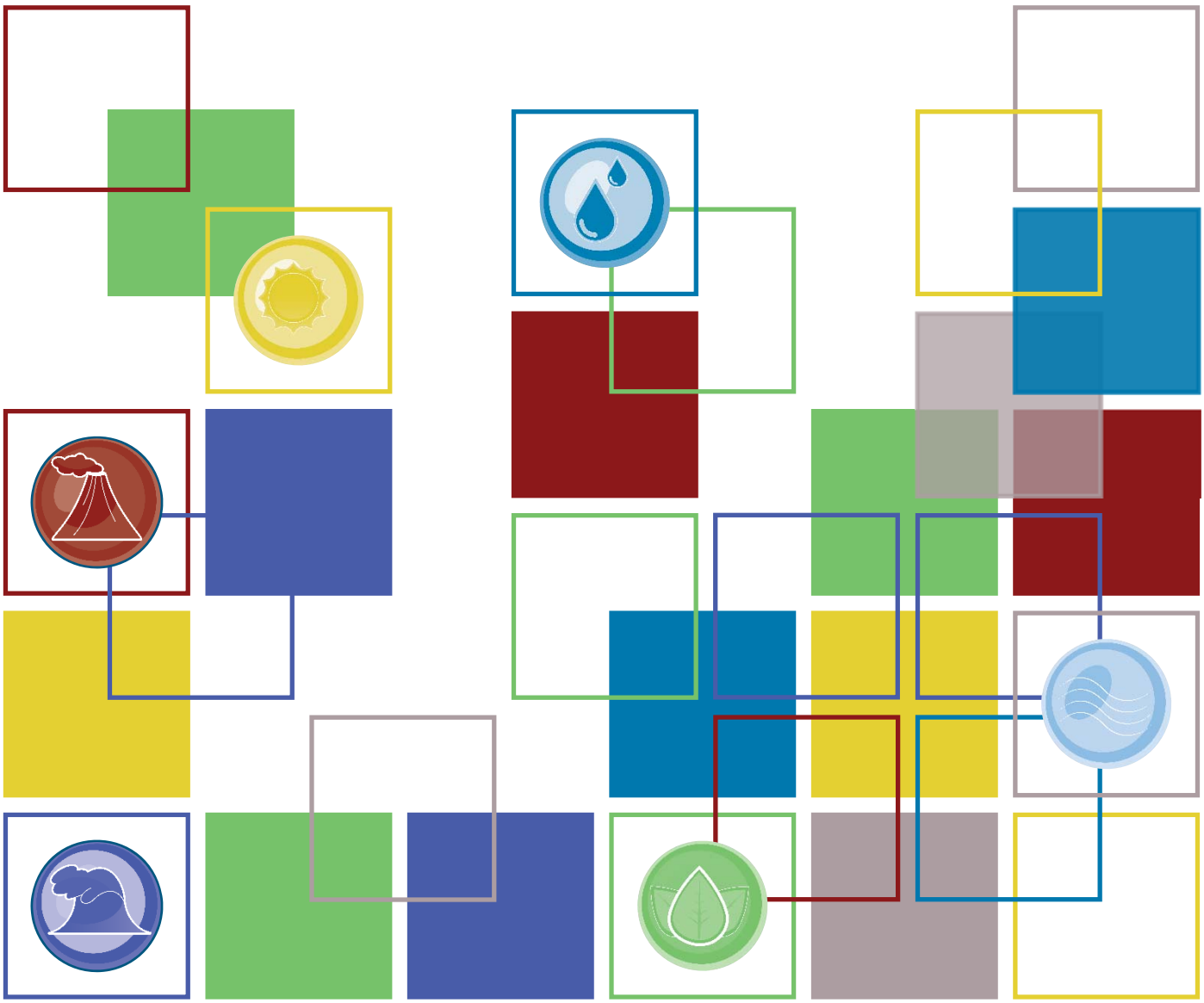
IRENA
International Renewable Energy Agency

Capacity needs assessment for renewable energy statistics



About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. www.irena.org

Acknowledgements

Author: Samah Elsayed.

