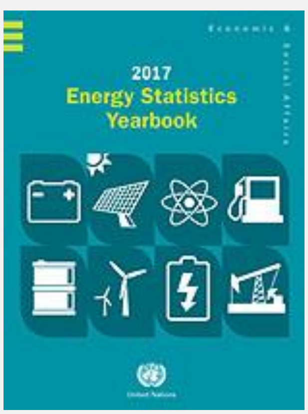
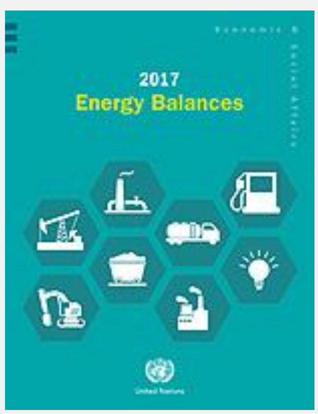
UNITED NATIONS STATISTICS DIVISION

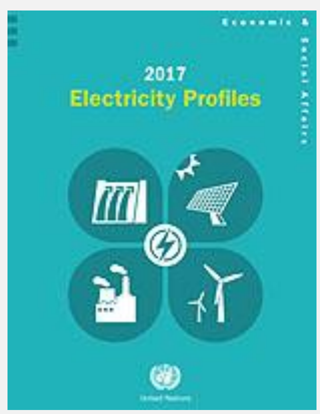
Energy Statistics *Newsletter*

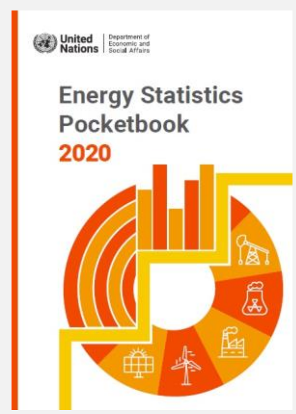
What's inside

ENERGY STATISTICS PUBLICATIONS – NEW EDITIONS







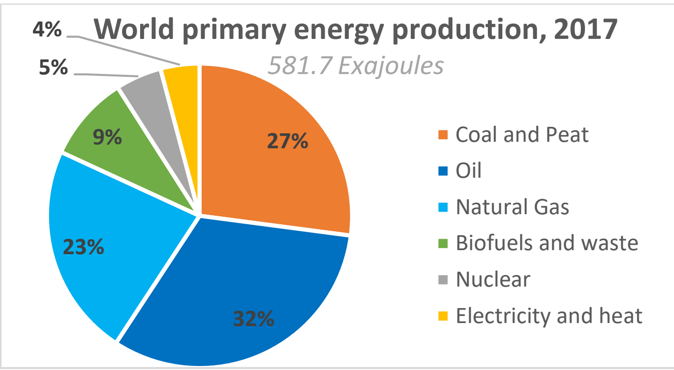


Complete energy datasets for 2017 are now available at the UNSD website (https://unstats.un.org/unsd/energystats/pubs/). The Energy Statistics Database (containing data from 1950 to 2017 and provisional 2018 data for selected countries) and printed copies of the 2017 Energy Statistics Yearbook, the 2017 Energy Balances, the 2017 Electricity Profiles and the 2020 Energy Statistics Pocketbook, can be ordered from the United Nations Publications website (https://shop.un.org).

Energy Statistics data for the period 1990 – 2018 are also available online free of charge at the UNdata portal (http://data.un.org/). Energy Balances for the period 1990 – 2017 are available via the UNSD Energy Balances Visualization Portal, allowing to view and download the balances matrices by country and year, as well as to picture Sankey diagrams and main energy trends (see: https://unstats.un.org/unsd/energystats/dataPortal/).

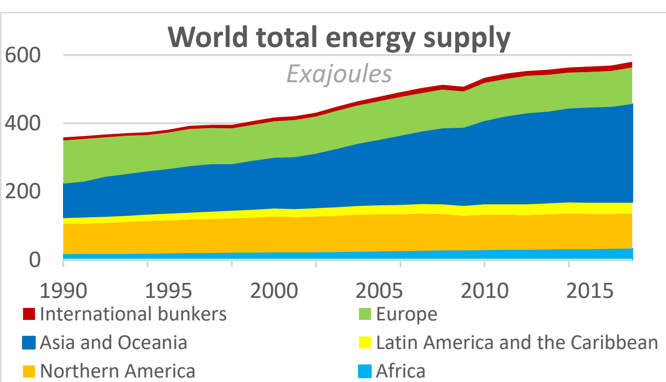
Selected highlights

World primary energy production was relatively stable at a level of 581.7 exajoules in 2017, showing a 2% increase compared to 2016. The most significant absolute increases were visible for natural gas (almost 5.2 EJ, or +4.1%) and for primary coal and peat (almost 4.3 EJ, or +2.8%). Oil continued dominating primary energy production mix in 2017, accounting for 32.2% of total, followed by coal (almost 27.1% of total energy) and natural gas (22.7% of total).



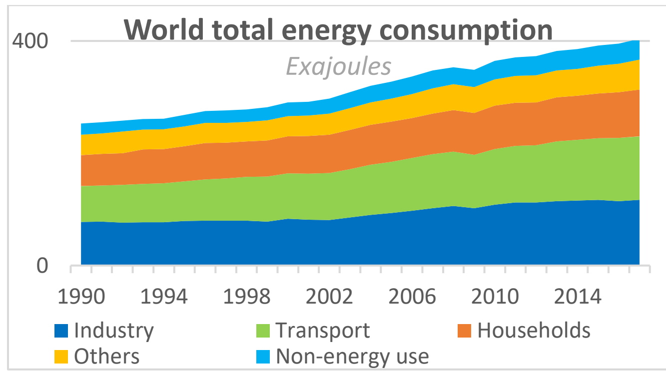
A significant share of 2017 primary energy production occurred in a handful of countries:

- China and the United States produced more than half of all primary coal (56.4%), with China alone producing 46.5% of the world coal;
- The United States topped the oil producers in 2017, rising from third in 2016. The three biggest producers of oil (United States, Russian Federation, Saudi Arabia), produced more than a third of all primary oil (37.9%) in 2017;
- Five natural gas producers (United States, Russian Federation, Iran, Canada and Qatar) produced more than half of all natural gas (53.9%).

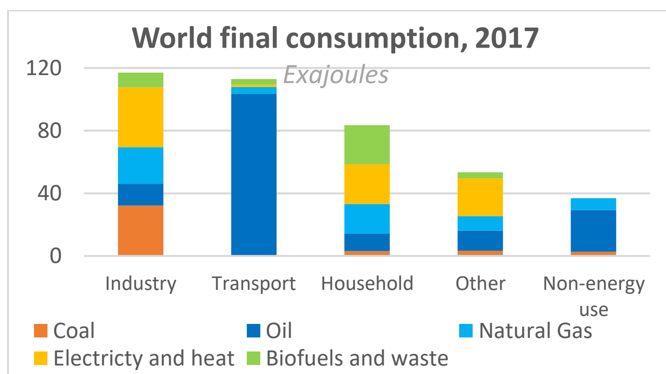


World total energy supply (TES) increased slightly in 2017, exceeding 580.2 exajoules[1] (+2.0% compared to 2016). This increase came mostly from the growth in Asia and Oceania (+2.6% compared to 2016), with Chinese supply growing 3.1% compared to the previous year. China, United States, India and Russian Federation combined made up for almost a half (48.5%) of world TES in 2017, with China alone accounting for 20.9% of world TES.

World final consumption[2] (FC) showed a 2.2% increase in 2017, reaching 403.8 exajoules. The industry sector remained the largest consuming sector in 2017 (accounting for 117 EJ, or almost 29% of world final consumption), followed closely by the transport sector (112.0 EJ or 28% of final consumption).



In 2017, almost 80% of coal (or 32.3 EJ) was consumed[3] by the industry, while 61.5%[4] of oil (103.5 EJ) was consumed for transportation and 15.9% of oil for non-energy use). Natural gas was used[5] mostly in industry (more than 36.9% of all consumed natural gas or 23.3 EJ) and households (almost 29.8% or 18.8 EJ). The largest share of electricity was consumed by industry (almost 42.5% of electricity FC or 32.5 EJ), followed by households (almost 27.2% or 20.8 EJ); other sectors accounted for more than 28.6% of electricity FC or 21.9 EJ.

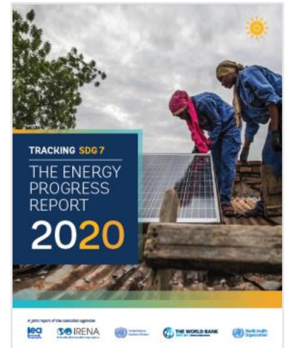


[1] Including the amounts used in international bunkers
[2] Final consumption refers to the last stage of energy flows, meaning that fuels used for electricity generation are not accounted here, but accounted indirectly as final electricity consumption.
[3] Ibid.
[4] Including the amounts used in international bunkers
[5] Ibid.

