International Energy Agency

Secure • Sustainable • Together

The Role and Importance of Energy Statistics

Duncan Millard

Chief Statistician

International Energy Agency

www.iea.org

Overview

- The IEA
- Why collect energy stats?
- Data and use
- Challenges for Statistics

International Energy Agency

Secure • Sustainable • Together

The IEA

www.iea.org

Founded in 1974

- **Formed in wake of 1973 oil embargo with mission to promote member country energy security – autonomous agency of the Organisation for Economic Cooperation and Development (OECD)**

29 member countries

- **Asia Pacific:** Australia, Japan, Republic of Korea and New Zealand
- **North America:** United States, Canada
- **Europe:** Austria, Belgium, Czech Rep, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey and United Kingdom
- **European Commission** also participates in the work of the IEA
- **Chile** and **Mexico** are in the process of accession to become members of the IEA
- **China, Indonesia** and **Thailand** are countries in **Association**

Headquarters: Paris

Decision-making body: Governing Board

- Consists of member country representatives
- Under the Governing Board, several committees are focusing on each area

Secretariat:

- **Staff of around 240,** mainly energy experts and statisticians

International Energy Agency

Secure • Sustainable • Together

New Structure of the IEA

www.iea.org

Economics and Investment Office

Energy Data Centre

Office of Communication and Information

Office of Global Energy Policy

Office of Legal Counsel

Office of Management and Administration

Executive Office

Dr. Fatih Birol (Executive Director)

Paul Simons (Deputy Executive Director)