For further information or to provide feedback, please contact the IRENA Statistics team (statistics@irena.org).

This report is available for download from: www.irena.org/publications.

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1. INTRODUCTION

Accurate, timely and accessible renewable energy statistics support a range of energy planning activities and are used by a wide range of stakeholders to understand the current status of renewable energy developments in a country or region. Good statistics are also essential for countries to develop renewable energy policies and action plans, set targets, track progress towards goals and design finance mechanisms. However, despite the importance of renewable energy statistics, many countries still struggle to collect reliable renewable energy statistics on a regular basis.

The specific challenges to collecting renewable energy statistics will vary from country to country and can include issues such as the lack of a clear mandate for data collection, insufficient human resources, limited technical knowledge or a lack of funding. In some countries, these challenges may be overcome by simply adapting and expanding existing processes for collecting and managing energy statistics. In other countries, a whole new set of protocols and procedures may be needed to collect renewable energy data.

This guide aims to help energy statisticians understand the various elements and processes involved in renewable energy data collection and management, as well as identify potential areas of weakness where capacity may need to improve. Specifically, the document looks at the following key requirements for effective data management:

1. Legal and institutional frameworks
2. Well-defined data requirements
3. Sufficient skilled personnel
4. Clear methodologies and processes
5. Appropriate data collection mechanisms
6. Analysis, review and validation procedures
7. Mechanisms for data dissemination

The next section of this document describes the capacities that are required in each of the areas listed above. These are the main capacities that should be assessed by countries wishing to strengthen their renewable energy statistics. The discussion of each requirement starts with a brief overview of potential challenges, followed by some actions that may be taken if the assessment suggests that improvements are needed.

The final section contains three assessment tools that countries can employ to identify gaps in these capacities. The data audit can help countries to evaluate the status of their current data collection activities. The data flow mapping exercise can be used to explore information flows in institutions to see where useful data may already exist. Finally, the capacity needs assessment tool is a simple questionnaire that may be used in countries to identify gaps in each of these areas that can then be addressed by follow-up activities.

2. REQUIREMENTS FOR EFFECTIVE DATA MANAGEMENT

This section describes some of the main requirements for effective data management. Weaknesses in any of these areas can be assessed using the tools presented in the next section.

LEGAL AND INSTITUTIONAL FRAMEWORKS

A well-developed legal and institutional framework for energy statistics is essential for the smooth operation of data collection, analysis and dissemination activities. This is particularly true for renewable energy statistics given the complex web of installations and actors that are often involved in the sector.

Developing a robust framework for renewable energy statistics could require changes in a number of areas such as:

Legal frameworks:
- Statistical acts
- Mandatory reporting requirements
- Institutional mandates

Institutional frameworks:
- Institutional arrangements for data collection and reporting
- Division of roles and responsibilities
- Coordination mechanisms between institutions
- Processes and timelines for data collection

Legal framework. In many cases, unless an agency has been explicitly required to collect renewable energy statistics through a law or formal mandate, there will be no resources to support such activities and no obligation for enterprises and individuals to provide data.

Ideally, existing statistical laws or regulations in a country should be adopted or revised to include the collection and dissemination of renewable energy statistics. If this is not practical, then less formal processes (e.g. data sharing agreements, memoranda of understanding) should be arranged with other agencies collecting relevant data and major enterprises or private-sector associations that could be important sources of data. These arrangements should include details, such as the frequency and timing of data exchanges and the types of data that will be shared.

Institutional framework. Depending on the existing situation, the development of an institutional framework for the collection of renewable energy statistics may involve the expansion of an existing statistical system for energy data or require an entirely new framework. If data collection will be based on expansion of an existing system, then the challenges associated with collecting renewable energy data need to be taken into account.

For example, the number and type of enterprises producing renewable energy may be much larger and more variable than those producing or trading fossil fuels. It may also include households and others not typically associated with the energy sector. Because of this complexity, it is unlikely that a single agency will have a complete picture of activities in the renewable energy sector and data collection will often require collaboration between many different agencies (e.g. institutions responsible for energy, forestry, agriculture, environment and rural development). The role of householders as producers and consumers of renewable energy also complicates matters and suggests that the national statistics office in a country may have an important role to play in data collection.