2020 TRACKING SDG7 REPORT

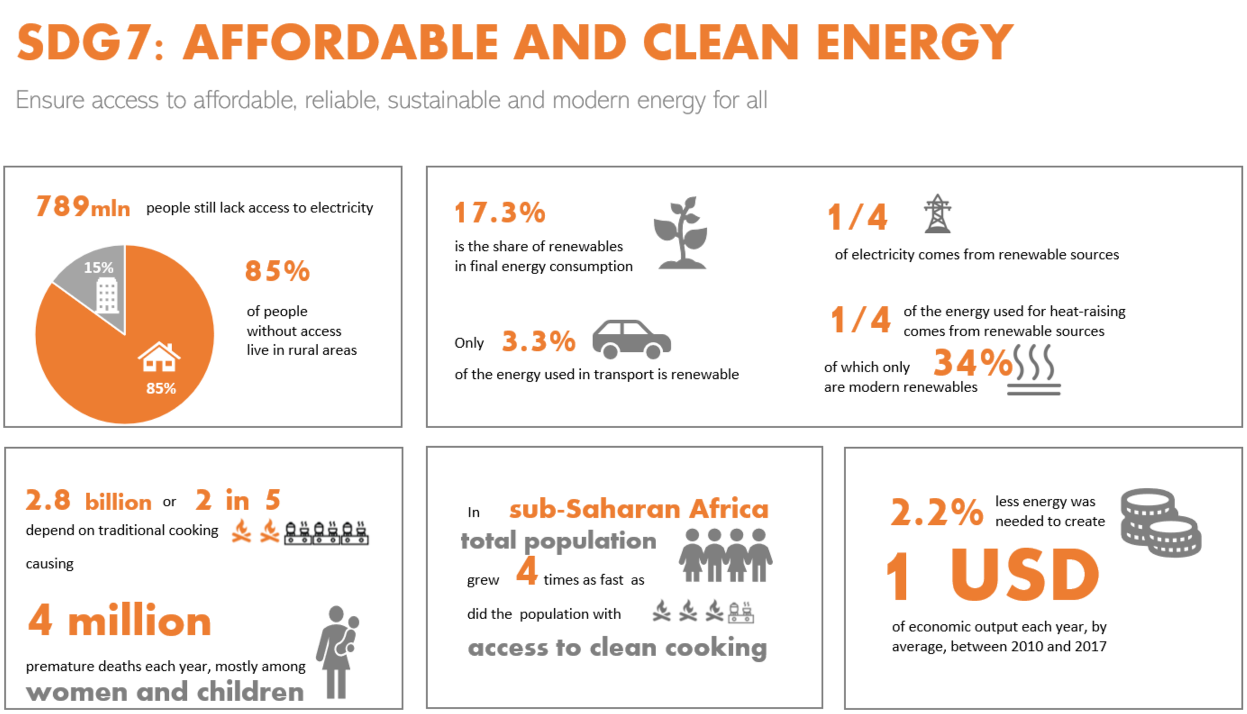
New 2020 Tracking SDG 7: The Energy Progress Report, was released on 28 May 2020. According to the report, significant progress has been made on various aspects of the United Nations Sustainable Development Goal (SDG) 7 in recent years, including a notable reduction in the number of people worldwide lacking access to electricity, increased deployments of renewable energy technology for electricity generation, improvements in energy efficiency and expanded access to clean cooking solutions. But despite these advances, global efforts remain insufficient to reach the key targets of SDG 7 by 2030:

- Since 2010, more than a billion people have gained access to electricity. As a result, 90% of the planet's population was connected in 2018. Yet 789 million people still live without electricity.
- Almost 3 billion people remained without access to clean cooking in 2018, mainly in Asia and Sub-Saharan Africa. Over the 2010 to 2018 period, progress has remained largely stagnant, with the rate of increase in access to clean cooking even decelerating since 2012, falling behind population growth in some countries.
- The share of renewables in the global energy mix reached 17.3 percent of final energy consumption in 2017, up from 17.2 percent in 2016 and 16.3 percent in 2010. Renewables consumption (+2.5 percent in 2017) is growing faster than global energy consumption (+1.8 percent in 2017), continuing a trend in evidence since 2011. Most of the growth in renewables has occurred in the electricity sector, thanks to the rapid expansion of wind and solar power that has been enabled by sustained policy support and falling costs. Meanwhile, the use of renewables in heating and transport is lagging.



- Global primary energy intensity - an important indicator of how heavily the world's economic activity uses energy - improved by 1.7 percent in 2017. That is better than the 1.3 percent average rate of progress between 1990 and 2010 but still well below the original target rate of 2.6 percent and a marked slowdown from the previous two years.

Visit SDG7 Tracking website to get the full report as well as view and download all underlying data: https://trackingsdg7.esmap.org.



District cooling energy in statistics[7]

Mr. Edito Barcelona and Ms. Elvira Gelindon,
Energy Statistics Training Office, Asia Pacific Energy Research Centre (APERC)

Cooling is of high importance in hot and humid countries. For example, in a country in Southeast Asia, air-conditioning is the largest end-use of electricity with almost 59% of total residential consumption distantly followed by refrigeration at 18%[i]. Lighting and other uses comprise less than a quarter of the total consumption. Traditionally, electrically powered air conditioners are used for cooling, and these usually require large volumes of electricity. This has significantly led to finding a solution for effective space cooling at a lesser cost; the district cooling.

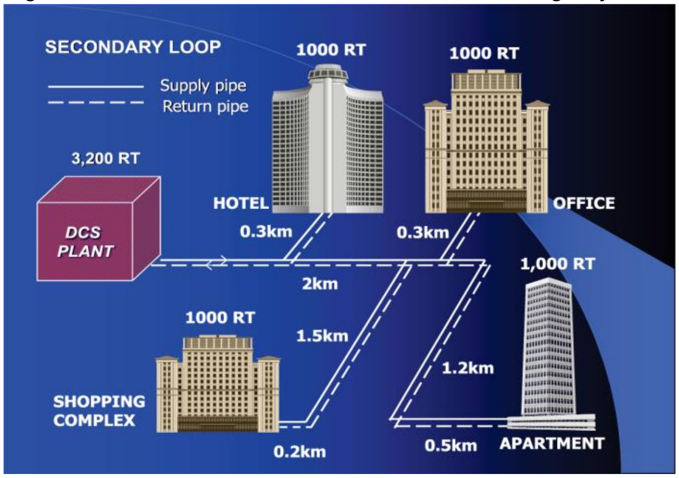
District cooling systems (DCS) are now increasingly significant worldwide to meet the growing demand for space cooling. While they are becoming popular the energy used for cooling water has not been clearly accounted for in energy statistics or energy balances.

But what do we know about district cooling?

District cooling is the supply of chilled water from a central chilled water production facility to customers through underground insulated pipelines, which is commonly built in the commercial and residential buildings. Chilled water is used for air-conditioning.

Tabreed, the national cooling company in the United Arab Emirates has a very clear definition and illustration of the district cooling as can be seen in Figure 1 below[ii].

Figure 1. Illustration of the district cooling system.



Source: Tabreed, 2017. http://www.kenwisesb.com/wp-content/uploads/2014/03/1.jpg

The concept of DCS is similar to that of heating—chilled water is distributed in much the same way as steam or hot water—but this time to satisfy cooling loads. A typical district cooling system has three main components: a cooling source and generating plant, a cooling distribution system, and an energy transfer station with heat exchangers.

Similarities with district heating

As mentioned earlier, the concept of district cooling system is similar to district heating system. A district heating system is an energy transformation process that produces heat, in the form of steam or hot water that is delivered to customers via insulated pipelines. The steam or hot water are then used to radiate heat in building spaces during winter season. Energy or fuels are needed to produce steam and/or hot water in boilers. These energy or fuels could be fossil fuels, electricity, renewable or non-renewable wastes and renewable energy.

Similarly, a district cooling system, also uses energy or fuels to produce chilled water in chillers. The chillers could be electric, or absorption chillers or a combination of both. For example, in a district cooling facility in Malaysia, natural gas is used in a turbine to generate electricity[iii]. The electricity generated is then used to chill water in an electric chiller. Meanwhile, the waste heat in electricity generation is used in absorption chillers to gasify the coolant that circulates to the chiller to produce chilled water. Chilled water goes to the storage tank and is delivered to multiple buildings connected through the insulated pipeline network.