Directorate of Energy Markets and Security

Keisuke Sadamori

Directorate of Sustainability, Technology and Outlooks

Kamel Bennaceur

New Energy Efficiency Division in EMS

Training and Capacity building now part of EDC

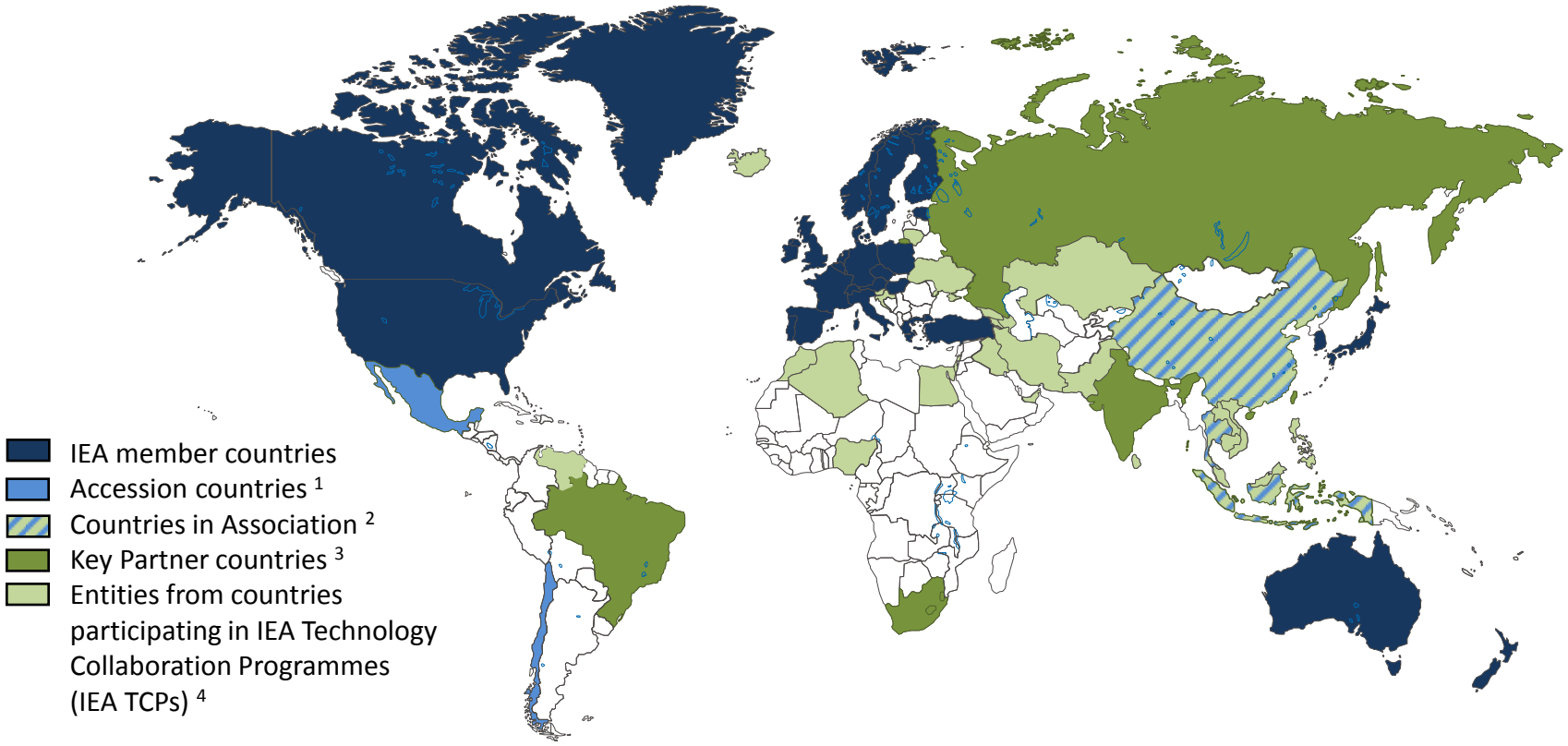
WEO part of STO alongside ETP

International Energy Agency

Secure • Sustainable • Together

IEA engagement worldwide

www.iea.org



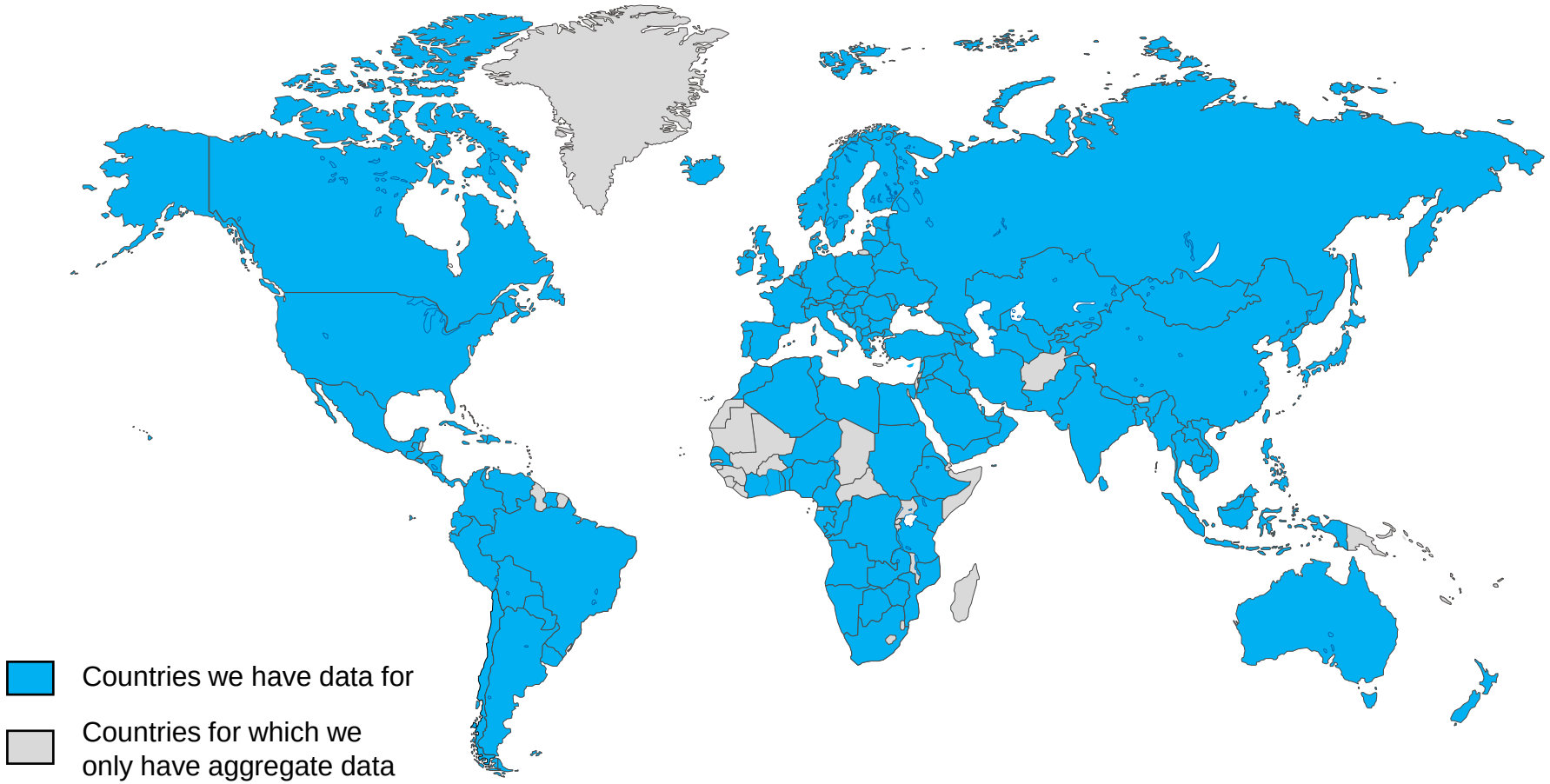
1. *Accession countries are OECD member countries that have begun the formal process to become a full member of the IEA.*
2. *Countries in Association are partner countries with which the IEA has established joint activities.*
3. *Key Partner countries are countries with which the IEA is seeking enhanced engagement.*
4. *IEA member countries (except Estonia, Luxembourg and the Slovak Republic), Accession countries, Countries in Association (except Indonesia) and key Partner countries also participate in IEA TCPs. Entities participating in (signatories to) IEA TCPs may represent governmental or non-governmental organisations. The Economic Community of West African States (ECOWAS), the European Commission (EC), ITER, the Organisation for Petroleum Exporting Countries (OPEC), the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE, located in Egypt), and the United Nations Industrial Development Organisation (UNIDO) are also participants in IEA TCPs.*

International Energy Agency

Secure • Sustainable • Together

IEA's Global energy data Collection

www.iea.org



International Energy Agency

Secure • Sustainable • Together

www.iea.org

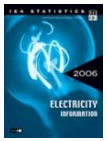
Secretariat
Maike Fischmann

Head of Division
Duncan Millard

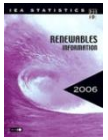
Desk-Top Publisher
Sharon Burghgraeve

Coal, Electricity and Renewables
Vladimir Kubecek

Annual Coal



Annual Electricity



Annual Renewables

Short-Term Statistics (coal, electricity)

Oil and Natural Gas
Erica Robin

Annual Oil

Annual Natural Gas


Monthly Oil Statistics


Monthly Gas Statistics

JodiOil
JodiGas
JODI


Oil Emergency - Qu


Gas Trade Flow Maps

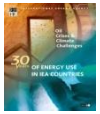
Balances, Prices & Taxes, Efficiency and Emissions
Roberta Quadrelli

Energy Prices and Taxes

Energy Statistics and Balances

SLT and R&D Statistics

CO2 Emissions


Energy efficiency

OECD

Non-Member Countries
Celine Rouquette


Energy Statistics and Balances of Non-OECD Countries


Energy Statistics and Balances of Non-OECD Countries


Energy Statistics and Balances of Non-OECD Countries


Energy Statistics and Balances of Non-OECD Countries


Energy Statistics and Balances of Non-OECD Countries


Energy Statistics and Balances of Non-OECD Countries

NMC

Why collect energy stats

?

Because they are needed and used

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**

Ministers recognise need for data

"We welcome, in particular, the five key opportunities recommended to reduce GHG emissions from the energy sector. ….. ***This must all be supported by high-quality energy statistics***" IEA Ministerial Statement on Energy and Climate Change

Ministers also noted ….. ***the vital role that high-quality energy statistics and analysis play in understanding energy markets***
Summary of the Chair, The Hon. Ernest J. Moniz, U.S. Secretary of Energy 2015 IEA Ministerial Meeting

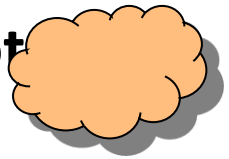
Energy security
Production
Energy access
Off grid generation
Renewables
RD&D
Prices
Investment
Energy efficiency/use
Monitoring
Training and capacity building

Importance of energy statistics for policy makers

- **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

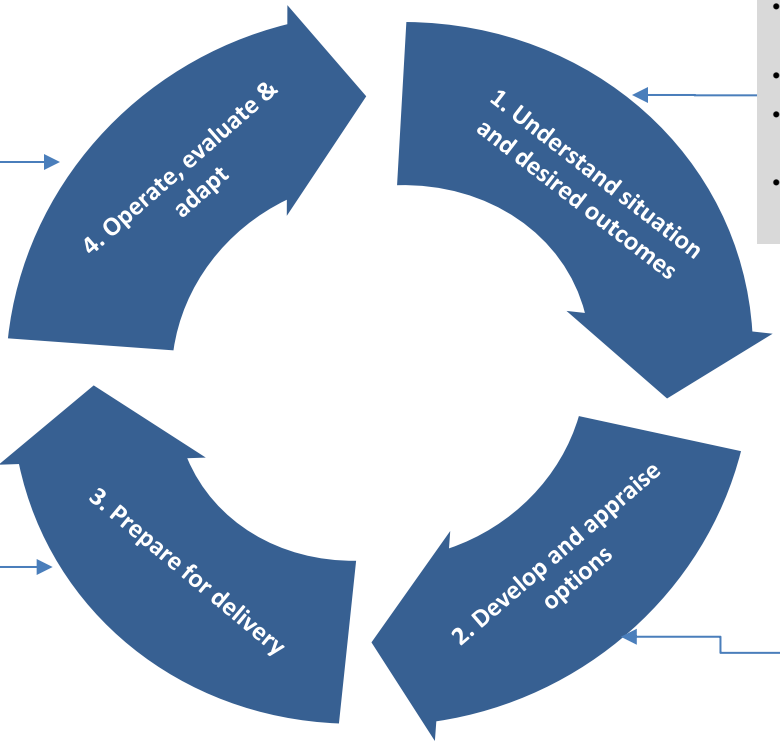
- **OPEC Member countries: production vs quota**
  - Need reliable and timely data on production