The institutional framework for data collection should identify the lead agency responsible for collating and analysing renewable energy data and the roles and responsibilities of collaborating institutions. This should include a timeline for the collection and publication of data (such as a statistical calendar), so that renewable energy statistics are produced periodically rather than on an ad-hoc basis.

It may also be beneficial to form a multi-agency renewable energy statistics working group, comprising the main agencies and institutions associated with the sector. This group can facilitate the exchange of data and the validation and dissemination of the final renewable energy statistics.

Monitoring and evaluation. Finally, it will be useful to monitor and evaluate the production and quality of renewable energy statistics every few years, so that changing needs and improvements in processes can be identified and implemented in the future.

WELL-DEFINED DATA REQUIREMENTS

The most basic energy statistics usually collected in countries include time-series of the production, trade and consumption of different energy products as well as, in many cases, annual energy balances that show how fuels and other sources of energy are transformed and used to meet final energy demands. In addition to these, countries may also collect data about energy infrastructure (e.g. electricity generating capacities), energy costs and prices, energy reserves (including estimates of the availability of renewable energy resources) and various indicators of the socio-economic impacts of energy production and use (e.g. employment statistics).

TABLE 1: EXAMPLES OF DATA COLLECTION OBJECTIVES AND DATA NEEDS

Objective	Required data
To measure progress towards a renewable energy target (as a share of final energy consumption)	Annual energy balance showing renewable energy consumption, including its share of heat and electricity consumption
To monitor short-term trends in the markets for renewable energy	Quarterly renewable capacity statistics, investment statistics, cost and price statistics
To monitor and adjust a feed-in-tariff programme for rooftop solar photovoltaic installations	Monthly statistics on new rooftop solar photovoltaic installations, electricity prices and solar panel costs
To monitor energy access, measured as the share of the population with an electricity supply	Annual statistics on the number of households connected to the national electricity grid and sales of solar home systems
To measure energy security	Annual energy balance showing net imports of energy as a share of final consumption, by sector

While countries generally collect similar renewable energy statistics, the level of detail can differ from country to country depending on their needs and the availability of resources. For example, some countries may collect a very detailed breakdown of energy use by end-use sector (residential, commercial, industry, transport etc.), while others may be more interested in measuring the amounts and different types of energy used by households in different locations (e.g. off-grid or on-grid electricity, or the use of different types of bioenergy).

To ensure that renewable energy statistics are collected efficiently, it is important to consider how they will be used by different stakeholders and what sorts of data will be required to meet their needs. It is also important to assess the cost and feasibility of data collection, so that data can be collected at an appropriate level of detail and frequency.

Data collection objectives. The objectives for renewable energy statistics in a country can be determined by examining the policies, projects and other activities in the sector that should be monitored. This should include developing monitoring and data collection systems when new renewable energy policies are developed and implemented.

Defining data needs and availability. Based on the identified objectives, the different types of data required to monitor progress in each of these areas should be assessed. For renewable energy, this should include an assessment of the importance of different renewable energy sources in a country (now and in the future) as well as an assessment of the level of detail that it is realistic and useful to measure.

Some examples of data collection objectives and the data that might be required to meet these objectives are given in the table above.

SUFFICIENT SKILLED PERSONNEL

The production of timely and reliable renewable energy statistics requires an adequate number of staff with the requisite skills in statistics and some knowledge of renewable energy. Despite this, many countries do not have a sufficient number of dedicated personnel or those that do collect energy statistics are not familiar with the way that renewable energy is measured and recorded in energy statistics.

One common challenge is that although many staff working on energy statistics may have developed a thorough understanding of fossil fuel statistics, they have often not gained much experience in renewable energy statistics, particularly in terms of definitions, measurement units, data collection and measurement methodologies.

Furthermore, depending on which institution leads energy data collection activities, some types of technical knowledge may be missing. For example staff at an energy ministry may understand the generation of hydroelectricity very well, but may not have detailed knowledge about how to measure bioenergy. Similarly, staff at a national statistical office may be very good at conducting household surveys, but are unlikely to be familiar with how to measure household energy consumption. Overcoming these limitations requires both training and coordination between agencies.

