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SRMI Sustainable Renewables Risk Mitigation Initiative

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A Sure Path to Sustainable Renewable Energy

Maximizing Socioeconomic Benefits Triggered by Renewables

October 2022

This report was researched and prepared by the World Bank with the contributions of its consultants, Vivid Economics and Value for Women, in partnership with the Agence Française de Développement (AFD), the International Renewable Energy Agency (IRENA), Sustainable Energy for All (SEforALL), and the International Solar Alliance (ISA). The work was funded by the Energy Sector Management Assistance Program (ESMAP), a multi-donor trust funded program administered by the World Bank, and the Clean Technology Fund (CTF), one of two multi-donor trust funds among the Climate Investment Funds (CIF).

Authors: World Bank (Nadia Taobane, Zuzana Dobrotkova, Stephanie Pinnington, Kavita Rai, Inka Schomer, Anders Pedersen, Farah Outeldait and Elin Hallgrimsdottir).

Contributors: Vivid Economics, Value for Women, World Bank Group staff and consultants (Anna Aghababyan, Nathyeli Acuna Castillo, Sabine Cornieti, Carlos Andres Guadarrama Gandara, Franz Gerner, Paivi Koskinen-Lewis, Megan Meyer, Lolette Kritzinger-van Niekerk, Claire Nicolas, and Zubair Sadeque), Moroccan Agency for Sustainable Energy (Bouchra Hassoune), and AFD (Adam Ayache and Antoine Belosselsky).

Editors: Steven Kennedy and Fayre Makeig

Design: Visual Capitalist and Sergio Andres Moreno/World Bank Group

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ABBREVIATIONS

AFD	Agence Française de Développement
ANAPEC	National Agency for Employment and Skills Promotions
ANCEE	African Network of Centers of Excellence in Electricity
CEEAT	Clean Energy Employment Assessment Tool
CGE	computable general equilibrium
CSP	concentrated solar power
ESMAP	Energy Sector Management Assistance Program
FTE	full-time equivalent
GDP	gross domestic product
GESI	gender equality and social inclusion
GWh	gigawatt-hour
GWO	Global Wind Organization
IFC	International Finance Corporation
ILO	International Labour Organization
IO	input-output
INSPIRE	Initiative for Social Performance in Renewable Energy
IPP	independent power producer
IRENA	International Renewable Energy Agency
MASEN	Moroccan Agency for Sustainable Energy
M&E	monitoring and evaluation
MW	megawatt
NABCEP	North American Board of Certified Energy Practitioners
NGO	nongovernmental organization
O&M	operation and maintenance
PPA	power purchase agreement
PV	photovoltaic
RE	renewable energy
REDZ	renewable energy development zone
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
REoI	request for expression of interest
RfP	request for proposal
SE	socioeconomic
SEforALL	Sustainable Energy for All
SMEs	small and medium enterprises
SRMI	Sustainable Renewables Risk Mitigation Initiative
STEM	science, technology, engineering, and mathematics
TVET	technical and vocational education and training
USD	United States dollar
VRE	variable renewable energy

GLOSSARY

Apprenticeship	A system by which practitioners of a trade or profession receive on-the-job training, often accompanied by an opportunity to study. In some cases, apprentices may gain a license to practice in a regulated occupation.
Benefit sharing	Sharing a project's benefits with communities aims to move beyond compensation for any negative environmental and social impacts, toward the goal of sustainable development for all. Benefits can be financial, such as revenue or equity sharing. They can also include improvements to infrastructure, support for health and education programs, and local employment opportunities, amongst others.
Bidder	In the case of a renewable energy project, this is most often an independent power producer or special purpose vehicle that responds to a request for proposals for project development.
Certification	An official document attesting to its recipient's standardized level of achievement.
Compensation	Financial payments made for an ownership change, to make up for lost earnings, or to gain the appropriate right-of-way for a piece of land.
Direct jobs	Jobs associated with the design, development, management, construction/installation, and maintenance of projects and project facilities.
Disadvantaged groups	Groups of people who have been systematically disadvantaged over long periods of time because of their social identities, construed across dimensions of gender, age, location, occupation, race, ethnicity, religion, citizenship status, disability, or sexual orientation and gender identity, among other attributes.
Disaggregated data	The result of breaking down compiled information into smaller units to uncover underlying trends and patterns. For example, employment data may be looked at more closely to see patterns related to gender, ethnicity, geographic location, etc.
Domestic	Existing or occurring inside a particular country (not foreign or international).
Domestic employment	The employment of legal residents of a particular country.
Domestic firms	Firms legally registered and operating within a particular country.
Domestic participation	Domestic participation encompasses the employment opportunities given to the national workforce, and the dollars spent on project development that go to domestic firms providing needed goods and services.
Employment factors	A jobs-per-megawatt employment calculation.
Female-led firm	A company that is fully or majority-owned by a woman or group of women, or whose senior-most management position is filled by a woman.

Full-time equivalent	The number of hours considered full-time work. For example, if a company considers 40 hours full time, then two employees working 20 hours per week would equal 1.0 full-time equivalent (FTE).
Gender	The array of socially constructed roles and relationships, personality traits, attitudes, behaviors, values, relative power, and influence that society ascribes to the sexes on a differential basis. Gender is an acquired identity that is learned, changes over time, and varies widely within and across cultures.
Gender equality	The absence of discrimination on the basis of a person's gender, in the allocation of resources or benefits, or in access to opportunities.
Gross domestic product	The total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period. As a broad measure of overall domestic production, gross domestic product (GDP) functions as a comprehensive scorecard of a given country's economic health.
Higher education	An optional final stage of formal learning that occurs after the completion of secondary education and results in the awarding of an academic degree (such as a bachelor's, master's, or doctoral degree). Also referred to as postsecondary, third-level, or tertiary education.
Independent power producer	A non-utility generator, typically not owned by the national electricity company or public utility, that generates electricity for sale to the electricity network.
Indirect jobs	Jobs associated with the manufacturing of equipment and materials used for a facility, the supply chain that provides the raw materials and services needed for the manufacturing process, and the finance and banking sectors that provide services for the construction and operation of a facility.
Induced jobs	Jobs created due to the spending of earnings by persons directly and indirectly employed by a project.
Local	In this report, local pertains to the immediate area around a project site.
Local development	A multidimensional concept of change bringing together economic, social, cultural, and environmental dimensions. Local development may be seen as a method that helps improve quality of life, supporting or accelerating the empowerment of people, developing or preserving local assets, strengthening cohesion, and defining and delivering grassroots development projects.
On-the-job training	A training approach by which trainees acquire the skills and competencies needed for a job in an actual workplace environment.
Procurement	The process of finding and agreeing on terms, and acquiring goods, services, or works from an external source, often via a tendering or competitive bidding process.
Region, regional	In this report, a region is a subnational administrative area.
Resilience	The capacity to emerge stronger, and not weaker, after experiencing social and economic impacts. Communities' resilience can be supported through project interventions.