- **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 Prot (70% to 80% of GHG come from fuel combustion)**
  - Need reliable data on both supply and demand

The Policy Delivery Cycle – where stats can impact



- Do we really understand what the problem or issue is?
- Are you sure there is a gap?
- What policy or evidence is already out there & what are others doing in UK/abroad?
- What outcome would indicate success

- Understand, quantify & analyse impacts, costs, risks & benefits of policy options, including on GHGs
- Address evidence gaps & identify research & analysis required

- Undertake pilots & collect good practice
- Benchmark against other schemes
- Agree and put in place delivery arrangements with delivery partners and regulators
- Put in place policy monitoring, evaluation & reporting mechanisms

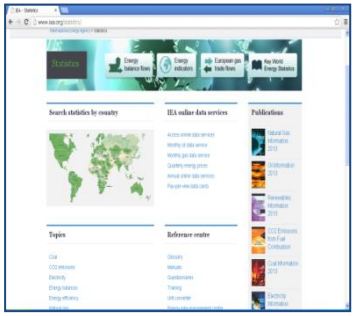
- Monitoring performance indicators and expected benefits
- Evaluation and reporting, eg GHGs

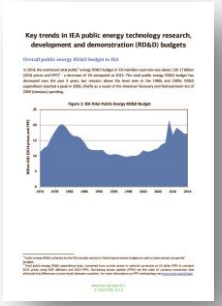
Energy statistics is at the core of the IEA

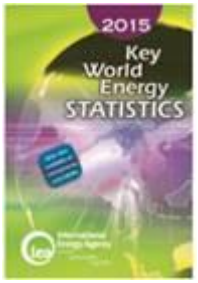
International Energy Agency
Secure • Sustainable • Together

www.iea.org

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







10 000 hard copies and over 200 000 downloads a year for Key World Energy Statistics, also available as an App

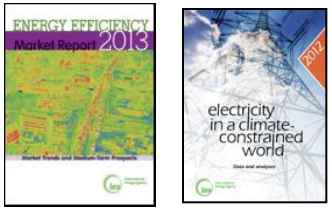
International Energy Agency

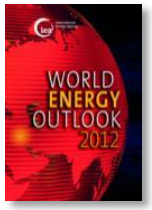
IEA statistics feed all IEA studies and analyses

Secure • Sustainable • Together

www.iea.org

ENERGY MARKETS AND SECURITY

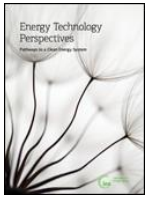


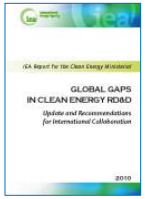


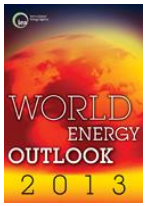
SUSTAINABLE ENERGY POLICY & TECHNOLOGY

Energy Statistics

GLOBAL ENERGY ECONOMICS







Training

GLOBAL ENERGY POLICY

A few Basic Principles for Establishing an Energy Information System

Do not collect statistics for the sake of collecting statistics but collect only statistics which are needed

Establish a legal basis

Establish a proper reporting mechanism:

- **Questionnaires (as user friendly as possible)**
- **A network of contacts**
- **An agreed timetable**

Establish proper dissemination mechanism

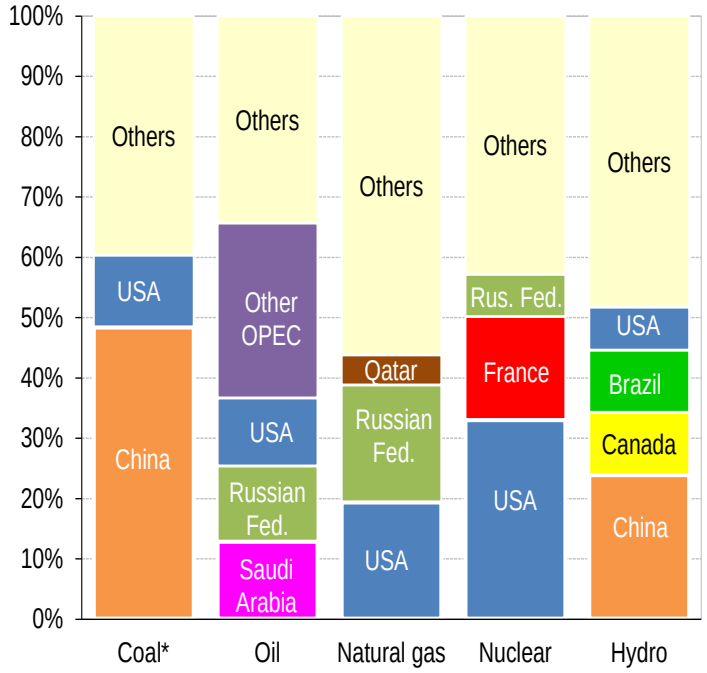
Allocate proper resources to collect/process the data

Review methodology and process, to anticipate and adapt to change in the energy situation