In addition to the skills needed to design and implement surveys of renewable energy, there is also often a need to build technical capacities at a lower level for enumerators collecting data in the field.

Institutional arrangements. While the number of energy statisticians in the lead agency is dependent on the resources available, it is essential for at least one

staff member to focus explicitly on the collection and reporting of renewable energy statistics.

It is also important to promote the sharing of expertise and knowledge amongst key agencies such as the ministry of energy, national statistical office and other relevant agencies. This cooperation can be either formal or informal depending on local circumstances.

Training in renewable energy statistics. Training in renewable energy statistics should be provided to energy statisticians in the lead agency and others collaborating in the collection of these statistics. Topics for training could include: renewable energy terms and definitions; measurement units and conversion factors; sample design and survey procedures; questionnaire design; and data processing and analysis (e.g. how to integrate renewable energy into energy balances).

For enumerators, training should include an overview of renewable energy terms and concepts and practical training in how to measure renewable energy in the field (e.g. to measure the capacity of solar water heaters or solar panels or to measure the amount of wood fuel used by a household).

Clear methodologies and processes

A standardised and stable set of methodologies and procedures for data collection and analysis are essential to ensure the consistency and comparability of statistics over time and between different locations or sectors within a country. These methodologies and procedures should be clearly explained in manuals for both data enumerators and the statisticians responsible for implementing and interpreting the results of renewable energy surveys. If possible, these methodologies and procedures should also be consistent with those used to collect other types of energy data or similar data in other sectors (e.g. in employment surveys or cost and price surveys).

A number of manuals and guidebooks on energy statistics already exist, such as the International Recommendations on Energy Statistics (IRES) published by the United Nations Statistics Division.[1] However, it is important that these general principles are adapted to meet the needs and local circumstances of individual countries. Each country will have its own unique set of challenges and processes that will need to be reflected in a national manual for renewable energy statistics.

As well as manuals to help staff collect and analyse renewable energy statistics, it is also important to keep records of all data collection activities so that staff turnover does not result in a loss of institutional knowledge. Reference documents should contain information such as sources of data (contacts), adjustments and revisions to data, inconsistencies in the data and any assumptions or methodologies used to produce estimates and complete the dataset.

Some of this additional information can be included in the database used to store renewable energy statistics, which should contain background information (in a "working system") as well as the final statistics that are disseminated to the public. Other information can be recorded in separate files or databases for future reference. The overall aim of keeping these records is to maintain the history of each data point in case it is ever necessary to revise whole data series back through time or explain revisions to the data.

Reporting templates. The forms or questionnaires for collecting renewable energy data should use internationally agreed definitions and measurement units for renewable energy statistics (see IRES). They should also be clear and simple to understand and, preferably, not change much over time.

Manuals. The lead agency collecting renewable energy statistics should have a manual showing all calculations and estimation methods used for the production of renewable energy statistics. There should also be a manual for enumerators, providing guidance on how to measure renewable energy or make estimates in the field. This can include pictures and diagrams to explain some of the concepts for those less familiar with renewable energy technologies.

Archiving. Changes in historical data, data sources, estimates and other adjustments to the data should be recorded in an archive or statistical working system. This should also include other useful information such as contact points and their timelines for data collection.

Appropriate data collection mechanisms

There are three main ways to collect renewable energy data: household surveys; enterprise surveys; and by using administrative data collected by local and national government authorities. Renewable energy statistics are often compiled using a combination of these methods, with the overall approach depending on the availability of resources and local circumstances. Given the costs of implementing surveys, it is always useful to explore whether administrative data or other existing data collection activities can be used to provide data before starting a new data collection exercise.

Household surveys are used to gather data on household energy consumption and are mostly used to

[1] United Nations, 2016, International Recommendations for Energy Statistics, Statistical Papers, Series M No. 93, ST/ESA/STAT/SER.M/93, available at: http://unstats.un.org/unsd/energy/ires

collect data about the production and use of bioenergy and off-grid electricity. Household surveys are usually expensive, so they are not used very frequently, but there may be scope to add questions about renewable energy to other existing surveys.