Skills development	The acquisition of practical competencies, know-how, and attitudes necessary to perform a trade or occupation in the labor market.
Social inclusion	The process of improving the terms on which individuals and groups take part in society—improving the ability, opportunity, and dignity of those disadvantaged groups on the basis of their identity.
Social license	In this report, a social license is the acceptance granted to a company, organization, or industry by a community. The concept encompasses a company's or industry's standard business practices and operating procedures.
Socioeconomic benefits	Tangible social and economic improvements to inequality, poverty, and marginalization, measured through employment, income, resource access, and power and control. This report focuses on three categories of socioeconomic benefits: domestic value creation, local development, and gender equality and social inclusion.
Technical and vocational education and training	A form of education designed to develop practical skills, understanding, and knowledge relating to specific occupations, often in the trades (for example, electrical works, plumbing, etc.).
Tender, tendering	An invitation to bid for a project. Tendering usually refers to the process whereby governments invite bids for large projects that must be submitted within a specific time frame.
Value chain	In the case of renewable energy, the value chain is the sequence of business activities and processes involved in producing power from renewable energy sources.
W+	The W+ Standard, created by Women Organizing for Change in Agriculture and Natural Resource Management, is the first women-specific standard that measures women's empowerment in a transparent and quantifiable manner, gives a monetary value to results, and creates a new channel to direct financial resources to women.
Women's empowerment	The expanded ability of women to make strategic life choices that had once been constrained by social and cultural norms.

EXECUTIVE SUMMARY

Achieving global goals for access to energy and mitigation of climate change will require a quadrupling of present levels of solar photovoltaic, nine times current wind power generation and a doubling of the geothermal power generation in the developing world by 2025. These leaps in production represent approximately 650, 270, and 8 gigawatts of additional solar, onshore wind, and geothermal energy production, respectively, requiring an investment of more than USD 450 billion in new solar photovoltaic generation, USD 320 billion for wind power, and USD 27 billion for geothermal.

To reach this objective, large amounts of private funding will have to be unlocked to complement the limited public financing available. Yet most developing countries still lack a pipeline of bankable renewable energy (RE) projects for consideration by the private sector. To develop such a pipeline, countries must tackle critical risks perceived by the private sector while they also minimize risks for the public sector.

To address these challenges, the World Bank and the Energy Sector Management Assistance Program—in partnership with the Agence Française de Développement, International Renewable Energy Agency, International Solar Alliance, and Sustainable Energy for All—developed the Sustainable Renewables Risk Mitigation Initiative (SRMI). SRMI aims to support countries in developing sustainable and bankable RE programs, attracting private investment, and reducing reliance on public finances while maximizing associated benefits to the societies and economies of developing countries. Its unique approach offers development and climate financing for:

- Technical assistance to help countries develop evidence-based targets for RE capacity and related socioeconomic benefits, develop a sustainable RE program, and operationalize it through bankable projects procured competitively;
- Critical public investments to enable integration of variable renewable energy, finance enabling infrastructure, and expand access to electricity; and
- Risk mitigation instruments to cover critical residual risks perceived by private investors.

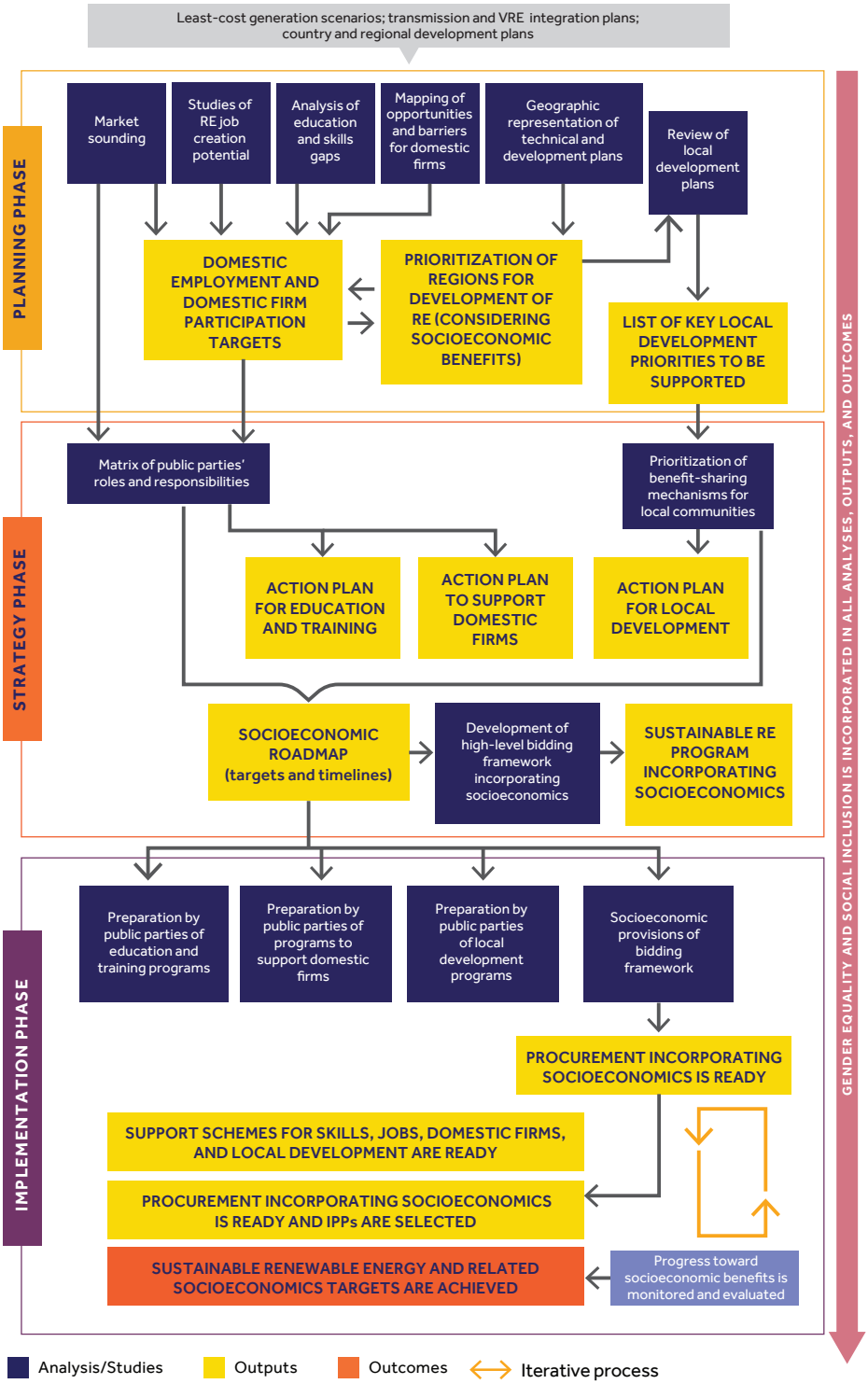
To complement the initiative, two technical guides were developed to lay out a path to privately financed sustainable RE projects (World Bank 2019, 2022a). These technical guides present a comprehensive and integrated approach to support (i) evidence-based RE targets based on sound least-cost planning, (ii) the design and implementation of a sustainable RE program, and (iii) the operationalization of such a program through bankable projects procured competitively. This guide is a companion to the two technical guides. It spells out the steps and entry points for boosting the socioeconomic benefits of RE programs.

