The Role and Importance of Energy Statistics

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International Energy Agency

www.iea.org
Overview

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

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
New Structure of the IEA

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
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.

This map is without prejudice to the status of sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.
Attached is the annual questionnaire for coal which provides for the submission of 1997 data and a revision of 1996 data where applicable. Administrations are requested to complete the questionnaire at the latest 30 October 1998. However, if data are available earlier, please do not hesitate to send your questionnaire to the Head of Division, Energy Statistics, Combined Energy Staff, who will forward the data to the United Nations Economic Commission for Europe (Geneva). In addition, Member states of the European Union are requested to transmit the completed questionnaire to Eurostat, Head of Unit, Energy Statistics, Batiment Jean Monnet, Plateau du Kirchberg, L-2920, Luxembourg.
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 recognize 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
  Energy access
  Renewables
  Prices
  Monitoring

Energy efficiency/use

Production
  Off grid generation

RD&D

Investment

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 Protocol (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

1. Understand situation and desired outcomes
   - 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

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

3. Prepare for delivery
   - 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

4. Operate, evaluate & adapt
   - Monitoring performance indicators and expected benefits
   - Evaluation and reporting, eg GHGs

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- Are you sure there is a gap?
- What policy or evidence is already out there & what are others doing in UK/abroad?
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Energy statistics is at the core of the IEA

- 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
IEA statistics feed all IEA studies and analyses

ENERGY MARKETS AND SECURITY

SUSTAINABLE ENERGY POLICY & TECHNOLOGY

Energy Statistics

GLOBAL ENERGY POLICY

GLOBAL ENERGY ECONOMICS

Training
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

<table>
<thead>
<tr>
<th>Country</th>
<th>TPES (Mtoe)</th>
<th>Share in world TPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>People’s Rep. of China</td>
<td>3 022</td>
<td>22%</td>
</tr>
<tr>
<td>United States</td>
<td>2 188</td>
<td>16%</td>
</tr>
<tr>
<td>India</td>
<td>775</td>
<td>6%</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>731</td>
<td>6%</td>
</tr>
<tr>
<td>Japan</td>
<td>455</td>
<td>3%</td>
</tr>
<tr>
<td>Germany</td>
<td>318</td>
<td>2%</td>
</tr>
<tr>
<td>Brazil</td>
<td>294</td>
<td>2%</td>
</tr>
<tr>
<td>Korea</td>
<td>264</td>
<td>2%</td>
</tr>
<tr>
<td>France</td>
<td>253</td>
<td>2%</td>
</tr>
<tr>
<td>Canada</td>
<td>253</td>
<td>2%</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>5 002</td>
<td>37%</td>
</tr>
<tr>
<td>World</td>
<td>13 555</td>
<td>100%</td>
</tr>
</tbody>
</table>

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Oil consumption

World Oil Demand

- Non-OECD
- OECD Total

26% in 1973
51% in 2013
World electricity production by source (1971-2013)

Electricity consumption

Total final consumption of electricity

TWh


OECD Non-OECD World
Investing in clean energy research is key to new challenges

IEA Total Public Energy RD&D Budget

Billion USD (2014 prices and PPP)

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’

TFC and savings within IEA countries (IEA-11*) from EE investments since 1973

Hypothetical energy use had there been no energy efficiency improvements


*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 CO₂ emissions from fuel combustion data, EDGAR 4.3/4.2 FT2010 for all other sources.
Global CO₂ emissions

Energy data: essential to understand climate change and to meet the challenge it creates
Emissions driven by energy use

Total Primary Energy Supply

The importance of electricity generation

Electricity production by fuel (2013)

**OECD**
- **Coal**: 32.5%
- **Natural Gas**: 24.3%
- **Nuclear**: 18.1%
- **Hydro**: 13.6%
- **Other¹**: 5.7%
- **Biofuels and Wastes**: 2.9%

**Non-OECD**
- **Coal**: 48.6%
- **Natural Gas**: 19.5%
- **Hydro**: 19.1%
- **Nuclear**: 4.1%
- **Other**: 2.0%
- **Biofuels and Wastes**: 1.2%
- **Oil**: 5.6%


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

Continuous data quality improvement

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.

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.

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

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?
### Identification number:
R: Residential
Su: Survey

### Background

#### Survey:
Sample, Frequency, Data

#### Data collection

<table>
<thead>
<tr>
<th>Country</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>Statistics Austria</td>
</tr>
<tr>
<td>Name of the survey</td>
<td>Household energy consumption survey</td>
</tr>
<tr>
<td>Survey purpose</td>
<td>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</td>
</tr>
</tbody>
</table>

#### 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

#### Frequency
- Every two years
- Last time surveyed: 2010

#### Time to complete survey
- 10 minutes

#### 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
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 possibility 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.

#### Key best practice

#### Other documentation
Available: Surveying Methodology and Questionnaire

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

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