 120 countries
- Cooperation with international organisations

Common objective for all - to improve timeliness and detail of data sent to IEA

# What flows are collected annually?

**Production**  
**Import**  
**Export**  
**International Marine Bunkers**  
**Stock Changes**  
**Domestic Supply**



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**Transfers**  
**Statistical Differences**



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**Transformation Sector (18 sub-sectors)**  
**Energy Sector (16 sub-sectors)**  
**Distribution Losses**



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**Final Consumption**  
**Industry Sector (13 sub-sectors)**  
**Transport (7 sub-sectors)**  
**Other Sectors (4 sub-sectors)**  
**Non Energy Uses**



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***Electricity and Heat Outputs***


**TOTAL: 95 FLOWS**

# What products are collected annually?

- **Coal (17 products/categories)**
- **Natural gas**
- **Crude Oil and Petroleum products (25 products)**
- **Nuclear Energy**
- **Hydro Energy**
- **Renewable Energy (19 products/categories)**
- **Waste Energy (3 products/categories)**
- **Electricity**
- **Heat (7 categories)**

**TOTAL: over 75 products/categories**

- Covers end-use energy and activity for four sectors: residential, services, industry, transport
- Agreed by member countries in 2009 (IEA Ministerial)
- Developed with international experts, based on historical work on indicators (Odyssee, LNBL, etc)
- Disaggregation level varies across sectors
- Includes graphical tools for data quality checks

 <b>Draft Energy Efficiency Indicators Template</b> country name	
<b>COUNTRY DATA SECTION (to be reviewed and updated)</b>	
MACRO ECONOMIC DATA	Macro economic and activity data
COMMODITIES	Production outputs from selected energy-consuming industries
INDUSTRY	Energy consumption by ISIC categories
SERVICES	Energy consumption by end-uses in the services sector
RESIDENTIAL	Household energy consumption by end-uses and selected appliances data
TRANSPORT	Energy and activity data for passenger and freight transport
<b>IEA DATA and AGGREGATE INDICATORS</b>	
ELECTRICITY GENERATION	Electricity generation from combustible fuels and efficiencies
BASIC INDICATORS	Predetermined set of aggregate energy and activity indicators
<b>SUPPORT TOOLS</b>	
USER REMARKS	To incorporate comments associated to the data from the individual sheets
DATA COVERAGE	Generates a graphical summary of data coverage (completed vs. expected)
SINGLE INDICATOR GRAPHS	To generate a graph for one energy indicator
MULTIPLE INDICATORS GRAPHS	To generate a graph comparing trends from multiple indicators
CONSISTENCY CHECKS	To run the integrated consistency checks

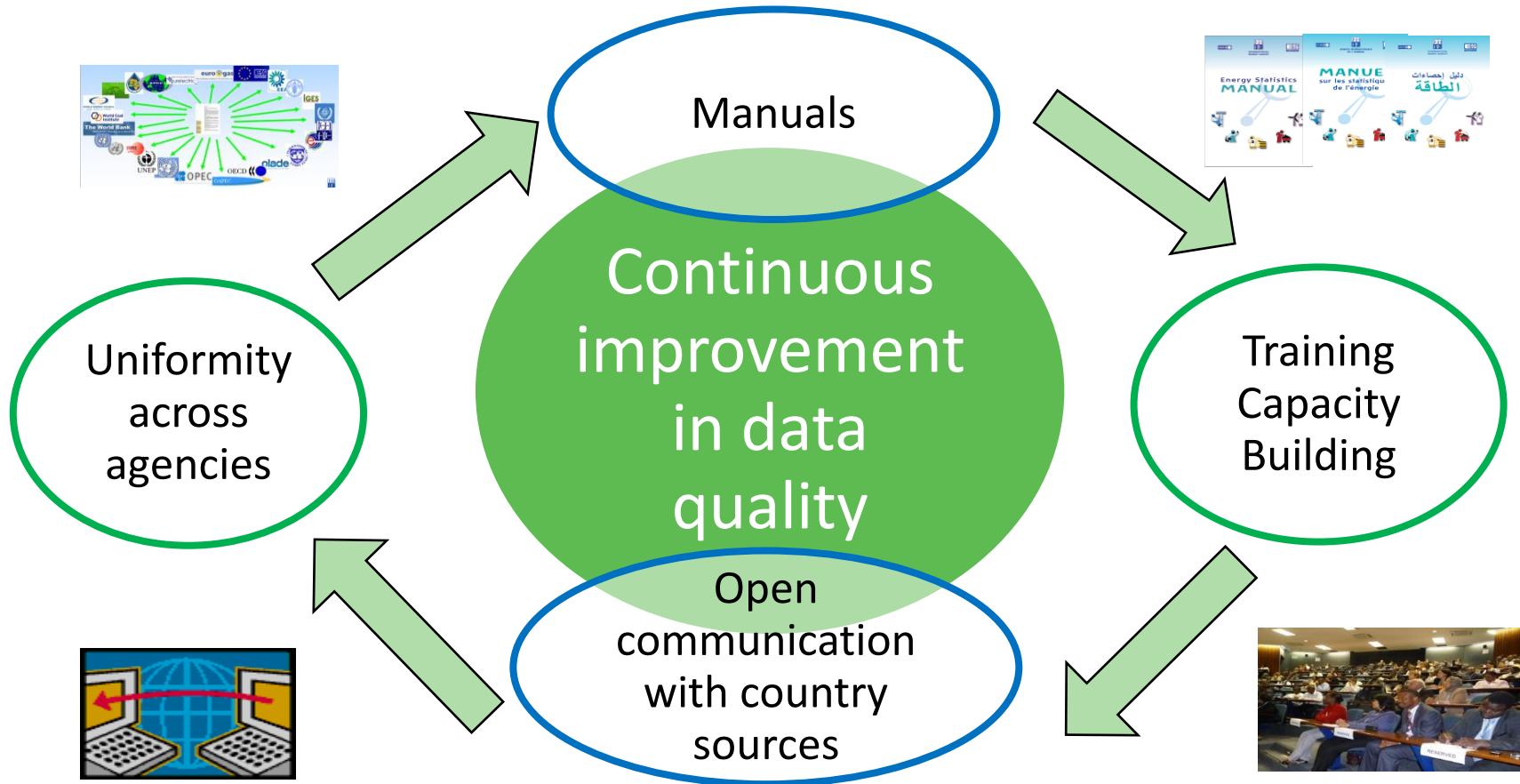
- IEA has no mandate – **based on cooperation**
- 120 countries and growing and 3 aggregate world regions – allows compilation of World energy balance
- Collected in multiple formats – whatever the country can provide: but official data
- Use of secondary sources and estimations – when country cannot provide data
- Communication with country contacts to help solve problems/confirm changes
- Data availability – for some countries energy data collection is ad-hoc process
- Data governance
- IEA remains the reference when it comes to energy data: others reconcile or calibrate their data/models to us.