These benefits are examined across three categories:

- Involvement of domestic firms and labor along the RE value chain in a competitive manner to maximize job creation, skills development, and knowledge transfer;
- Involvement of communities in implementing projects that strengthen resilience and livelihoods (going beyond environmental and social safeguard requirements); and
- Gender equality and social inclusion so that women and disadvantaged groups benefit from projects through proactive policies to promote their participation across the RE project cycle and the RE value chain.

Maximizing the socioeconomic benefits of RE deployment follows the three-phase approach of the SRMI technical guides (figure ES.1, based on the approach detailed in Annex I).

Figure ES.1 • A three-phase approach to maximizing the socioeconomic benefits of renewable energy programs



The planning phase enables a country to develop informed socioeconomic targets as it:

- **Assesses the domestic capabilities of a country** and any comparative advantages it may have along the RE value chain.
- **Assesses gaps in the skills and capabilities of the domestic market** and identifies barriers that women and other socially disadvantaged groups face. These point to areas where the government may need to intervene.
- **Sets participation targets for the domestic workforce and domestic firms**, dependent on country context, level of industrialization, and willingness of the private sector.
- **Coordinates least-cost planning alongside assessments of country development priorities** to leverage synergies in alignment with the strategic priorities of a country.

In the strategy phase, a country develops a cross-sectoral socioeconomic roadmap to address the gaps identified and prepare domestic players to seize the opportunities offered by the emerging RE program. In the process, it:

- **Devises action plans that lay out the costs, timeline, roles, and responsibilities of the support programs** required to address the gaps highlighted in the planning phase (e.g., in education, training, support to enterprises, etc.), including how to equitably engage women and other disadvantaged groups.
- **Achieves consensus** on a high-level competitive bidding framework that rewards the creation of benefits and readies the government to operationalize the socioeconomic strategy when launching the bidding process.

In the implementation phase, a country operationalizes the socioeconomic roadmap as it:

- **Specifies the requirements (e.g., evaluation criteria)** to be incorporated into the bidding documents. These requirements leverage private sector support for targets.
- **Implements support programs.**
- **Monitors and evaluates progress.**

The report details the steps involved in developing a program to maximize the socioeconomic benefits of an RE deployment. It highlights links connecting the steps and sets out an integrated approach. Governments may adopt specific steps depending on the country's context and strategic priorities. Suggested measures in this report, particularly in relation to local development, are meant to go above and beyond mandatory environment and social safeguards required by law and/or any financing institutions. The report also includes a diagnostic tool to lay the path forward and track national progress toward a successful RE program that maximizes socioeconomic benefits. These guidelines are intended to be a living document, updated intermittently to reflect on lessons learned and include case studies.

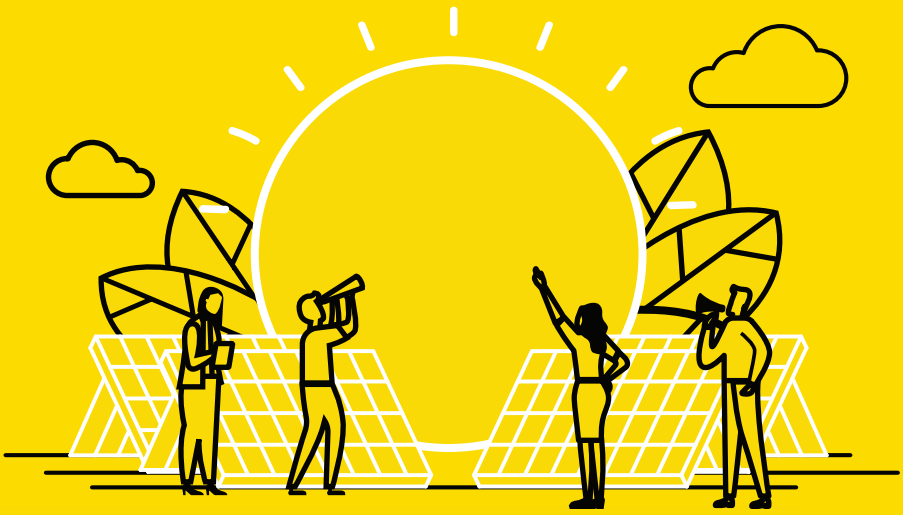
To support the development of the guidelines, input was sought from the private sector, governments, and RE practitioners. The goal was to be able to propose practical approaches and solutions that could be implemented in diverse settings throughout the developing world and that would exploit the synergies between the public and private sectors.

By following the steps outlined in this report, governments can make the most out of their domestic resources, capitalizing on the implementation of their renewable energy programs to:

- Improve energy security and increase self-sufficiency; and
- Support energy transitions that are just and equitable through partial localization of RE supply chains, thus contributing to faster, better, and cheaper deployment of renewables. This will benefit local firms and workers, offer opportunities to women and other disadvantaged groups, and more broadly catalyze the socioeconomic development of the country.

