

RENEWABLES READINESS ASSESSMENT

DESIGN TO ACTION



A GUIDE FOR COUNTRIES ASPIRING TO SCALE-UP RENEWABLE ENERGY

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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 cooperation, 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.

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FOREWORD

In the short time since its establishment, tailored guidance and advice have emerged as one of the core strengths of the International Renewable Energy Agency (IRENA), as it seeks to support countries to scale up renewable energy to achieve their development goals. One of the main instruments for providing such advice is the Renewables Readiness Assessment (RRA), a country-led consultation process developed by IRENA to determine appropriate policy and regulatory choices and ensure the broadest possible buy-in from stakeholders.

Since the RRA was developed in 2011, more than 10 countries in different parts of the world have undertaken the process. IRENA has published final RRA reports for Senegal, Mozambique, Kiribati and Grenada, with reports for the other countries to be published soon. Already we have found that, despite the often stark variations in the needs, goals, and resource endowments of different countries, the RRA process stimulates tangible actions that promote renewable energy uptake.

This publication – a guide for any country interested in conducting an RRA – marks a new stage of maturity, both for IRENA as an organisation and for the RRA as one of our flagship products. Throughout the development of the RRA process, and during its implementation to date, IRENA has analysed and continually refined the steps. The process described in this guide is intended to be the catalyst for longer-term individual country-driven engagement in renewable energy planning and implementation.

During the RRA process, IRENA can serve as an interlocutor between national governments and development partners, helping to translate RRA findings into valuable projects and validate a country's commitment to renewable energy. Conducting the assessment in partnership with IRENA strengthens the business case for renewable energy in each country or region, helping to attract investment and address complex, cross-cutting social and economic questions. IRENA remains engaged following the RRA process, using the knowledge and insights gained through the RRA to provide country-specific policy and technical advice.

IRENA supports countries to accelerate the adoption and sustainable use of renewable energy through these activities, and helps to advance the goals of the Sustainable Energy for All initiative. While refinements will continue, the RRA has emerged as a pragmatic tool for policy makers and countries aspiring to scale up renewable energy.

Adnan Z. Amin

Director-General, IRENA

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ACRONYMS

CDM	Clean Development Mechanism
EDM	Electricidade de Moçambique (Electricity Mozambique)
FiT	Feed in Tariff
GEDAP	Ghana Energy Development and Access Project
GDP	Gross Domestic Product
GRENLEC	Grenada Electricity Services Limited
GW	Gigawatt
GWh	Gigawatt-hour
HDI	Human Development Index
IEA	International Energy Agency
IPP	Independent Power Producers
IRELP	IRENA Renewable Energy Learning Partnership
IRENA	International Renewable Energy Agency
kWh	Kilowatt-hour
LCOE	Levelised cost of energy
m/s	Metre per second
MW	Megawatt
PPA	Power Purchase Agreement
PPP	Public Private Partnership
R&D	Research and Development
RE	Renewable Energy
RRA	Renewables Readiness Assessment
SHS	Solar Home System
SMART	Specific, Measureable, Achievable, Realistic, Time Bound
SME	Small and Medium Enterprise
Toe	Tonne of oil equivalent
ToR	Terms of Reference
USD	United States Dollar

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EXECUTIVE SUMMARY

In 2011, the International Renewable Energy Agency (IRENA) developed the Renewables Readiness Assessment (RRA) as “a comprehensive tool for assessing key conditions for renewable energy technology development and deployment in a country, and the actions necessary to further improve these conditions”. Unlike other assessments, the RRA is a country-initiated, country-led process that identifies short- to medium-term actions for rapid deployment of renewables.

By the end of 2012, eleven countries were engaged in RRAs. The assessment process has developed significantly since its inception with constant feedback from the various national teams as well as reviews received from industry experts. There has also been an increasing involvement of development partners and other stakeholders in the RRA process. Drawing from all these perspectives, IRENA has built on experience to further develop and refine the process that is reflected in this publication. Enriched with technical details, it can be used as a guide to initiate and conduct RRAs by IRENA members. A summary of the development of the RRA from inception to the current status is provided in Annex 2.

The RRA consists of four main phases: initiation and demonstration of intent; country assessment and Action Plan; RRA country validation and finalisation; and follow-up. Various stakeholders are engaged during each phase to ensure that the process achieves its intended purpose of compiling relevant information, establishing networks and promoting renewable energy deployment.

Past RRA experience has shown that the assessments are influenced by each country’s social, economic and political context. Therefore, to account for each country’s unique context at an early stage, a detailed Background Paper is introduced to initiate the process. It describes and analyses the current status, the main barriers, and drivers to deploy renewable energy technologies in the country conducting the RRA. Once finalised, the Background Paper provides a sound basis for different experts and stakeholders to debate and decide upon key ‘service-resource’ pairs, which are priority pairings of energy services (electricity on-grid and off-grid, motive power, thermal-heating and cooking, and

transport) with relevant renewable energy resources (bioenergy, geothermal, hydro, marine, solar, wind). The identification of barriers as well as the service-resource pairs enables IRENA to additionally identify resource experts from its global Renewable Energy Practitioners Network (REPAN), who could add value by bringing regional or global perspectives into the discussions at the RRA Expert Workshop, later in the process.

Although a greater emphasis is on national governments undertaking the RRA, the role of development partners, private sector and civil society is equally important. Their engagement is activated at the first phase, when a National Expert Group is formed to steer the process forward and for some, to follow-up on the proposed actions. This group selects the service-resource pairs, and with additional experts, if required, defines and prioritises key short- to medium-term actions.

RRAs have the potential to make a business case for renewable energy and attract investments. Yet since the RRA is highly focussed on a few priority needs, it should be complemented with detailed longer term energy planning and strategies. IRENA views the process as a spark for a stronger, long-term country-driven engagement, where the assessment leads to actions for promoting renewable energy.

A distinguishable characteristic of the RRA process stems from incorporating a broad range of stakeholders engaged in multiple and iterative forums using a range of engagement tools. The RRA Validation Workshop forms one such engagement to create buy-in from a wider group of stakeholders.

It is important to emphasise that the ultimate purpose of the assessment extends beyond the RRA report, and aims to initiate a process that is focussed and realistic. In doing so, it brings about tangible actions that address questions that are often thought of as being complex and cross-cutting, such as how to bring in policy and regulatory reforms. Each country needs to balance the effort in the preparation of background information and the process of engagement with experts and stakeholders. It is also important to note that an RRA needs to add value and avoid any duplication of ongoing initiatives.

RRAs are already adding value in some countries. Examples include: the initiation of renewable energy target-setting and implementation plans in Kiribati; enactment of two decrees under the Renewable Energy Law in Senegal; initiation of a drafting policy framework for small hydropower development in Mozambique; and proposals for a 2 Megawatt grid-integrated solar plant in Grenada.

The role of IRENA as an interlocutor between national governments and development partners simultaneously helps translate the findings into actual projects if countries demonstrate motivation and commitment in the follow-up phase. Governments and development partners can also utilise the RRA findings and proposed actions to shape their own future activities. For IRENA, the knowledge and insight gained from engagements at a national level have contributed to charting the Agency's regional activities taking into account the needs of the countries. The RRA is a work in progress as IRENA continuously refines and adapts it to different country needs.



Setting up wind masts in Carriacou, Grenada
Courtesy of GRENLEC

1. INTRODUCTION

RENEWABLES READINESS ASSESSMENT: A CATALYST FOR RENEWABLE ENERGY DEPLOYMENT

The energy sector poses enormous challenges for national economies today as most of them are exposed and vulnerable to volatile fuel prices and supplies that can undermine development. Additionally, fossil fuel-based energy production and consumption generates harmful impacts through activities such as mining, fuel refining, power generation and transportation. In the developing world, 1.3 billion people still lack access to modern energy services that are vital for economic development.

Strategic investments in renewable energy (RE) resources provides many benefits for economic development in both industrialised and developing countries including enhanced energy security, reduced fuel import dependency, improved energy access and poverty reduction, low carbon development, and job creation. Over the past decade, countries have also accelerated the adoption of a wide range of renewable energy policies that have started to address barriers and supported renewable energy deployment at regional, national and subnational levels. By 2012, over 100 countries had implemented policies to support renewables and more than 118 countries had renewable energy targets in place (REN21, 2012)¹.

In April 2011, over 50 Ministers and senior officials from across the globe took part in a high-level segment discussion at the inaugural Assembly of the International Renewable Energy Agency (IRENA). They addressed several issues, including national initiatives for the deployment of renewable energy, energy access and security, and climate change. IRENA was urged to lead the global transition to renewable energy by fulfilling its mandate to promote the global development and deployment of all forms of renewable energy. In July 2011, over 25 Ministers of Energy and Heads of Delegation attended the high-level African consultative Forum, namely: The Partnership on Accelerating Renewable Energy Uptake for Africa's Sustainable Development. The Communique adopted at the end of the Forum urged IRENA to *inter alia* "better understand the

1. REN21. 2012. Renewables 2012 Global Status Report (REN21 Secretariat, Paris).

opportunities and constraints in our countries and regions by mapping Renewable Energy Readiness, a collaborative process that will provide rapid, objective assessment of the status of renewable energy opportunities and identify pathways to address gaps”. Furthermore, in January 2012, leaders and representatives of the Pacific Islands Countries and Territories (PICTs) committed to engage with IRENA in mapping the “Renewable Energy Readiness” in their countries.

In response to the guidance provided by Governments across the world, IRENA incorporated the Renewables Readiness Assessment (RRA) as a major component of its Work Programme. The knowledge and insight gained from the RRAs will in turn contribute to charting the Agency’s regional activities including advisory services, taking into account the real needs of the countries.

INITIAL DEVELOPMENT OF THE RENEWABLES READINESS ASSESSMENT

An initial desktop review on assessments of the status of renewable energy deployment was conducted to ensure that the RRAs would capture all relevant major factors. Literature reviewed was either from the private sector (Ernst and Young, MAKE Consulting and Ecofys) or from International Organisations {World Economic Forum, World Energy Council, and the International Energy Agency (IEA)}. A comparative review (see Table in Annex 1) resulted in the following key observations:

- ◆ Most of the assessments focused on renewable energy market framework and status of both developed and emerging economies with little

Box 1

Comparative advantage of the RRA

- i. Aims to assist countries deploy renewable energy in the short- to medium-term.
- ii. Identifies and prioritises services and resources relevant to the country.
- iii. Provides a holistic approach with five elements: National Energy Policy and Strategy; Institutional, Regulatory and Market Structures; Resources, Technologies and Infrastructure; and Business Model (financing, developing renewable energy projects). Capacity needs, the fifth element, cuts across all the other four.
- iv. Has the ability to be used within a national as well as a sub-national context.
- v. Defines and develops a concrete Action Plan by relevant actors to be implemented within a specified timeline.

attention to developing countries. The apparent lack of market data on renewable energy from developing countries is a concern especially if these tools were to be utilised for private sector engagement and investments.

- ◆ All methodologies utilise both quantitative and qualitative data with an emphasis on wind and solar technologies.
- ◆ Assessments do not address how policy changes could be made, especially the contribution of renewable energy for development and poverty alleviation at national and sub-national levels. In

addition, there is a lack of clarity of the involvement of national stakeholders, particularly governments.

A list of comparative advantages of an RRA is presented in Box 1.

Following the literature review, an RRA approach was designed and discussed with experts working in the field of renewable energy, as well as practitioners and government representatives from developing countries. It was then decided to pilot the RRA to receive feedback on the process and refine the approach. After conducting the RRA in two pilot countries (Senegal and Mozambique) the experts were reconvened and recommendations were made for the RRA to be split into two distinctive steps as follows:

- ◆ Design and implementation of RRA: focus on objective and scope of RRA, assessment criteria, stakeholders' engagement, good practices, communication and transparency, flexibility, sub-national and supra-national governance, and inclusiveness of the RRA.
- ◆ Post implementation: result oriented action plans, coordination and monitoring.

Additionally, it was decided that a detailed Background Paper should be prepared first to initiate the RRA, as the key barriers and drivers to deploy renewable energy technologies vary from country to country. It was also proposed that the defined actions should not be the end of the process but lead to implementation. Action plans should be defined in detail, with a specified timeline, cost and most importantly, identified responsible stakeholder. The RRAs should become lobbying tools for investment and make a business case for renewable energy.

The historical development of the RRA is provided in Annex 2.

DEFINITION, OBJECTIVES AND AUDIENCE

An RRA is “a comprehensive assessment of key conditions for renewable energy technology development and deployment in a country, and the actions necessary to further improve these conditions”. For participating countries, RRAs assist in the identification of targeted actions needed to create the enabling framework that will catalyse renewable energy deployment.