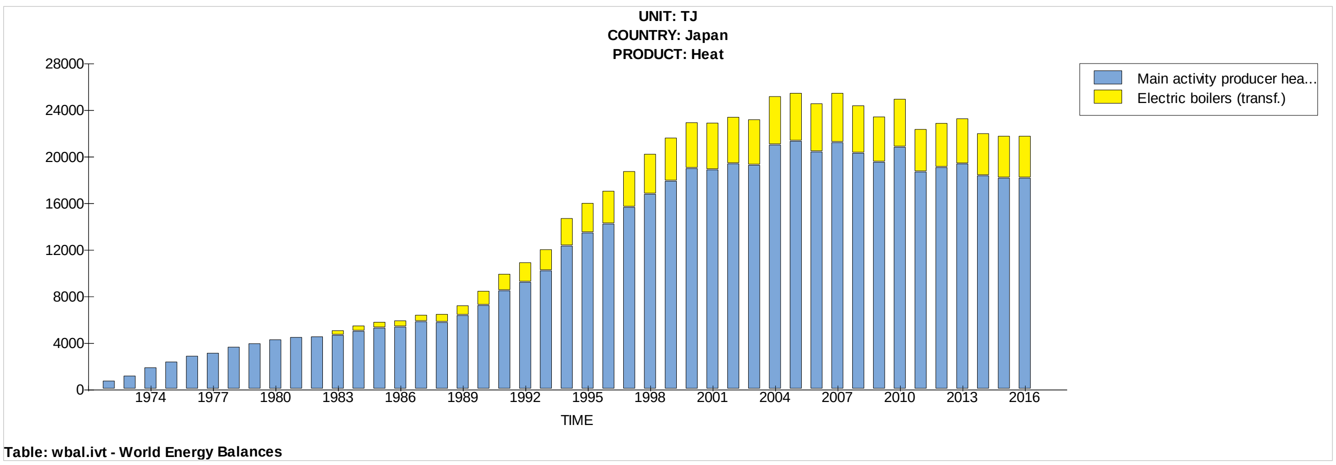
It clearly indicates that both district heating and district cooling need energy or fuels in producing steam, hot water and chilled water. The products are delivered via insulated pipelines. The energy or fuel inputs and the products are all measurable. The products delivered to customers are also measurable.

Heat in energy balances and energy statistics

[7] The views expressed in this article are not necessarily the views of the United Nations Statistics Division.

Currently, heat is already reported in the International Energy Agency (IEA) and Asia-Pacific Economic Cooperation (APEC [8]) energy statistics. Initially, the understanding is that this heat is for heating of building spaces during the winter season. Based on a study conducted by the Energy Statistics and Training Office (ESTO) of the Asia Pacific Energy Research Centre (APERC), cooling data in the form of chilled water is included in the heat data of Japan and might have also been included in heat data in China and Korea. Figure 2.1 shows the heat reported by Japan to IEA[iv] while Figure 2.2 shows the heat and cooling data obtained from the Japan Heat Supply Business Association (JHSBA)[v].

Figure 2.1.



Japan's heat data in IEA energy balances

Source: IEA, 2018.

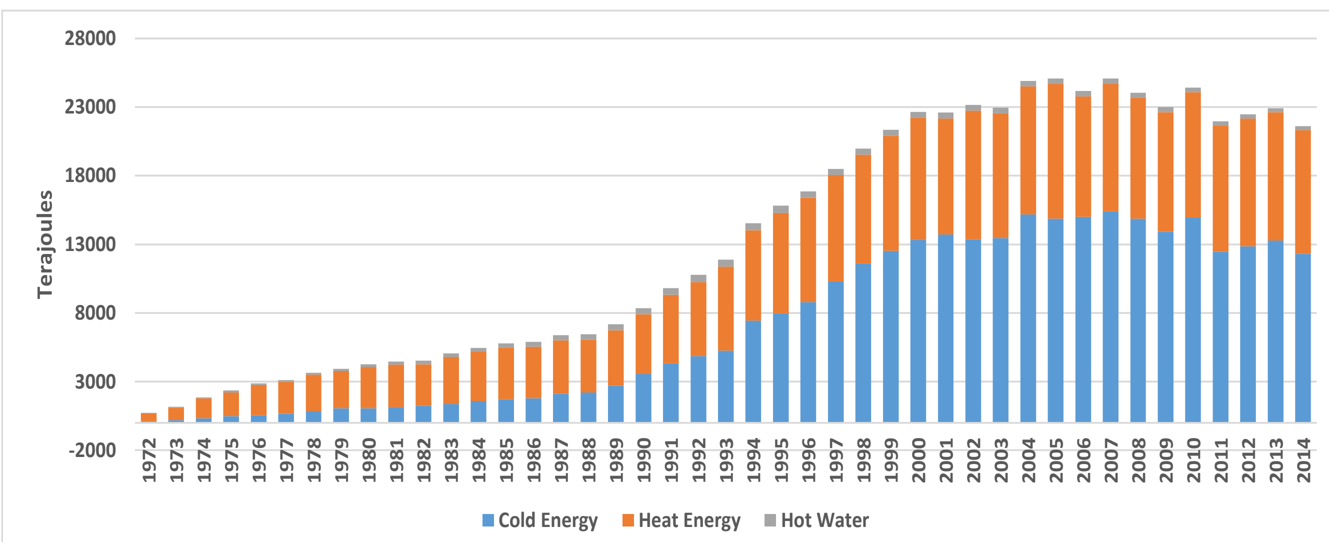


Figure 2.2. Output of Japan Heat Supply Business Association

Source: JHSBA, 2015.

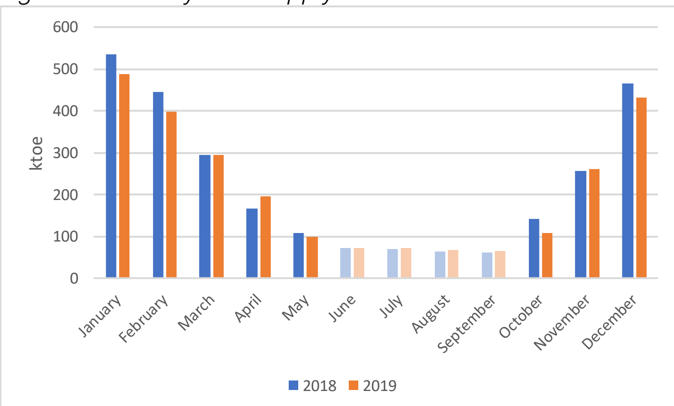
From the figures above, the heat reported to IEA is equal to the original data from the JHSBA. However, the original data from JHSBA shows the breakdown of heat and cold energy (chilled water), and more likely since "chilled water" has no place in the questionnaire submitted to IEA, the consumption reported was heat. In the later years, the chilled water supply is even larger than heat energy and hot water combined.

For China, the National Bureau of Statistics (NBS) mentioned that cooling is included in the heat reported in their energy balances but NBS does not have the capacity to share the source of the data.

[8] APEC is a dynamic region consisting of 21 diverse economies including Australia; Brunei Darussalam; Canada; Chile; China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; the Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States and Viet Nam.

As regards Korea, the Korea Institute of Energy Economics (KEEI) also indicated that cooling data is included in the heat reported to IEA. KEEI does not have the same detailed record as Japan and searching for publication where cooling data was separated was not successful. However, Figure 3 may indicate the cooling that is said to be reported as part of heat.

Figure 1. Monthly heat supply in Korea



Source: KEEI, 2020[vi].

Most probably, cooling data are those supply reported in the months of June, July, August and September, or during the period of summer, when there is demand for cooling.

District cooling in other countries

Search for district cooling data for the United States and Canada where there are existing district cooling systems were also carried out.

In the United States, although there are many well-known district cooling facilities, specific data for district cooling is not reported to EIA. EIA energy statistics only shows[vii] the number of buildings connected to district cooling facilities, the corresponding floor areas and the heat obtained by buildings connected to district cooling systems from district heating facilities.

In Canada, the survey on commercial and institutional energy use shows district heating and cooling supply data[viii]. However, the district cooling data, in particular, was not included in the IEA energy statistics and the energy statistics of Natural Resources Canada (NRCan).

Should district cooling be in energy statistics?

As mentioned above, cooling is a major end-use in hot and humid countries. District cooling is seen to be increasing in these countries to meet the demand for cooling, and hence significant amounts of energy will be used and likely displace electricity. For this reason alone, district cooling and its products should be properly accounted and represented in the energy balances and statistics.

As illustrated above, in principle the delivery of service in district cooling is similar to district heating. Heat production is part of the transformation process in the energy balance table; therefore, district cooling should also be treated the same way. The energy used in the production of chilled water, steam and hot water are measurable, the same way as the energy used in the production of heat. The outputs are also measurable namely, the amount of heat and the amount of "cooling" delivered to end-users. While heat is already an energy product, accordingly therefore, "cooling energy" in district cooling should also be considered an energy product.

To illustrate further, let's look at the building efficiencies that are measured by energy use intensity (EUI). If chilled water is not included in the calculation, energy consumption for cooling will be understated resulting in false EUI.

For example, consider two identical buildings in the same city, Bldg A and Bldg B. Bldg A is connected to a district cooling system (DCS) while Bldg B has its own chiller using electricity for air conditioning and all other factors considered similar. Theoretically, being similar, the two buildings should have equal energy consumption. However, Bldg B will consume more electricity because it takes a lot of energy to chill water. The total consumption of this building for cooling would be the sum of electricity for chilling water, pumping water to pipes and the fans that blows cold air to the building spaces. The water chiller consumes over 70% of the total electricity consumption in a chilled water-cooling system[ix]. On the other hand, Bldg A would not need to produce chilled water as it gets the commodity from the DCS. Only the electricity that is used in the pump and fans would be counted as energy consumption for cooling. This makes the electricity consumption of Bldg A lower by about 70%. It is therefore necessary to consider the chilled water that is delivered from the district cooling plant as cooling energy. Otherwise, the building that is connected to DCS would have false EUI.