1

INTRODUCTION



1.1 BACKGROUND AND CONTEXT

Over the past decade, large-scale deployments of renewable energy (RE) technologies have soared. Important drivers include environmental concerns, energy security, and energy access. These deployments have unveiled the massive potential of RE to generate socioeconomic (SE) benefits. As a result, RE and SE outcomes are leaping to the forefront of government discussions and strategic decision-making. This is particularly true in developing economies, where governments see the growth of the RE sector as an opportunity to develop new skills and create new jobs for their people, contribute to industrial development, and support local development in sites surrounding RE projects.

The International Renewable Energy Agency (IRENA) estimates that in 2020 the RE sector employed 12 million people worldwide, a rise of 64 percent over 2012, when 7.3 million people worked in renewable energy (IRENA and ILO 2021). Under an energy transition pathway aiming to limit the rise in the average global temperatures to 1.5°C, IRENA forecasts that by 2030, GDP could be on average 2.4 percent higher (IRENA 2021). Meanwhile, 26.5 million additional employment opportunities would be created in the RE sector (IRENA 2022).

The advent of RE has, in addition, boosted the role of women in the energy sector's workforce. Women now account for 32 percent of jobs in renewables, compared with 22 percent in oil and gas (IRENA and ILO 2021). Advances in gender equality and social inclusion (GESI) have improved innovation, financial performance, compliance, and risk management. They have also strengthened employee retention, created a safer operating environment, and improved community outcomes and sustainability (Schomer and Hammond 2020). Challenges persist, however, particularly in managerial-level jobs. An Organisation for Economic Co-operation and Development/International Energy Agency analysis of data from approximately 2,500 firms in energy-related sectors shows that women make up just under 14 percent of senior managers, with representation strongest in the utility sector (17.1 percent). Excluding utilities, women hold less than 12 percent of leadership roles, compared with 15.5 percent of the 30,000 nonenergy firms in the analysis (IEA 2021). Renewable energy firms are below the average, with women holding just 10.8 percent of senior roles.

The RE investments that will bring about additional GDP growth will lead to complex changes in interdependent sectors. Lower demand for fossil fuels will affect the GDP of some countries that rely heavily on their mining and fuel-refining industries. This reality highlights the need for a holistic approach to the energy transition, not only for generation assets but also for related labor and communities dependent on extractive industries.

Aggregated data can hide notable differences in how the global shift to renewables will play out at the regional and local levels—and in how benefits are distributed. An assortment of obstacles keep countries from realizing the full benefits of RE deployment. These range, among others, from a piecemeal approach to projects procured by governments to a lack of coordination between public programs. Independent power producers (IPPs) are faced with tight time frames for tenders, often lack of awareness about what could be done competitively in a country and may feel unsure about how to support communities near RE projects in ways that bring sustained communitywide benefits. At the country level, the implications of the energy transition will be determined largely by a government's policy framework and its ability to capture added value domestically.

Maximizing the benefits of RE and ensuring their equitable spread require thorough assessments of domestic needs and capabilities, comprehensive action plans to address gaps, and coordination and collaboration between the public and private sectors to generate the best possible outcomes.

BOX 1.1. SUSTAINABLE RENEWABLES RISK MITIGATION INITIATIVE (SRMI)

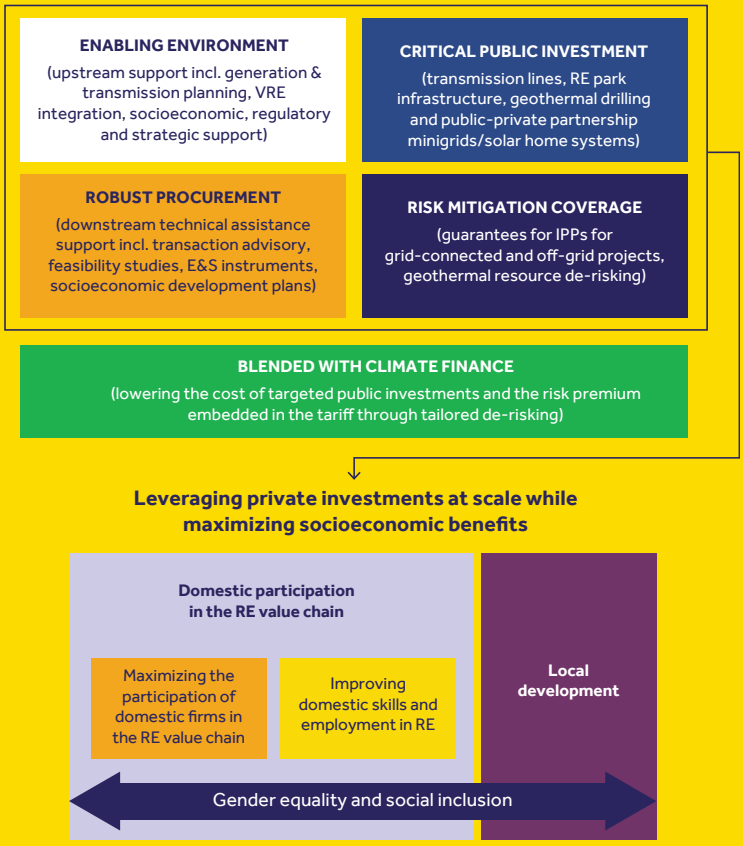
SRMI is an initiative of the World Bank's Energy Sector Management Assistance Program (ESMAP), developed in partnership with Agence Française de Développement, International Solar Alliance, International Renewable Energy Agency, and Sustainable Energy for All. It is supported by a Stakeholders Group that includes the African Development Bank, the European Investment Bank, the Kreditanstalt für Wiederaufbau (KfW), and the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ). Key financiers are making SRMI's implementation possible with financial support via ESMAP of, in particular, the United Kingdom Foreign, Commonwealth and Development Office and the Norwegian and Canadian governments, and through co-financing of investments, in particular the Green Climate Fund, the Clean Technology Fund, and the Canada Facility.

SRMI helps countries develop and implement their grid-connected and off-grid renewable energy (RE) targets by mitigating critical risks inherent in RE deployment and attracting private capital. This approach directs public investments to critical aspects of variable renewable energy integration and energy access, as detailed in figure B1.1.1.

The SRMI approach offers development and climate financing for:

- Technical assistance to help countries develop evidence-based targets for RE capacity and related socioeconomic benefits, develop a sustainable RE program, and operationalize it through bankable projects procured competitively;
- Critical public investments to enable integration of variable renewable energy, finance enabling infrastructure, and expand access to electricity;
- Risk mitigation instruments to cover critical residual risks perceived by private investors.