The main objective of the RRA in each

Box 2

Defining service-resource pairs

Service-resource pairs are priority pairings of energy demanding services with relevant renewable energy resources. Services fulfil demand through electricity (on-grid and off grid), motive power, thermal (heating and cooling) and transport.

Renewable energy resources are classified into bioenergy, geothermal, hydro, marine, solar, wind – either on their own or in a hybrid installation.



BIOENERGY



GEOTHERMAL



HYDRO



MARINE



SOLAR



WIND

Table 1: Probable combination of service-resource pairs

SERVICE	Renewable energy resource					
	Bioenergy	Geothermal	Hydro	Marine	Solar	Wind
On grid – electricity	✓	✓	✓	✓	✓	✓
Off grid – electricity	✓	✓	✓		✓	✓
Off grid – motive power			✓			✓
Thermal energy*	✓	✓			✓	
Transport	✓					

*heating and cooling

country is to identify key actions and obtain consensus from a wide range of stakeholders to carry out these actions and accelerate the deployment of renewable energy. This objective is supported through a country-wide consultation as follows:

- ◆ Identify "service-resource pairs" of desired energy services and renewable technologies that can provide these services, and assess the market status of each of these pairs (See Box 2 and Table 1).
- ◆ Identify key barriers to the uptake of the service-resource pairs and rank these barriers in order of priority.
- ◆ Obtain consensus on immediate actions to be undertaken by relevant actors, on their own or through partnerships; to address the barriers and thereby bring the service-resource pairs to market scale up.
- ◆ Assess capacities of actors (institutions, businesses and individuals) to carry out the agreed actions and capacity building needed to enhance their abilities.

The main audience of the RRA are the

country's decision makers, development partners (multilateral and bilateral), as well as the private sector. All these stakeholders, including IRENA could follow up on targeted recommended actions that are proposed during the RRA. These actions, once acted upon, would improve the enabling framework, generate interest and increase investments and/or funding, and build capacity amongst other expected impacts. The completed RRAs will also contribute to a database of the status of renewables readiness across member countries of IRENA.

KEY ATTRIBUTES OF THE RENEWABLES READINESS ASSESSMENT

The RRA is designed with three key attributes that need to be embraced by each country. These are:

- Country-led:** The RRA is designed to be conducted by national governments, allowing countries to obtain a comprehensive overview of the national conditions for renewable energy, and identify the actions that stakeholders view as critical measures to improve these conditions. The lead department would normally be the

Box 3

The RRA - adding value, creating impact

The RRA is designed differently from other assessments, such as country reviews, which are conducted by organisations to lay the ground for their future projects. The process works to improve tacit knowledge and ensure complementarity with existing initiatives.

The strong ownership of the RRA by the governments is a key factor that is leading to results and follow ups. By the end of 2012, eleven (11) countries from Africa, Latin America and the Caribbean, Middle East, and the Pacific Islands were engaged in the process of RRAs. As an example, in Senegal, the RRA led to the enactments of two decrees being passed under their Renewable Energy Law, enriched the national Renewable Energy Strategy and helped to build a local renewable energy network. In Mozambique, small hydro power development is now being considered and a policy to promote it is under consideration. In Grenada, the RRA has led the utility company - Grenada Electricity Services Limited (GRENLEC) to propose a 2 MW solar plant. In summary, the countries where the RRA results led to further actions could subsequently act as a channel for dissemination and engagement across their respective regions.

ministry in charge of energy or renewable energy, and close cooperation with other relevant ministries would be required to obtain the desired results. All processes and documentations involve inputs from all stakeholders and the resultant report outlines the main outcome – a set of actions that are developed and owned by the country. IRENA acts as the facilitator, as well as supporter, for the follow-up actions where necessary. The aim being that once the country has undergone the process, capacities would be built to enable them to conduct subsequent detailed assessments, utilising their local expertise and knowledge.

- ii. Building consensus through process orientation:** The RRA has a strong process orientation, which is reliant on a wider expert stakeholder consultation – officials from ministries (energy, finance, economic planning, environ-

ment, and agriculture), national energy authorities and agencies (regulator, power utilities, rural energy agencies, rural electrification agencies), industry, multilateral and bilateral funding agencies, civil society and academia. A key focus is to build processes that can be utilised effectively for initiating possible changes in legislation, regulation and policy framework, and to develop forums for discussing their impact (see Box 3). The RRA is transparent, with the actions and background materials discussed openly, allowing various perspectives to be incorporated while finalising actions and creating a buy-in among key stakeholder groups.

- iii. Laying foundation for collaboration:** The RRA, while assessing the current situation, also provides a list of concrete actions that can be implemented by the country with other stakeholders including development partners.

Solar-Wind Powered Irrigation System
in Mipandi, Mozambique



2. PLANNING THE RENEWABLES READINESS ASSESSMENT

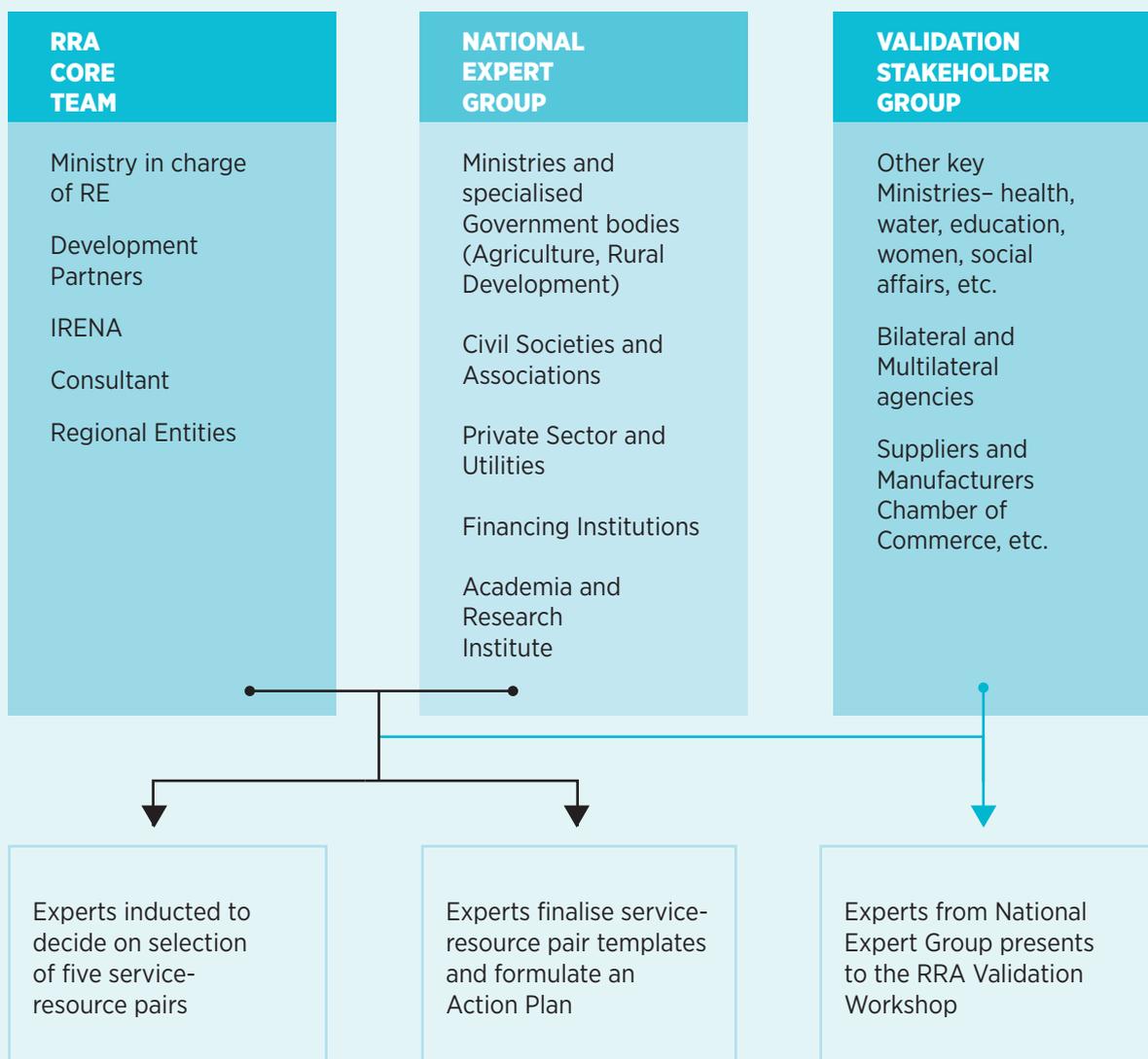
This chapter provides an overview of the stakeholders that are needed in the four phases of the RRA, including a brief about the phases themselves. A well-planned process will end up with a structured and balanced result that could yield meaningful actions. An RRA is a starting point for engaging with the country and is not meant to duplicate actions that are already supported by other development partners. Such a consideration needs to be looked at carefully during the planning process, especially with respect to the added value the RRA will bring to accelerate the deployment of renewable energy.

THE RRA STAKEHOLDERS

There are three clusters of stakeholders involved in the RRA as presented in Figure 1. These are:

- ♦ **RRA Core Team:** consists of representatives from the Ministry of the requesting country, relevant regional entity, the Consultant, IRENA and any development partner who may be specifically interested in the RRA and follow up support. The roles and responsibilities of each member of the RRA Core Team are explained in this section.
- ♦ **National Expert Group:** consists of members of the RRA Core Team as well as public institutions (ministries and specialised government agencies), private sector, financial institutions, civil society, and research institutes. A small group from amongst the National Expert Group will determine the appropriate service-resource pairs (up to 5), followed by a larger group of experts working with RRA Core Team to finalise the service-resource pair templates and the Action Plan.

Figure 1: RRA stakeholders



- Validation Stakeholder Group:** a wider range of stakeholders from key ministries, financing institutions, industry, will be invited to a workshop to validate the results and provide inputs into action plans as well as suggestions for moving forward.

draw upon the expertise and knowledge of a larger group of experts (National Expert Group) that will participate in the RRA Expert Workshop and discussion. The Consultant is called upon to play different roles as the process enters different stages. The roles and responsibilities of RRA Core Team members are clearly defined as shown in Figure 2.

The RRA Core Team is first set up and will

Figure 2: Roles and responsibilities of the RRA Core Team members

RRA ADVISOR

- Represents the Ministry responsible for renewable energy
- Oversees the direction of the RRA
- Provides strategic guidance to the process

RRA FOCAL POINT

- Senior expert from the Ministry with thorough knowledge and experience in renewable energy
- Acts as an interface between the RRA implementing team and the Ministry

CONSULTANT

- Facilitates the successful completion of the RRA
- Supports the process within the country
- Works with the RRA Focal Point, IRENA, development partners and expert team

IRENA

- Facilitates the RRA
- Provides technical assistance to the process

DEVELOPMENT PARTNERS

- Provides technical assistance to the process
- Provides support for identified prioritised actions

REGIONAL ENTITIES

- Provides technical assistance to the process and builds its capacity in the process if it wants to independently complete the RRA in other countries in the region
- Links actions to regional initiatives (vice-versa)

THE FOUR PHASES OF THE RRA

The first three phases of an RRA (excluding the publication of the final RRA report) is carried out approximately within an 18 week period. The fourth ‘follow up’ phase does not have a time limit as it may include detailed assessments and implementation of the proposed priority pairings including actions (see Figure 3). The four phases are briefly presented below:

- ♦ **Phase 1 – Initiation and demonstration of intent:** consists of engagement with the country to select a Consultant and identify key stakeholders for the RRA. In addition, development partners could also commit themselves to engage in the RRA and subsequent actions. The Consultant will draft a Background Paper that provides an overview of the country’s socio-economic status and issues, the energy sector (institutions, policy, laws and

regulations), and renewable energy potentials and initiatives among others. Upon the finalisation of the Background Paper, the RRA Advisor and RRA Focal Point will form the National Expert Group of decision makers and knowledgeable individuals of the country's renewable energy sector to determine the priority service-resource pairs (preferably up to 5). Additionally, regional and international expert can also be identified to join the National Expert Group.

- ◆ **Phase 2 – Detailed country assessment and action plan:** involves bringing the National Expert Group to discuss and fill up in detail the RRA service-resource pair templates; and to draft a prioritised Action Plan during the RRA Expert Workshop. In addition, interviews will be conducted with high level stakeholders who may have a holistic view of the trends and developments that can enrich the findings of the process. The Consultant will develop a draft RRA report.
- ◆ **Phase 3 – RRA validation and finalisation:** involves presenting the draft RRA report that resulted from the previous phase and making it available for validation by a wide range of stakeholders in an RRA Validation Workshop. Subsequent to this workshop, the Consultant along with the Ministry and IRENA will finalise the RRA report after a peer review process. The phase ends with the publication of the country RRA report.
- ◆ **Phase 4 - Follow up:** the report is disseminated and follow up is undertaken by governments, IRENA, development partners and others where applicable. Support may be provided by IRENA and development partners for further engagement with the country.