Household surveys can also be used to take detailed field measurements that may be used to generate estimates at a national level or provide other useful information about renewable energy. Such measurements can include weighing the amount of solid biofuels used by households, metering heat or electricity consumption, measuring the area of solar thermal collectors or photovoltaic panels, or measuring the volume of biogas produced by household biogas plants.

Enterprise surveys are used to collect data about non-household renewable energy production and use. They may be implemented using a variety of techniques, including postal, email or online questionnaires, telephone surveys or face-to-face interviews.

Enterprise surveys collect information about the production and use of energy in industry, commerce and the public sector.[2] More detailed surveys may be used to collect data from energy producers and, in the case of renewable energy, this could include enterprises in the agriculture, forestry, food and wood processing sectors (i.e. bioenergy and biofuel producers). Surveys of renewable energy technology providers may also be considered as a source of information about household renewable energy production (e.g. from solar photovoltaic panels, heat pumps and solar water heaters).

Administrative data sources can include data from renewable energy incentive schemes, feed-in tariffs, certification schemes, import tariff exemptions, capital grants and other types of support given to promote the use of renewable energy. At the local level, the records of planning authorities may also indicate where renewable energy facilities have been established.

Data audit. A useful method for identifying renewable energy data sources is to identify where relevant data may already exist. This should examine the administrative records kept by all government agencies that are somehow involved in the renewable energy sector, to see if they already collect the data that is required. Even if data is not available, they may be collecting information that is useful for the design of sampling frames or may have existing surveys that could be adapted to ask a few questions about renewable energy.

Sample design. To collect a representative sample of renewable energy use, it is important to design a sample that takes into account the characteristics of renewable energy. For example, there may be considerable regional variations in the availability of bioenergy resources and significant differences between rural and urban renewable energy use.

Survey methods. For household and enterprise surveys, potential survey methods could include face-to-face interviews, telephone surveys, postal surveys or online surveys and the most suitable method should be chosen, depending on the desired sample size, the availability of resources and the complexity of the data that is required. More detailed or complicated data is likely to require the use of more expensive survey techniques, such as telephone or personal interviews.

If enumerators are expected to take measurements in the field, then they should be provided with the necessary equipment (e.g. a scale to weigh solid biofuels, and a tape measure to measure the area of solar panels and solar water heaters or the volume of solid biofuels used by a household).

Analysis, review and validation procedures

Once data has been collected, the next important step is to analyse the numbers in order to make national estimates. This may include making estimates to fill gaps. In order to ensure consistency between years and across staff, it is important to have set procedures for estimation and imputation which should be described the statistics manual (see previous section).

