UNITED NATIONS STATISTICS DIVISION

Energy Statistics *Newsletter*

What's inside

2018 ENERGY STATISTICS POCKETBOOK

The 2018 Energy Statistics Pocketbook is now available online at the UNSD website. To access the online publications, please visit: *http://unstats.un.org/unsd/energy/*.

This publication is the first in a series of pocketbook compilations on energy statistics designed to highlight the availability of data on various aspects of energy production, transformation and use and its linkages to other key statistics.

The data are available in the 2015 editions of the Energy Statistics Yearbook, the Energy Balances and the Electricity Profiles, three annual UNSD publications that present energy data in basic indicator formats, as well as formats that show the overall picture of production, trade, transformation and consumption of energy products in more than 200 countries and territories.

The Energy Statistics Pocketbook aims at providing additional information by highlighting key indicators and using different visualizations to show developments, dependencies and distributions in a way that standard data tables cannot convey.

The first five chapters: Total energy supply (TES), Total energy production, Electricity, Refinery output, Total final consumption (TFC), present global data with a breakdown by world regions or type of fuels.

Energy transformation is covered in two chapters: Electricity (including highlights of global electricity capacity) and Refinery output.

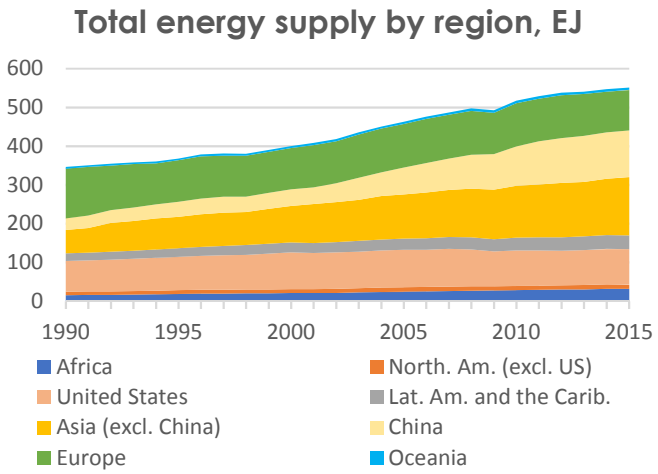
The world energy balance chapter presents a short format of energy balance for the world while the energy indicators chapter contains several indicators based on TES, TFC, energy production, population and GDP.

Selected highlights

Primary energy supply

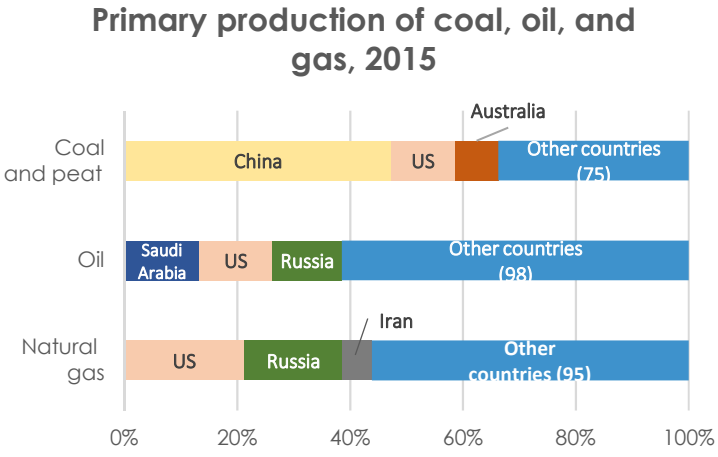
Global total energy supply[1] (TES) increased by 60% in 2015 compared to 1990, exceeding 550 EJ. This growth was driven by Asia, where Chinese total energy supply increased by almost 4 times during this period, accounting for 22% of global TES in 2015.

The European share of global TES fell from 37% in 1990 to 19% in 2015. A similar trend was observed in the United States, whose share of TES dropped by 7 percentage points since 1990 to reach 16% in 2015.



Primary energy production

Global primary energy production was 572 EJ in 2015, showing a 60% increase compared to 1990. Coal, oil and natural gas represented more than 82% of total primary energy production, and oil continued to be the largest type of fuel in the production mix, accounting for 32% of the total.