Lastly, there is likely a huge potential for the use of free cooling[9] in the production of chilled water. Free cooling is already used in Canada's district cooling system, tapping the cold water from the great lakes[x]. Coastal cities all over the world may have similar potential. If "cooling energy" is considered as an energy product, the use of free cooling may be considered renewable energy. With the support

[9] The extraction of cold water directly from source or direct use of heat sinks from seawater or lake water without a chiller, usually at a temperature 4oC (39.2oF) or lower at a depth of 80 meters.

given by governments around the world to renewable energy development, the use of free cooling for district cooling will become more competitive. A large portion of non-renewable energy could be displaced by free cooling, consequently reducing greenhouse gas emissions.

With all the foregoing, considering "district cooling" as transformation process and "cooling energy" an energy product would add to the tremendous benefits that district cooling has including achieving energy efficiency and sustainability, and now in improving energy statistics

[i] BNERI (Brunei National Energy Research Institute). 2015. *Energy consumption survey for households 2015*. (unpublished).
[ii] National Central Cooling company PJSC (Tabreed). https://www.tabreed.ae/district-cooling/. Accessed: 24 October 2017
[iii] GDCP. (2016). *A Presentation on District Cooling in Putrajaya. Gas District Cooling (Putrajaya) SdnBhd*.
[iv] IEA (2018) *World Energy Balances*, www.iea.org/statistics, Paris.
[v] JHSBA (Japan Heat Supply Association). 2016. *Report of Japan Heat Supply Association*. Tokyo. (in Japanese)
[vi] KEEI (Korea Energy Economics Institute). 2020. *Monthly energy statistics February 2020*. Seoul.
[vii] EIA (Energy Information Administration). *2012 CBECS Survey Data*. https://www.eia.gov/consumption/commercial/data/2012/
[viii] CEEDC (Canadian Energy and Emissions Data Centre. 2019. *District Energy in Canada*.
[ix] Swidler M. 2011. *High performance chilled water systems.* https://www.slideshare.net/illinoisashrae/high-performancechilledwatersystems-ashraechicago?from_action=save.
[x] Kennedy, D. (2005). *Enwave's cooling system uses lake water to chill Toronto's core*. Cleantech Canada. Retrieved January 23, 2018, from https://www.canadianmanufacturing.com/technology/enwaves-cooling-system-uses-lake-water-to-chill-torontos-core-153572/

SERIES: EXAMPLES FROM THE ENERGY STATISTICS COMPILERS MANUAL

QUALITY ASSURANCE FRAMEWORKS

Data quality, quality assurance and quality assurance frameworks

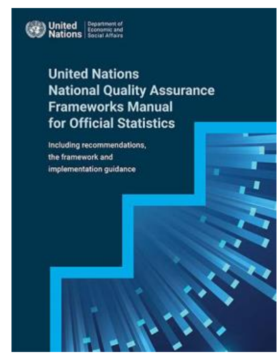
Data quality

While the word "quality" can have different meanings depending upon the context in which it is used, data quality is most commonly defined in terms of its "fitness for use", or how well the statistical outputs meet their users' needs. The definition is thus a relative one that allows for various perspectives on what constitutes quality depending upon the purposes for which the outputs are intended.

Quality assurance

Quality assurance comprises all planned and systematic activities that can be demonstrated to provide confidence that the products or services are adequate or fit for their intended uses by clients and stakeholders. It entails anticipating and avoiding problems, with the goal of preventing, reducing or limiting the occurrence of errors, in a survey for example. It is worth noting here that quality assessment is a part of quality assurance that focuses on assessing or determining the extent to which quality requirements have been fulfilled.

Activities or measures for ensuring that attention is paid to the quality of the data cover not only the final outputs, but also the organization producing the outputs, and the underlying processes that lead to the outputs. The outputs or products are typically described in terms of quality dimensions such as relevance, accuracy, reliability, timeliness, punctuality, coherence, comparability, accessibility and clarity. The organization or agency exhibits high quality when it maintains a professionally independent, impartial and objective institutional environment, a commitment to quality, the guarantee of confidentiality and transparency, and provides adequate resources for producing the outputs. For these processes the organization employs to be considered to be high quality, the use of sound statistical methodology and cost-effective procedures that minimize the reporting burden must be paramount.



Thus, quality is approached along three lines: statistical product (or output) quality; process quality; and the quality or characteristics of the environment in which the office/agency operates. As will be seen below, many of the quality frameworks are structured clearly along those three lines. The focus in this chapter will be on the discussion of assuring product (or output) quality.

Quality assurance frameworks

Systematic data quality management in a statistical office typically takes the form of a quality assurance framework. Examples include the generic National Quality Assurance

Framework (NQAF)[10] template developed by a UNSD Expert Group, the European Statistics Code of Practice, which are summarized below[11] in tables 1 and 2. Although these quality frameworks may differ slightly from each other, they share most of the same common aspects and provide comprehensive structures for taking stock of quality concerns, activities, requirements and initiatives and for fostering standardization and systematization of quality practices and measurement within statistical offices and across countries.[12]

Table 1: Template for a Generic National Quality Assurance Framework

Template for a Generic National Quality Assurance Framework (NQAF)

(Developed by the United Nations Expert Group on NQAF)

1. Quality context

- 1a. Circumstances and key issues driving the need for quality management
- 1b. Benefits and challenges
- 1c. Relationship to other statistical agency policies, strategies and frameworks and evolution over time

2. Quality concepts and frameworks

- 2a. Concepts and terminology
- 2b. Mapping to existing frameworks

3. Quality assurance guidelines

- **3a. Managing the statistical system**
  - [NQAF 1] Coordinating the national statistical system
  - [NQAF 2] Managing relationships with data users and data providers
  - [NQAF 3] Managing statistical standards
- **3b. Managing the institutional environment**
  - [NQAF 4] Assuring professional independence
  - [NQAF 5] Assuring impartiality and objectivity
  - [NQAF 6] Assuring transparency
  - [NQAF 7] Assuring statistical confidentiality and security
  - [NQAF 8] Assuring the quality commitment
  - [NQAF 9] Assuring adequacy of resources
- **3c. Managing statistical processes**
  - [NQAF 10] Assuring methodological soundness
  - [NQAF 11] Assuring cost-effectiveness
  - [NQAF 12] Assuring soundness of implementation
  - [NQAF 13] Managing the respondent burden
- **3d. Managing statistical outputs**
  - [NQAF14] Assuring relevance
  - [NQAF15] Assuring accuracy and reliability
  - [NQAF16] Assuring timeliness and punctuality
  - [NQAF17] Assuring accessibility and clarity
  - [NQAF18] Assuring coherence and comparability
  - [NQAF19] Managing metadata

4. Quality assessment and reporting

- 4a. Measuring product and process quality -- use of quality indicators, quality targets and process variables and descriptions
- 4b. Communicating about quality – quality reports
- 4c. Obtaining feedback from users
- 4d. Conducting assessments; labelling and certification
- 4e. Assuring continuous quality improvement

5. Quality and other management frameworks

- 5a. Performance management
- 5b. Resource management
- 5c. Ethical standards
- 5d. Continuous improvement
- 5e. Governance

The NQAF lines 1-19 in section 3 each have a set of indicators or "elements to be assured". See http://unstats.un.org/unsd/dnss/docs-nqaf/2012-13-NQAF-E.pdf and the NQAF Checklist.

[10] More information in the United Nations National Quality Assurance Frameworks Manual for Official Statistics available at https://unstats.un.org/unsd/methodology/dataquality/un-nqaf-manual/

[11] More examples, like the International Monetary Fund's (IMF) Data Quality Assessment Framework (DQAF), and Statistics Canada's quality assurance framework are available in ESCM.

[12] A mapping of each of the above-mentioned frameworks to the NQAF Template, as well as an extensive collection of other quality documentation, are available on UNSD's NQAF website at http://unstats.un.org/unsd/dnss/QualityNQAF/nqaf.aspx.

Table 2: European Statistics Code of Practice – 15 Principles

Institutional Environment: Institutional and organisational factors have a significant influence on the effectiveness and creditability of a statistical authority developing, producing and disseminating European Statistics. The relevant issues are professional independence, mandate for data collection, adequacy of resources, quality commitment, statistical confidentiality, impartiality and objectivity.

1. Professional Independence: Professional independence of statistical authorities from other policy, regulatory or administrative departments and bodies, as well as from private sector operators, ensures the credibility of European Statistics.
2. Mandate for Data Collection: Statistical authorities have a clear legal mandate to collect information for European statistical purposes. Administrations, enterprises and households, and the public at large may be compelled by law to allow access to or deliver data for European statistical purposes at the request of statistical authorities.
3. Adequacy of Resources: The resources available to statistical authorities are sufficient to meet European Statistics requirements.
4. Quality Commitment: Statistical authorities are committed to quality. They systematically and regularly identify strengths and weaknesses to continuously improve process and product quality.
5. Statistical Confidentiality: The privacy of data providers (households, enterprises, administrations and other respondents), the confidentiality of the information they provide and its use only for statistical purposes are absolutely guaranteed.
6. Impartiality and Objectivity: Statistical authorities develop, produce and disseminate European Statistics respecting scientific independence and in an objective, professional and transparent manner in which all users are treated equitably.