Some key trends in data – needed for policy making

Global picture - 2013

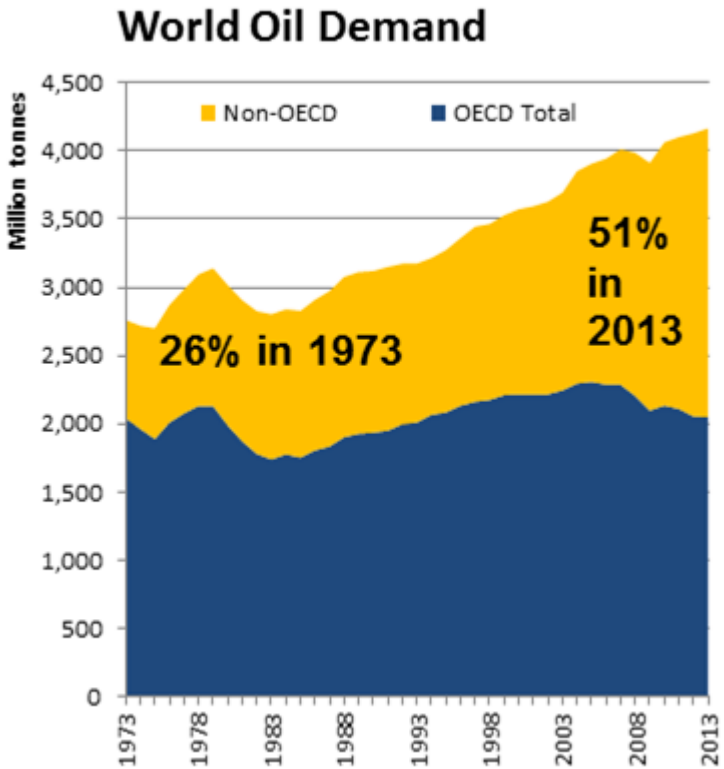
Production



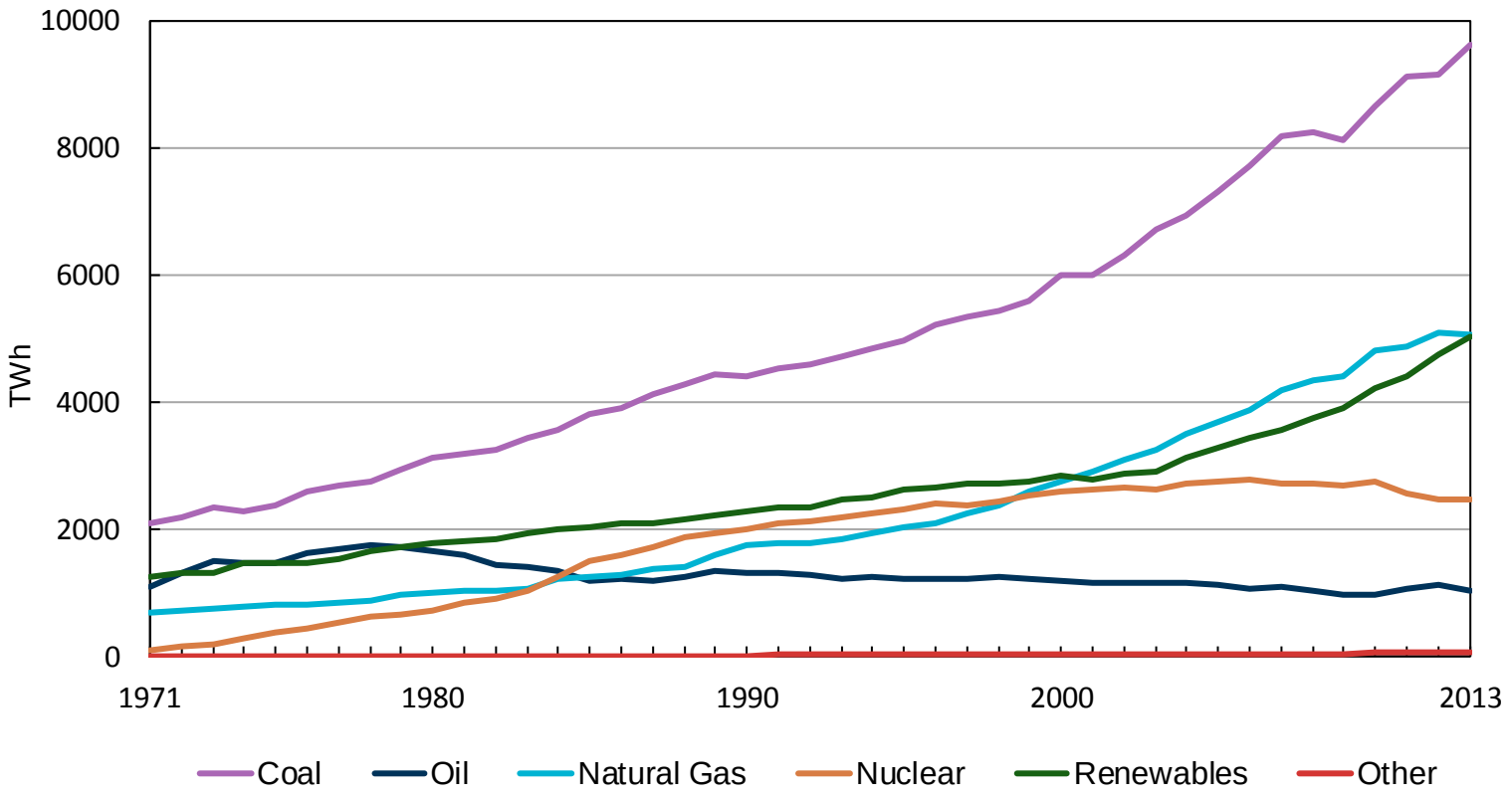
Use

Country	TPES (Mtoe)	Share in world TPES	
		2013	1971
People's Rep. of China	3 022	22%	7%
United States	2 188	16%	29%
India	775	6%	3%
Russian Federation	731	6%	N/A
Japan	455	3%	5%
Germany	318	2%	6%
Brazil	294	2%	1%
Korea	264	2%	0.3%
France	253	2%	3%
Canada	253	2%	3%
Rest of the world	5 002	37%	44%
World	**13 555**	**100%**	**100%**

Oil consumption



World electricity production by source (1971-2013)



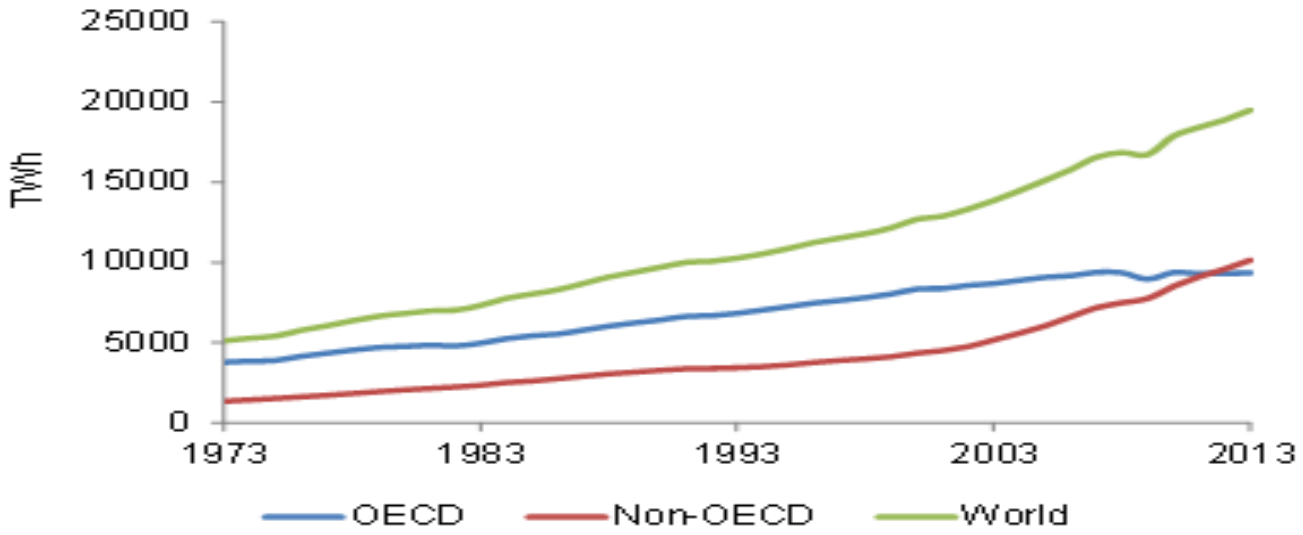
Source: IEA World Energy Balances, OECD/IEA, Paris, 2015.