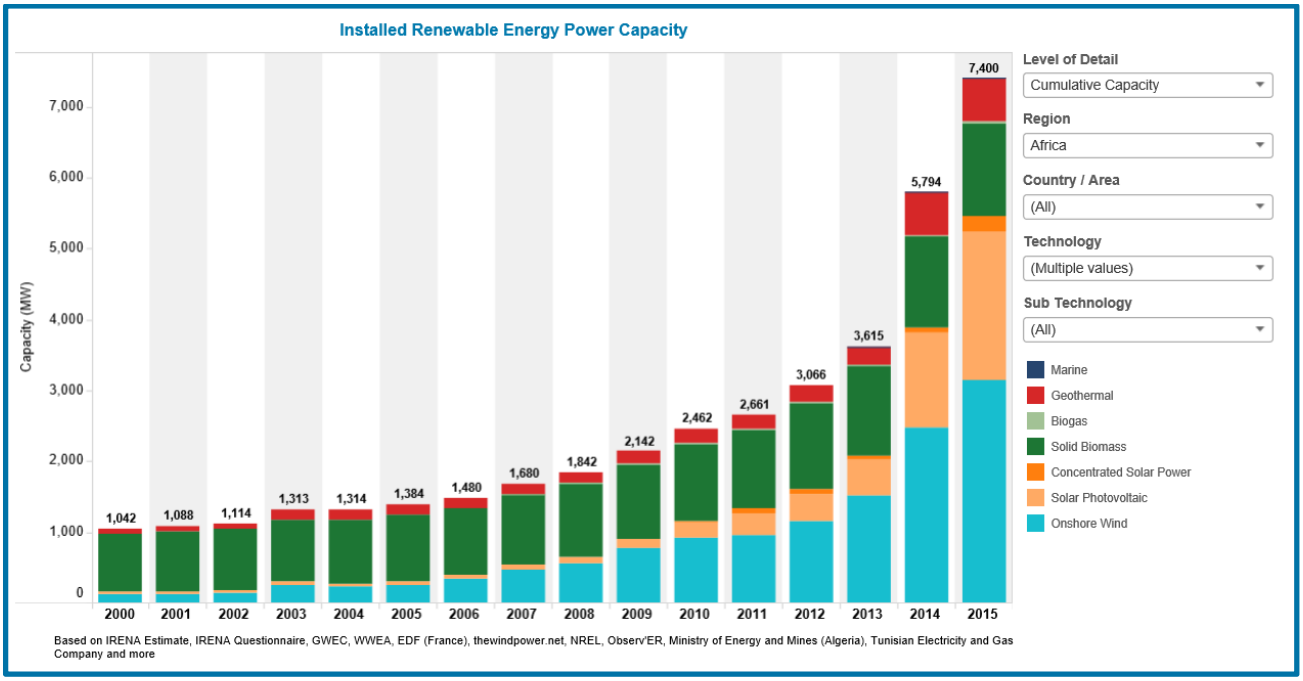
Validation procedures to check the completeness and consistency of the data should also be developed and applied. These can be a combination of manual checks and computer calculations. Furthermore, it may be useful to have peer reviewers check and comment on the accuracy and quality of the statistics.

Data validation. Validation procedures should check to make sure that all fields have been completed, check whether data is internally consistent (e.g. that energy use matches what has been produced and purchased) and check whether data is realistic (e.g. by comparing between years and between similar enterprises). Where possible, these checks should be automated to promote consistency; and imputation and estimation methods should be noted in the statistics manual.

Peer review. Prior to publication, stakeholders and major data providers should be given the opportunity to review and provide feedback on the statistics, including any procedures that have been used to produce estimates or adjust figures.

[2] The division of enterprises into different end-use sectors is determined by the International Standard Industrial Classification of All Economic Activities (ISIC), as described in IRES.

FIGURE 1: EXAMPLE OF HOW TO PRESENT RENEWABLE ENERGY STATISTICS



Source: IRENA REsource website, available at: http://resourceirena.irena.org

MECHANISMS FOR DATA DISSEMINATION

Having good renewable energy statistics is only valuable if the data is seen and used by the right people. As such, mechanisms for data dissemination and sharing should be an essential component of data management. The dissemination of renewable energy statistics can include publications and online platforms, as well as press releases and launch events to raise awareness.

It is also important to make data available as quickly as possible and in a user-friendly format. Most countries release statistics according to a regular schedule (a "statistical calendar") that informs people when data will become available, so that the most recent data can be used for analysis

Some users of renewable energy statistics will want access to detailed data (either digitally or in print) and most countries publish their detailed statistics annually in the form of an energy yearbook. Other stakeholders are likely to want more general information showing trends and developments in the sector. Providing such information in attractive charts and figures can be invaluable for raising the profile of data collection efforts as well as renewable energy activities more broadly (for an example, see figure above from the IRENA website).

Statistical calendar. Renewable energy statistics should be published according to a regular schedule known in advance, so that users can plan to use this data in their activities. At a minimum, annual data should be presented and the time lag between the end of the year and the date of publication should ideally be 12-18 months or less.

Data accessibility. Renewable energy statistics should be made available to the public in an easily accessible format. This can include both publications (e.g. annual yearbooks) and online materials. The presentation of statistics online can be a very cheap and effective way of disseminating data and this should include charts, tables and thematic reports that promote the use of renewable energy statistics to support decision making.

As part of monitoring and evaluation, major data users should be consulted periodically to ensure that the presentation of renewable energy statistics meets their needs.