These phases are depicted in Figure 3.

Figure 3

The four RRA phases

1

INITIATION AND DEMONSTRATION OF INTENT

(WEEK 1- 10)

- Formal request by Government made to IRENA is accepted, in-country RRA Focal Point designated
- Identify development partners interested in joining hands in the RRA and follow up actions
- Contract National Consultant. Draft the Background Paper
- Identify regional and global experts and form a National Expert Group (public and private sector, civil society, research institutes, development partners).
- Members of the National Expert Group determine up to 5 priority service-resource pairs for the country

Note: Possibility for RRA to end at this stage if there is low level of engagement or weak responsiveness from country

2

DETAILED COUNTRY ASSESSMENT AND ACTION PLAN

(WEEK 11-14)

- Conduct RRA Expert Workshop to discuss and fill in the RRA template in detail and develop a prioritised Action Plan
- Conduct meeting with high level decision makers that are not part of the Expert meeting
- Prepare a draft RRA report
- Plan the RRA Validation Workshop

3

RRA VALIDATION AND FINALISATION

(WEEK 15-18/ AND ONWARDS FOR FINAL REPORT)

- Distribute the draft RRA report to all stakeholders who will attend the RRA Validation Workshop
- Convene all stakeholders to the RRA Validation Workshop
- Validate the RRA actions
- Peer review and finalise RRA report

4

FOLLOW UP

- Follow up by governments, development partners and IRENA (policy, capacity needs assessments, supply chain, etc.)
- Track RRA impact, lessons learned and feedback for improvement of the RRA



Designing, testing and selling highly efficient water wheels in Peru.
Courtesy of GVEP International

3. CONDUCTING A RENEWABLES READINESS ASSESSMENT

PHASE 1- INITIATION AND DEMONSTRATION OF INTENT

The RRA can be formally requested by an IRENA member country through an official communication expressing interest of engagement. It requires a high level of commitment from the country with a confirmation of intent from the respective Ministry, designating a country RRA Focal Point (preferably the Director of Energy/Renewable Energy in the country). This communication marks the initiation of Phase 1.

Objectives:

- ◆ Define the scope of assessment
- ◆ Identify main actors to ensure success and communicate individual roles and responsibilities
- ◆ Collect and compile information, and prepare a detailed Background Paper
- ◆ Determine relevant service-resource pairs



Table 2: Activities, expected outputs, responsibilities and timeline for phase 1

Main activities	Expected outputs	Responsibilities	Timeline
A1.1 Initiation of the RRA	<ul style="list-style-type: none"> Formal request and acceptance Designated country RRA Advisor and RRA Focal Point Identification of development partners interested to participate in RRA 	<ul style="list-style-type: none"> Ministry, IRENA Ministry Ministry, IRENA 	<ul style="list-style-type: none"> 4- 8 weeks prior to week 1 of the RRA
A1.2 Formation of RRA Core Team and role assignment	<ul style="list-style-type: none"> Signed Terms of Reference (ToR)/Contract for a designated Consultant RRA Core Team formed Mapping out relevant renewable energy experts and preparatory work for Background Paper completed 	<ul style="list-style-type: none"> Ministry, IRENA Ministry, IRENA Consultant, RRA Focal Point 	<ul style="list-style-type: none"> Week 1-3
A1.3 Finalisation of background	<ul style="list-style-type: none"> Background Paper finalised National Expert Group commit to provide inputs for identification of country relevant service-resource pairs 	<ul style="list-style-type: none"> Consultant (with Ministry, IRENA) Ministry, Consultant, National Expert Group 	<ul style="list-style-type: none"> Week 9 Week 10
A1.4 Preparation of RRA Expert Workshop determination of service-resource pairs	<ul style="list-style-type: none"> Mapping out wider group of experts relevant to the identified service-resource pairings and invite them to the RRA Expert Workshop. This could include national, regional and global experts 	<ul style="list-style-type: none"> RRA Core Team 	<ul style="list-style-type: none"> Week 10

ACTIVITY 1.1 - INITIATION OF THE RRA

The RRA is initiated after an agreement is reached with a country committed to the process. This commitment is central to the formulation of the RRAs. It is also relevant to countries with renewable energy policies and developed strategies, and with implementation experience.

To conduct an RRA, it is expected that the following is in place:

- Political commitment

- Participation/Leadership of Ministry of Energy or relevant Ministry for Renewable Energy (and regional governments if appropriate)
- Access to information related to energy and renewable energy

It must be noted that countries with developed renewable energy policies, strategies and markets could directly undertake a targeted advisory service such as resource assessment, supply chain assessment for possible local manufacturing, and

Table 3: Main operational activities to be completed

Operational checklist		Ministry	IRENA	Consultant
A1.1	Country governments send formal request to IRENA	✓		
	Review and evaluate formal requests		✓	
	Ministry assigns an RRA Advisor and RRA Focal Point (acts as the overall Project Manager)	✓		
	Approach development partners (vice-versa) to engage in the RRA	✓	✓	
	Announce partnership by IRENA/RRA Advisor		✓	
	Draft detailed ToR and identify consultant to facilitate country process	✓	✓	
	Decisions: planned budget against an activity plan finalised	✓	✓	✓
A1.2	IRENA assigns a co-ordinating officer for a particular country and develops a method to share all collected information (for example, cloud interfaces)		✓	
	Form RRA Core Team	✓	✓	
	Identify renewable energy experts who work in the country to form the National Expert Group	✓		✓
	Collect information via interviews, desktop research and other relevant sources to prepare a draft Background Paper			✓
A1.3	Send draft Background Paper for review to the RRA Core Team. Incorporate comments and suggestions. Finalise the paper	✓	✓	✓
	RRA Advisor convenes a meeting with the identified renewable energy experts and decision makers who form the National Expert Group. Identify priority service-resource pairs	✓		✓
A1.4	Consultant and RRA Focal Point contact and invite additional experts relevant to the identified service-resource pairs for the RRA Expert Workshop	✓		✓

Note: Highlighted responsibility (in red) implies the main lead.

capacity building. Countries who have recently conducted detailed studies and assessments on renewables may also be considered for advisory services.

All processes and documentation are led by the country and inputs derived from discussions with stakeholders are facilitated by a designated country RRA Focal Point with the support of an RRA Advisor from the Ministry. For the RRA to create an

impact and be meaningful, it is important that the process is conducted in countries where there is not only a demonstration of high-level intent, but also active renewable energy initiatives in place. It will be additionally beneficial if there are development partners with interest to take forward the actions that would be proposed from the RRA. If those conditions are not met then the process will be brought to an end with the publication of an issue paper.

ACTIVITY 1.2 - FORMATION OF RRA CORE TEAM AND ASSIGNMENT OF ROLES

The selection of a Consultant is crucial to the process, as he/she is expected to deliver key outputs in the RRA. The selection is a formal process that consists of the following steps:

- i. Shortlisting and selecting candidates for Consultant:** the Ministry proposes a short list of three possible candidates. In consultation with IRENA, the selection of the Consultant is finalised after reviewing the recommendations and reports from previous assignments and conducting an interview with potential candidates. The Consultant is a key stakeholder in the RRA and therefore it is critical that he/she is selected after due diligence.
- ii. Contracts:** after selection, contracts are drawn up with the defined deliverables and timelines linked to payments. IRENA completes this step after the Consultant is selected. The "Tool A" shows the criteria, duties and responsibilities for the Consultant.

After the contracts are finalised, the Consultant will start a review of the existing information and reports on renewables in the country. During the background research, barriers to

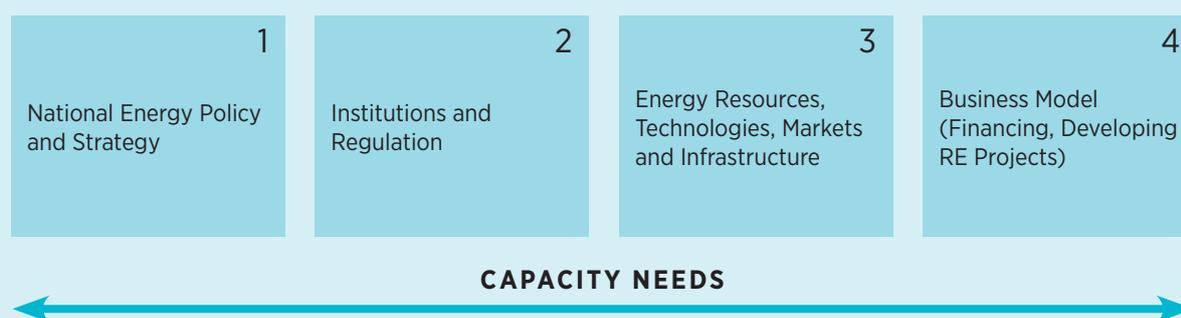
renewable energy development, stakeholder mapping, profiling organisations and individuals active in renewable energy are all identified to develop an understanding of the renewable energy readiness in the country (see Tool B).

ACTIVITY 1.3 - FINALISATION OF BACKGROUND PAPER AND IDENTIFICATION OF PRIORITY SERVICE-RESOURCE PAIRS

The Background Paper is prepared by the Consultant and reviewed by members of the RRA Core Team. The paper acts as an important document that would highlight the overall energy and renewable energy deployment within a country's development framework. The paper also needs to feature possible good practices that could be developed into case studies (as featured in the final report) for showcasing efforts/initiatives and sharing experience and knowledge with other countries regionally and globally. The information gathered in the Background Paper will eventually feed into the final report.

The Background Paper, a final product, provides an overall report for all follow-up discussions. The Paper presents a country overview and focusses on five thematic elements as presented in Figure 4. The need for fulfilling capacity is a cross cutting element through the policy, regulatory, technical and business themes.

Figure 4: Thematic elements of the Background Paper of an RRA



Tool A - Sample RRA Terms of Reference for Consultant

The primary objective of the Consultant is to support the application of the RRA in the local context and to develop a plausible RRA report on the way forward for the country to increase the deployment of renewable energy.

Criteria for a Consultant

- a. Adequate competencies in the field of renewable energy, policy analysis and a track record of deliverables related to the sector. Between 7-10 years of relevant experience in the energy sector is preferred.
- b. Advanced University Degree (Master's degree or equivalent) in Energy and/or Renewable Energy Project Management.
- c. Profound knowledge of the structure, functioning, policies, measures and actors relevant to the energy sector, including utilities and regulators, and specific knowledge on the renewable energy sector in the country.
- d. Language: English and that of the RRA country.
- e. Strong analytical skills, including proven track record of drafting relevant materials in the above-mentioned areas (publications, project proposals, reports and related documentation), preferably with exposure to international institutions.

Duties and Responsibilities

- a. Preparatory work: become familiar with RRA phases and presentation. Identify relevant studies on energy/renewable energy within the context of sustainable development; define key documents related to renewables and share this information with the RRA Focal Point and IRENA; under guidance, prepare and finalise Background Paper including conducting interviews if needed (20 days).
- b. Draft a detailed plan and timeline for RRA in collaboration with the RRA Focal Point, identify renewable energy experts who work in the country to form the National Expert Group, assist in convening meetings with identified experts for service-resource pair selection, and prepare for the RRA Expert Workshop (4 days).
- c. Organise the RRA Expert Workshop with key experts (from among others, government, private sector, academia, international organisations and civil society). The Consultant will prepare initial RRA service-resource pair templates from the Background Paper and continue to assist during the RRA Expert Workshop to complete the templates, draft Action Plan based on workshop results. The Consultant will also draft a report based on the filled in workshop service-resource pair templates and actions proposed by National Expert Group (5 days).
- d. Assist IRENA in arranging high level meetings with decision makers and include key discussion points to be fed into the draft report (2 days).
- e. Prepare a draft RRA report detailing the service-resource pairs, draft Action Plan and substantiating information from the Background Paper. Present the comprehensive draft RRA Report for consideration by the RRA Advisor, RRA Focal Point and IRENA (10 days).
- f. Prepare for an RRA Validation Workshop, send invitation and receive confirmation of attendance. Assist in all logistical preparation of the RRA Validation Workshop with the RRA Focal Point, discuss the RRA draft Report during the workshop (4 days).
- g. Incorporate additional inputs from the RRA Validation Workshop into the final RRA Report. Send it to IRENA (who will send to other peer reviewers) and incorporate comments including from RRA Advisor and RRA Focal Point. Present the final RRA Country Report (6 days).

Note: The number of days for the Consultant are approximate and will vary from one country to the next.