Electricity consumption

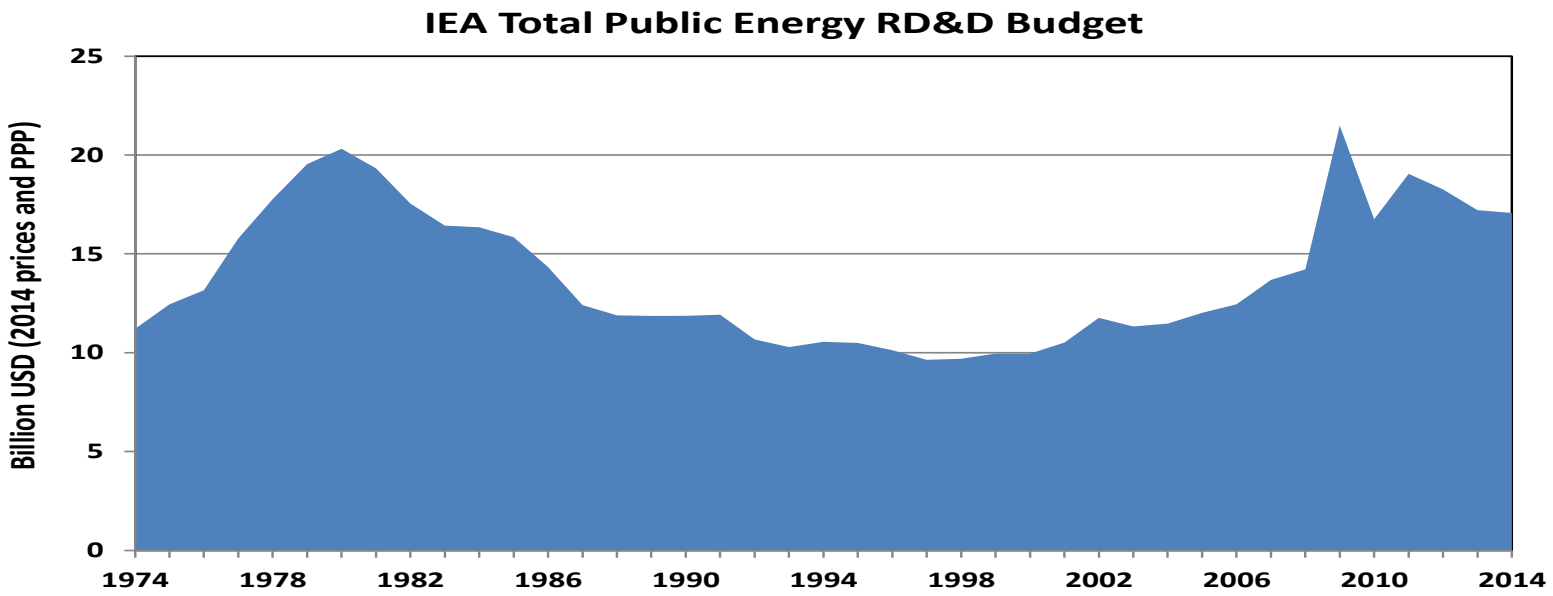
International Energy Agency
Secure • Sustainable • Together

Total final consumption of electricity

www.iea.org



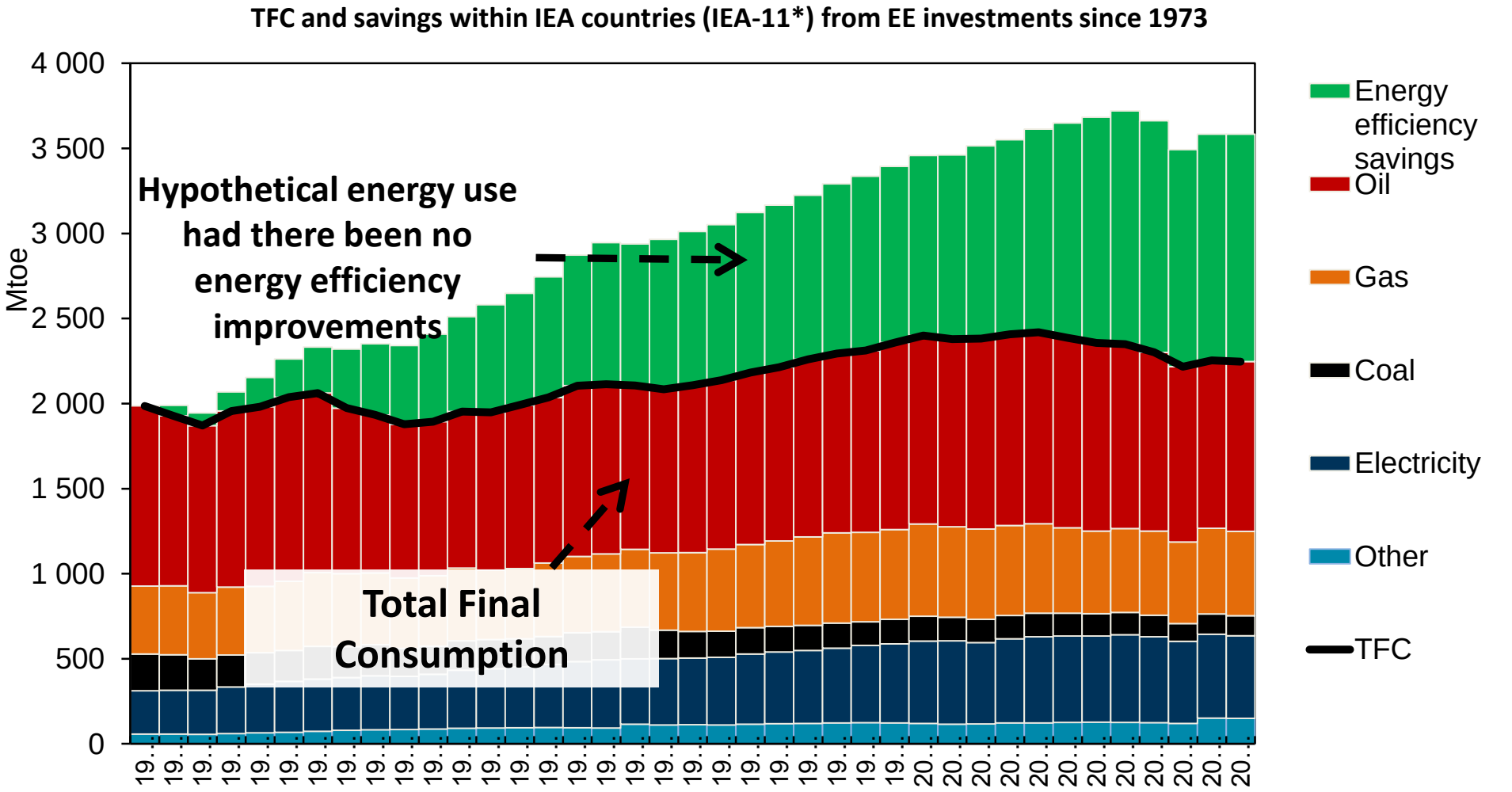
Investing in clean energy research is key to new challenges



Source: IEA Energy Technology Research Development and Demonstration database, 2015

IEA currently monitors public expenditure in OECD, vital for understanding Mission Innovation

Energy efficiency: the 'first fuel'