# Issues with energy statistics and IEA support tools

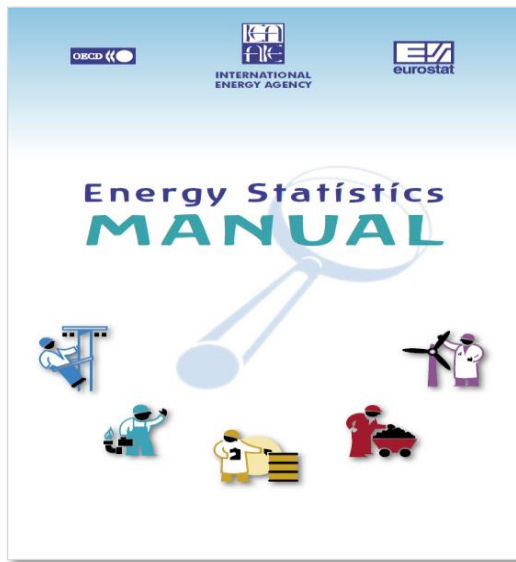
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- Liberalisation of the market:  
From one company to hundreds
- Confidentiality (liberalisation, “political”)
- More work passed to statistics offices:
  - Renewables (remote information)
  - Energy efficiency (including socio-economic data)
  - Environment (estimation of GHG emissions, ....)
  - Policy monitoring (hopefully!).
- Resources do not follow work load:  
Statistics still have a low profile, budget cuts
- Fast turnover in staff: lack of experience, continuity
- Data governance and cooperation

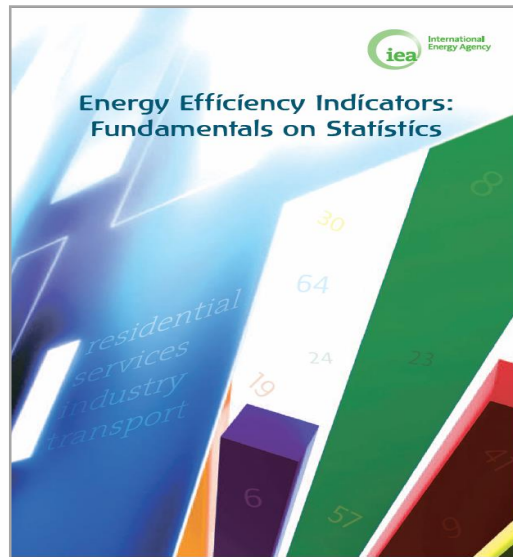
# What Support Does The IEA Provide?







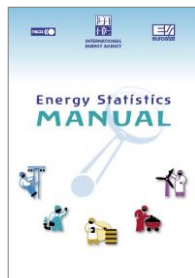
Available in 10 languages



Available in 3 languages

		R/Su/01
<b>Background</b>	Country	Austria
	Organisation	Statistics Austria
	Name of the survey	Household energy consumption survey
	Survey purpose	<ul style="list-style-type: none"> <li>To determine total household energy consumption</li> <li>To determine household appliances energy consumption</li> <li>To collect household energy expenditure</li> <li>To collect dwelling physical characteristics</li> <li>To collect household occupant characteristics</li> </ul>
<b>Data collection</b>	Sample design	Stratified random sampling approach
	Sample sources	List of addresses, list of telephone numbers, labour force survey.
	Collection methods	<ul style="list-style-type: none"> <li>Computer assisted personal interview (CAPI)</li> <li>Computer assisted telephone interview (CATI)</li> </ul>
	Sample/Population size	14 000 / 3 429 720
	Frequency	Every two years
	Time to complete survey	10 minutes
	Incentive	None
	Survey respondents	Households
<b>Notes and comments</b>	Elements collected	Dwelling type, dwelling floor area, building age, household occupancy, energy-related renovations, household energy consumption and related expenditures.
	End-uses collected	Space cooling, space heating, domestic hot water, other: cooking.
<b>Notes and comments</b>	Main challenges	<ul style="list-style-type: none"> <li>Inconsistent responses</li> <li>Response quality</li> </ul>
	Possible improvements	
	Key best practice	A new approach to data control compared with previous surveys was taken for the first time in 2004 and continued in the follow-up survey runs. Up to and including the 2000 survey, only the individual energy sources themselves were checked for plausibility, any missing data were calculated (quantity-value pairs) and substitutions were made if necessary. Such routines of course continue to be used, with the additional step that the total of the reported energy consumption is then related to a calculated (fictitious) overall consumption. This fictitious overall consumption by the household is calculated from the data for that household, on the one hand (floor space, number of people in household) and pre-set parameters for the individual types of use (space heating, water heating, cooking, other purposes), on the other hand. Calculating the total reported energy consumption per household in this way involves some quite complicated plausibility routines, because one or more alternative quantities have to be calculated if the quantity-value pairs do not match and these alternative quantities then, when variably applied, lead to a number of different calculated overall energy consumption figures. The fictitious standard value is then used to select the quantity-value pairs that appear most probable.
Other documentation	Available: Surveying Methodology and Questionnaire	

Over 170 country practices



## 1 What is Oil ?

# 1 What is Oil ?

## General information

**Petroleum** is a complex mixture of liquid hydrocarbons, chemical compounds containing hydrogen and carbon, occurring naturally in underground reservoirs in sedimentary rock. Coming from the Latin *petra*, meaning rock, and *oleum*, meaning oil, the word “petroleum” is often interchanged with the word “oil”. Broadly defined, it includes both primary (unrefined) and secondary (refined) products.