Installation of solar panels in the village of Sine Moussa Abdou, Senegal
Courtesy of INENSUS West Africa S.A.R.L

Tool B: Outline for RRA Country Background Paper

Table of Content

A. Country Overview

- ♦ Geographic factors: location, climate, topography.
- ♦ Social indicators: population, rural to urban population ratio, migration, education, employment level.
- ♦ Governance structure: political arrangement, roles and responsibilities.
- ♦ Economic indicators: gross domestic product (GDP) per capita, main sources of GDP, national annual budget (energy specific), % of GDP spent on energy, poverty (Human Development Index - HDI), employment, key industries, trade and development, ease of doing business.

B. Energy Resources, Technologies, Markets and Infrastructure

- ♦ Energy resource availability and access: national energy balance, types of domestic energy resources, current exploitation, forecasted demand and supply trends, external/imported energy resources, access levels for primary and secondary energy (rural/urban).
- ♦ Renewable energy resource potential: technical and economic, tabulated potentials and maps (existing data, satellite data, modelling, new measurements).
- ♦ Renewable energy technology options: available conversion technologies (bioenergy, geothermal, hydro, marine, solar, wind), type and range of suppliers, renewable energy generation for electricity (grid, decentralised – standalone/mini grid), motive, thermal and transport.
- ♦ Infrastructure: roads, rail, marine, telecommunications, power utilities (electricity generation, transmission, purchase, distribution), current grid infrastructure (capability for integration of variable power sources), grid integration with neighbouring countries.
- ♦ Markets: prices for available primary and secondary energy, adoption rate of the available renewable energy technologies, price trends and forecasts demand for renewable energy power and its management, value chain renewable energy market structure (resources, installation, distribution, operation and maintenance, users), sales of various products and services for technologies, barriers and risks.
- ♦ Energy policy, strategy and reforms: regional/national/subnational energy (vision, objectives and targets), rural electrification plans/strategy (objectives and targets), environmental policies

C. National Energy Policy and Strategy

- ♦ Renewable energy policy or specific mandate (objectives and targets): renewable energy roadmaps and action plans, portfolio of incentives for renewable energy.
- ♦ Policies and programmes: from other sectors (health, agriculture, sanitation, education, gender/social welfare) that include renewable energy technologies as part of their development (forestry, health, water, education, women/social welfare, etc.).



Meeting on locally built small wind turbine for rural electrification in Dakar, Senegal
 Courtesy of Eol Senegal

D. Institutions and Regulation

- ◆ Governance structure: ministries, renewable energy department/centres structure, regulatory bodies (energy/electricity regulation/standards, etc.), rural electrification agencies/rural energy agencies.
- ◆ Regulation: renewable energy or electricity law with provision for renewable energy, legal framework for utilities and Independent Power Producers (IPP), structure of Power Purchase Agreement (PPA), tariff structure, grid code, investment code, process for managing conflicts (e.g. grid connection), etc.
- ◆ International actors: bilateral and multilateral organisations, donors.
- ◆ Non-government institutions: types (civil society, Research and Development (R&D) institutions, financial institutions, private sector), roles and responsibilities (for all).

E. Capacity Needs

- ◆ Education and training institutions for renewable energy (technical, management, maintenance, policy, etc.).
- ◆ Renewable energy research and development: public and private, structure, relationship with energy industry, areas of expertise.
- ◆ Other providers of capacity building: civil society, donors, corporates, etc.
- ◆ Knowledge and skills along the supply chain: including resource assessments, policy and regulation, procurement, finance, management, operation and maintenance, etc.
- ◆ Cross sectional knowledge (e.g., technical vs. finance), gaps.

F. Business Model

- ◆ Renewable energy business model: off-grid (stand alone and mini grids) and on-grid business models; management models, operation and maintenance, power generation costs, product costing, effect of direct and indirect financial incentives, successful business models
- ◆ Financing renewable energy projects: availability and types of financing, gaps, risks, opportunities for domestic and international financing/funding

Note: Section D should go beyond descriptive and provide an analysis on the roles and relationships of mentioned institutions.
 Please refer to data collection information points for Background Paper in Annex 1.

Box 4

Outline agenda for the RRA Expert Workshop

- ◆ Opening session - RRA Advisor
- ◆ Overview of conducting an RRA and expected outcomes - IRENA
- ◆ Background paper and presentation of service-resource pair - RRA Focal Point
- ◆ Presentation of current status of each service-resource pair - Consultant
- ◆ Discussion and analysis of each service-resource pair - National Expert Group divided in sub-groups
- ◆ Presentation of finalised templates - Sub-group representatives
- ◆ Consensus on all templates - RRA Focal Point and Moderator

The key challenges and issues from the Background Paper could be guiding pointers for the RRA Core Team to identify regional and global experts to join the National Expert Group. The outline for the Paper is provided in Tool B and a more detailed list of metrics for the data/information that need to be collected are provided in Annex 1.

Upon the completion of the Background Paper, the document is disseminated by the Ministry to the National Expert Group who will be convened to a meeting with the objective of determining the service-resource pairs that are most relevant to the country (see Table 1). The National Expert Group needs to involve decision makers, these could be from the Directorate of Renewable Energy, Directorate of Electricity, Ministry of Agriculture/Forestry (relevant to the country), utility, regulatory body and the National Planning Board (and

other relevant experts deemed relevant by the RRA Advisor).

It is important to note that the RRA is not a technology focussed assessment. However, the selection of service-resource pairs is an important and critical activity of the RRA and are usually identified based on the findings presented in the detailed Background Paper. The identified and selected pairs need to align with the country's objectives and priorities. For example, a country with abundant solar resources may select the resource pair "off-grid solar - electricity" if the targets to increase electrification action in rural areas is a high national priority.

The criteria for service-resource pair selection include (but are not limited to):

- ◆ Adequate assessment of renewable energy sources and support for grid and institutional infrastructure to harness the resource.
- ◆ Availability of renewable energy technologies at national level, its maturity at the global level and local capability for manufacturing, building, operating and maintaining.
- ◆ Socio-economic contribution to national priorities.
- ◆ Scope for up-scaling and replication-presence of business models.
- ◆ Commercial viability and availability of financing.

ACTIVITY 1.4 - PREPARATION OF RRA EXPERT WORKSHOP

A national RRA Expert Workshop (see outline of the Agenda in Box 4) needs to be conducted to discuss in depth the

prioritised service-resource pairs. National experts relevant to the service-resource pairs need to be identified by the RRA Core Team. Depending on the identified service-resource pairings, experts could be invited from the following:

- ◆ **Government bodies:** Ministry of energy, agriculture, health, water, finance (national and regional), environment and or sustainable development, regulatory body, public R&D institutions (including universities), inter-governmental bodies (regional entities, power pools, etc.)
- ◆ **Utilities:** public, private, others.
- ◆ **Private:** project developers, manufacturers, product suppliers, service providers, renewable energy associations, business chambers/forums, etc.
- ◆ **Financing institutions:** banks, micro-finance institutions, credit associations, investment funds providers, etc.
- ◆ **Civil society:** non-governmental organisations, renewable energy associations, academia, etc.

Aside from the national RRA Expert Workshop, a series of interviews are conducted by IRENA with a range of senior decision makers from public and private sectors, key donors, and academia amongst others, all of whom have a critical role in the deployment of renewable energy. This is of particular importance as these decision makers may not attend the workshop,

but it is important to interact with them to ensure stronger validation of the process and its outcomes. The broad vision and overview that they possess will enrich the findings of the RRA. Members interviewed could include Vice Minister/Permanent Secretary level officers from ministries, high-level representatives from the regulatory body, head of the utility, chief of the regional power pool, head of rural electrification agency, head of national development bank, CEO of independent power generating companies, senior officials from multilateral and bilateral funding agencies, amongst others.

PHASE 2 - COUNTRY ASSESSMENT AND ACTION PLAN

The main element of this phase is to hold detailed discussions relating to the service-resource pairs in the RRA Expert Workshop and to draw up actions. The commitment and involvement of the ministry is integral to this phase, especially in countries with less developed institutional structures, where roles and responsibilities may not be clearly defined.

Objectives:

- ◆ To conduct a detailed assessment workshop with experts in the identification of issues pertaining to relevant service-resource pairs and proposed actions.
- ◆ To prepare a draft RRA report.



Table 4: Activities, expected outputs, responsibilities and timeline for phase 2

Main activities	Expected outputs	Responsibilities	Timeline
A2.1 RRA Expert Workshop: detail discussion on identified service-resource pairs	<ul style="list-style-type: none"> RRA Expert Workshop conducted. Relevant service-resource pairs templates filled in detail 	<ul style="list-style-type: none"> Consultant, National Expert Group, IRENA 	Week 11-12
A2.2 RRA Expert Workshop: draft an Action Plan	<ul style="list-style-type: none"> Action templates filled out with the proposed actions for each finalised service-resource pair Action Plan drafted 	<ul style="list-style-type: none"> National Expert Group, Consultant 	Week 11-12 Week 13
A2.3 Prepare draft report and plan for the RRA Validation Workshop	<ul style="list-style-type: none"> Interviews with high level stakeholders conducted and fed into the draft report Draft report finalised and circulated Detailed plan for RRA Validation Workshop finalised Templates and draft Action Plan are sent to IRENA for review and inputs to prepare for the RRA Validation Workshop 	<ul style="list-style-type: none"> IRENA Consultant Consultant / Focal point 	Week 11-14

ACTIVITY 2.1 - RRA EXPERT WORKSHOP: DETAILED DISCUSSION ON IDENTIFIED SERVICE-RESOURCE PAIRS

During the RRA Expert Workshop, the service-resource pair template (see Tool C) is the primary tool to be utilised by the group. Before the workshop, the Consultant is expected to fill out the “Current status” portion of the templates (for each service-resource) based on data and information from the country Background Paper (See Annex 1). The National Expert Group will review this information and further discuss the issues, opportunities and actions for the five elements in each service-resource pair template. Each service-resource pair template has to be filled in for the following elements:

- Energy Resources, Technologies, Markets and Infrastructure
- National Energy Policy and Strategy
- Institutions and Regulations
- Business Model
- Capacity Needs

It is important to reiterate that capacity needs are cross cutting and each of the other four elements will require this trait to be completed. For example “National Energy Policy and Strategy – Capacity needs, Business model – Capacity needs, etc”. A filled in example of Tool C template is provided in Annex 3.

Table 5: Main operational activities to be completed for phase 2

	Operational checklist	Ministry	IRENA	Consultant	EG*
A2.1	Identify and recruit an experienced moderator for the RRA Expert Workshop	✓	✓		
	Organise RRA Expert Workshop with key experts identified based on the service-resource pairings and ensure good representation in each group	✓	✓	✓	
	Complete service-resource pair templates			✓	✓
A2.2	In line with each service-resource pairs, identify and agree upon a key set of actions. Start to develop detailed description of actions and prepare a draft Action Plan.	✓		✓	✓
	Cross-check all service-resource templates for any anomalies			✓	
A2.3	Prepare a list of high level decision makers to be interviewed and contact them for interviews			✓	
	Conduct interviews with high level decision makers with an aim of engaging them further for RRA follow up action. Include important actions in the draft report		✓	✓	
	Finalise the stakeholder list for RRA Validation Workshop. Send invitation and get confirmation of attendance. Invitations to be sent out by the Ministry (RRA Advisor) to receive maximum commitment from the participants	✓		✓	

Note: Highlighted responsibility (in red) implies the main lead
 *EG: Expert Group

After the identification of issues in each service-resource pair, action plans for the short- to medium-term identified by the National Expert Group are further deliberated upon in the workshop. The moderator needs to steer the discussion in the right direction, make sure that service-resource pair templates are filled in, and facilitate consensus building. This will allow the experts to come up with firm corrective ac-

tions (2 per service-resource pair; maximum of 10 in total). Table 6 provides some examples of completing the RRA service-resource pair template. It must be noted that these are not exhaustive. The data on current status should already be available from the Background Paper and the Consultant needs to provide this or can fill in this part of the service-resource pair templates prior to the RRA Expert Workshop.