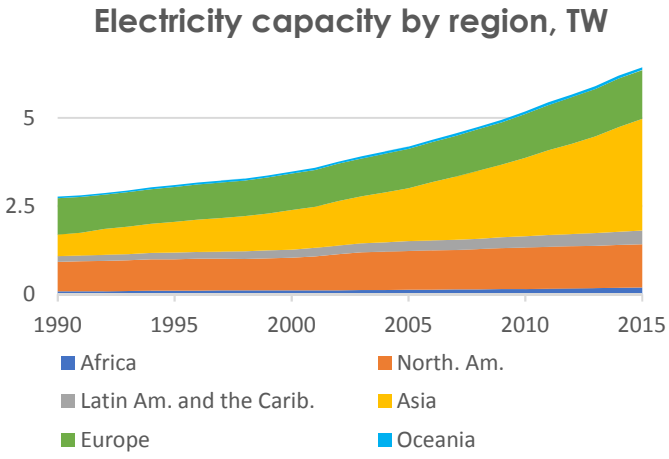
A significant share of 2015 primary energy production occurred in a handful of countries:

- China and the United States produced more than half of all primary coal (59%);
- The six biggest producers of oil (Saudi Arabia, United States, Russian Federation, Canada, China and UAE) produced more than half of all primary oil (53%);
- Five natural gas producers (United States, Russian Federation, Iran, Qatar and Canada) produced more than half of all natural gas (53%).

Electricity generation and capacity

Global electricity generation more than doubled from 1990 to 2015, reaching above 24,300 TWh in 2015. The biggest absolute growth from 1990 to 2015 was observed for electricity generated from coal (around 5,200 TWh or +115%) and natural gas (around 3,100 TWh or +167%) while the fastest growth was visible for electricity generated from solar, wind and other sources[2] (+2,712% or 1,136 TWh).

Global electricity capacity increased from 2,763 GW in 1990 to 6,435 GW in 2015. The biggest absolute growth was observed in Asia where electricity capacity increased more than five times during the period, reaching almost 50% of world electricity capacity in 2015 (or 3,170 GW).



While almost 80% of electricity in 2015 was generated from thermal (68% or 16,595 TWh) and nuclear sources (10.6% or 2,570 TWh), renewable electricity accounted for over 50% of global power capacity additions over the past five years (or 646 GW), reaching 1,972 GW in 2015 (30.6% of total electricity capacity).

[1] Here international aviation and international marine bunkers are excluded from global total energy supply.

[2] "Solar, wind and other sources" refers to Solar, Wind, Geothermal, Chemical heat, Tide, wave and marine and other non-specified sources

SERIES: EXAMPLES FROM THE ENERGY STATISTICS COMPILERS MANUAL

DATA SOURCES AND DATA COLLECTION

Introduction

There are few typical data collection methods used for energy statistics. The choice of the specific data collection method to use depends on a number of factors including - but not limited to - data availability, human and financial resources. The clear identification of what needs to be collected and what needs to be disseminated, and the review of the necessary methodological concepts (together with the consistency with international and national standards) are important elements that lead to the choice of the data collection methods and instruments that best fit the purpose.

The actual choice of the data collection method is specific to the national situation. A review of the data already available in the country (whether or not in the same institution or in other institutions in the country) is often a first step. If data are already available and can be used for energy statistics, there is little justification to embark on a new data collection. It is important however to have information on how the data are collected (e.g. administrative data or existing statistical surveys) as it affects the fit to use for statistical purposes.

Classical examples include the use of administrative data from public or private registers or data collected through an existing survey designed for different purposes. A typical example of the latter are data on diesel consumption for agricultural purposes that are collected through an existing agricultural statistics survey. If this is the case, these data should be used in any way for several reasons such as resource saving or reduction of response burden.

If no data are available in the country from other sources and a new data collection method has to be put in place (whether adding questions to an existing survey or designing a new survey), additional work needs to be carried out to identify the respondents and the needed human and financial resources.

Data sources and data collection

We can distinguish four types of data sources and data collection methods: administrative data, statistical surveys, modelling and in-situ measurements.

Administrative data refer to the set of data derived from an administrative source, that is by an "organisational unit responsible for implementing an administrative regulation (or group of regulations), for which the corresponding register of units and the transactions are viewed as a source of statistical data".[3]

Statistical surveys refer to both sample surveys and censuses. They refer to an investigation about the characteristics of a given population by means of collecting data from a sample of that population (sample survey) or from the whole population (census) and estimating their characteristics through the systematic use of statistical methodology. It should be noted that the census refers to a complete enumeration of the units in the population, which is usually expensive; however, in energy statistics it is often a feasible option in the cases where the number of units in the population is low. This can be the case when looking at the refineries in countries where there are only a few and it may be more accurate to collect the data from all of them rather than from a sample.