Oil is the largest traded commodity world wide, either through crude oil or through refined products. As a consequence, it is essential to get data as complete, accurate and timely as possible on all oil flows and products. Although oil supply continues to grow in absolute terms, its share in global total energy supply has been

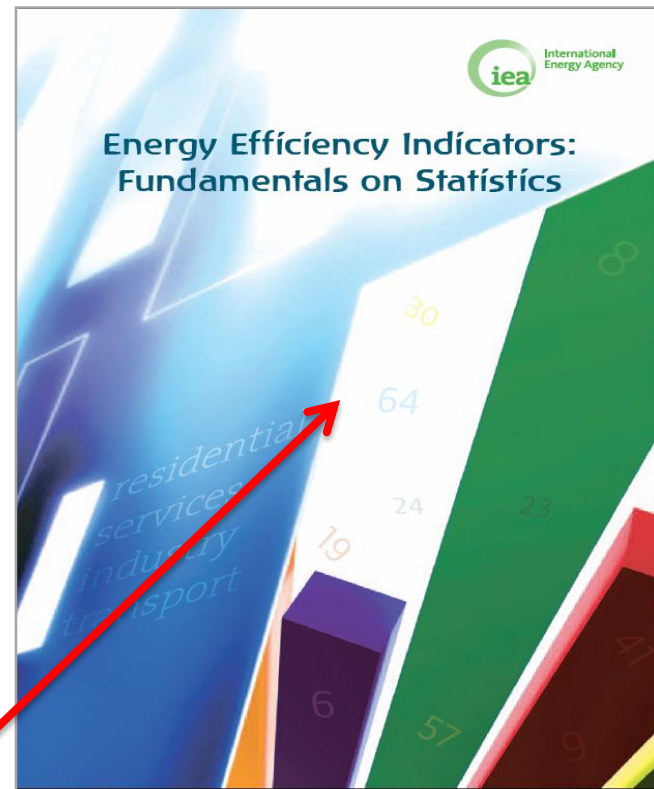
## Specific information related to the joint questionnaire

The Oil Questionnaire covers oils processed in refineries and the petroleum products made from them. All sources of supply and the uses of the oils are included as well as their calorific values.

## Table of contents

- **Introduction - Why a manual?**
- **What are energy efficiency indicators?**
- **How to collect the data for indicators?**
- **Collecting what and how for the Residential sector**
- **Collecting what and how for the Services sector**
- **Collecting what and how for the Industry sector**
- **Collecting what and how for the Transport sector**
- **Validating the data**
- **Disseminating the data**

Draft Energy Efficiency Indicators Template country name	
<b>COUNTRY DATA SECTION (to be reviewed and updated)</b>	
MACRO-ECONOMIC DATA	Identify economic and activity data
INDUSTRIES	Producer output from selected energy-consuming industries
INDUSTRY	Energy consumption by ISIC categories
SERVICES	Energy consumption by sub-sectors in the services sector
RESIDENTIAL	Finalised energy consumption by end-use and selected appliance data
TRANSPORT	Energy and activity data for passenger and freight transport
<b>IEA DATA AND AGGREGATE INDICATORS</b>	
ELECTRICITY GENERATION	Electricity generation from combustible fuels and efficiencies
BASIC INDICATORS	Predefined set of aggregate energy and activity indicators
<b>SUPPORT TOOLS</b>	
IEA REPORTING	To incorporate comments associated to the data from the individual sheets
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CONSISTENCY CHECKS	To run the integrated consistency checks



Great questionnaire! But how to collect the data? And what indicators to build with these data?

## Annexes

# The Annex: An essential part of the Manual

Background		R/Su/01
Country	Austria	
Organisation	Statistics Austria	
Name of the survey	Household energy consumption survey	
Survey purpose	<ul style="list-style-type: none"> <li>To determine total household energy consumption</li> <li>To determine household appliances energy consumption</li> <li>To collect household energy expenditure</li> <li>To collect dwelling physical characteristics</li> <li>To collect household occupant characteristics</li> </ul>	
Data collection		
Sample design	Stratified random sampling approach	
Sample sources	List of addresses, list of telephone numbers, labour force survey.	
Collection methods	<ul style="list-style-type: none"> <li>Computer assisted personal interview (CAPI)</li> <li>Computer assisted telephone interview (CATI)</li> </ul>	
Sample/Population size	14 000 / 3 429 720	Response rate 55%
Frequency	Every two years	Last time surveyed 2010
Time to complete survey	10 minutes	Mandatory No
Incentive	None	
Survey respondents	Households	
Elements collected	Dwelling type, dwelling floor area, building age, household occupancy, energy-related renovations, household energy consumption and related expenditures.	
End-uses collected	Space cooling, space heating, domestic hot water, other: cooking.	
Notes and comments		
Main challenges	<ul style="list-style-type: none"> <li>Inconsistent responses</li> <li>Response quality</li> </ul>	
Possible improvements		
Key best practice	<p>A new approach to data control compared with previous surveys was taken for the first time in 2004 and continued in the follow-up survey runs. Up to and including the 2000 survey, only the individual energy sources themselves were checked for plausibility, any missing data were calculated (quantity-value pairs) and substitutions were made if necessary. Such routines of course continue to be used, with the additional step that the total of the reported energy consumption is then related to a calculated (fictitious) overall consumption. This fictitious overall consumption by the household is calculated from the data for that household, on the one hand (floor space, number of people in household) and pre-set parameters for the individual types of use (space heating, water heating, cooking, other purposes), on the other hand. Calculating the total reported energy consumption per household in this way involves some quite complicated plausibility routines, because one or more alternative quantities have to be calculated if the quantity-value pairs do not match and these alternative quantities then, when variably applied, lead to a number of different calculated overall energy consumption figures. The fictitious standard value is then used to select the quantity-value pairs that appear most probable.</p>	
Other documentation	Available: Surveying Methodology and Questionnaire	