Tool C: RRA Service-Resource Pair Template

	1	2	3	4
	National Energy Policy and Strategy	Institutions and Regulations	Energy Resources, Technologies, Markets and Infrastructure	Business Model
Current status				
Issues to be resolved				
Capacity Needs				
Opportunities and actions				



Wind Blade Manufacturing in Pemba, Mozambique
Courtesy of Renewable World

Table 6: Example to fill the RRA service-resource pair template in the RRA Expert Workshop

RRA Element: Renewable Energy Resource, Technology, Markets and Infrastructure				
RRA Elements and Sub-Elements	STEP 1 – Current Status (from Background Paper) (example for discussion)	STEP 2 – Issues to be Resolved (example for discussion)	STEP 3 – Capacity Needs (example for discussion)	STEP 4 – Opportunities and Actions*
Renewable energy resource assessment and potential	<ul style="list-style-type: none"> Resource availability – current exploitation, geographical/topography Resource potential – technical and economic 	<ul style="list-style-type: none"> Data availability and gathering Data reliability 	<ul style="list-style-type: none"> Number of institutions collecting data on resource assessment – current/potential Levels of skills and knowledge available in country (in scale) 	(Workshop group fills in)
Renewable energy technology options, markets and infrastructures	<ul style="list-style-type: none"> In Units (kWh/m^2, m/s^3, MW^4, etc.) Location of resources (district, regions, etc.). GIS mapping, other maps 	<ul style="list-style-type: none"> Quality/Standard Costs (Initial investment, LCOE⁶, etc.) Market penetration – size of the market, ability and willingness to pay, etc. Ability (technical) of the grid to integrate variable power Power shortages and demand side management 	<ul style="list-style-type: none"> Ability of the grid operator to understand and manage variable power Levels of skills and knowledge available in country – manufacturing, distribution, etc. 	(Workshop group fills in)

2 Where kWh/m^2 is kilowatt-hours per square meter. **3** Where m/s is metre per second. **4** Where MW is Megawatt .

5 Where GWh is Gigawatt-hour. **6** Where LCOE is the levelised cost of energy .

RRA Element : National Energy Policy and Strategy				
RRA Elements and Sub-Elements	STEP 1 – Current Status (from Background Paper) (example for discussion)	STEP 2 – Issues to be Resolved (example for discussion)	STEP 3 – Capacity Needs (example for discussion)	STEP 4 – Opportunities and Actions*
National energy policy and strategy	<ul style="list-style-type: none"> ◆ National energy policy ◆ Presence of a national renewable energy policy ◆ Presence of RET⁷ targets in policies and strategies (including actions) other than energy sector ◆ Presence of a policy that facilitates investment /encourages private sector participation (Fiscal policies) 	<ul style="list-style-type: none"> ◆ Weaknesses ◆ Conflicts in policy ◆ Socio-environmental conditions and effects (land, water, human rights, gender) 	<ul style="list-style-type: none"> ◆ Government – internal capacity in relation to policy and strategy targets, ability to monitor and evaluate. ◆ Knowledge of private sector needs 	(Workshop group fills in)

7 Where RET is Renewable Energy Technologies.

Table 6				
RRA Element : Institutions and Regulations				
RRA Elements and Sub-Elements	STEP 1 – Current Status (from Background Paper) (example for discussion)	STEP 2 – Issues to be Resolved (example for discussion)	STEP 3 – Capacity Needs (example for discussion)	STEP 4 – Opportunities and Actions*
Institutional structures	<ul style="list-style-type: none"> ◆ Current energy institutional structure { Government (Govt.)} ◆ Specific renewable energy department/ centres (Govt.) ◆ Renewable Energy institutional landscape 	<ul style="list-style-type: none"> ◆ Organogram of the energy institutional landscape ◆ Renewable energy fit within the energy institutional landscape (Govt.) ◆ Number of technical/ non-technical staff working for the renewable energy division (Govt. and other institutions) 	<ul style="list-style-type: none"> ◆ Co-ordination (Conflicts) between institutions, clarity of roles and responsibilities ◆ What are the capacity gaps in the institutions? ◆ R&D in renewables 	(Workshop group fills in)
Regulatory: regulations and legal processes for projects, standards, quality testing, IPPs, structure of PPAs	<ul style="list-style-type: none"> ◆ Presence of a body in charge of energy/ electricity regulation ◆ Presence of a renewable energy law or electricity law with provision for renewable energy ◆ National standards agency – details on renewable energy standards, presence of technical committees, adoption, etc. 	<ul style="list-style-type: none"> ◆ Does the grid code facilitate the integration of renewables? ◆ Number of technical/ non-technical staff working for the renewable energy division (Govt.) 	<ul style="list-style-type: none"> ◆ Conflicts of arrangement between regulatory bodies (e.g. Rural Energy Agency vs. Electricity regulator) ◆ Gaps in the regulation for private sector and utilities ◆ Impact of existing regulations ◆ Challenges related to environmental licencing 	

RRA Element: Business Models		STEP 1 – Current Status (from Background Paper) (example for discussion)	STEP 2 – Issues to be Resolved (example for discussion)	STEP 3 – Capacity Needs (example for discussion)	STEP 4 – Opportunities and Actions*
RRA Elements and Sub-Elements					
Developing renewable energy projects	<ul style="list-style-type: none"> ◆ Supply chain (installation, distribution, operation and maintenance) ◆ Management models ◆ Number of companies involved along the supply chain, incentives for developing renewable energy projects, and along the supply chain ◆ Public, private, Public-Private-Partnerships, cooperatives, concessionaries, small and medium enterprise (SMEs), communities 	<ul style="list-style-type: none"> ◆ Challenges along the supply chain ◆ Perception of the renewable energy sector as high risks ◆ Socio-environmental barriers and challenges (land, water, human rights, gender) 	<ul style="list-style-type: none"> ◆ Capacity for projects along the supply chain, including operation & maintenance ◆ Financing capacity ◆ Lack of knowledge of the renewable energy sector by financiers 	(Workshop group fills in)	
Financing renewable energy	<ul style="list-style-type: none"> ◆ Ease of doing business ◆ Availability/types of financing ◆ Opportunities for domestic and international financing/funding ◆ Assets registration (property), investor protection, trade treaties across borders, contract enforcements, etc. ◆ Number of financing institutions and mechanisms favouring renewable energy (grants/loans/risk guarantees from donor/multilateral and bilateral agencies, development banks, Clean Development Mechanism (CDM), foreign and domestic investments) 				

*Analyse information from step 1 to 3 and fill in

ACTIVITY 2.2 - RRA EXPERT WORKSHOP: DRAFT OF AN ACTION PLAN

Each discussion group presents the final list of suggested action plan/s to overcome the gaps that arise using the Action Plan template example (Table 7). To avoid extensive or vague action plans, use of the SMART concept (Specific, Measureable, Achievable, Realistic, and Time bound) is important to ensure that the proposed

will need to have specific skills to deliver the required task, and may not necessarily be a renewable energy expert. It is the role of the Consultant to check that the technical elements are well covered.

The Consultant will also need to prepare a report of the RRA Expert Workshop with inputs from the moderator that includes the feedback on the Background Paper and the finalised version of the filled in templates

Table 7: Example of an Action Plan template from Ghana

Service – resource pair(s)	Off grid – solar
Action	Devise appropriate end-user financing mechanisms including the mobilisation of funding to enhance affordability of off-grid renewable energy systems based on lessons learnt under the GEDAP project.
Actors	Ministry of Energy, financial institutions, Association of Ghana Solar Industries, Sustainable Energy Network of Ghana, project developers
Time frame	February 2013 – December 2013
Indicator for success	Signed agreement between X and Y

Note: All actions need to be SMART

actions are attainable within a short- to medium-time frame (3-5 years). An example is proposed in Table 7.

In addition to the Consultant and the RRA Core Team, an external moderator will need to be brought in to moderate the RRA Expert Workshop. All necessary information need to be provided by the Consultant who will be working closely together to prepare the workshop sessions including the expected outcomes. The role of the moderator is important in this process as an Action Plan needs to be drafted succinctly, and a common understanding achieved. She/he

and draft Action Plan. These would need to be circulated to all the stakeholders who will be attending the RRA Validation Workshop.

ACTIVITY 2.3- PREPARATION OF DRAFT REPORT AND PLANNING OF RRA VALIDATION WORKSHOP

The Consultant would need to consolidate the filled up RRA service-resource pair templates as well as the Action Plan templates, synthesise all findings from the RRA Expert Workshop and finalise a draft RRA report. This report needs to be circu-

Box 5

Engaging the civil society in Grenada

Civil society and non-governmental organisations play an important role in building awareness and bring perspectives of social and environmental integrity in the wide-scale renewable energy deployment. In light of this, it was crucial to engage with civil society at an early stage of the RRA to ensure buy-in and ownership. The incorporation of feedback from these organisations into the RRA is important to the successful implementation of the recommendations contained in the document.

In addition, a separate meeting was also organised with the member organisations of the Non State Actors Panel (NSAP), an umbrella civil society body. The NSAP membership is diverse, consisting of organisations such as, the Agency for Rural Transformation (ART); North East Farmers Association; Grenada Association of Poultry Producers; Grenada Network of Rural Women Producers; National Development Foundation and Friends of the Earth-Grenada. The key outcome of the meeting was the validation of some of the workshop recommendations. The NSAP and the representative members were particularly supportive of standalone renewable energy technologies, especially to provide affordable and sustainable energy supply to individuals and communities.



lated to the RRA Core Team and National Expert Group before being circulated to other stakeholders prior to the RRA Validation Workshop.

The RRA Validation Workshop agenda (Box 6) is drafted by the Consultant and reviewed by the RRA Core Team before it is sent to the participants. In addition to the National Expert Group, a wider set of stakeholders need to be invited for the RRA Validation Workshop. Invitation letters are prepared by the Consultant/RRA Focal Point, but they should be signed and sent by the latter at least two weeks in advance in order to increase the level of commitment from the invitees.

Additional invited stakeholders could be:

- ◆ Government bodies: ministries, regional bodies (not represented during expert group workshop)
- ◆ Development partners/ funding organisations
- ◆ Industry associations (chamber of commerce, etc.)
- ◆ Wider civil society (see Box 5)

This group will comprise the Validation Stakeholder Group.

PHASE 3 – COUNTRY VALIDATION AND FINALISATION OF RRA

In this phase, the various service-resource pairings including the Action Plan are validated. The phase concludes with the production of a published report.

Objectives:

- ◆ To discuss and validate the draft RRA report through a wide stakeholder consultation.
- ◆ To synthesise all results and action plans, and convert into a coherent, well edited, policy relevant report to be presented to decision makers and development partners.



Roof-top solar in Kiritimati Island, Kiribati
Courtesy of Bruce Clay



Table 8: Activities, expected outputs, responsibilities and timeline for phase 3

Main activities		Expected outputs	Responsibilities	Timeline
A3.1	RRA Validation Workshop: refinement and finalisation of country Action Plan	<ul style="list-style-type: none"> ◆ Wider stakeholder validates both the service-resource pairings and prioritises appropriate actions, Consensus achieved on RRA draft report 	<ul style="list-style-type: none"> ◆ Consultant, country stakeholders, RRA Core Team 	Week 15
A3.2	Preparation and publication of the RRA Report	<ul style="list-style-type: none"> ◆ Workshop findings incorporated into a final RRA draft report ◆ Draft RRA report peer reviewed by at least five experts ◆ Publication of country RRA reports 	<ul style="list-style-type: none"> ◆ Consultant ◆ IRENA ◆ IRENA 	Week 18 (and onwards)

Table 9: Main operational activities to be completed for phase 3

	Operational checklist	Ministry	IRENA	Consultant	WP*
A3.1	RRA Validation Workshop roles and responsibilities made clear for organisers as well as participants. Logistical arrangements for workshops are made by the Focal Point and the Consultant	✓		✓	
	Discuss the RRA draft report and validate in the workshop. Finalise a workshop report			✓	✓
A3.2	Incorporate additional inputs from RRA Validation Workshop into the final draft RRA report			✓	
	Peer review the draft report and finalise the RRA report	✓	✓	✓	

WP*: Workshop Participants
 Note: Highlighted responsibility (in red) implies the main lead.

ACTIVITY 3.1 - RRA VALIDATION WORKSHOP

The RRA Validation Workshop allows for a wider stakeholder consultation and agreement on the outcomes of the RRA including validation of the proposed actions. Box 6 outlines an agenda for the workshop.

RRA Validation Workshops can also be tailored to a specific country need, an example of Peru is provided in Box 7.

ACTIVITY 3.2 - PREPARATION AND PUBLICATION OF RRA REPORT

An important step in the finalisation of the RRA report is a peer review process that will involve experts at the national, regional or international level. This will be conducted by IRENA in consultation with the RRA Focal Point and Consultant. The report is finalised and published by IRENA after approval of the Ministry. This comprehensive country assessment report will

provide the platform for follow-up implementation activities based on the country's Action Plan.

Box 6

Outline of an agenda for the RRA Validation Workshop

- ◆ Opening session –RRA Advisor
- ◆ Overview: Conducting an RRA and expected outcomes – RRA Focal Point
- ◆ Renewable energy sector overview – Consultant
- ◆ Presentation of findings and discussions–Representative from National Expert Group
- ◆ Validation of proposed country Action Plan– Validation Stakeholder Group

Box 7

Adapting the RRA in Peru

As a result of a strong economic growth, financial institutions in Peru currently enjoy a high level of liquidity, but credit lines to renewable energy projects have not grown proportionately. As part of the Peru RRA, a specific discussion group was set up during the RRA Validation Workshop, to identify barriers to the expansion of credit for renewable energy projects. Some of the findings were as follows:

- a) While the bankers are comfortable in assessing commercial risks of renewable energy projects they have limited experience and understanding regarding assessment of technology risks.
- b) There is limited knowledge in structuring financial products to mitigate risks associated with renewable energy especially in the case of geothermal energy.