Statistical Processes: European and other international standards, guidelines and good practices are fully observed in the processes used by the statistical authorities to organise, collect, process and disseminate European Statistics. The credibility of the statistics is enhanced by a reputation for good management and efficiency. The relevant aspects are sound methodology, appropriate statistical procedures, non-excessive burden on respondents and cost effectiveness.

7. Sound Methodology: Sound methodology underpins quality statistics. This requires adequate tools, procedures and expertise.
8. Appropriate statistical procedures: Appropriate statistical procedures, implemented from data collection to data validation, underpin quality statistics.
9. Non-excessive burden on respondents: The reporting burden is proportionate to the needs of the users and is not excessive for respondents. The statistical authorities monitor the response burden and set targets for its reduction over time.
10. Cost effectiveness: Resources are used effectively.

Statistical Output: Available statistics meet users' needs. Statistics comply with the European quality standards and serve the needs of European institutions, governments, research institutions, business concerns and the public generally. The important issues concern the extent to which the statistics are relevant, accurate and reliable, timely, coherent, comparable across regions and countries, and readily accessible by users.

11. Relevance: European Statistics meet the needs of users.
12. Accuracy and Reliability: European Statistics accurately and reliably portray reality.
13. Timeliness and Punctuality: European Statistics are released in a timely and punctual manner.
14. Coherence and Comparability: European Statistics are consistent internally, over time and comparable between regions and countries; it is possible to combine and make joint use of related data from different sources.
15. Accessibility and Clarity: European Statistics are presented in a clear and understandable form, released in a suitable and convenient manner, available and accessible on an impartial basis with supporting metadata and guidance.

For each of the Code of Practice's 15 principles, there is a set of indicators of good practice.
See https://ec.europa.eu/eurostat/documents/3859598/5897077/KS-77-07-026-EN.PDF/55e59bd7-7e26-419d-8e0b-9d33e5c3066d?version=1.0 and http://ec.europa.eu/eurostat/documents/3859598/5923349/QAF_2012-EN.PDF/fcdf3c44-8ab8-41b8-9fd0-91bd1299e3ef?version=1.0.

In light of the benefits of having a quality assurance framework in place, in the International Recommendations for Energy Statistics (IRES) countries were encouraged to develop their own national quality assurance frameworks if they had not already done so. Countries were invited to review the frameworks mentioned above and to consider either adopting one directly or structuring a framework of their own against one or some of them in a way that would best fit their country's practices and circumstances. It was noted that the NQAF was one framework that had been based on and aligned with the other four.

Countries that intend to develop a quality assurance framework can find guidance on the content and structure for theirs from the example above and in the additional examples available in the Energy Statistics Compilers Manual (ESCM), chapter 7. The NQAF website http://unstats.un.org/unsd/dnss/QualityNQAF/nqaf_country _search.aspx can also be consulted for a more comprehensive listing of national and international quality references.

Dimensions of quality

It is widely recognized that the concept of quality in relation to statistical information is multidimensional or multifaceted; there is no one single measure of data quality and no longer is accuracy thought to be the one absolute measure or indicator of high-quality data. As mentioned above, data outputs are typically described in the various quality assurance frameworks in terms of several dimensions or components of quality. The dimensions are assessed, measured, reported on and monitored over time to provide an indication of output quality to both the data users and data producers.

The following dimensions of quality reflect a broad perspective and have been incorporated in most of the existing frameworks: relevance; accuracy; reliability; timeliness; punctuality; accessibility; clarity; coherence; and comparability. In the NQAF, they make up NQAF lines 14-19; all of them are grouped in a separate section on managing statistical outputs.

The dimensions of quality are overlapping and interrelated and, therefore, the adequate management of each of them is essential if the information produced is to be fit for use. They should be taken into account when describing, measuring and reporting the quality of statistics in general and energy statistics in particular.

(a) Relevance. The relevance of statistical information reflects the degree to which the information meets or satisfies the current and/or emerging needs of key users. Relevance therefore refers to whether the statistics that are needed are produced and whether those that are produced are in fact needed and shed light on the issues of most importance to users; to know this requires the identification of user groups and knowledge about their various data needs and expectations. Relevance also covers methodological soundness, particularly the extent to which the concepts, definitions and classifications correspond to those that users require. Relevance can be seen as having the following three components: completeness; user needs; and user satisfaction.

An energy statistics programme's challenge would be to weight and balance the conflicting needs of its current and potential users in order to produce energy statistics that satisfy the most important needs of the key users in terms of the data's content, coverage, timeliness, etc., within given resource constraints. To ensure or manage relevance, data compilers must be engaged with their users and data providers before and during the production process and after the outputs have been released. Some strategies for measuring the relevance of an energy programme's outputs include consulting directly with key users about their needs, priorities and views of any deficiencies in the programme, tracking requests from users and evaluating the ability of the programme to respond, and analyzing the results of user satisfaction surveys. Also, since needs evolve over time, ongoing statistical programmes should be regularly reviewed to ensure their continued relevance.

As discussed both in the balances chapters of ESCM and of IRES, one measure of relevance for energy statistics would be to determine whether sufficient data are collected to construct an energy balance with the most relevant product categories and transformation and consumption broken down sufficiently. The ability to construct a detailed energy balance complying with IRES principles should be considered automatically relevant for all countries.

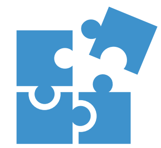
(b) Accuracy and reliability. The accuracy of statistical information reflects the degree to which the information correctly estimates or describes the phenomena it was designed to measure, i.e. the degree of closeness of estimates to true values. It has many facets and there is no single overall measure of accuracy. It is usually characterized in terms of the errors in statistical estimates and is traditionally decomposed into bias (systematic error) and variance (random error) components. In the case of energy estimates based on data from sample surveys, the accuracy can be measured using the following indicators: coverage rates, sampling errors, non-response errors, response errors, processing errors, and measurement and model assumption errors. Reliability is an aspect of accuracy and concerns whether the statistics consistently over time measure the reality that they are designed to represent. The regular monitoring of the nature and extent of revisions to energy statistics is considered a gauge of reliability.

As data on oil products are often collected on both a monthly and annual basis, each temporal data set can be used to assess the accuracy of the other. In addition, the size of the statistical difference can be somewhat considered an indicator of accuracy.

(c) Timeliness and punctuality. Timeliness of information refers to the length of time between the end of the reference period to which the information relates and its availability to users. Timeliness targets are derived from considerations of relevance, in particular the period for which the information remains useful for its main purposes. This varies with the rate of change of the phenomena being measured, with the frequency of measurement, and with the immediacy of user response to the latest data. Planned timeliness is a design decision, often based on a trade-off between accuracy and cost. Thus, improved timeliness is not an unconditional objective. However, timeliness is an important characteristic that should be monitored over time to provide a warning of deterioration especially as timeliness expectations of users are likely to heighten as they continue to experience faster and faster service delivery, thanks to the impact of technology. Punctuality refers to whether data are delivered on the dates promised, advertised or announced (for example, in an official release calendar).

Mechanisms for managing timeliness and punctuality include announcing release dates well in advance, implementing follow-up procedures with data providers if they haven't responded by the specified deadlines, releasing preliminary data followed by revised and/or final figures, making best use of modern technology and adhering to the pre-announced release schedules (and if necessary, informing users of any divergences from the advance release calendar and the reasons for the delays). Paying attention to timeliness and punctuality and announcing schedules and release dates in advance helps users plan, provides internal discipline and guarantees equal access to all by undermining any potential effort by interested parties to influence or delay any particular release for their own benefit.

(d) Coherence and comparability. The coherence of energy statistics reflects the degree to which the data are logically connected and mutually consistent, that is to say, the degree to which they can be successfully brought together with other statistical information within a broad analytic framework and over time. Comparability is a measurement of the impact of differences in applied statistical concepts, measurement tools and procedures, where statistics are compared between geographical areas or over time. The use of standard concepts, definitions, classifications and target populations promotes coherence and comparability, as does the use of a common methodology across surveys. The coherence and comparability concepts can be broken down into coherence within a dataset (internal coherence), coherence across datasets, and comparability over time and across countries.



Mechanisms for managing the coherence and comparability of energy statistics include adherence to the methodological basis of the recommendations presented in IRES when data items are compiled, and promotion of cooperation and the exchange of knowledge between individual statistical programmes. Automated processes and methods, such as coding tools, can be used to identify. The use of common concepts, definitions, classifications and methodology will result in coherence across datasets (e.g. between energy and other statistics such as economic and environmental), and comparability over time and across countries. Divergences from the recommendations and common concepts, definitions, classifications and methodology, as well as breaks in series resulting from changes in the concepts, definitions, etc. should be explained.

Care should be taken when combining energy statistics with national accounts data such as GDP, due to the notable difference of energy statistics being collected on the territory principle and national accounts being compiled on the residency principle. However, in practice this is not a huge difference and thus not a major worry for most countries.