3. CAPACITY ASSESSMENT TOOLS

DATA AUDIT

A data audit is an assessment of the availability and quality of data in a country or institution. For renewable energy, it involves identifying all potential data providers (e.g. government agencies, utilities, donors, non-governmental organisations, etc.) and assessing whether the data they are currently collecting is useful for the compilation of renewable energy statistics.

How to conduct a data audit

The most effective procedure for conducting a data audit is through a stakeholder workshop involving representatives from a range of potential renewable energy data providers, including: the energy ministry; national statistical office; rural development agency; forestry, natural resources and agriculture ministries; and environment ministry, as well as utilities, private-sector representatives, donors, non-governmental organisations and other relevant institutions.

The objective of the workshop should be for all participants to share information about the data that they are currently collecting. Specifically, it should consider the following questions:

- What types of renewable energy data need to be collected?
- Is this data currently being collected? If it is, who is collecting the data and what is the quality of the data?
- Is the data being collected frequently enough and at a level of detail that is useful? If not, how can this be improved?
- What are the remaining gaps in renewable energy statistics and how might this data be collected?

The sample template given below can be used to gather and record information from each agency about administrative data and other current data collection exercises that may be useful for the compilation of renewable energy statistics. After completion by workshop participants, these templates can be compiled into a matrix of existing data sources (by energy type and flow) so that gaps can be identified.

TABLE 2: TEMPLATE TO RECORD EXISTING DATA SOURCES USEFUL FOR COLLECTING RENEWABLE ENERGY DATA

Agency:				
Data is collected for these types of renewable energy:	O Hydroelectricity O Marine energy O Wind energy O Geothermal	O Solar PV O Solar water heating O Heat pumps	O Renewable waste O Solid biofuels O Biogas O Liquid biofuels	
Data is collected for these energy flows:	O Electricity generation O Generating capacity O Heat production O Heat capacity	O Biofuel production O Production capacity O Biofuel trade O Biofuel stocks	O Electricity consumption O Heat consumption O Biofuel consumption	
	Additional information:			
Description of the data collection process (sample size, frequency, methods, etc.):				**Data quality:** O High O Medium O Low

Mapping reporting flows

One of the main challenges to the collection and reporting of renewable energy statistics is often not a lack of data but a lack of formalised coordination and information sharing between key institutions.

A mapping of reporting flows looks at the movement of data and information between various actors and institutions. This includes examining all potential data providers (which in the case of renewable energy statistics can include individual households and small enterprises) as well identifying the various mechanisms used to share data between institutions.

How to conduct a reporting flow mapping

Reporting flows should be mapped directly after the data audit exercise using a similar format of a multi-stakeholder workshop.

The exercise aims to assess how data flows between various institutions, starting from the point of renewable energy producers and consumers to the end of the data flow where it is consolidated into a set of national statistics. This should include an analysis of who holds the data at different points along the flow and what mechanism are used to collect, validate and share this data with others.

As part of the exercise, stakeholders should:

- Conduct a mapping showing current data reporting flows in the country for each of the main types of renewable energy data that are needed.
- Indicate whether these flows are formalised or informal and how often data is transmitted between different parties.
- Based on the mapping, consider what mechanisms could be introduced to provide the necessary data flows to support the production of renewable energy statistics.

An example of what such a mapping exercise could look like is given below. In this case, the reporting flows at the top of the table could be useful for providing information about off-grid solar photovoltaic installations, while data flowing through the Ministry of Energy could provide more regular data about larger facilities.

Table 3: Example of a reporting flow for the collection of solar photovoltaic capacity data

Data source	Data flow →	Data source	Data flow →	Data source	Data flow →
		Households	National census (every 10 years)	National Statistical Office	Energy Chapter of the National Statistics Yearbook (annual)
International donors	Formal reporting on projects (annual)	Rural Development Agency	Informal reporting to National Statistical Office		
Solar panel installers	Informal data collection				
Enterprises	National energy survey (annual)	Ministry of Energy	Formal reporting for production of the National Statistics Yearbook (annual)		
Households	Ad-hoc surveys (every 5 years)				
Utilities	Formal reporting for licencing (quarterly)				

CAPACITY NEEDS ASSESSMENT

A capacity needs assessment is a systematic survey of whether a country or institution has in place the capacities necessary to achieve a specific task (in this case the effective collection and reporting of timely and reliable renewable energy statistics).