Possible ways forward:

- a) Building capacity in the banking system for evaluating technology risks associated with renewable energy technologies. This could potentially be undertaken under the sponsorship of the Association of Banks of Peru (ASBANC), the Ministry of Energy and Mines and the Peruvian Association of Renewable Energies.
- b) Build a structured interface to improve the flow of information in potential business opportunities for renewable energy between investors and banking representatives.
- c) Share best practices from developed markets on experiences of structuring different products to mitigate risks associated with renewable energy projects.

PHASE 4 - FOLLOW UP

The final RRA report provides a clear roadmap of the actions that need to be taken in order to gain traction and achieve results. IRENA, with the country governments and development partners, will follow up with a series of interactions that are meant to:

- i) further assist the country in realising its goals and targets for renewable energy deployment
- ii) provide the opportunity for coun-

tries to deepen their assessment on a selected topic

- iii) assess the outcomes of the RRA on the country renewable energy sector development
- iv) receive feedback from the country on the RRA and any areas of improvement, and
- v) share the knowledge that was created with other countries.

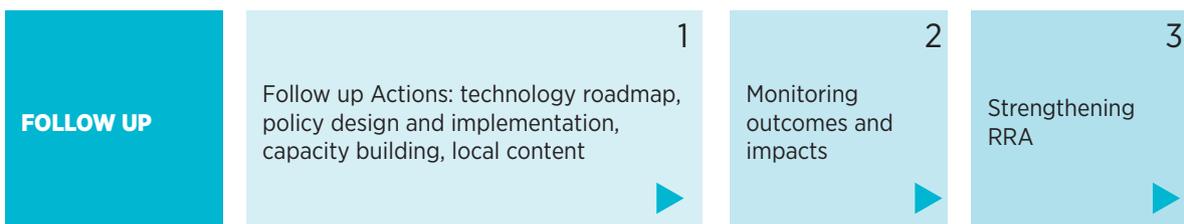


Table 10: Activities and expected outputs for phase 4

Main activities		Expected outputs
A4.1	Follow up of actions proposed in the RRA report and/or additional advisory services	<ul style="list-style-type: none"> ◆ Actions proposed in RRA report are implemented ◆ Additional advisory services provided by IRENA/development partners
A4.2	Monitoring of RRA outcomes and impact	<ul style="list-style-type: none"> ◆ Concrete actions established and results disseminated
A4.3	Strengthening RRAs	<ul style="list-style-type: none"> ◆ Reviews of RRAs conducted and improve the process

Table 11: Main operational activities to be completed for phase 4

Operational checklist		Ministry	IRENA	DP*
A4.1	Utilise RRA report to suitably implement proposed actions	✓		
	Conduct follow-ups through IRENA advisory services as requested		✓	✓
A4.2	Monitor progress of implemented actions	✓	✓	✓
A4.3	Incorporate lessons learnt into new RRAs		✓	

DP*: Development partners

Note: Highlighted responsibility (in red) implies the main lead.

Objectives:

- ◆ To follow up the Action Plan and where necessary provide the opportunity to deepen assessments in key relevant topics.
- ◆ To continually learn lessons and feed it into new RRAs, share information and co-ordinate actions with relevant stakeholders.

ACTIVITY 4.1 - FOLLOW UP

The essential outcome of the RRA is an Action Plan that presents an opportunity for all stakeholders to play a role in assisting the country to realise its goals, through sharing knowledge, skill enhancement, and financing amongst others. Governments, IRENA and development partners will

individually or in partnership work together to act upon the proposed Action Plan. In some cases, the recommended actions may need to be sequenced to create maximum impact. Examples could be to support the development or capacity of a regulatory body before supporting a major policy reform, and to integrate packages of measures such as active engagement with investors before - and in the process of designing new financing mechanisms.

The follow up is expected from all three key partners in an RRA:

- ◆ **Governments:** Participating Governments can take up the respective actions outlined in the RRA report, such as passing a Renewable Energy Law, arranging an inter-ministerial commit-

Table 12: Follow up activities and expected results

Main activities	Expected output	Responsibilities
Assisting in the implementation of Action Plans	Identified areas of further collaboration between the country and IRENA/ development partners	Government/IRENA/Development Partners
Conducting in-depth assessments	Applied RRA additional modules - advisory services	Requesting organisation/Consultant/ IRENA
Disseminating successes	Shared RRA success	Government/IRENA/ Development Partners

tee on renewable energy and others. Governments can actively use the RRA document to shape dialogues and garner support for the actions identified therein. Many countries produce documents that provide detailed long term visions, but these may not often possess the granularity that can easily guide the vision throughout implementation. The RRA is comparatively advantageous as the short- to medium-term plans may be readily converted into real actions that would spur markets and deployment of renewable energy.

In Senegal, the RRA galvanised government actions to further accelerate the enactment of two decrees under the Renewable Energy law (See Box 8), while in Grenada it encouraged the revision of the existing Electricity Supply Act to increase the intake of renewable energy. Wherever assistance is required, governments can also reach out to IRENA or development partners to provide guidance or targeted support in designing appropriate policies, regulations and programmes.

- ◆ **Development partners:** Development partners can also simultaneously pick up actions or activities for further

support, such as funding for specific projects, technical assistance and others according to their own vision and plans. As the RRA is refined, it is expected that development partners will play an integral and significant role in the process, and supportive actions can be identified and determined from early stages.

Development partners can be an integral part of an RRA from initiation till the follow up phase. The RRA will provide the opportunity to be engaged consistently with the different stakeholders in the country and lay a foundation for undertaking solid actions.

- ◆ **IRENA:** The RRA follow up phase includes several activities such as undertaking a deeper assessment on a specific subsector of renewable energy or assessing the progress against the proposed RRA actions. Based on the feedback from the countries, the pertinent areas for the provision of advisory services include: capacity needs assessment, resource assessment, technology roadmaps, local content and finance. The advisory services will be offered to countries where RRAs have been conducted and upon

Box 8

Senegal – paving the path for increasing renewable energy deployment using RRA

Senegal, in demonstrating its strong and consistent support to IRENA and its mission, volunteered to conduct the first RRA pilot study in November 2011. The RRA identified among others, specific actions focusing on finalisation of the legislative frameworks for renewable energy and biofuels, including financial support measures. The strong government ownership of the process accelerated the enactments of two pending decrees under the aegis of the Renewable Energy Law:

- ◆ **Decree No. 2011-2013** providing conditions of power purchase and remuneration for electricity generated by renewable energy plants and the conditions of their connection to the grid was enacted in December 2011;
- ◆ **Decree No. 2011-2014** provides conditions for purchase of surplus renewable power from producers of electricity primarily for self-consumption.



Solar Water Heater in rural area in Senegal
Courtesy of Enersol

The enactment of the decrees laid the foundation for further support from the EUEI Partnership Dialogue Facility (EUEI PDF) through the Africa EU Renewable Energy Cooperation Partnership (RECP) to assist the regulator (Commission de Regulation du Secteur de l'Electricite) in designing FiTs and model PPAs, and building the capacity of the regulator and Ministry of Energy to apply these tariff models and PPAs. The RRA also provided critical insights to formulate a Renewable Energy Strategy that the World Bank is now assisting the government of Senegal in articulating.

request. Advisory services may focus on a particular sector each year. IRENA will assist countries to build strategies for assessments (e.g. resource) and simultaneously identify needs for technical assistance and funding.

In addition to the repertoire of advisory services that can be provided by IRENA, the RRAs would also have identified actions that would require collaboration with other international organisations and development partners. IRENA will facilitate the interaction with such entities, including the private sector in order to support the implementation of the Action Plan formulated by countries.

A follow-up strategy would guide

IRENA in supporting RRA countries achieve higher renewable energy deployment in the short- to medium-term scale. The expected outcomes from this activity are a more detailed assessment and a series of additional actions focused on one subsector of renewable energy that is deemed crucial for the development of renewable energy sector, or to align with other government policies such as development of local content. Three of the advisory services are explained briefly as follows:

Capacity needs assessments: The advisory services on capacity needs assessment will assist countries identify and take decisions on the appropriate capacity-building needs and

Box 9

Advancing the small hydropower sector in Mozambique – A catalyst for entrepreneurship development

In Mozambique, the RRA actors identified significant potential for developing small hydro projects in the country, thereby taking advantage of the grid network and extension plans being coordinated by the Electricidade de Moçambique (EDM). Development of small hydropower projects along the grid could offer significant reductions in grid losses of 25% through distributed generation closer to consumption. Some of the actions recommended in the RRA to promote small hydropower in Mozambique were as follows:

- ◆ EDM could take a small equity stake in small hydropower projects to reinforce the credibility of its long-term PPA.
- ◆ The Ministry could work with the donor group to develop a partial risk-guarantee fund with financial institutions in Mozambique to promote lending to small hydropower projects.
- ◆ A system of feed-in tariffs could be developed to provide long-term PPAs, access to the grid and attractive return on investment to promote IPPs in this sector.



Rotanda hydropower project in Mozambique
Courtesy of FUNAE, Fundo de Energia

- ◆ Consultations could be held with stakeholders to design a simpler process for environmental impact assessment (EIA) for small run-of-the-river hydropower plants.

With the RRA, Mozambique has taken the first steps towards promoting small hydropower IPPs. Mozambique enjoys high human capital with a number of technical institutes teaching hydro power engineering. The RRA may open a new chapter of renewables based local enterprise and provide highly qualified technical professionals a way to move from being employees to providing employment. Key bilateral partners have indicated their willingness to support Mozambique in this venture through joint ventures with technology providers and financiers.

interventions. It may range from the creation of an enabling environment for renewables, particularly for investments and through the supply chain for the deployment of various renewable energy technologies.

Capacity needs assessments will be detailed, and will go beyond the focus on service-resource pairs. Assessments will be participatory and there will be a focus on the intersection of needs between governments, private sector and utilities. The creation and reten-

tion of human capacity at all levels will be assessed in detail. Appropriate action plans will be determined at the end of the assessments. Linkages between and amongst various countries or regions and/or development partners will be made wherever possible for skills, knowledge and technology transfers amongst others.

Renewable energy resource assessments: The availability of accurate, reliable and readily accessible data helps a country and communities

access their resources and accelerate deployment of renewable energy resources by providing input to energy supply plans. Renewable energy resource assessments will aim to inform future industry investment analysis, decision-making and government policy development. The information and knowledge generated will enable governments and the community to make informed decisions about the exploitation of resources, the management of the environment, and the safety of critical infrastructure.

The renewable energy resource assessments will also bring together public information from a range of domestic and international sources, as well as the latest information held by scientific centres, research institutes, universities and government institutes. These sources could be from existing data, satellite data, modelling and new measurements. Specific technical expertise in sciences and engineering will be tapped to assist countries in the advancement of resource assessments.

Supply chain assessment for possible local manufacturing: The advisory services on developing supply chain assessment will enable countries to assess their comparative advantages for supporting the manufacturing/ local content of the chain or part of it. For each relevant renewable energy technology, strategies to develop absorptive capacities for technology uptake and adaptation to take advantage of regional/global opportunities will be assessed. It will also identify actions needed in the areas of policy to stimulate private enterprise and attract financing.

ACTIVITY 4.2 - ASSESSING IMPACT AND DISSEMINATING INFORMATION

The RRA assessments and information generated by countries could be shared with other countries. One vehicle could be IRENA's knowledge sharing platform with countries. New information generated can be effectively utilised by prospective developers, investors and donors of renewable energy in the specific countries. It is important to document outcomes and impacts of the RRA to learn lessons and garner increased actions. Policy measures, changes in institutional structures around renewables, specific capacity building actions, new partnerships, increased level of programmes and projects, additional budgets, new markets and active engagement of private sector will be impact areas that would be of interest to see whether RRAs fulfil the goal of increasing markets for deployment of renewables.

ACTIVITY 4.3 - STRENGTHENING THE RRA

The RRA is subject to constant review and readjustment. Lessons learnt through initial results and planned impact assessments will feed into this process. The assessment of the usefulness and effectiveness of the RRA will play a major role in ensuring that IRENA fills its mandate to support countries in the deployment of renewable energy. IRENA will track the progress of countries that adopt the RRA, assessing results and impacts gained at the national level, or its translation at the localised levels. This activity entails receiving feedback from the implementing country, the identification of areas of improvement, and updating the methodology of how an RRA is conducted.