Identification number:

R: Residential

Su: Survey

Background

Survey:

Sample, Frequency,

Data

Comments:

- Challenges
- Key learnings
- Documents
- Links

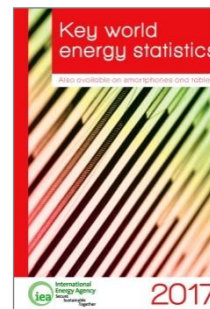
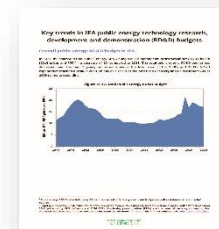
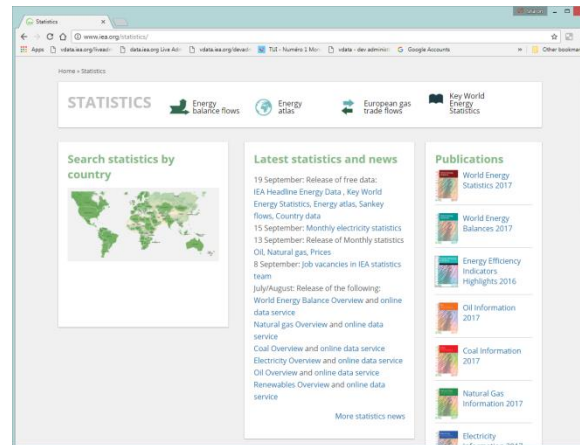
**160** practices covering surveys, modelling, metering and administrative sources

- **Country specific issues with partners**
  - E.g. Indonesia – coal; China – international standards, data collection; Mexico legislative basis; All – Energy Efficiency, policy monitoring
- **Senior policy level seminars workshops**
  - focus on: policy use, data governance, data sharing, access to admin data
  - Elements added to all training
- **Webinars**
  - Being piloted to support and reinforce formal training
  - Option of leading on on-line package – working with Olade
- **Alumni Network**
  - On line Blog space to allow trainees to raise questions with each other and us, share knowledge and be part of wider group
- **Cooperation with partners**
  - Joint training events with APEC, IRENA, UN, AFREC and all for JODI

# Energy statistics are at the core of the IEA



- Comprehensive
  - Energy data for more than 140 countries
  - All fuels
  - Supply and demand
  - Energy efficiency, Prices, RD&D



**3 000 hard copies  
and over 200 000 downloads  
a year for Key World Energy  
Statistics, also available as  
an App**



[www.iea.org](http://www.iea.org)



❑ **IEA Member countries** have an obligation to hold 90 days of stocks (net imports/consumption)

- Need reliable and timely data on imports, consumption and stocks



❑ **OPEC Member countries:** production vs quota

- Need reliable and timely data on production



❑ **EU Member countries:** obligation to have a minimum share of electricity consumption coming from renewables

- Need reliable data on renewables



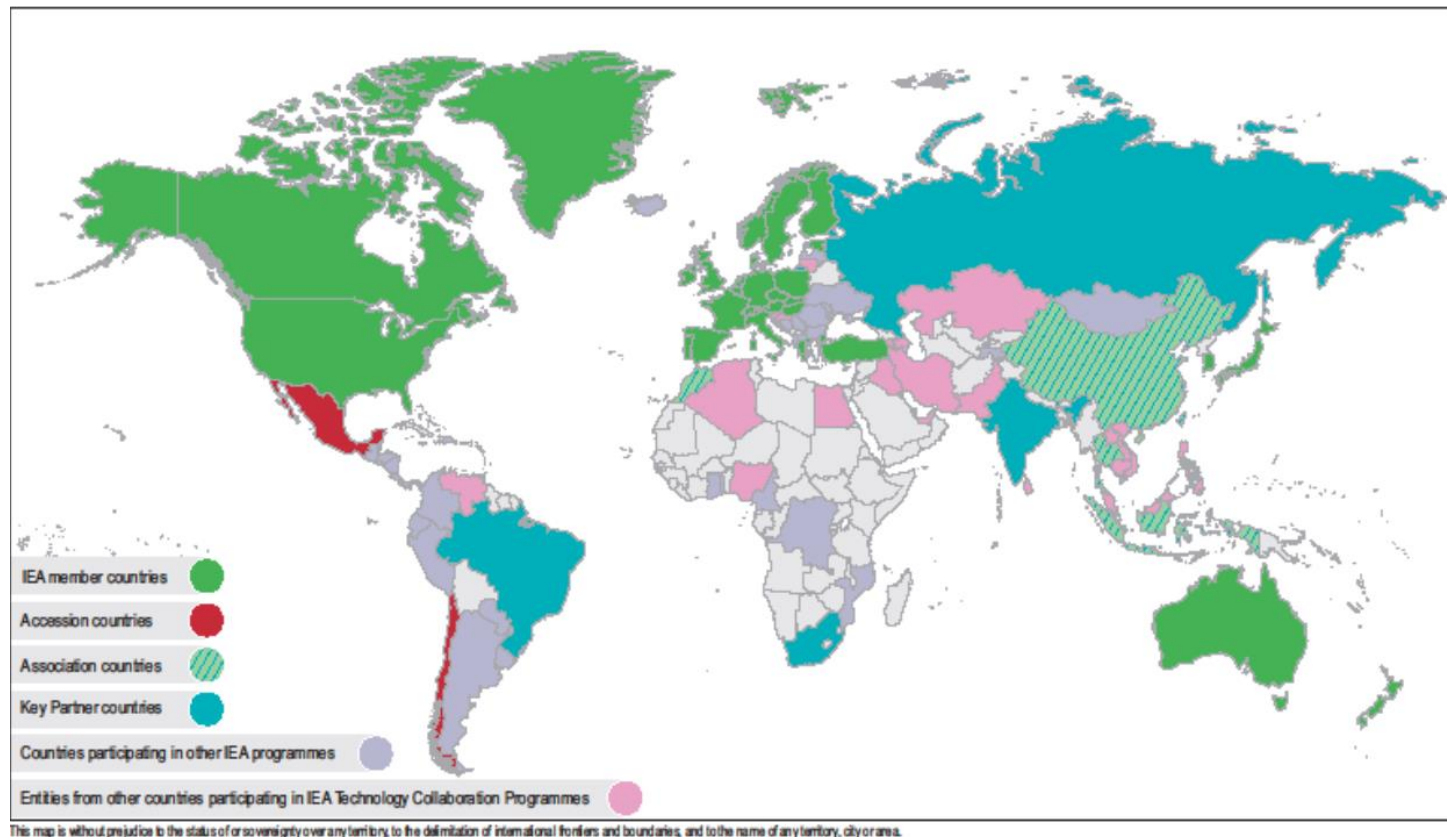
❑ **Annex 1 countries to the Conference of Parties:** respect of the engagement they have ratified when signing the Kyoto Protocol (70% to 80% of GHG come from fuel combustion)