(e) Accessibility and clarity. Accessibility of information refers to the ease with which users can learn of its existence, locate it and import it into their own working environment. It includes the suitability of the form or medium through which the information can be accessed and its cost. An advance release calendar or timetable to inform users in advance about when and where the data will be available and how to access them promotes accessibility and also enables equal access to information for all groups of users. A provision for allowing access to microdata for research purposes, in accordance with an established policy which ensures statistical confidentiality, also promotes accessibility.

Clarity refers to the extent to which easily comprehensible metadata are available, where the metadata are necessary to give a full understanding of the statistical data. It is sometimes referred to as “interpretability”. The clarity dimension is fulfilled by the existence of user support services and the provision of supplementary explanatory information and metadata, which are necessary for the proper understanding of the statistics and the appropriate uses to which they can be put. This information should normally cover the underlying concepts and definitions, origins of the data, the variables and classifications used, the methodology of data collection and processing, and indications of the quality of the statistical information. User feedback is the best way to assess the clarity of data from the user’s perspective, e.g. through questions regarding their understanding and interpretation in user satisfaction surveys.

Three obvious items of metadata promoting clarity for an energy balance would be a) the calorific values used to convert data from physical units, b) whether the balance was compiled using gross or net calorific values, and c) if the physical energy content method or partial substitution method was used.

The dimensions of quality described above are interconnected and as such are involved in a complex relationship. The accuracy-timeliness trade-off is probably the most frequently occurring and most important of the trade-offs. For example, striving for improvements in timeliness by reducing collection and processing time may reduce accuracy. A similar situation requiring consideration by energy statistics programmes, for example, would be the trade-off between aiming for the most accurate estimation of the total annual energy production or consumption by all potential producers and consumers, and providing this information in a timely manner when it is still of interest to users. IRES therefore recommends that if, while compiling a particular energy statistics dataset, countries are not in a position to meet the accuracy and timeliness requirements simultaneously, they produce provisional estimates, which would be available soon after the end of the reference period but would be based on less comprehensive data content. These estimates would be supplemented at a later date with information based on more comprehensive data. In such cases, the tracking of the size and direction of revisions can serve to assess the appropriateness of the chosen timeliness-accuracy trade-off. Additional trade-offs, such as those between relevance and comparability over time, may need to be dealt with when changes in classifications to improve relevance lead to reductions in comparability over time due to breaks in series.

The trade-offs described above relate to those between two dimensions of output quality. Other conflicting situations may emerge requiring difficult trade-offs, such as those between one of the dimensions and such quality considerations as the respondent burden, confidentiality, transparency, security or costs. For example, ensuring the efficiency or cost-effectiveness of the statistical programme may create challenges for ensuring relevance by limiting the flexibility of the programme to address important gaps and deficiencies. A careful examination of all relevant factors and priorities will be required to make the necessary decisions relating to these types of difficult trade-offs.

Monthly or quarterly oil and gas data, focusing on the principal components of supply and not attempting significant consumption or transformation breakdowns, can also be considered a practical application of the trade-off between timeliness and relevance, assuming that complete data are collected annually independently.

Measuring and reporting on the quality of statistical outputs

Quality measures and indicators

There are essentially two ways to measure quality - using quality measures and quality indicators. The quantitative and qualitative quality measures and indicators, developed around dimensions such as those described above, i.e. relevance, accuracy, reliability, timeliness, punctuality, accessibility, clarity, coherence and comparability, enable the data compilers to describe, measure, assess, monitor and report output quality to assist users in determining whether the outputs meet their needs and are fit for use or fit for the purposes for which they will be used. The measures and indicators can also be used by the data compilers to monitor data quality for the purpose of continuous improvement.

Quality measures are defined as those items that directly measure a particular aspect of quality. For example, the time lag from the reference date to the day of publication of particular energy statistics, measured in the number of days, weeks or months, is a direct quality measure of timeliness. In practice, many other quality measures can be difficult and costly to calculate. In these cases, quality indicators can be used to supplement or act as substitutes for the desired quality measures.

Quality indicators usually consist of information that is a by-product of the statistical process. They do not measure quality directly but can provide enough information to give an insight into quality. For example, in the case of accuracy, it is very challenging to measure non-response bias since the characteristics of those who do not respond can be difficult and costly to ascertain. In this instance, response rates are often utilized as a proxy to provide a quality indicator of the possible extent of nonresponse bias. Other data sources can also serve as a quality indicator to validate or confront the data. For example, in the energy balances, energy consumption data can be compared with production figures to flag potential problem areas.

Examples and selection of quality measures and indicators

Examples of quality indicators and measures that have already been defined around the specific dimensions and are in use by statistical organizations are numerous. Most are presented as descriptive statements or assertions (e.g. the majority of the indicators of good practice relating to the European Statistics Code of Practice's principles; the "elements to be assured" in the NQAF Guidelines and NQAF Checklist, and those relating to the International Monetary Fund's (IMF) Data Quality Assessment framework (DQAF)[13] "elements of good practice"). Others may be quantitative statements or quantified measures calculated according to specific formulas (e.g. the ESS Standard Quality and Performance Indicators). The various quality indicators and measures are intended to make the description of a product by quality dimensions more informative and increase transparency. IRES encourages countries to develop or identify a set of quality measures and indicators that can be used to describe, measure, assess, document and monitor over time the quality of their energy statistics outputs and make them available to users. Table 3 presents a limited and domain-specific sample of some indicators and measures that countries' energy statistics programmes can consider using for indicating the quality of their energy statistics.

Table 3: Selected Indicators for Measuring the Quality of Energy Statistics[14]

Quality Dimension	Quality measure/indicator
Relevance	• Procedures are in place to identify the users of energy data and consult with them about their needs • Unmet user needs - Gaps between key user (e.g. energy policy makers, emissions inventory compilers, environmental statisticians) needs and compiled energy statistics in terms of concepts, coverage and detail are identified and addressed • Requests for energy information are monitored and the capacity to respond is Evaluated • User satisfaction surveys on the agency's energy statistics outputs are regularly conducted and the results are analysed and acted upon
Accuracy and reliability	• Energy source data are systematically assessed and validated • Sampling errors of estimates, e.g. standard errors, are measured, evaluated and systematically documented • Non-sampling errors, e.g. item non-response rates and unit non-response rates, are measured, evaluated and systematically documented • Coverage – The proportion of the population covered by the energy data collected is assessed (here the "population" refers to all entities either producing, trading, transforming or consuming energy, not necessarily the same as the common understanding of 'population" • The imputation rate is reported • Information on the size and direction of revisions to energy data is provided and made known publicly
Timeliness and punctuality	• A published release calendar announces in advance the dates that (key) energy statistics are to be released • The time lag between the end of the reference period and the date of the first release (or the release of final results) of energy data is monitored and reported • The possibility and usefulness of releasing preliminary data is regularly considered, while at the same time taking into account the data's accuracy • The time lag between the date of the release or publication of the data and the date on which they were announced or promised to be released is monitored and reported

[13] For more information on DQAF see ESCM, Table 7.3:

[14] The indicators listed represent only a sample of possible indicators that can be used for measuring quality.

	• Any divergences from pre-announced release times for the energy data are published in advance; a new release time is then announced with explanations on the reasons for the delays
Coherence and comparability	• Comparison and joint use of related energy data from different sources is • made • Energy statistics are comparable over a reasonable period of time • Divergences from the relevant international statistical standards in concepts and measurement procedures used in the collection/compilation of energy statistics are monitored and explained • Energy statistics are internally coherent and consistent
Accessibility and clarity	• Energy statistics and the corresponding metadata are presented in a form that facilitates proper interpretation and meaningful comparisons, and they are archived • Modern information and communication technology (ICT) is mainly used for disseminating energy statistics; traditional hard copy and other services are provided when appropriate, to ensure that users have appropriate access to the statistics they need • An information or user support service, call centre or hotline is available for handling requests for energy data and for providing answers to questions about statistical results, metadata, etc. • Access to energy microdata is allowed for research purposes, subject to specific rules and protocols on statistical confidentiality • The regular production of up-to-date quality reports and methodological documents (on energy concepts, definitions, scope, classifications, basis of recording, data sources (including the use of administrative data), compilation methods, statistical techniques, etc.) is part of the work programme, and the reports and documents are made known publicly

The objective of quality measurement is to have a practical set (limited number) of quality measures and indicators that can be used to describe and monitor over time the quality of the data produced by the responsible agencies and to ensure that users are provided with a useful summary of overall quality while not overburdening respondents with demands for unrealistic amounts of metadata. As such, it is not intended that all quality measures and indicators be addressed for all data. Instead, as mentioned in IRES, countries are encouraged to select practical sets of measures and indicators to compile that are most relevant to their specific outputs and can be used to describe and monitor the quality of the data over time. They should also ensure that the selected measures and indicators cover each of the quality dimensions that describe their outputs, have well-established methodologies for their compilation, and are easy to interpret by both internal and external users.

Data compilers should decide how frequently the measures or indicators for different key outputs are to be produced. Certain types of quality measures and indicators can be produced for each data item in line with the frequency of production or publication of the data; for example, response rates for total energy production can be calculated and disseminated with each new estimate. However, other measures could be produced once for longer periods and only be produced again for newly released data if there were major changes.