Exploiting water resources for hydropower in Honduras
Courtesy of GVEP International

ANNEX 1: Overview of reviewed energy assessment tools and methodologies

Methodology Title	Features	Strengths	Remarks
World Economic Forum Scaling-up RE Methodology Design and Application	<ul style="list-style-type: none"> • Focused on 5 countries • Uses renewable energy lifecycle model (planning and policy, project/programme, scaling-up) • Government, utility and project developers • Regulatory and infrastructure challenges in emerging markets. • Barriers analysis • Qualitative scoring system Traffic light assesment 	<ul style="list-style-type: none"> • Maps challenges across different renewable energy development stages and sub-stages and different stakeholders • Template replicable at national and local levels • Wide consultation with businesses, governments and financial and academic stakeholders 	<ul style="list-style-type: none"> • Non-differentiation for renewable energy technologies, applications (utility scale on-grid or off-grid system) • Non-inclusion of other relevant stakeholders in the renewable energy lifecycle methodology (R&D, consumers, etc.) • High reliance on qualitative barriers analysis • Recommendations are generic
Ernst and Young Renewable Attractiveness Index Methodology Design	<ul style="list-style-type: none"> • Tracks 40 countries • Ranks national renewable energy markets and suitability for individual technologies quarterly • Two major indices: renewables infrastructure index (35%) and technology factors (65%) • Quantitative and weighted scoring system both developed and emerging economies • Macro assessment tool 	<ul style="list-style-type: none"> • Ranking provides an indication on where investments in renewable energy could be made • Quantitative index permits benchmarking and cross country comparisons • Ranking results provide an evolutionary progress (or regression) of renewable energy in countries 	<ul style="list-style-type: none"> • No details provided on how each country index was quantitatively assessed • All indicators (technology factors) may not be uniformly assigned to all countries and ranking may be skewed • Is mainly a tool for investment not for policy
MAKE Consulting Wind Power Market Outlook Methodology Design	<ul style="list-style-type: none"> • Provides forecasts and accompanying analysis to the quarterly outlook for cumulative installed capacity and grid-connected capacity 	<ul style="list-style-type: none"> • Focused on wind energy • Includes latest trends and updates on regulatory, institutional, infrastructural and financial aspects 	<ul style="list-style-type: none"> • Presents new highlights in an ad-hoc manner

Methodology Title	Features	Strengths	Remarks
USAID Stocktaking Report for the Regional Assessment of Renewable Energy for Eastern Europe	<ul style="list-style-type: none"> • A policy framework methodology for renewables • Quantitative and qualitative assessment of legislation, support mechanisms and current markets 	<ul style="list-style-type: none"> • Incorporates country's resource potential in the assessment • Permits comparison between different countries and year to year comparison for the same country 	<ul style="list-style-type: none"> • Summarises country analysis, but no potential for regional comparisons • No identification of actors responsible for action plans
ECOFYS EU Climate Policy Tracker Methodology	<ul style="list-style-type: none"> • Focus on climate and energy policies in the EU-27 • Specific to low carbon related policies • Assessment is made by sector because the ultimate objective is reduction of carbon emissions • Follows a qualitative ranking system (A-G) or on different stages (such as low, limited, significant, high) 	<ul style="list-style-type: none"> • Assesses the same factor on four dimensions that can be visually represented and comparable between countries • Assessment allows country comparison 	<ul style="list-style-type: none"> • Focuses on implemented new policies and does not take into account continued policies or the effect of existing policies • Focuses on showing change rather than on updating the score • The focus is on adopted legislation. Developments are not mentioned if they are considerable, only when it concerns plans
The World Energy Council Energy Sustainability Index	<ul style="list-style-type: none"> • Ranks WEC member countries according to their ability to provide a stable, affordable, and environmentally-sensitive energy system • Rankings are based on a range of country level data and databases that capture both energy performance and the contextual framework 	<ul style="list-style-type: none"> • Provides scores for each factor from 1-100 • Enables comparisons across time and between countries. 	<ul style="list-style-type: none"> • Lack of clarity on the method for selecting the factors used in the assessment • Lack of consideration of financial and human capacity requirements
IEA Country Review Process	<ul style="list-style-type: none"> • Looks at the country's long term energy strategy and the energy policies adopted • Peer review approach, carried out by a visiting team of 10-12 experts composed of the Secretariat and member countries • Broad spectrum of parties active in the energy field consulted, resulting in a set of policy recommendations • The reports draw from a wide range of quantitative and qualitative information sources to provide an overall assessment of the policy landscape 	<ul style="list-style-type: none"> • Peer review process that looks at the comprehensive composition of the energy sector of a country to discuss the current situation and identify the main barriers 	<ul style="list-style-type: none"> • Each country is assessed based on different factors • Conclusions are country specific and unique to each country review

ANNEX 2: The historical development of the Renewables Readiness Assessment

DEVELOPMENT OF THE INITIAL RRA

A standard set of service-resource pair template was designed in the preliminary RRA to identify issues and propose corrective actions under an overarching framework comprising of eight distinct elements - i) national energy and policy; ii) institutional, regulatory and market structures; iii) resource planning, appropriate technologies and infrastructure; iv) cost and incentive mechanism; v) business models and financing; vi) tender, procure and construct; vii) operate and maintain; viii) and human capacity. It was initially proposed that the conditions would be assessed against best practice models, using a ranking metric (A-E). The metrics defined “A” as the application of best practices, and “E” as their non-compliance. This process was discussed at a roundtable meeting in October 2011, attended by experts working in the field of renewable energy as well as practitioners and government representatives from developing countries.

Two RRA pilots were then carried out in Senegal (November 2011) and Mozambique (December 2011). In Mozambique, early engagement between the Consultant and the participants meant significant preparatory work was done as templates were already partially filled from relevant sources. A brief report reviewing the current status of energy policy was produced and distributed to stakeholders in advance of the completion of RRA. In addition to the challenges faced by countries, discussions during the RRA workshops also provided a number of positive examples where participants felt that initiatives had been implemented with a considerable degree of success. The pilots provided a forum for



Mozambique rural village shop solar panel inside Limpopo National Transfrontier Park
 Courtesy of Fredhooger Vorst

experts to raise and discuss issues within the group and to propose appropriate changes on conducting an RRA. Some of the suggested changes were:

- ◆ Reduction of number of RRA elements. The number of elements in each RRA template needed to be reduced to avoid overlaps and repetition. This suggestion was made after the experience of the Senegal assessment.
- ◆ Right mix of quantitative and qualitative information required. It was decided that in addition to the collection of detailed qualitative information, a quantitative approach should also be stressed to capture the facts and experience of national experts in the report.
- ◆ Recognition of good practice to be incorporated in the RRA. It was felt that the RRA should capture information on current good practices and that the notion of a 'best practice model' was not realistic.
- ◆ Recommended actions need stakeholder consent. An important lesson learnt during the implementation of the RRA at this stage, was that the

discussion and eventual agreement of a series of actions was achievable with the right mix of stakeholders.

MID-TERM REVIEW OF THE RRA

A mid-term review was carried out in a workshop in April 2012 by inviting representatives from countries where RRAs had been conducted, intergovernmental organisations, private sectors, NGOs and academia. The participants were presented with the lessons learnt from conducting RRAs in Senegal and Mozambique, experiences from international organisations conducting related work, and the perspective from a middle income country such as Peru. Following presentations, participants engaged in small-group discussions on how to improve the RRA. Discussions were structured around three questions relating to:

- (a) the RRA information gathering process,
- (b) conceptualisation of the RRA, and
- (c) the results of the RRA.

The participating experts emphasised that an RRA needs to have a well-defined objective. It was suggested that the RRA could be utilised as a tool for govern-

ment strategy update, policy formulation, assessment of capacity building needs, mobilising private investment or attracting international donor funding. An important related issue is to determine the drivers or the motivation behind the country's adoption of renewable energy. For example, if the purpose is economic development, the weights of the factors and barriers to assess the country's readiness would differ from that of an assessment of a country adopting renewable energy for energy security. The need for clearly communicating the objectives of RRA to the private sector and disseminating the information to a broad range of stakeholders including end-users, practitioners, policymakers, investors and research institutions was emphasised.

There was also a considerable emphasis on use of quantitative assessments in the RRA to allow comparison and bench-marking. It was felt that more time is needed in the design and implementation stages to make the RRA comprehensive, and that this would need additional resources.

In addition to the identification and discussion of current barriers, it was emphasised that future challenges need to be ascertained and discussed. For example, early stage deployment of renewable energy might not be limited by the grid infrastructure, but as the percentage of deployment increases substantially, the grid must be sufficiently robust. Such an analysis of the current versus the future scenario would make the assessment more applicable.

CONSOLIDATION

Conclusions from the mid-term evaluation workshop, as well as experience from the initial piloted countries, guided the next phase of RRA development. It was decided that efforts should be focussed on sharing

available good practices, and limiting the elements from eight to the current five. In addition, the ranking metric (A-E) was dropped as country teams felt that there were insufficient 'best practice' sheets for comparison and the subjectivity of assessing country performances may provide skewed results.

A strong Background Paper was also to be prepared first to initiate the RRA as the key drivers to promote renewable energy technologies vary from country to country. While economic growth opportunities drive policies in some countries; need for diversification of energy mix, reduced dependence on imports and job creation could be the drivers for renewable energy in other countries. Thus, the Background Paper would identify what the key drivers for renewable energy are, in the country undertaking the RRA but also the interplay between various national priorities. The Background Paper also collects relevant quantitative and qualitative information to build an understanding of the business case to determine the key areas where renewable energy markets can be enhanced.

The RRA in its current form attempts to strike a balance of analysis that simultaneously provides both information and a plan that will allow the country, IRENA and development partners to structure follow up advisory services. Countries that have conducted the RRAs have used the findings to initiate actions within the government, and also start discussions with development partners and the private sector as follow-up actions. The most recent RRA reports have started introducing elements of quantitative analysis. Engagement with countries will be further deepened as IRENA offers advisory services in key areas identified during the process.

ANNEX 3: Example of filled RRA service-resource pair template

Off-grid - solar, Ghana for two RRA elements – business model and capacity needs



Current Status

- Decentralised renewable energy standalone and mini-grid systems have had relatively limited applications in the country; they are primarily energy conservation projects and a handful for self-generation. The main decentralised renewable energy applications being promoted on the Ghanaian market are solar home systems (SHS) and solar lanterns. These technologies are being promoted in the urban, peri-urban and rural Ghana and have generated interest from remote off-grid areas with sparse populations.
- There are two models that are being used to serve the SHS and solar lantern market and these are the dealer-sales and micro credit models.
- There are also a few main distributors (DENG Ltd, Wilkins Engineering Ltd and Wise Energy) of SHS and solar lanterns who act as entry points for the networks of local distributors/retailers. Most of the local distributors/retailers have no formal agreements with the central distributors hence they receive supplies based on a one-off arrangement (and notably on a dealer-sales basis).
- The dealer-sales model (the dominant model employed by the market) is such that there is a feedback mechanism by which end-users report to the point of sale or retailers the problems/faults they encountered while using the systems within the dealer warranty period. There is low financial risk under this model, as the end-users pay for the systems upfront.
- The renewable energy component of the Ghana Energy Development and Access Project (GEDAP) is in place and helping to create the necessary enabling environment for the scaling up of renewable energy businesses.

Issues to be resolved

- Mini-Grid connected systems involve very high investment and transaction cost.
- There is difficulty in assessing affordable and appropriate financing schemes.
- There is inadequate working capital to stock up solar products and the unfavourable tax/duty regime is threatening the commercial viability of most solar systems.
- The high upfront cost of SHS and lanterns systems is a barrier to commercialising solar photovoltaic.
- The problem is further compounded by the fact that a significant part of the price build-up for solar products is accounted for by challenges in the implementation of legislation on import taxes, duties and other charges on imported renewable energy equipment.
- The influxes of inferior solar products in the country, which are normally offered at cheap prices, have been a major concern to retailers/local distributors. This phenomenon is fast eroding public confidence in solar lighting solutions, thereby creating marketing problems for the genuine retailers and local distributors.
- Limited involvement of women in the planning and implementation of energy interventions such as promotion and usage of renewable energy systems.

Capacity Needs

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- Capacity building needs for financial institutions with regard to conducting technical appraisals of energy businesses and the potentials of renewable energy businesses.
- Unavailability of warehousing facilities to keep large quantities of stocks in Ghana.

Opportunities and actions

- An enhanced end-user education (by Association of Ghana Solar Industries and NGO's) on quality solar products (i.e. the technical standards and specifications) on the market to help end-users identify inferior products.
- The Government and other stakeholders should partner with the financial institutions and local banks in providing rural consumers with consumer credits that have proven to be an effective approach in addressing consumer affordability issues.
- Government must enforce the implementation of the current tax policy on solar PV systems, which considers all solar home systems as tax exempt.