- Need reliable data on both supply and demand

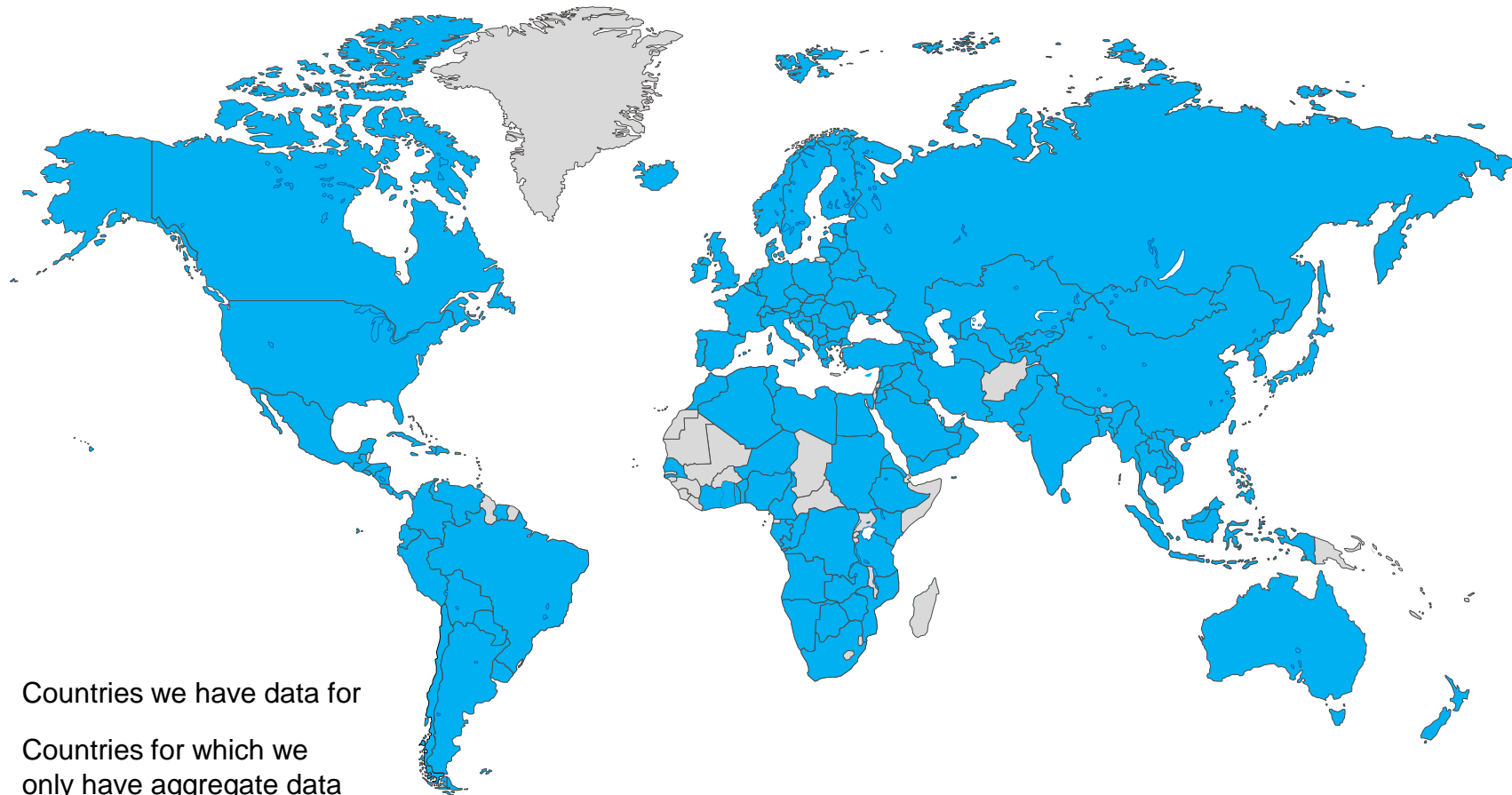





# IEA engagement worldwide



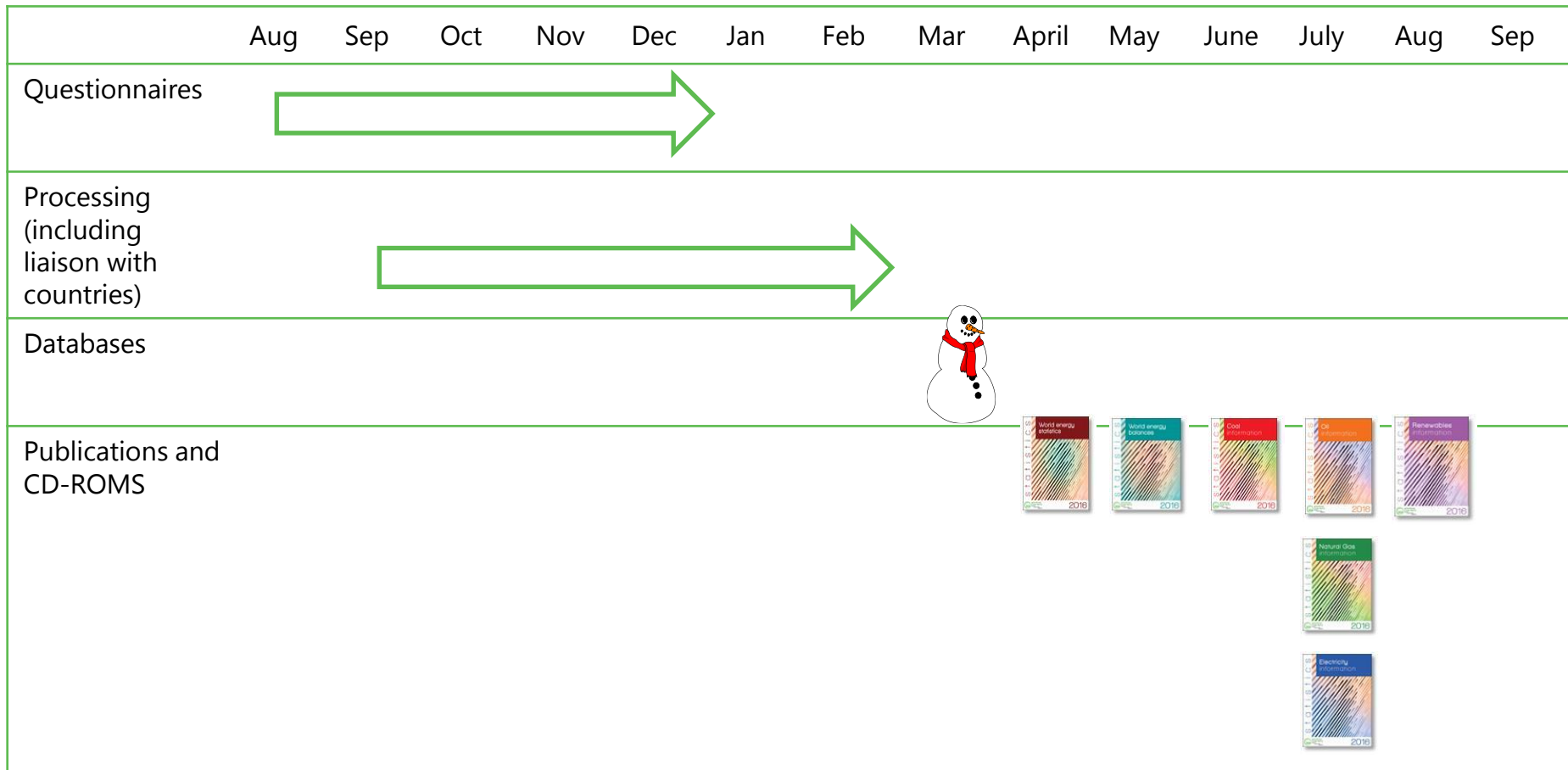
# IEA's global energy data collection



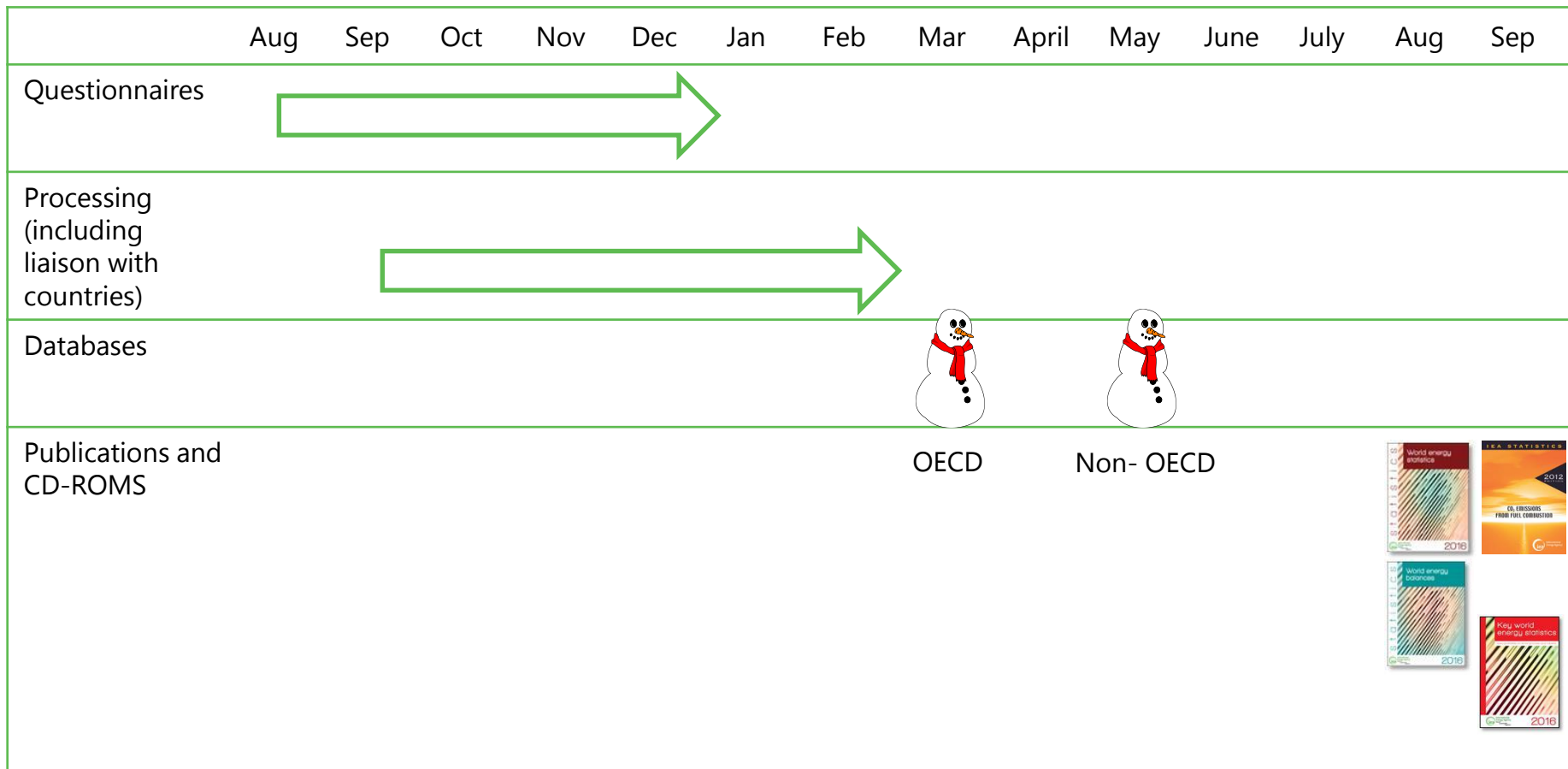
 Countries we have data for

 Countries for which we only have aggregate data

# The annual OECD statistics cycle



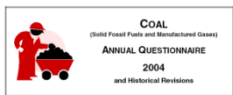
# The annual non-OECD statistics cycle



# The IEA reporting mechanism



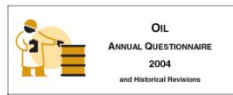
## ➤ Five Annual Energy Questionnaires



Attached is the annual questionnaire for coal, gas, manufactured fuel oil, and residual gases which provides for the submission of 2004 data and historical revisions where applicable. Administrations are requested to complete the questionnaire by the latest September 30<sup>th</sup> 2005. Further submissions are welcome. Please send your questionnaire to:

- International Energy Agency (IEA/EC/EU), Energy Statistics Division
- 10, rue de la Fédération, 92015 Courcouronnes, Cedex 03, France or Geneva
- Committee of the European Communities, Economic, Energy and Transport Statistics
- 10, rue de la Fédération, 92015 Courcouronnes, Cedex 03, France or Geneva and EPFL, Chaux-de-Fonds