Figure B1.1.1
A comprehensive and integrated approach



That is why the World Bank and the Energy Sector Management Assistance Program (ESMAP) joined forces with the Agence Française de Développement (AFD), IRENA, the International Solar Alliance, and Sustainable Energy for All to develop the Sustainable Renewables Risk Mitigation Initiative (SRMI) to support countries in the design of sustainable and bankable RE programs (box 1.1).

The SRMI guidelines—*A Sure Path to Sustainable Solar* (World Bank 2019) and *A Sure Path to Sustainable Solar, Wind and Geothermal* (World Bank 2022a)—henceforth termed "technical guidelines," present key steps for governments to create conditions that attract private investment in utility-scale renewable energy projects, reduce reliance on public finances, and maximize SE benefits triggered by the projects launched in the country.

The present publication provides detailed guidance on how governments can maximize the SE benefits of RE deployment considering the following technologies: utility-scale solar photovoltaic with battery storage, concentrated solar power with thermal storage, onshore wind, and geothermal energy.

It should be used with the first set of guidelines, as the actions to maximize SE benefits detailed here should be implemented alongside the technical aspects of RE program design (as shown in figure 1.2). The aim is to identify the key entry points for governments to leverage competitive bidding processes to generate desired socioeconomic outcomes—outcomes that extend beyond compensation for land and introducing new sources of power supply to energy systems.

For the purpose of this report, SE benefits fall into three categories:

1. **Domestic participation in the RE value chain.** The goal here is to enhance the involvement of domestic firms and labor in a competitive manner to maximize job creation, skills development, and knowledge transfer all along the value chain.
2. **Local development.** The objective is to design and implement initiatives to strengthen the resilience and livelihoods of communities living near RE project sites. These could include programs to hone skills (general or specific to RE), improve or augment services and infrastructure, increase revenue and initiate ownership-sharing agreements. Suggested measures in this report, particularly in relation to local development, are meant to go above and beyond mandatory environment and social safeguards required by law and/or any financing institution.
3. **Gender equality and social inclusion.** The aim here is to ensure that all individuals and groups—including women and those disadvantaged on the basis of their identity—have equal opportunity to benefit from RE deployment, including job opportunities, education and training, business opportunities, and local development initiatives. To the extent possible, this report considers gender equality and social inclusions issues through an intersectional lens, recognizing the interconnectedness of social identity (ethnicity, age, class, disability, and gender) and the way those identities interact to reinforce inequalities. Women, of course, are more than a single marginalized group and cross all categories. As this is a cross-cutting theme, it will be addressed throughout the report along with the two categories above, as shown in figure 1.1.

Figure 1.1 • Categorization of socioeconomic benefits

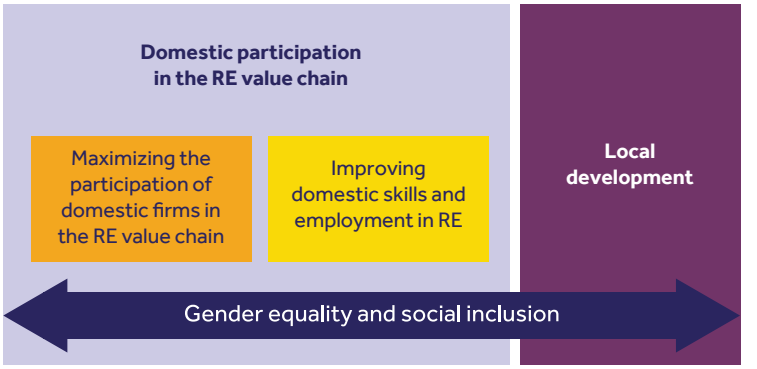
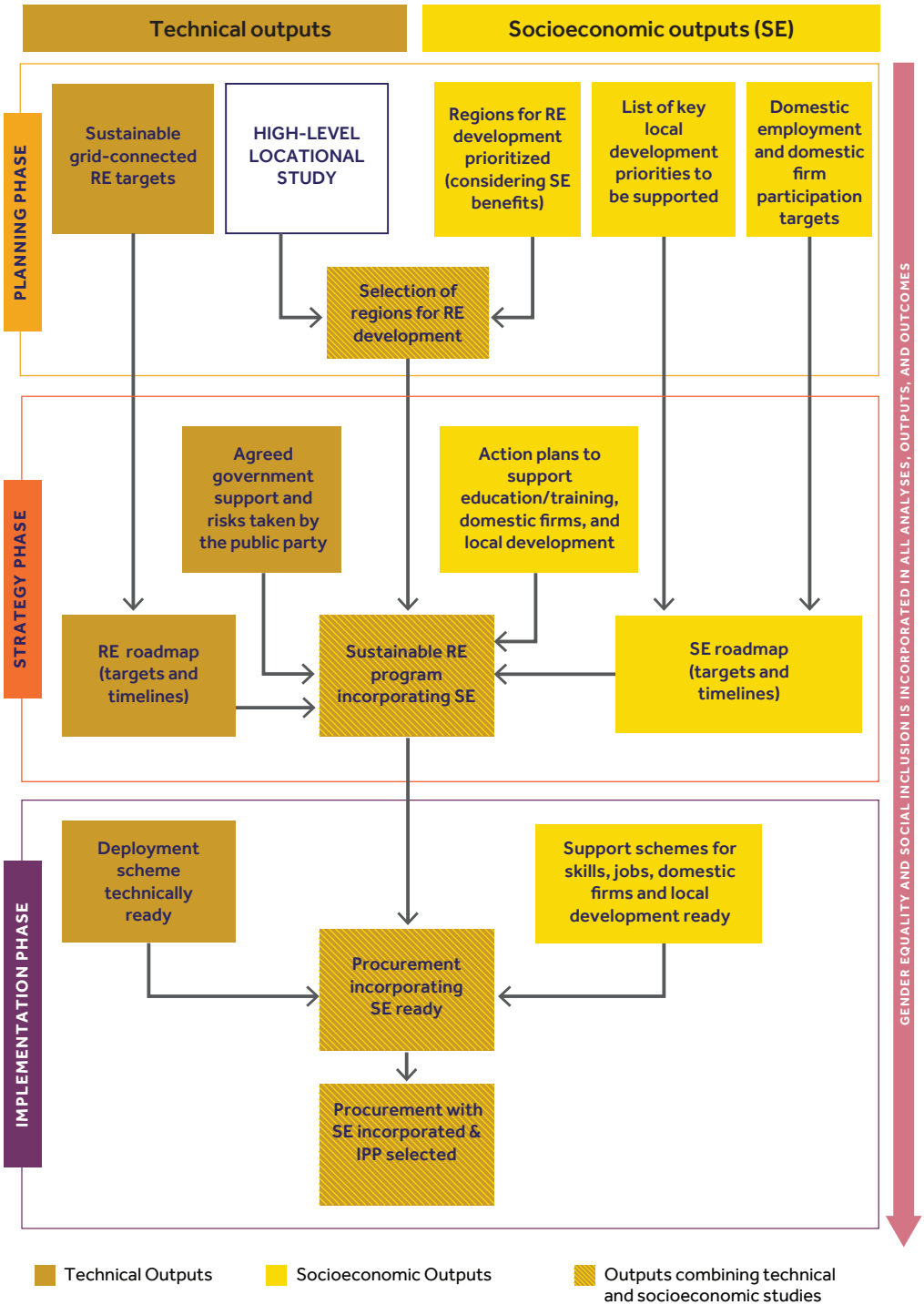