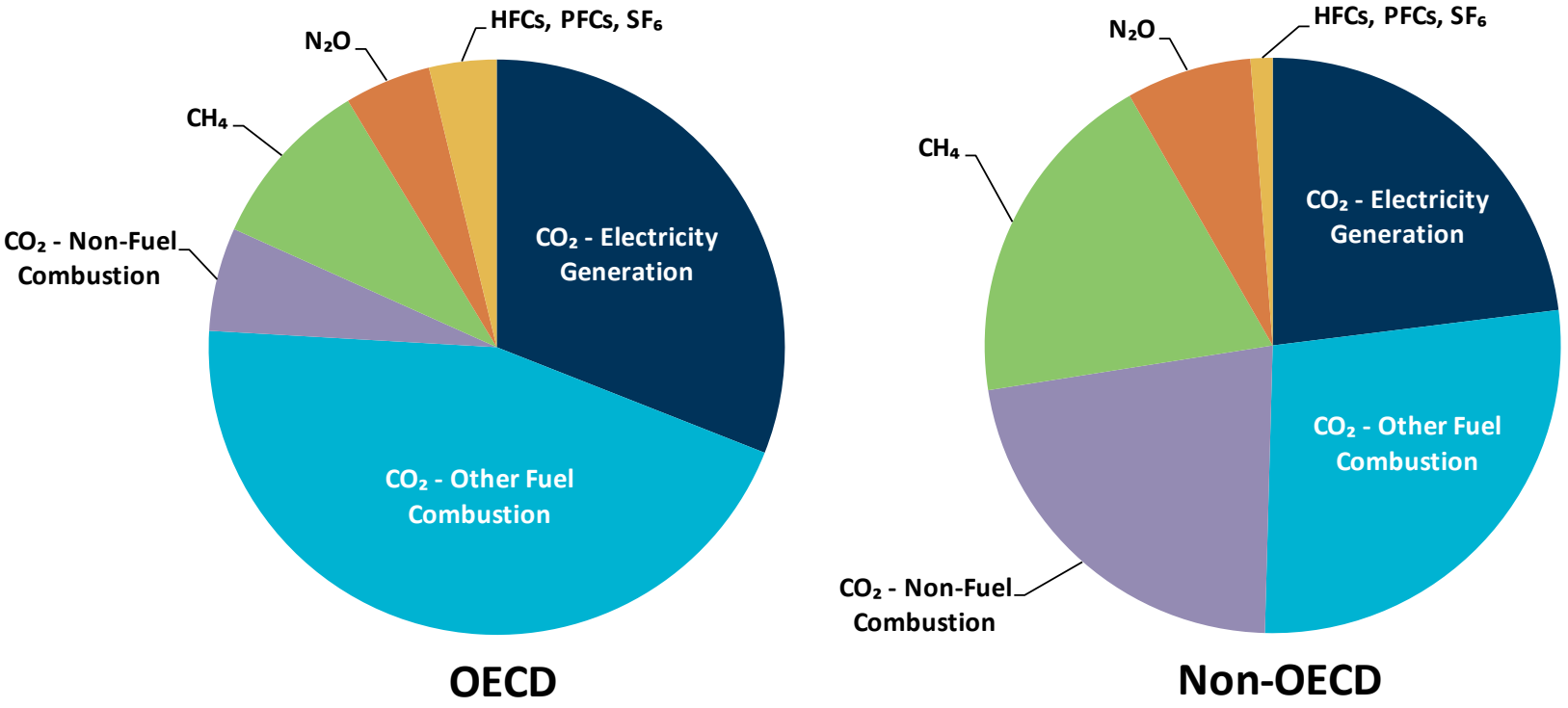


Source: IEA Energy Efficiency Market Report, 2014.

*IEA-11: Australia, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, United States

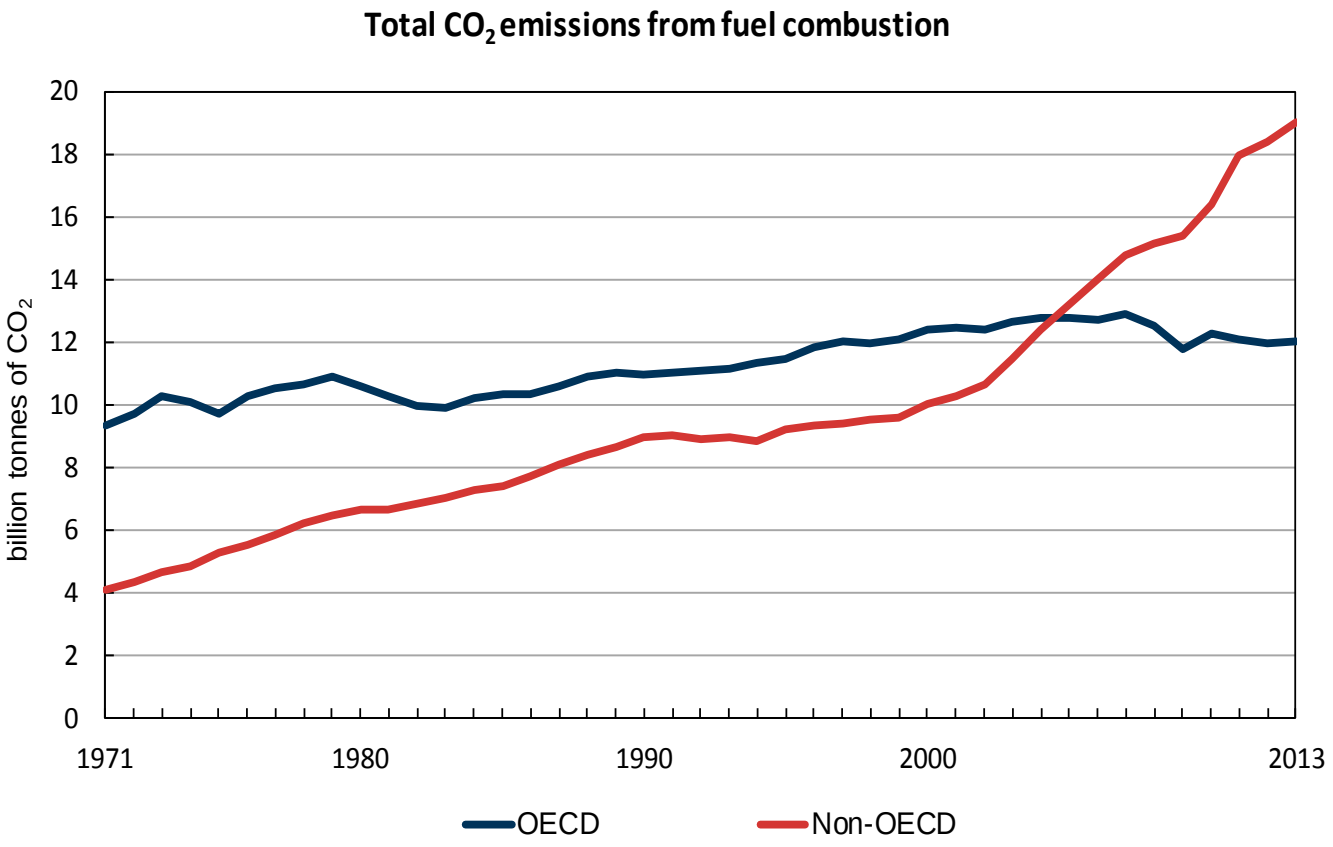
Energy is at the core of climate change

GHG emissions by source



Source: Data for 2010. IEA estimates for CO_2 emissions from fuel combustion data, EDGAR 4.3/4.2 FT2010 for all other sources.