- United Nations Statistics Division, Energy Statistics Section

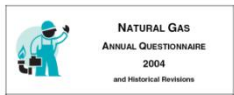
Transmission details are provided in the "Data Communication Procedures" section.



Attached is the annual questionnaire for oil which provides for the submission of 2004 data and historical revisions where applicable. Administrations are requested to complete the questionnaire by the latest September 30<sup>th</sup> 2005. Further submissions are welcome. Please send your questionnaire to:

- International Energy Agency (IEA/EC/EU), Energy Statistics Division
- 10, rue de la Fédération, 92015 Courcouronnes, Cedex 03, France or Geneva
- Committee of the European Communities, Economic, Energy and Transport Statistics
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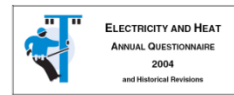
Transmission details are provided in the "Data Communication Procedures" section.



Attached is the annual questionnaire for natural gas which provides for the submission of 2004 data and historical revisions where applicable. Administrations are requested to complete the questionnaire by the latest September 30<sup>th</sup> 2005. Further submissions are welcome. Please send your questionnaire to:

- International Energy Agency (IEA/EC/EU), Energy Statistics Division
- 10, rue de la Fédération, 92015 Courcouronnes, Cedex 03, France or Geneva
- Committee of the European Communities, Economic, Energy and Transport Statistics
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- United Nations Statistics Division, Energy Statistics Section

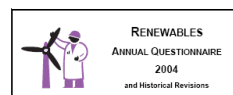
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Attached is the annual questionnaire for electricity and heat which provides for the submission of 2004 data and historical revisions where applicable. Administrations are requested to complete the questionnaire by the latest 30<sup>th</sup> of September 2005. Further submissions are welcome. Please send your questionnaire to:

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- United Nations Statistics Division, Energy Statistics Section

Transmission details are provided in the "Data Communication Procedures" section.



Attached is the annual questionnaire for renewables and waste which provides for the submission of 2004 data and historical revisions where applicable. Administrations are requested to complete the questionnaire by the latest 30<sup>th</sup> of September 2005 or the latest October submissions are welcome. Please send your questionnaire to:

- International Energy Agency (IEA/EC/EU), Energy Statistics Division
- 10, rue de la Fédération, 92015 Courcouronnes, Cedex 03, France or Geneva
- Committee of the European Communities, Economic, Energy and Transport Statistics
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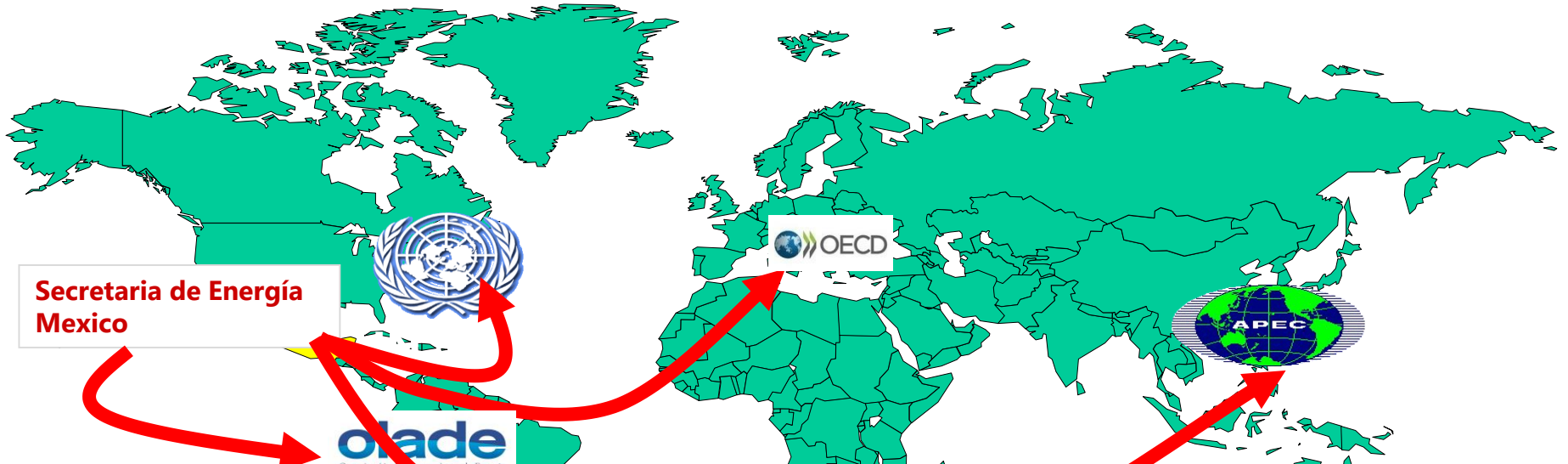
➤ **Other Annual: Mini annual (y-1), RD&D, Energy efficiency**

➤ **Quarterly Questionnaires: Prices and Taxes questionnaire**

➤ **Monthly Questionnaires:**

**Monthly Oil and Gas Statistics, Joint Oil Data Initiative  
Electricity production and trade**

➤ **Exceptional Questionnaires: Mainly in case of oil crisis,  
or ad-hoc activities (e.g.: Non-Energy Use Network)**



**Secretaría de Energía  
Mexico**

**olade**  
Organización  
Americana de Energía



**5% gap**

**Crude Oil Production for Mexico (in kbd)**

	1995	1996	1997	1998
<b>APEC</b>	2653	2903	3087	3134
<b>IEA</b>	2741	2872	3062	3109
<b>OLADE</b>	2722	2969	3022	3070
<b>OPEC</b>	2618	2858	3022	3071
<b>UN</b>	2834	2977	3166	3210

## Technical Assistance:

- *Barriers assessments*
- *Data processing missions*
- *Guidance documents*
- *Manuals*

## Training and capacity building:

- *Regular bi-annual*
- *Missions and hosting*
- *Collaboration with other organisations*



Continuous  
data quality  
improvement

**Data collection, processing,  
dissemination and use:**

- *Maintaining country contacts*
- *Dialogue with analysts and users*
- *Expanding data coverage and reach*
- *Promoting use of stats in policy*
- *Score cards*

- History
- Role
- International coordination and cooperation



## Annual and quarterly Publications

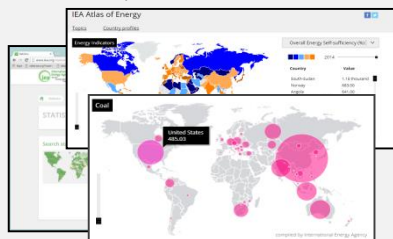
Fuel Information books, World energy statistics & balances, CO<sub>2</sub> emissions...



Free  
overviews  
from books  
saw 15,000  
downloads in  
first 3 weeks

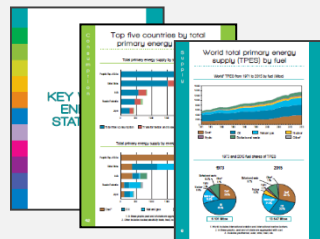
## IEA website

Atlas, Sankey flows...



## Booklet

Key World Energy Statistics



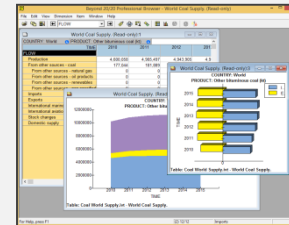
## Mobile App

Android, apple and windows



## Electronic data files

Data online service



- During 2016/17
  - 114 countries in the JODI Oil DB
  - 3 new countries in the JODI Gas DB (Angola, Kazakhstan & Nigeria => 88 countries)
  - 15<sup>th</sup> Regional JODI Training Workshop for African Countries (Tunis, April 2017)
  - Energy Data Transparency Reception/Exhibition (London, October 2017)
  - JODI-Gas Information Seminar Latin America (Santa Cruz, November 2017)
  - 3 Inter-Secretariat meetings with JODI Partners (Vienna, New-York, London)
- 13<sup>th</sup> JODI International conference was held in London, UK from 10-11 October 2017 and was generously hosted by the UK Government
- Conference attended by 120 delegates representing around 26 countries/economies, including energy data experts, market analysts, financial sector, media, and the industry at large, along with 7 of the 8 JODI partners
- Conference showed the continued development of JODI data specifically on oil, now being seen as a reference to verify data as the output moved from showing global supply and demand to showing balance by product.
- The distribution of JODI data via platforms such as Bloomberg, Thomson Reuters and Argus was announced.
- Focus on improving oil and gas data
  - Participation
  - Timeliness
  - Completeness
  - Market coverage