Figure 1.2 • Links of outputs of socioeconomic guidelines and technical guidelines



For this report, the World Bank undertook a market sounding to better understand the barriers and opportunities faced by the public and private sectors in boosting SE benefits across these three categories.[1] In 2021, 40 interviews were conducted with key stakeholders in the RE industry. Focusing on public bodies, IPPs, and supporting institutions, the market sounding confirmed that the difficulties governments have in capturing SE benefits stem not from unwillingness on the part of the private sector but rather from an underprepared domestic market, poor planning, and a lack of coordination. In particular, the public sector must set its SE goals by making adequate provisions in competitive bidding documents and defining optimized processes. SE gains are typically not a priority for the private sector—which is focused on maximizing its financial returns and minimizing risks —*unless* a business case can be made to enhance local prosperity.

While each country presents a unique context, the market sounding revealed barriers in most developing countries. These are explained below, with reference to the categories identified in figure 1.2.

PARTICIPATION IN THE RE VALUE CHAIN

- **Lack of available skills and capabilities,** at individual and firm levels, to participate competitively in the RE value chain.
- **Lack of support systems that meet RE industry needs** that can build capacities of workers and domestic firms to the point where they can take advantage of emerging opportunities.

LOCAL DEVELOPMENT

- **Lack of foresight or communication regarding the desired impacts of RE on local communities.** Planning and implementation are often left to the private sector and its corporate social responsibility priorities.

GENDER EQUALITY AND SOCIAL INCLUSION

- **Gender gaps and lack of inclusion in RE decision making** and employment, policy formulation, bidding frameworks, and project implementation, as well as in local development initiatives.
- **Lack of access to opportunities in RE for socially disadvantaged groups** based on their location, occupation, race, ethnicity, religion, citizenship status, disability, sexual orientation, or gender identity.

OVERARCHING ISSUES

- **IPP resistance to viable opportunities to generate SE benefits,** citing costs, bidding time frames, and existent supply chains.
- **Insufficient coordination and engagement** around SE benefits, both among public sector agencies and between the public and private sectors.
- **Lack of evidence-based information in RE ministries and public procurement agencies** on how to leverage competitive bidding to give the private sector incentives to generate desired SE outcomes.
- **Lack of well-designed measurement and evaluation processes.**

These points, along with relevant case studies, are addressed in the report and provide evidence on what has worked in practice.

Comprehensive support for governments using the SRMI approach in deploying RE could also leverage other work supported by ESMAP, notably workstreams addressing the labor transition in coal-based communities (Bulmer et al. 2021), coal mine closures and the repurposing of these sites for renewable energy (Stanley et al. 2018; ESMAP 2021), and the jobs impacts of the energy transition (currently under preparation by ESMAP).

1 *The results of the market sounding are reported throughout this report.*

1.2 HOW TO USE THIS REPORT

This report describes ways, from the "public party," or government, perspective to fully realize the benefits of RE deployment. Ministries, public utilities, and regulators play different roles in each country. Throughout this document, public parties are referred to as "the government," except where roles are defined for a utility or other public sector actor.

A methodology to plan, design, and implement RE programs that maximizes socioeconomic benefits is proposed; it uses the same phases at the RE program level that were defined in the SRMI technical guides.

In the planning phase, a country:

- **Assesses its domestic capabilities** and any comparative advantages it may have along the RE value chain.
- **Assesses gaps** in the skills and capabilities of the domestic market and identifies barriers faced by women and other socially disadvantaged groups. These point to areas where the government may need to intervene.
- **Sets participation targets** for the domestic workforce and firms, depending on the country context, level of industrialization, and private sector willingness.
- **Coordinates least-cost planning and variable RE integration studies alongside assessments of country development priorities** to leverage synergies in alignment with the strategic priorities of a country.

In the strategy phase, a country:

- **Devises action plans that lay out the costs, timeline, roles, and responsibilities of the support programs** required to address the gaps highlighted in the planning phase (e.g., in education, training, support to enterprises, etc.), including how to equitably engage women and other disadvantaged groups.
- Achieves consensus on a high-level competitive bidding framework that rewards the creation of benefits and readies the government to operationalize the SE strategy when launching the bidding process.
- **Creates an SE benefits roadmap** that guides the RE program under development.

In the implementation phase, a country:

- **Specifies the SE requirements** (e.g., evaluation criteria) to be incorporated into the bidding documents. These requirements leverage private sector support for targets.
- **Follows the SE roadmap** and implements support programs.
- **Monitors and evaluates** progress.

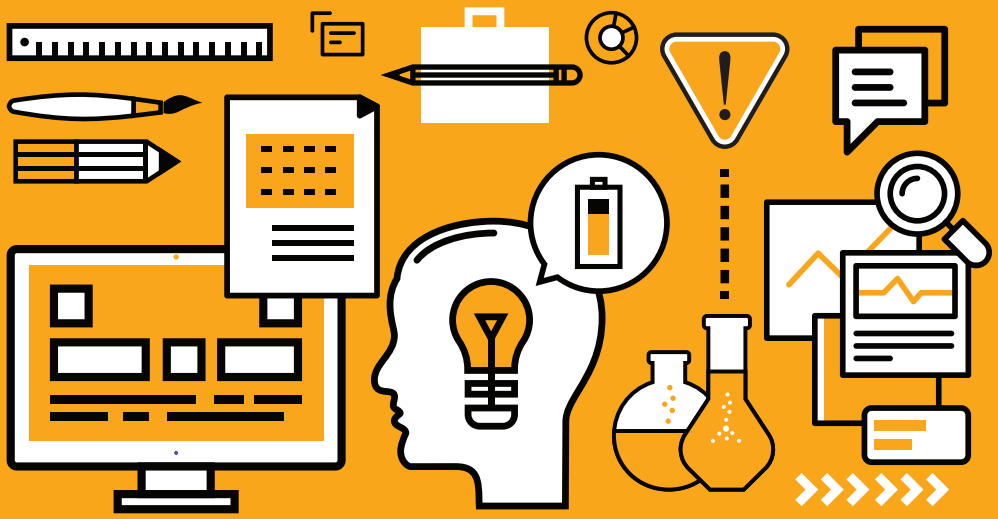
Throughout, entry points are introduced both at the program and project levels. In the planning and strategy phases, governments are designing their renewable energy program, and all actions taken will be at the program level. Once governments arrive at the implementation phase, they will have launched their program and begun the competitive bidding process for specific projects. Here, interventions take place at the project level.