Courtesy of INENSUS West Africa S.A.R.L

ANNEX 4: Data collection information for Background Paper

Theme	Sub-Theme	Information required	Data type	Quantitative metric	Source
Country Overview	Geographic factors	◆ Location/Topography	Qualitative/Quantitative	◆ Land area (square kilometre)	◆ National Statistics Office, Multilateral Organisations
		◆ Climate	Qualitative/Quantitative	◆ Degree days, CO2 emissions (metric tonnes per capita)	◆ National Statistics Office, Multilateral Organisations
	Social indicators	◆ Population	Quantitative	◆ Total population, % rural and urban/total population, density	◆ Multilateral Organisations
		◆ Life expectancy at birth (male and female)	Quantitative	◆ In years	◆ Multilateral Organisations
		◆ Education-literacy rate	Quantitative	◆ Adult total (% of people ages 15 and above)	◆ Multilateral Organisations
		◆ Migration	Quantitative	◆ Rate of migration (temporary/permanent)	◆ Multilateral Organisations
	Governance structure	◆ Political arrangement	Qualitative	—	◆ Government
		◆ Ruling entities	Qualitative	—	◆ Government
	Economic indicators	◆ Economic output	Quantitative	◆ GDP per capita (USD)/GDP growth (annual %), inflation consumer prices (annual %)	◆ Multilateral Organisations
		◆ Main sources of economy	Quantitative	◆ % of GDP/sector (primary, secondary, tertiary, remittances etc.)	◆ Multilateral Organisations
		◆ Net official development assistance and official aid received	Quantitative	◆ Current USD	◆ Multilateral Organisations
		◆ Trade and development	Quantitative	◆ Foreign direct investment, net inflows (balance of payment, current USD), Ease of Doing Business index (rank)	◆ Multilateral Organisations
◆ Employment		Quantitative	◆ Unemployment rate (male/female %)	◆ Multilateral Organisations	
◆ Poverty		Quantitative	◆ Income inequality (Gini coefficient), % living less than USD1/day, HDI	◆ Multilateral Organisations	
◆ National budget (energy specific budget)		Quantitative	◆ Share of budget for energy/renewable energy	◆ Multilateral Organisations	
◆ Country energy bill		Quantitative	◆ GDP %, cost of energy import (USD)	◆ Multilateral Organisations	

ANNEX 4					
Theme	Sub-Theme	Information required	Data type	Quantitative metric	Source
Energy Resources, Technologies, Markets and Infrastructure	Energy resource availability and access	<ul style="list-style-type: none"> Types of domestic energy resources (oil, coal, gas, hydro, wind, solar, biomass, etc.) Total primary energy supply/population Forecasted demand and supply trends External/imported energy resources Access levels for primary and secondary energy (rural/urban) 	<p>Quantitative</p> <p>Quantitative</p> <p>Quantitative</p> <p>Quantitative</p> <p>Quantitative</p>	<ul style="list-style-type: none"> Volume/ Toe^8 / kgs, Wh/m^2 ⁹, m^3/s Toe/capita Units (tonnes, GW, GWh, barrels, etc.), main suppliers Units (tonnes, GWh, etc.), main suppliers, net exporter/importer Ratio (percentage) 	<ul style="list-style-type: none"> IEA, IRENA, National Ministries, Regulators, Statistical Bureau IEA Ministry, Regulator, Private Sector, Regional Entity Ministry, Regulator, IEA, IRENA Multilateral Organisations, IEA World Energy Outlook
	Renewable energy resource potential	<ul style="list-style-type: none"> Theoretical and technical Identified economic potentials 	<p>Quantitative</p> <p>Qualitative/Quantitative</p>	<ul style="list-style-type: none"> Units (tonnes, MW, GWh, etc.), main suppliers Units (MW, etc.), supported by satellite data and ground measurement wherever data available 	<ul style="list-style-type: none"> World Energy Resources, IRENA Government, Research Institutions, IRENA
	Renewable energy technology options	<ul style="list-style-type: none"> Local cost of RET (solar, hydro, wind, biomass-combustion, waste, biofuels, geothermal, marine), standards and certification Projects cost Type and range of suppliers Renewable energy generation {electricity (grid, decentralised-stand-alone/mini-grid), motive, thermal, transport} 	<p>Qualitative/Quantitative</p> <p>Qualitative/Quantitative</p> <p>Qualitative/Quantitative</p> <p>Quantitative</p>	<ul style="list-style-type: none"> Cost of electricity generation per resource identified Costs (USD per unit of capacity or generation)/year commissioned Numbers Units (GWh, kWh, litres, tonnes, etc.) 	<ul style="list-style-type: none"> IRENA, Other Studies Regulatory Agency, Rural Electrification Agency, Project Developers Consultant (country research) IEA, IRENA, Ministry

⁸ Where Toe is Tonne of oil equivalent ⁹ Where Wh/m^2 is Watt hour per square meter

ANNEX 4

Theme	Sub-Theme	Information required	Data type	Quantitative metric	Source
Energy Resources, Technologies, Markets and Infrastructure Contd.	Infrastructure	<ul style="list-style-type: none"> Roads and communication Utilities State of the grid infrastructure, amount of dispatchable/balancing power, interconnections 	<p>Qualitative/Quantitative</p> <p>Qualitative/Quantitative</p> <p>Qualitative/Quantitative</p>	<ul style="list-style-type: none"> Units (kilometres (km), number of telecom masts), maps Number, types, reach Length/coverage (km), capacity (MW/GWh) 	<ul style="list-style-type: none"> Ministries Utility Utility, Regional Power Pools
	Markets	<ul style="list-style-type: none"> Prices for available primary and secondary energy Energy subsidy Adoption rate of the available RETs Sales of various products and services for technologies Electricity market model and structure (bundled/unbundled) Barriers and risks 	<p>Quantitative</p> <p>Qualitative/Quantitative</p> <p>Quantitative</p> <p>Quantitative</p> <p>Qualitative</p> <p>Qualitative</p>	<ul style="list-style-type: none"> USD/unit (Reference price - end-user price) x units consumed Percentage Numbers/units — Categorisation 	<ul style="list-style-type: none"> Consultant (country research) Ministries (Finance, Energy), World Energy Outlook Consultant (country research) Suppliers (needs research) Consultant (country research) Consultant (country research)
National Energy Policy and Strategy	Energy policy and strategy	<ul style="list-style-type: none"> Regional/national/subnational energy policy (vision, objectives, etc.) Rural electrification plans/Strategy 	<p>Qualitative/Quantitative</p> <p>Qualitative/Quantitative</p>	<ul style="list-style-type: none"> Targets, years since policy/ies developed, budget allocation (subsidies for fossil fuels, etc.) Objectives and targets 	<ul style="list-style-type: none"> Government, IRENA Policy Database Government, IRENA Policy Database
	Renewable energy policy or specific mandate	<ul style="list-style-type: none"> Renewable energy in overall energy policy, renewable energy roadmaps and action plan Portfolio of renewable energy fiscal incentives Environmental policy 	<p>Qualitative/Quantitative</p> <p>Qualitative</p> <p>Qualitative</p>	<ul style="list-style-type: none"> Objectives and targets, budgets Grant, energy production payment, rebate, tax credit, tax reduction/exemption 	<ul style="list-style-type: none"> Government Government Government
	Sector specific policies targeting key RETs	<ul style="list-style-type: none"> Agriculture, water, health, etc. - nexus between energy policies and other sector policies/implementation 	Qualitative/Quantitative	<ul style="list-style-type: none"> Sector type, targets, years of implementation, etc. 	<ul style="list-style-type: none"> Government
	Power sector reforms	<ul style="list-style-type: none"> Status (bundled/unbundled), reforms and progress over timespan (if any) 	Qualitative	—	<ul style="list-style-type: none"> Government, Other relevant organisations

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Theme	Sub-Theme	Information required	Data type	Quantitative metric	Source	
Institutions and Regulation	Governance structure	<ul style="list-style-type: none"> Ministries, renewable energy department/centres, regulatory bodies (energy/electricity regulation/standards), Rural Energy or Rural Electrification Agencies 	Qualitative (Include an Organogram)	—	<ul style="list-style-type: none"> Ministry/Departments 	
	International organisation active in country	<ul style="list-style-type: none"> Bilateral, multilateral, donors 	Quantitative	<ul style="list-style-type: none"> Types, numbers, renewable energy related projects and funds 	<ul style="list-style-type: none"> Consultant (country research) 	
	Non-government institutions active in the country	<ul style="list-style-type: none"> Types (civil society, private sector, R&D institutions, financial institutions, private sector) Roles and responsibilities of all these stakeholders 	Quantitative	<ul style="list-style-type: none"> Types (and reach, numbers, renewable energy related projects and funds) 	<ul style="list-style-type: none"> Consultant (country research) 	
	Regulatory structure	<ul style="list-style-type: none"> Institutions in charge of energy/electricity regulation, standards, etc. 	Qualitative-organogram, roles and responsibilities	—	—	<ul style="list-style-type: none"> Ministry, Departments, Regulator
	Coordination (conflicts) between institutions	<ul style="list-style-type: none"> Roles and responsibilities - short analysis 	Qualitative	—	—	<ul style="list-style-type: none"> Regulator, Consultant (country research)
	Legal instrument/regulation	<ul style="list-style-type: none"> Renewable energy or electricity law Legal framework for utilities and IPPs Structure of PPAs Tariff structure Grid code - (elements) Investment code - (elements) 	Qualitative/ Quantitative	<ul style="list-style-type: none"> Yes/No, renewable energy portfolio standard/quota, tendering/bidding, Feed-in-tariff, net-metering 	<ul style="list-style-type: none"> Ministry/Departments, IRENA-IEA Policy Database Ministry Ministry, Utility, Regulator Utility, Regulator Ministry Ministry 	
				Qualitative/ Quantitative	<ul style="list-style-type: none"> Yes/No, timescale, delivery, impact Types (on-grid, off-grid, social, etc.), levels (in detail) Yes/No Yes/No 	

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Theme	Sub-Theme	Information required	Data type	Quantitative metric	Source
Capacity Needs	Education and training institutions for renewable energy	<ul style="list-style-type: none"> ◆ Technical, management, maintenance, policy 	Qualitative/Quantitative	<ul style="list-style-type: none"> ◆ Number of institutions, types of support, budgets, projects 	<ul style="list-style-type: none"> ◆ Consultant (country research), IRENA Renewable Energy Learning Partnership (IRELP)
	Renewable energy research and development	<ul style="list-style-type: none"> ◆ Public and private 	Qualitative/Quantitative	<ul style="list-style-type: none"> ◆ Same as above 	<ul style="list-style-type: none"> ◆ Same as above
	Other providers of capacity building	<ul style="list-style-type: none"> ◆ Civil society, donors, corporates, etc. 	Qualitative/Quantitative	<ul style="list-style-type: none"> ◆ Same as above 	<ul style="list-style-type: none"> ◆ Same as above
	Knowledge and skills along the supply chain	<ul style="list-style-type: none"> ◆ Resource assessments, finance, management, operation and maintenance, procurement, policy and regulation, etc. 	Qualitative	—	<ul style="list-style-type: none"> ◆ Consultant (country research), IRENA Renewable Energy Learning Partnership (IRELP)
	Cross sectional knowledge (e.g. technical vs. finance)	<ul style="list-style-type: none"> ◆ Analysis of existing and potential 	Qualitative	—	<ul style="list-style-type: none"> ◆ Same as above

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Theme	Sub-Theme	Information required	Data type	Quantitative metric	Source
Business Model	Renewable energy business model	<ul style="list-style-type: none"> ♦ On-grid business models ♦ Off-grid (standalone, mini-grids) ♦ Costings ♦ Effect of direct and indirect financial incentives ♦ Successful business models (best practice) 	<p>Qualitative/ Quantitative</p> <p>Qualitative/ Quantitative</p> <p>Qualitative/ Quantitative</p> <p>Qualitative</p>	<ul style="list-style-type: none"> ♦ Types(public, private, Public Private Partnership (PPP), co-operatives, etc.), numbers ♦ Types (public, private, PPP, co-operatives, etc.), numbers ♦ LCOE — — 	<ul style="list-style-type: none"> ♦ Consultant (country research) ♦ Same as above ♦ Same as above ♦ Same as above ♦ Same as above
	Financing renewable energy projects	<ul style="list-style-type: none"> ♦ Availability and types of financing ♦ Gaps, risks and opportunities for domestic and international funding 	<p>Qualitative/ Quantitative</p> <p>Qualitative</p>	<ul style="list-style-type: none"> ♦ Types (formal, informal public etc.), number of financing institutions,available mechanisms (investment, grants, loans, CDM, risk guarantees, etc.), lending interest rate (%) — 	<ul style="list-style-type: none"> ♦ Same as above ♦ Same as above

Harnessing the plentiful supply of wind along Peru's coastline to power local communities and businesses



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