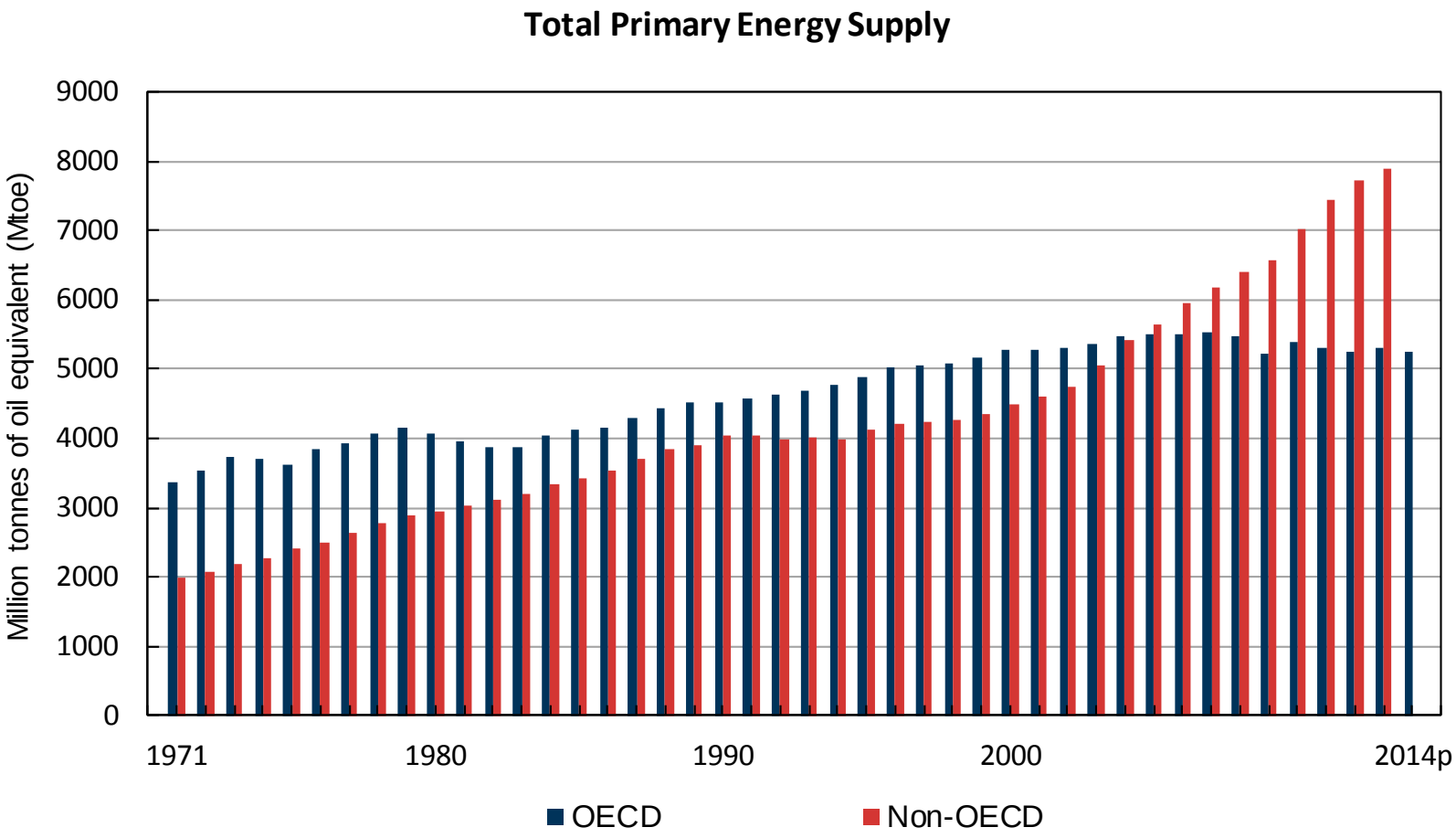
Global CO_2 emissions



Source: IEA CO_2 Emissions from Fuel Combustion, OECD/IEA, Paris, 2015.

Energy data: essential to understand climate change and to meet the challenge it creates

Emissions driven by energy use

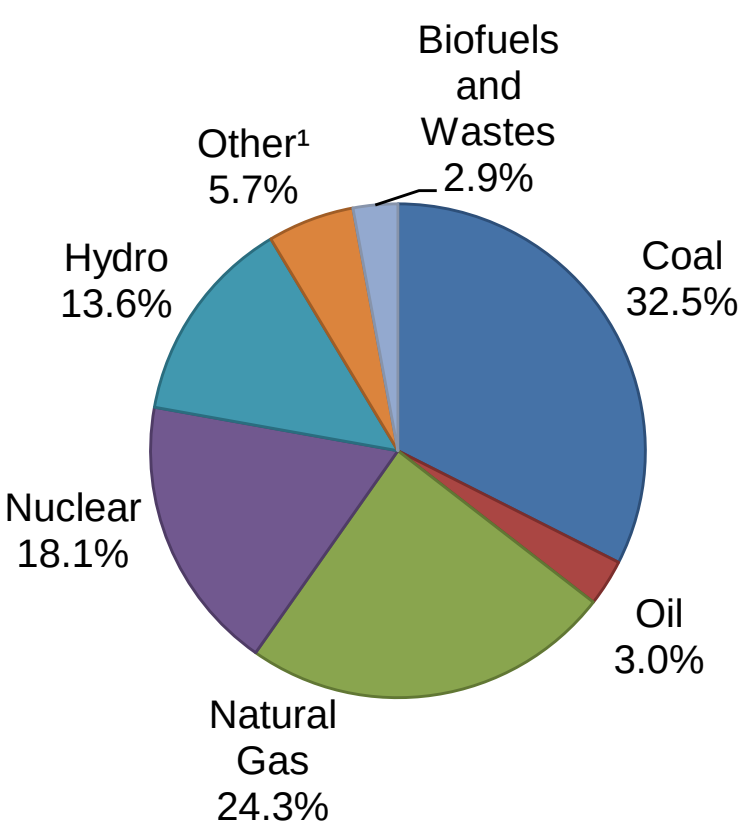


Source: IEA World Energy Balances, OECD/IEA, Paris, 2015.

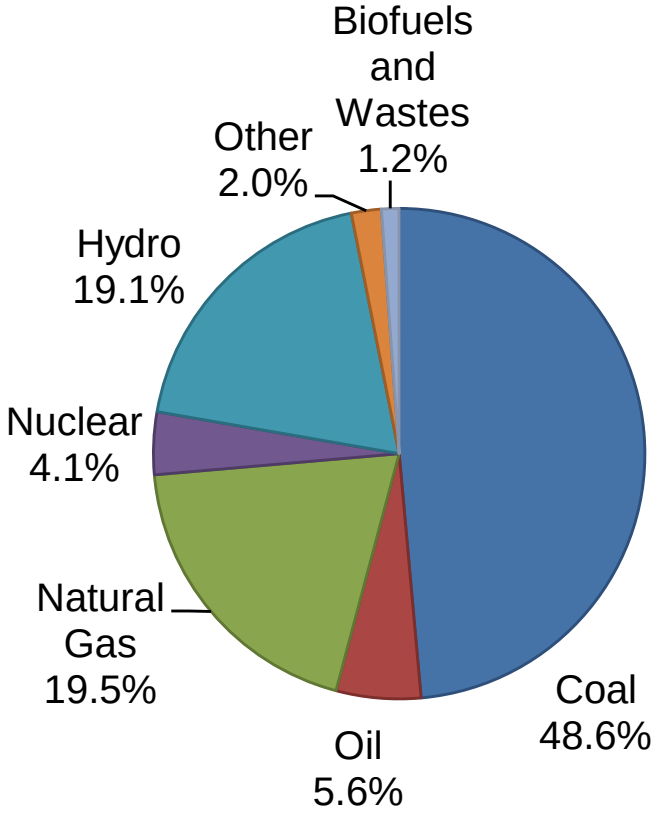
The importance of electricity generation

Electricity production by fuel (2013)

OECD



Non - OECD



Source: IEA World Energy Balances, OECD/IEA, Paris, 2015.