Across the three phases, governments should bear the following questions in mind:

- How can RE projects boost SE benefits?
- How can governments make a business case for development and capacity building priorities?
- How can countries set realistic goals that are also cost-effective and competitive?
- How can countries leverage competitive bidding to boost SE benefits and positive impacts to local communities?

2

DIAGNOSTIC TOOL



Developed to design a renewable energy program and procure projects, the diagnostic tool detailed in table 2.1 presents key actions a country can take to maximize socioeconomic benefits. Inputs and outputs are mapped out for planning, strategy, and implementation from the perspective of the public sector stakeholders.

This tool is to be used alongside the SRMI technical guidelines. The steps do not need to be developed in a strict sequence; some can be taken in parallel. But each step is meant to guide program (and project) design and implementation. The phases and interactions at each step are detailed in chapters 3–5. The proposed approach is flexible enough to adapt to the context of each country and can be tailored accordingly when applied by a government.

Table 2.1 • Diagnostic tool: Enhancing socioeconomic benefits

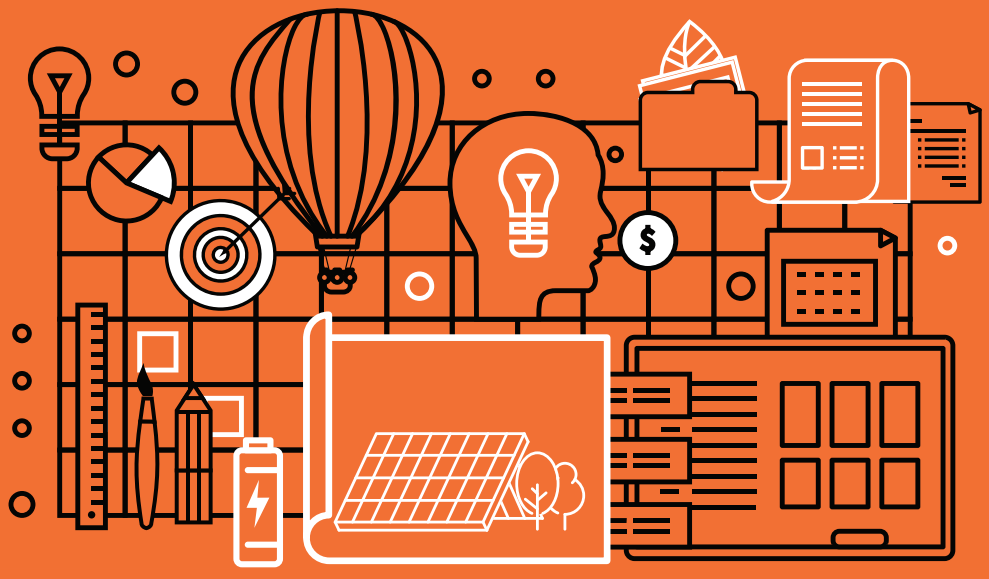
PHASE 1 • PLANNING		
Input	Studies of renewable energy's (RE's) job creation potential	Assess high-level job creation potential of the RE program using detailed RE value chains and job-creation models (or employment factors). Include an analysis of employment issues related to gender equality and social inclusion (GESI).
Input	Market sounding of benefits	Integrate the results of the consultations with the private sector to achieve a realistic approach to maximizing SE benefits and to inform the SE roadmap and bidding process.
Input	Analyses of education and training gaps	Identify education/training gaps for domestic workers that could manifest along value chains of RE projects and map additional barriers to education, training, and employment faced by women and disadvantaged groups.
Input	Mapping opportunities and barriers for domestic firms	Identify segments of RE value chains where domestic firms could realistically increase their participation in the short to medium terms (with and without additional support). Map additional barriers to firms led by women and disadvantaged groups.
OUTPUT	**Domestic employment and localization targets are set.**	
Plan (from technical guidelines)	Least-cost generation plan/ variable renewable energy integration studies	Identify the least-cost energy mix and the role of RE in the country in the years to come, including the geographic distribution of RE zones based on resource maps and variable renewable energy integration studies (such as high-level locational studies) developed during technical preparation of the RE program.
Plan (from separate government processes)	National/regional development plans	Map, review, and document overall development needs, including SE priorities in different regions in alignment with country strategic priorities. Ensure that inputs and views of women and disadvantaged groups are captured and considered in terms of impacts and opportunities.
OUTPUT	**Regions are prioritized for development of RE.**	
Plan (from separate local government processes)	Local development plans	Review local development plans around the possible RE sites in the regions selected for RE development to understand the most pressing local needs. Ensure that the needs of women and the disadvantaged are captured in plans and prioritized.