Quality reporting

In order for the users of energy statistics to be able to make informed use of the statistical information provided, they need to know whether the data are of sufficient quality. For some dimensions of quality, such as timeliness, users are able to easily assess the quality for themselves, while others, such as coherence and even relevance, may not be as obvious. The dimension of accuracy in particular is one which users may often have no way of assessing and must rely on the statistical agency for guidance. A quality report, or similar documentation, is meant to provide this guidance.

National practices for reporting on the quality of outputs vary. The quality documentation provided by data producers can range from short and concise to very detailed, depending upon the users for whom the information is meant. General users will most likely only be interested in a certain level of detail necessary for knowing whether they can rely on the data, while producers will want more detailed information in order to be able to evaluate whether the output quality meets the quality requirements and to identify strengths and any areas that need further improvement.

Quality information is often structured in a template format to promote comparability and consistency across statistical domains. Sometimes it is issued in a quality report that is separate from the other metadata, not as a replacement for, but rather as a complement to them. Other times it may be included as part of the other metadata (for example along with explanatory and technical notes and other more detailed documentation) provided by the compiling agency. Some compilers refer to the quality documentation as a quality statement or quality declaration. Typically though, the quality reports or quality documentation examine and describe quality according to those dimensions the agency has used to define its products' fitness for purpose, such as the following ones focused upon in this chapter: relevance, accuracy, reliability, timeliness, punctuality, coherence, comparability, accessibility and clarity.

Two types of quality reports can be distinguished – the shorter "user-oriented" one and the more detailed "producer-oriented" one. The focus of the user-oriented reports is on output quality, so they are often limited to brief descriptions of the output dimensions, and generally will include just a few of the indicators listed in the previous section on measuring quality. On the other hand, the longer, "producer-oriented" quality reports, such as the comprehensive type the ESS members are recommended to produce periodically (every 5 years or so or after major changes), go into greater detail on the dimensions, especially on errors and other aspects affecting accuracy, and provide additional information on the processes and other issues such as confidentiality, costs, and the response burden. For the users, such details may be confusing and unnecessary for their purposes, but for the producers, the comprehensive reports serve as an internal self-assessment. Quality reporting therefore underpins quality assessment which in turn is the starting point for quality improvements in the statistical programmes.

For the European Statistical System's (ESS) countries, a standard reporting structure has been developed for presenting quality information in a comprehensive quality report, i.e. a full scale, producer-oriented report with quantitative and qualitative information, dealing in detail with all important aspects of output and process quality. Table 4 presents two examples of what to include in the quality reports on two specific elements of survey design relating to accuracy and reliability, namely sampling errors and non-response errors.

Table 4: Selected suggested content to be covered in ESS Quality Reports
(for selected elements under the accuracy and reliability dimension)

What should be included on Sampling Errors

Always applicable:

• Where sampling is used there should be a section on sampling errors.

• As far as possible sampling error should be presented for estimates of change in addition to estimates of level. If necessary, reasonable assumptions can be used. If probability sampling is used:

• There should be a presentation of sampling errors calculated according to formulas that should also be made available. If the estimators include adjustments for non-sampling errors, for example non-response, this should be explained and included also in the accuracy assessment.

• The most appropriate presentational device should be chosen, normally CVs, ranges of CVs, or confidence intervals.

• If outliers have received special treatment in estimation, this must be clearly described. If non-probability sampling is used:

• For sampling with cut-off an assessment of the accuracy due to the cut-off procedure should be included in addition to the presentation of sampling error for the sampled portion of the population.

• For other forms of non-probability a sampling model can be invoked for the estimation of sampling error. A motivation for the chosen model and a discussion of sampling bias should be included.

What should be included on Non-response errors

• Non-response rates according to the most relevant definitions for the whole survey and for important subdomains.

• Item non-response rates for key variables.

• A breakdown of non-respondents according to cause for non-response.

• A qualitative statement on the bias risks associated with non-response.

• Measures to reduce non-response.

• Technical treatment of non-response at the estimation stage.

ESS *Handbook for Quality Reports 2013* - http://ec.europa.eu/eurostat/documents/3859598/6651706/KS-GQ-15-003-EN-N.pdf.

While the ESS Handbook guidelines presented above were developed specifically for the ESS Member States for the preparation of a comprehensive, full scale producer-oriented quality report, energy statistics programmes in non-ESS countries could draw upon the extensive work done in the ESS to set up their own quality reporting processes. They may find it useful to apply the ESS guidelines as a starting point for developing guidelines for their own energy programmes' quality reports. Another helpful ESS resource, for both quality reporting as well as for providing comprehensive metadata to users, is the Single Integrated Metadata Structure (SIMS), an inventory of statistical concepts used for quality and metadata reporting in the ESS (see Box 7.6 in the ESCM).

The preparation and updating of quality reports depend on the survey frequency and on the stability of the quality characteristics. A balance should be sought between the need for recent information and the report compiling burden. If necessary, the quality report should be updated as frequently as the survey is carried out. However, if the characteristics are stable, the inclusion of the quality indicators on the newest survey results could be enough to update the report. Another option is to provide a detailed quality report less frequently, and a shorter one after each survey, covering only the updated characteristics, such as some of the accuracy-related indicators. In IRES, countries were encouraged to regularly issue quality reports as part of their metadata.

Quality reviews

Quality reviews can be done in the form of self-assessments, audits or peer reviews. They can be undertaken by internal or external experts and the timeframe can vary from days to months, depending on the scope of the review. However, the results are more or less identical: the identification of improvement actions/opportunities in processes and products. In IRES, it is recommended that some form of quality review of energy statistics programmes be undertaken periodically, for example every four to five years, or more frequently if significant methodological or other changes in the data sources occur.

Self-assessments are comprehensive, systematic and regular reviews of an organization's activities and results are referenced against a model or framework. They are "do it yourself" evaluations. Typically, self-assessment checklists or questionnaires are developed to be used for systematic assessment of the quality of the statistical production processes[15].

A quality audit is a systematic, independent and documented process for obtaining quality evidence concerning the quality of a statistical process and evaluating it objectively to determine the extent to which policies, procedures and requirements on quality are fulfilled. In contrast to the self-assessments, audits are always carried out by a third party (internal or external to the organization). Internal audits are conducted with the purpose of reviewing the quality system in place (policies, standards, procedures and methods) and the internal objectives. They are led by a team of internal quality auditors who are not in charge of the process or product under review. External audits are conducted either by stakeholders or other parties that have an interest in the organization, by an external and independent auditing organization, or by a suitably qualified expert.

Peer reviews are a type of external audit which aim to assess a statistical process at a higher level, not to check conformity with requirements item by item from a detailed checklist. They are therefore often more informal and less structured than external audits. Normally peer reviews do not address specific aspects of data quality, but focus rather on broader organizational and strategic questions. They are typically systematic examinations and assessments of the performance of one organization by another, with the ultimate goal of helping the organization under review to comply with established standards and principles, improve its policy making and adopt best practices. The assessments are conducted on a non-adversarial basis, and rely heavily on mutual trust among the organization and assessors involved, as well as their shared confidence in the process.

[15] For more information, see for example, the European Statistical System's Development of a Self-Assessment Program (DESAP) and Data Quality Assessment and Tools https://ec.europa.eu/eurostat/documents/64157/4373903/07-Checklist-for-Survey-Managers_DESAP-EN.pdf/ec76e3a3-46b5-409e-a7c3-52305d05bd42

JODI Energy Data Transparency Workshop for Sustainable Future

JODI Energy Data Transparency Workshop Sustainable Future took place in Cape Town, South Africa, from 30 April to 3 May 2019. The Workshop ran concurrently with the 4th IEF-OFID Symposium of Energy Poverty. The Workshop was jointly organized by IEF and Government of South Africa with assistance of the following JODI partners: GECF, IEA, and UNSD.

The aim of the workshop was to review and discuss issues that countries face in the collection, compilation and dissemination of energy statistics and share national experiences. The workshop provided an excellent opportunity for selected countries to learn about the collection and compilation of energy statistics and energy balances following the International Recommendations for Energy Statistics (IRES).

The main topic of the 4th IEF OFID Symposium on Energy Poverty was "Energy Poverty in sub-Saharan Africa: options for closing the Gap". The panellists presented on various subtopics including challenges linked to collection of key indicators for energy poverty and the role of data transparency.

During the workshop and the symposium, 9 institutions presented their work during so called JODI exhibition, including UNSD. About 40 participants attended the JODI workshop: 30 attendees from 10 countries, and 10 experts from international organisations, and around 60 participants attended the Symposium.

The workshop covered the following topics:

- The background, objectives, and status of JODI initiative;
- International Recommendations for Energy Statistics;
- The importance of good cooperation at country level;
- Definitions and methodologies to complete the JODI Oil and JODI Gas questionnaires;
- Linkage between monthly and annual energy data collection activities;
- Annual energy statistics data collection and energy balances compilation;
- Principles of energy efficiency indicators;
- Data quality assessment techniques;
- Practical exercises to complete JODI Oil and JODI Gas questionnaires as well as annual questionnaires;
- Benefits and focus for short- and long-term energy data for policy making;
- Exchanges of good practices to collect energy data among participating countries.