1. Other includes geothermal, tide, wave, ocean, chemical heat and other non-specified (*e.g.* fuel cells) sources of electricity production.

ISSUES WITH ENERGY STATISTICS

Problems encountered in energy statistics

- 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
- Resources do not follow work load:
  Statistics still have a low profile, budget cuts
- Fast turnover in staff: lack of experience, continuity

How the IEA helps

Technical Assistance:

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

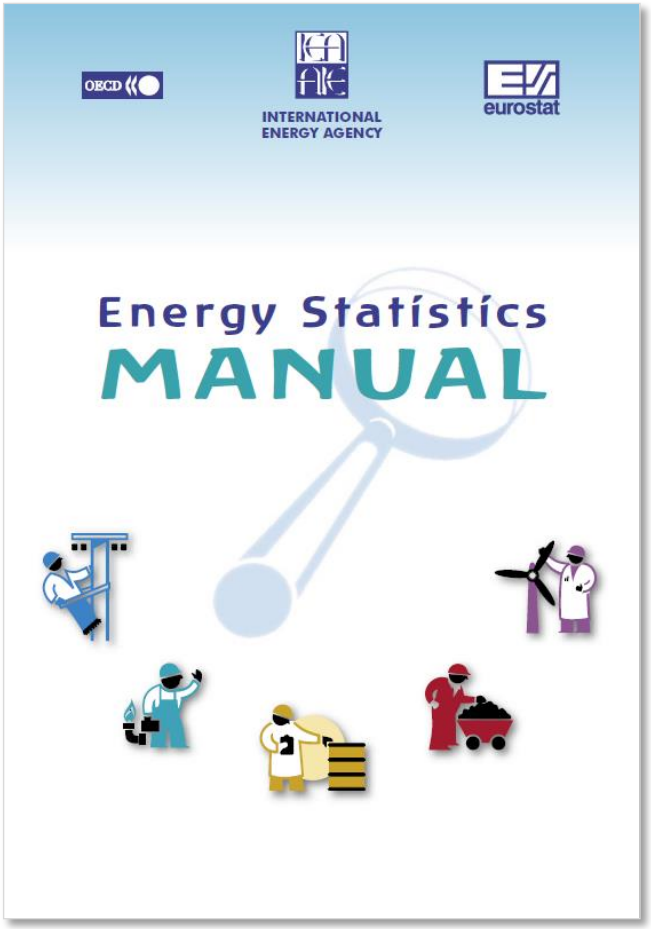
Training and capacity building:

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

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*

The Manual is now available in 10 languages and widely used all around the world



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.

of the processes and activities mentioned within the questionnaire.

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

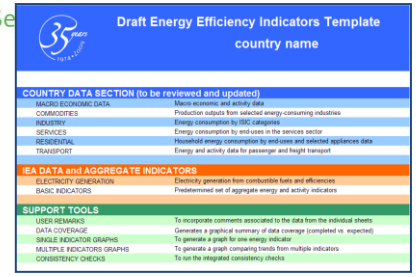
Specific information related to the joint questionnaire

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.

below).

A whole range of petroleum products are derived from crude oil, varying from light products such as LPG and motor gasoline to heavier ones such as fuel oil.

Energy Use/Efficiency

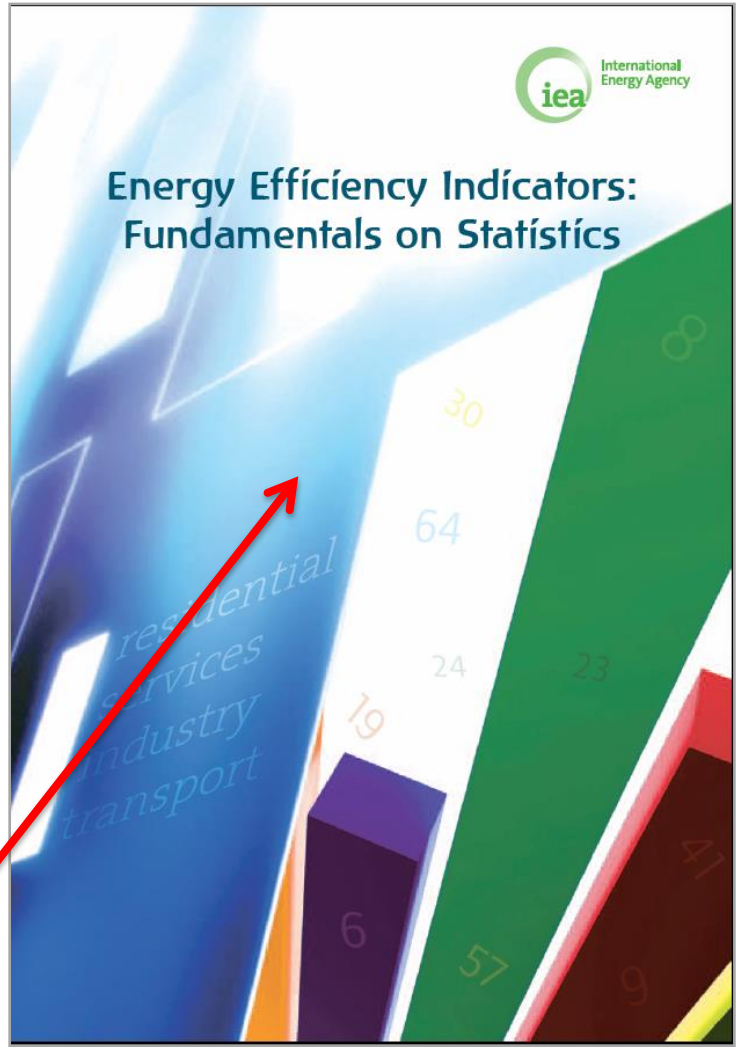

Draft Energy Efficiency Indicators Template
country name

COUNTRY DATA SECTION (to be reviewed and updated)	
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
IEA DATA and AGGREGATE INDICATORS	
ELECTRICITY GENERATION	Electricity generation from combustible fuels and efficiencies
BASIC INDICATORS	Predetermined set of aggregate energy and activity indicators
SUPPORT TOOLS	
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

Table of contents

Introduction - Why a manual?
What are energy efficiency indicators?
How to collect the date 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

Annexes



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

The Annex: An essential part of the Manua

Background		
Country	Austria	R/Su/01
Organisation	Statistics Austria	
Name of the survey	Household energy consumption survey	
Survey purpose	• To determine total household energy consumption • To determine household appliances energy consumption • To collect household energy expenditure • To collect dwelling physical characteristics • To collect household occupant characteristics	

Data collection			
Sample design	Stratified random sampling approach		
Sample sources	List of addresses, list of telephone numbers, labour force survey.		
Collection methods	• Computer assisted personal interview (CAPI) • Computer assisted telephone interview (CATI)		
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	• Inconsistent responses • Response quality
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

160 practices covering surveys, modelling, metering and administrative sources

Identification number:
R: Residential
Su: Survey

Background

Survey:
Sample,
Frequency,
Data

Comments:
Challenges
Key learnings
Documents
Links (e.version)

Questions