Identifying gaps in capacity can help countries to focus their efforts and limited resources on where they need to make improvements to their statistical processes. Furthermore, knowledge of which activities need to be prioritised can help institutions to make a case for financial and technical support from their national governments or international donors.

How to conduct a capacity needs assessment

A capacity needs assessment should be conducted through targeted interviews of key stakeholders in the main agencies involved in the collection of renewable energy statistics. People selected for interview should be familiar with the procedures currently used for the collection, validation and dissemination of renewable energy statistics.

The following questionnaire includes a series of questions about some of the main capacities required for effective data management (as they relate to renewable energy statistics). Respondents should be asked whether they strongly agree or disagree with each of the statements and they should be prompted for further information or comments after each question.

The answers to these questions can be scored using a five-point scale (5 = strongly agree, 1 = strongly disagree) and can then be aggregated to indicate where future capacity building may need to be prioritised.

This information can be used with the information gained from the other tools (data audit and reporting flows) and information about the cost and feasibility of different capacity building activities to develop recommendations for future capacity building.

Instructions: For each of the following statements, ask respondents whether they agree or disagree. Respondents should indicate the strength of their answers using a five point scale (strongly agree, agree, neither agree or disagree, disagree, or strongly disagree) and their answers should be recorded by ticking one of the five answer boxes. For questions where respondents do not have an opinion or are not in a position to give an answer, do not tick any of the answer boxes. Ask respondents for further comments, clarifications or explanations after each question and briefly note their answers in the space provided.		
Legal and institutional framework		
1.1 There is a legal framework for the collection of renewable energy statistics.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
1.2 Major actors in the renewable energy sector are required to provide data if requested.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
1.3 There is a lead agency with a mandate to collect renewable energy statistics.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
1.4 There is a consultation process to facilitate data collection and review procedures.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
1.5 There is adequate funding for the collection of renewable energy statistics.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
1.5 The production of renewable energy statistics is monitored and evaluated.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
Well defined data requirements		
2.1 There are clear objectives for the collection of renewable energy statistics.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
2.2 Renewable energy statistics are adequate for policy and project monitoring.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○

2.3 New policies and plans for renewable energy include monitoring processes.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
Sufficient skilled personnel		
3.1 There is a sufficient number of staff collecting renewable energy statistics.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
3.2 Staff collecting renewable energy statistics have adequate skills and experience.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
3.3 Technical knowledge about data collection is shared between agencies.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
3.4 Staff collecting and analysing renewable energy statistics are adequately trained.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
Clear methodologies and processes		
4.1 Renewable energy data is collected using standard templates and questionnaires.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
4.2 Manuals explaining how to collect renewable energy statistics are adequate.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
4.3 Methodologies for processing and validating data and making estimates are documented.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
4.3 The original sources of data and estimates are recorded in an archive.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
Appropriate data collection mechanisms		
5.1 All potential renewable energy data sources have been examined and assessed.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○

5.2 Data collection methodologies are regularly reviewed and assessed.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
5.3 Sampling frameworks for household and enterprise surveys are adequate.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
5.4 The equipment used to collect, analyse and store renewable energy data is adequate.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
Analysis, review and validation procedures		
6.1 The processes for checking, validating and reviewing data are adequate.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
6.2 The methods for producing estimates (for missing values) are adequate.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
Mechanisms for data dissemination		
7.1 Renewable energy statistics are released according to a published schedule.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
7.2 Renewable energy statistics are released in a reasonable amount of time.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
7.3 Renewable energy statistics are published in various ways to meet different needs.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
7.4 The availability of renewable energy statistics is promoted through awareness raising.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○
7.5 Users of renewable energy statistics are asked for comments and feedback.	Comments:	←Agree – Disagree→ ○ ○ ○ ○ ○

IRENA Headquarters
Masdar City
P.O. Box 236, Abu Dhabi,
United Arab Emirates
www.irena.org