Modelling here refers to the estimation of a variable/data item which cannot be measured directly, but is estimated based on measurable and observable data. A typical example is the estimation of the production of electricity through non-metered solar photovoltaic panels. Often this quantity is estimated based on the number of solar photovoltaic panels in use and average weather conditions.

In-situ measurement refers to techniques to collect detailed consumption data based on a measuring device which for example can be installed at the point of final consumption.

Each of these data sources has some advantages and disadvantages. Ideally the objective is to collect data by the most efficient means possible. Therefore, if data are already available from an administrative source, or an existing survey (and they can be used for your purposes), then there would be no apparent need to embark on a new data collection process. If no such information of suitable quality is available then adding questions to existing surveys or a new survey could be considered. Often production of energy is a licensed activity, so production data may be available within administrative systems, and existing trade

[3] OECD Glossary of Statistical Terms http://stats.oecd.org/glossary/

data collection may provide suitable information on energy imports and exports.

There is a clear trade-off between cost and quality; the larger the sample size, the more expensive, but the lower the standard error. Such decisions need to be based on the desired quality, though with reference to the available budget. If the population is fairly homogeneous then a smaller sample may suffice, whilst if heterogeneous then larger sample sizes will be required. In general, energy surveys are repeated so the sample sizes can be amended over time based on levels of variation among companies. In addition to the direct cost to the organization, the response burden of the survey on the businesses should also be considered. This burden should be measured and minimized.

The frequency of data collection also needs to be considered. For example, if the same statistic is being measured on a monthly and annual basis – a smaller sample to produce the monthly data may be considered with a larger sample at the year end. Also, it may be that only more restricted data, such as total usage of a fuel, is available on a monthly basis, while on an annual basis information may be sought by detailed industrial sectors.

For surveys on energy supply where in most cases the number of respondents is low and the competence of the respondents is high, censuses can be feasible solutions. In contrast, for final energy consumption, the population of (potential) respondents is huge and their knowledge on the topics mostly relatively low. Therefore, for consumption sample surveys conducted as interviews may be the preferable solution.

Table 1 below gives an overview of strengths and weaknesses of the discussed data sources.

It is often the case that different data sources are used to collect different types of data in energy statistics. Table 2 (next page) shows the typical data sources used in energy statistics for different groups of data items.

Table 1: Summary of advantages and disadvantages related to statistical techniques

	Advantages	Disadvantages
Statistical Surveys	• Comprehensive information on all fuels supplied and used • Good data quality • Can be used directly and as an input for model calculations • Good response rates when surveys are covered by legislation	• Resource intensive and expensive • Time consuming • High survey burden • If voluntary, response rates can be low • Data validation required • Reporting of non-metered fuels, often purchases not used
Administrative data	• Low survey burden • Greater number of records allows more detailed breakdowns • Avoids duplication by making use of existing data • No sample error	• Dependency on third parties • Definitions and information may not match statistical needs • Often requires substantial effort to set up and there may be legal barriers to use
Modelling	• Allows quantification of variables that cannot be directly measured or observed • Save resources (money and staff) • Low survey burden • Quick results • Can be used to adapt or improve survey results • Can be used to reduce survey frequency	• Worse data quality compared to surveys • No stand-alone methodology: cannot be calculated without input data • Quality of results depends on accuracy of input data and the design of the model
"In situ" measurements	• Detailed information on individual appliances, information on patterns of use of the equipment • High quality of the results • Input data for surveys and/or modelling	• Invasive for respondents: difficulties in finding respondents willing to participate • High burden in terms of time and human resources • Expensive, so often small samples, and less representative • Constraints in monitoring equipment: limitation in the number of metering devices and monitoring incidences

Table 2: Suitable instruments and respondents depending on identified information needs