The workshop agenda and presentations are available at https://www.jodidata.org/events/jodi-energy-data-transparency-workshop-for-sustainable-future .

Joint JODI-APEC Workshop on Oil and Gas Statistics

The 17th APEC Workshop on Energy Statistics – Joint APEC-JODI Workshop on Oil and Gas Statistics was held in Tokyo, Japan on 11-13 June 2019. The Energy Statistics and Training Office (ESTO) of the Asia Pacific Energy Research Centre (APERC) organized the workshop with the support of Japan's Ministry of the Economy, Trade and Industry (METI). The workshop was also developed in collaboration with the other Joint Organisations Data Initiative (JODI) partners coordinated by the International Energy Forum (IEF). The workshop focused on oil and gas statistics with the primary objective of improving the monthly JODI Oil and JODI Gas data reporting in the APEC region. Representatives from 14 countries in charge of the collection of oil and gas data in national statistical offices and ministries overseeing energy data attended the meeting.

Dr. Kazutomo Irie, President of APERC, Mr. Fuad Al-Zayer, the JODI coordinator in IEF and Mr. James Kendell, Chair of the APEC Expert Group on Energy data and Analysis (EGEDA) welcomed participants in their opening remarks, stressing the importance of an active involvement of all the APEC members in the JODI data initiative, including those who do not submit their statistics on a regular basis.

After highlighting the importance of energy data transparency and availability, also for achieving the sustainable development goals, the workshop focused on the concepts and definitions behind the JODI Oil and Gas Questionnaires, with a specific attention to the role of conversion factors for petroleum products. The methods used to assess the JODI Oil and Gas data quality were also presented; member economies participating in the workshop were later involved in an assessment revision of their own data.

Representatives from member countries reported on their national experiences in the collection, treatment and dissemination of oil and gas statistics, emphasizing the major challenges linked specifically to monthly data and presenting some of the adopted solutions to solve the main issues and the methods in use to assess data quality.

One session of the workshop was also devoted to exploring how to engage with businesses which are the sources of data for statistical agencies and on how to deal with confidentiality; it was stressed that communication with business is vital to build confidence and relationships.

On the third day of the workshop participants were asked to complete hands-on practical exercises filling in the JODI Oil and Gas Questionnaires, looking at the automatic checks built into the Questionnaires and understanding how to correct errors.

Finally, the International Recommendations for Energy Statistics (IRES) were presented, highlighting the role of the IRES in enhancing transparency and promoting better coverage of global energy data. In this context, an account of both the Standard International Energy Product Classification (SIEC) and of the Energy Statistics Compilers Manual (ESCM) was also given to the participants to the workshop.

The workshop agenda and presentations are available at egeda.ewg.apec.org/egeda/meeting/workshop.html .

Photo credits: APERC

UNSD/ESCWA Technical Assistance to Lebanon

UNSD, in cooperation with UN-ESCWA, carried out a technical assistance mission to Lebanon on request from the General Directorate of Oil of the Ministry of Energy and Water. The objective was to facilitate discussion between stakeholders in the Lebanese Government and produce an action plan to improve energy statistics and develop energy balances for the country. A well-compiled energy balance following the International Recommendations for Energy Statistics is fundamental for calculating SDG indicators 7.2.1 on renewable energy and 7.3.1 on energy efficiency, as well as CO_2 emissions according to the IPCC methodology.

The meetings had participation of about 30 representatives of the Ministry of Energy and Water, Central Administration of Statistics, Electricité du Liban, Ministry of Environment, Council of Ministers (representing the Prime Minister), UNDP, UNSD and ESCWA, as well as independent experts. An expert from the International Energy Agency made a presentation via teleconference.

The meetings were very productive, including a thorough analysis of users and uses of energy statistics in Lebanon, the compilation of an inventory of data sources, data needs and data gaps, a discussion of new data sources to fill such gaps, and a discussion of possible institutional arrangements for improving data flows towards the compilation of energy balances. The legal framework was considered to be adequate, even if not totally enforced in practice. The mission included a visit of the two UNSD staff, along with ESCWA's Director of Statistics and Chief of Economic Statistics, to the Minister of Energy and Water HE Nada Boustani.

This mission was a result of UNSD's cooperation with the UN Regional Commissions and UN Offices of Resident Coordinators, as local experts knowing the socio-economic and political situation and having knowledge of and access to local institutions, to pursue its stated goals of strengthening countries statistical systems and disseminating statistical standards and norms.

The meeting agenda, presentations as well as the assessment report are available at *https://unstats.un.org/unsd/energystats/events/2019-Beirut/*.

Photo credits: UN-ESCWA

Workshop on Energy Statistics for Western African Countries

UNSD, together with the International Atomic Energy Agency (IAEA), and in cooperation with the African Institute for Economic Development and Planning (IDEP), organized a joint training workshop on energy statistics and its links to the Sustainable Development Goal 7. The workshop was held from 15 to 18 October 2019 and was hosted by the IDEP in Dakar, Senegal.

The training provided an opportunity to bring together energy statisticians from mainly Western African countries both from national statistical offices and ministries of energy. It identified areas where producers and users of energy statistics can build synergies for stronger data capacity at the national level. The event had participation of about 35 representatives from 10 countries (Benin, Gabon, Ghana, Guinea, Equatorial Guinea, Lesotho, Liberia, Mali, Senegal and Togo).

The main objective of the workshop was to raise awareness and facilitate that countries in Western Africa achieve full coverage of energy products and follow the international standards for compiling energy statistics. The training consisted of lectures and practical exercises led by international statistics experts, as well as an exchange of experience and sharing of best practices between participant countries from the region.

The programme of the workshop was organised around four themes:

i. International standards in energy statistics;
ii. Data collection and compilation issues;
iii. Dissemination and analysis, including commodity and energy balances, as well as energy efficiency indicators (energy SDG indicators therein contained);
iv. Preparation of energy balances with the Energy Balances Studio.

The meetings were held in English and French with simultaneous interpretation. The sessions were productive, with participants involved in the discussions. Countries had the opportunity to share national practices and discuss relevant issues for the region, such as sustainability of biomass exploitation for energy purposes, how to account for hydroelectricity production from shared power plants, and what information to obtain from household surveys.

The workshop agenda and presentations are available at https://unstats.un.org/unsd/energystats/events/2019-Dakar/ .

Workshop on Energy Statistics for Latin American and Caribbean Countries

The Energy Statistics Section of UNSD, together with the Latin American Energy Organization (OLADE) and the International Energy Agency (IEA), and in cooperation with the Peruvian Government, organized a joint training workshop on energy statistics, the International Recommendations for Energy Statistics (IRES) and their links to the Sustainable Development Goal 7. The workshop was held from 11 to 12 November 2019 in Lima, Peru.

The meeting was divided in two one-day events and was part of the meta-event Latin American Energy Week (https://semanadelaenergia.olade.org/). The first one-day event, entitled "Monitoring progress towards energy transitions in Latin America and the Caribbean: The Role of Energy Statistics and Indicators", promoted IRES and energy statistics in the process of transitioning to cleaner sources of energy, being open to the public participating in the Energy Week and having been attended by more than 60 participants. The second one-day event was called "Workshop on the International Recommendations for Energy Statistics (IRES) in Latin America and the Caribbean" and was built around methodological presentations and exercises, being attended only by the country representatives (18 participants, representing 18 countries). These country representatives were also present in the previous day event, when some even made presentations on the energy situation and IRES adoption in their countries. These participants were in most cases the person responsible for the energy balance in the countries, being very knowledgeable in the matter, which led to intense and productive discussions. The relevance of their participation to the event lies in the fact that, being responsible for the national energy balances, they are in the best position to move forward with IRES adoption in the country.

The workshop was organised around five themes:

i. Improving tracking through international cooperation;
ii. Tools to monitor progress at a national level;
iii. The value of data to promote clean energy transitions;
iv. International recommendations and harmonization of energy statistics in Latin America and the Caribbean; and
v. International recommendations and harmonization of energy statistics in Latin America and the Caribbean.

The workshop agenda and presentations are available at https://unstats.un.org/unsd/energystats/events/2019-Lima/ .

Photo credits: OLADE

UN COVID-19 Data Hub

Visit the global COVID-19 data hub, to get data suitable for the production of maps and other data visualizations and analyses, and easy to download in multiple formats, available at https://covid-19-data.unstatshub.org/ .

This website provides a space for the global statistical community to share guidance, actions, tools and best practices to ensure the operational continuity of data programmes by National Statistical Offices, and to address issues of open and timely access to critical data needed by governments and all sectors of society to respond to the global COVID-19 crisis.

Energy Balances Visualization Portal

In 2019, UNSD released the Energy Balances Visualization portal presenting annual energy data by country. Visualizations include simple trend charts for the main energy flows in an economy, SanKey diagrams, renewable and non-renewable energy by source, and energy balances for 220 countries.

Visit our website to view and download the most recent energy statistics at

https://unstats.un.org/unsd/energystats/dataPortal/ .

Editorial Notes

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

For further information and/or feedback, please contact visit our website: https://unstats.un.org/unsd/energystats/ or contact:

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