Information areas	Data collection methods	Data sources	Potential data observed
Energy supply: Primary production of solid, liquid and gaseous energy products	administrative data	data owners	coal production
			crude oil production
	census/ sample survey	entities in the mining industry (coal, oil, gas)	natural gas production
		entities in the forestry, agriculture or other related industries	biofuel production
Energy supply: Primary electricity, primary heat	administrative data	data owners	electricity generation from hydro, wind, tide, etc.
			geothermal heat
	census/sample survey	entities in the energy industries[4]	heat from chemical processes
		other energy producers	
Energy supply: Solar electricity, solar heat and ambient heat	administrative data	data owners	solar heat production (metered)
			PV electricity generation (metered)
	census/sample survey	entities in the energy industries	electricity generated from solar heat (metered)
		other energy producers	
	modelling	traders, installers	sales of solar heat and PV panels, and heat pumps[5]
Imports/exports	customs data	customs/ministry of finance	imports by country of origin and exports by country of destination
	census/sample survey	main importers/exporters	
Energy stocks (levels and flows)	administrative data	data owners	stock levels and flows for coal, oil, natural gas
	census/sample survey	entities in the energy industries,	stock levels and flows for biofuels
		other stock keeping entities (mining and big industrial entities)	water content of storage hydro power plants
International Bunkers	census	traders	sales to nondomestic ocean carriers and airlines
		domestic ocean carriers and airlines	use of fuels for international shipping and aviation
Energy transformation and Secondary production (power-plants, CHP-plants, district heating plants, refineries…)[6]	administrative data	data owners	transformation input/losses transformation output
	census/sample survey	entities in the energy industries	
		other energy producers	
Energy industry own use	census/sample survey	entities in the energy industries	own use of energy products in energy industries
		other energy producers	
Final consumption	business data from energy industries	data owners, resellers/distributors	final energy consumption (incl. transport)
	sample surveys	consumers[7]	non energy consumption
Energy prices	census/sample survey	suppliers/traders or consumers	expenditures/costs/taxes
	modelling		

[4] See IRES table 5.1
[5] As input for modelling the respective production
[6] Full list see IRES section 5.64
[7] See IRES table 5.3

16TH REGIONAL JODI TRAINING WORKSHOP IN ODESA

The Training Week on Monthly Energy Data for Eastern Europe, Caucasus and Central Asian countries took place in Odesa, Ukraine, on 12 to 16 March 2018. The week was divided in two parts:

- The 16th Regional JODI Training Workshop, on 12-14 March, organised by the International Energy Forum (IEF) and the JODI Partners together with the IEA for EU4Energy programme. Aside from the event, a policy forum on sustainable transport was organised in the framework of the EU4Energy programme and the participants of the training were invited to join some of the sessions.
- The sessions on 14-16 March were focused on data for energy security and data dissemination and were led by International Energy Agency (IEA).

The Workshop gathered 50 participants, mainly from Eastern European, Central Asian and Caucasus countries, who are in charge of hydrocarbon data collection in national statistical offices, and ministry representatives in charge of energy. 10 countries were represented (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Tajikistan, Ukraine and Uzbekistan). The international organizations participating in the training were Eurostat, GECF, IEA, UNSD and the IEF. The Energy Community was present during the workshop as an observer.

The JODI Training Workshop covered the following topics:

- A briefing on the background, status and objectives of the JODI initiative;
- An overview of the JODI-Oil questionnaire and the data quality assessment methods;
- An overview of the JODI-Gas questionnaire and examples of gas data validation techniques;
- A session presenting an overview of refinery processes and highlighting the importance of monthly data for market analysis;
- Practical exercises for both JODI-Oil and JODI-Gas;
- A brainstorming session on how to improve monthly data quality and coverage at the national level;
- An overview of other global initiatives, including presentation of the International Recommendations for Energy Statistics (IRES) and the Energy Statistics Compilers Manual (ESCM);
- Activities in session during the Policy Forum on Sustainable Transport.

Mr. Ihor Verner, Chair of the State Statistics Service of the Ukraine (SSSU) opened the workshop by welcoming the participants and international organizations. He recalled that SSSU has a long tradition of collecting energy data and highlighted the importance of a unified approach and harmonized statistics in order to track progress in sustainable development.

The first day of the workshop was dedicated to the importance of oil data transparency. The sessions focused on the background of the initiative, presentation of the JODI Oil questionnaire, data assessment methods, an overview presentation on refinery processes and the importance of monthly data for market analysis. The first day finished with practical exercises on filling the JODI Oil questionnaire.

The second training day started with an overview of the JODI Gas questionnaire, the assessment of the gas data quality and practical exercises. The afternoon included a brainstorming session on how to improve data quality at the national level and a conversation on developments and improvements done by countries that had participated in previous regional trainings. It was followed by a presentation of other global working groups like the Intersecretariat Working Group on Energy Statistics (InterEnerStat) and the Oslo City Group, as well as an overview of the International Recommendations for Energy Statistics (IRES) and the Energy Statistics Compilers Manual (ESCM).

During the third day, JODI Training Workshop participants were invited to join morning sessions of the policy forum on sustainable transport as the JODI Workshop was held under the framework of a bigger event, where importance of detailed and accurate end-use and activity data was highlighted. This allowed the participants to conduct brainstorming on improving data coverage on a country level and expand their national network of contacts.

The last two days of the training were dedicated to monthly data for energy security, with focus on extended monthly oil and gas questionnaire, monthly electricity questionnaire, emergency data collection as well as very practical sessions on data dissemination.

Further details can be found at:
https://www.jodidata.org/capacity-building/training.aspx.

TRACKING SDG7 PROGRESS - UPDATE

Global SDG7 Conference

The Global SDG7 conference was held from 21 to 23 February 2018 in Bangkok, convened by the United Nations Department of Economic and Social Affairs (UN DESA) in cooperation with United Nations Economic and Social Commission for Asia and the Pacific and the Ministry of Energy Thailand. Representatives from ministries, senior UN officials, civil society organizations, private sector and other stakeholders from around the world came together to engage in a dialogue on an integrated and cross-cutting approach to achieve progress toward the SDGs.

The conference identified trends and challenges in achieving SDG7 on energy. The conference included one full day of side-events as well as Ministerial Plenaries and Leadership Dialogues to share experiences and best practices. The conference also marked the start of the call for multi-stakeholder partnerships and voluntary commitments that advance the implementation of SDG7 in the lead-up to the High-Level Political Forum 2018[8] (HLPF 2018).

To support the SDG7 review an Ad Hoc Technical Advisory Group on SDG7 (SDG7-TAG) was established. It is composed of representatives from governments, UN entities, international organizations and other stakeholders. The Technical Advisory Group has produced 27 Policy Briefs on SDG7 and its interlinkages with other development goals. The briefs will provide key technical input for the intergovernmental discussions leading up to the HLPF, including a final Summary for Policymakers. In addition to the policy briefs, the outcomes of the Global SDG7 Conference will also provide input into the HLPF in July 2018.

Launch of Policy Briefs on SDG7 on Energy and its Interlinkages with other SDGS

The Group of Friends of Sustainable Energy with UN DESA organized a launch of Policy Briefs on SDG7 on energy and its interlinkages with other SDGs on 18 April 2018 in New York.

During the technical part of the meeting the Custodian Agencies[9] presented the progress toward the global energy

[8] More details on HLPF 2018 are available here: https://sustainabledevelopment.un.org/hlpf

[9] Custodian Agencies for SDG7 are: The International Renewable Energy Agency, the International Energy Agency, the United

targets for 2030 set as a part of SDGs: universal energy access, universal clean fuels and technologies for cooking, higher share of renewables in the global energy mix and improvement of energy efficiency. Next, the members of the SDG7 Technical Advisory Group (SDG7-TAG) presented key policy messages based on the aforementioned set of 27 Policy Briefs on SDG7. It was followed by High-Level Briefings and Interactive Dialogues. The highlight of the high-level meeting was the ceremonial submission of the report "Accelerating SDG7 Achievement: Policy Briefs on SDG7 in support of the first SDG7 review at the UN High-Level Political Forum 2018" by the SDG7 Technical Advisory Group to UN DESA.

The report is available here:

https://sustainabledevelopment.un.org/content/documents/18041SDG7_Policy_Brief.pdf.

Regional Workshop on Energy and Environment Indicators for Latin America

The United Nations Statistics Division (UNSD), in cooperation with the Economic Commission for Latin America and the Caribbean (ECLAC), organized a regional Workshop on Energy and Environment Indicators within the framework of the Sustainable Development Goals (SDGs) and the Green Economy from 30 January to 01 February 2018 in Guatemala City, Guatemala. The workshop aimed to improve the region's national statistical systems' capacity for energy and environmental statistics, particularly for the compilation of SDG indicators and indicators for the Green Economy, following the standards set out in the International Recommendations for Energy Statistics (IRES) and the Framework for the Development of Environmental Statistics (FDES). The workshop reviewed existing practices in the countries and discussed the compilation of the most relevant indicators and the associated data collection.

This workshop followed up on progress made during the UN Development Account project "Supporting developing countries measure progress towards achieving a Green Economy" in the region from 2014 to 2016.

Further details can be found at:

https://unstats.un.org/unsd/energy/meetings/guatemala2018.htm.

Editorial Notes

The Energy Statistics Newsletter is prepared by Energy Statistics Section of the United Nations Statistics Division, Department of Economic and Social Affairs.

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Nations Statistics Division, the World Bank and the World Health Organization.