Input	Stakeholder identification	Identify a range of local stakeholders for in-depth consultation in the strategy phase, highlighting the participation of women and disadvantaged groups.
OUTPUT	**Local development priorities to be supported are identified.**	
	PHASE 2 • STRATEGY	
Input from Phase 1	Domestic employment and localization targets	Take the targets defined in the planning phase and consider timelines to achieve them. Include sex-disaggregated targets or focus on GESI targets, e.g., women's employment, people with disabilities, etc.
Input from Phase 1	Market sounding focused on SE benefits	Consider private sector inputs for upskilling domestic workers and building up capabilities of domestic firms to inform needed actions and their timelines. Ensure the engagement of diverse stakeholder groups.
Input	Matrix of public/private parties' roles and responsibilities	Define public/private parties' roles and responsibilities for upskilling to achieve job creation targets and for support to firms to achieve localization targets. Reflect the existing roles and responsibilities in women's employment efforts in the energy sector.
OUTPUT	**Action plan for educating and training workers is devised.**	
OUTPUT	**Action plan for supporting domestic firms is drawn up.**	
Input from Phase 1	Key local development priorities to be supported	Identify sectors of intervention for local development priorities and players active in those sectors (nongovernmental organizations, local associations, etc.) and consider synergies among sectors to be supported and players active on the ground.
Input	Public sector consultation with local and regional stakeholders	Understand the typical approaches of key regional and local stakeholders (including women and socially disadvantaged groups) to the development of community-led projects and their interests and needs in community ownership and benefit sharing.
Input	Benefit-sharing mechanisms for local communities	Based on stakeholder consultations, lessons learned from past projects, and desired outcomes, develop and prioritize detailed and locally appropriate mechanisms for sharing benefits. Ensure sufficient allocation of budget and skills and support to deliver on actions focused on benefit sharing. Ensure women and the disadvantaged are represented in making decisions about the benefit sharing mechanism.
OUTPUT	**Action plan for local development is conceived.**	
Strategy	Socioeconomic roadmap with targets and timelines	
Strategy (from technical guidelines)	High-level bidding framework	
Input from Phase 1	Domestic employment and localization targets	Integrate SE targets into the bidding framework at the program level and coordinate the interim targets and timelines of individual tenders so as to support timely delivery on overall targets. Ensure that disaggregated information is collected and that GESI targets are set.
Strategy	High-level bidding framework incorporating SE benefits	
OUTPUT	**A sustainable RE program that incorporates SE benefits is designed.**	

PHASE 3 • IMPLEMENTATION		
Input from Phase 1	Market sounding focused on SE benefits	Consider private sector views on upskilling domestic workers and building up the capabilities of domestic firms to inform actions needed and timelines. Request input on how firms can contribute to enlarging the talent pool of women and targeting other social inclusion priorities in their operations.
Input from Phase 2	Matrix of public/ private parties' roles and responsibilities	Use matrix to define roles of public sector in upskilling to achieve job-creation targets and in supporting firms to achieve localization targets. Ensure engagement with departments and units focused on GESI in the energy sector.
Input from Phase 2	SE roadmap with targets and timeline	Use roadmap timelines and targets to inform the timing and extent of public party support to education/training programs, programs to support domestic firms and local development programs (incorporating GESI priorities across all support programs).
Input	Public party preparation of education and training programs	Develop public education and training programs, considering inputs of private sector obtained from market sounding, the division of responsibilities between the public and private sector, and the timelines of the SE roadmap. Ensure that barriers to women's participation in education and skills development are addressed.
Input	Public party preparation of programs to support domestic firms	Develop public programs to support domestic firms, considering private sector views gleaned from the market sounding, the division of responsibilities between the public and private sector, and the timelines of the SE roadmap. Ensure targeted and tailored support for women-led firms (based on needs assessment) to increase overall percentage spent on these companies.
Input	Public party preparation of local development programs	Develop public programs supporting local development, considering private sector inputs from the market sounding, and how responsibilities are split across the public/private sectors, in line with timelines outlined in the SE roadmap. Ensure plans include targeted development needs of women and disadvantaged groups with specific and budgeted activities (based on their feedback).
OUTPUT	**Support schemes for skills, jobs, domestic firms, and local development are ready for implementation.**	
Input	SE provisions of bidding framework	Develop detailed legal provisions, conditions, and monitoring clauses related to SE to be incorporated into the bidding documents, while respecting the interim targets and timelines of the SE roadmap. Ensure inclusion of GESI provisions in the bidding framework (including budget and staffing).
OUTPUT	**Procurement methods incorporating SE considerations are ready for implementation.**	
OUTPUT	**Methods are devised to select IPPs and conduct procurement in a manner that optimizes SE benefits.**	
Input	Mechanism for monitoring and evaluating SE targets	Use metrics and reporting requirements for SE benefits from individual tenders to document lessons learned and improve future tenders so as to achieve targets as prescribed by the SE roadmap. Scale ambition on GESI outcomes based on lessons from implementation and private sector feedback on feasibility.
OUTCOME	**Sustainable RE targets and related SE benefits are achieved.**	

3

PHASE 1: PLANNING



3.1 OBJECTIVES

In order to maximize the socioeconomic (SE) benefits offered by the deployment of renewable energy (RE), sound planning (e.g., least-cost generation plan and studies of the integration of variable renewable energy) must be closely coordinated with the SE approach. Alongside their technical studies, governments will therefore need to assess:

- The potential to boost domestic participation in RE value chains, both at the individual worker and firm levels (see sections 3.2, 3.3, and 3.5);
- The value creation potential of the least-cost scenarios laid out (section 3.4); and
- Synergies between RE deployment and a country's broader SE development plans (section 3.6).

Realistic SE targets and priorities are set in the planning phase. For example, targets are set for the total capital to be directed to goods and services from domestic firms and for the participation of domestic workers. Priorities for SE development at the regional and local levels are also identified. These outputs will become central to a SE roadmap developed in the strategy phase.

In the planning phase, key questions include:

- What is the potential SE impact (e.g., GDP, employment, fiscal revenues) of the RE development scenarios identified?
- Which job profiles and services are needed along the RE value chain? Can they be fulfilled domestically? What goods and services can be procured competitively within the country?
- What skills and capabilities exist at the individual and firm levels in the relevant sectors, and what gaps need to be addressed?
- Which regions should be prioritized for RE development, in alignment with a country's strategic priorities, and what SE needs exist at the regional/local levels?
- What barriers/opportunities exist with regard to gender equality and social inclusion—namely, leadership and decision-making, employment, livelihoods, entrepreneurship, and community-ownership models/trusts—as they pertain to RE value chains?

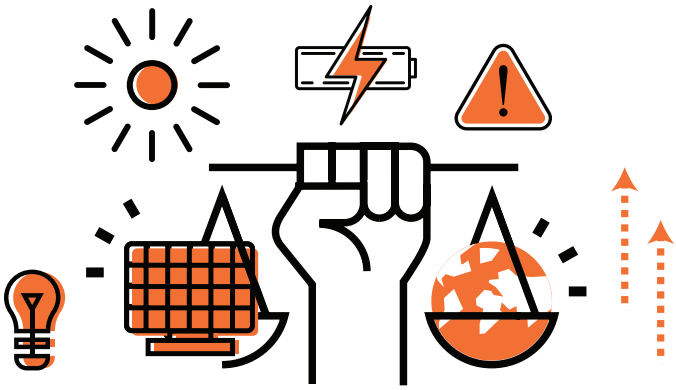
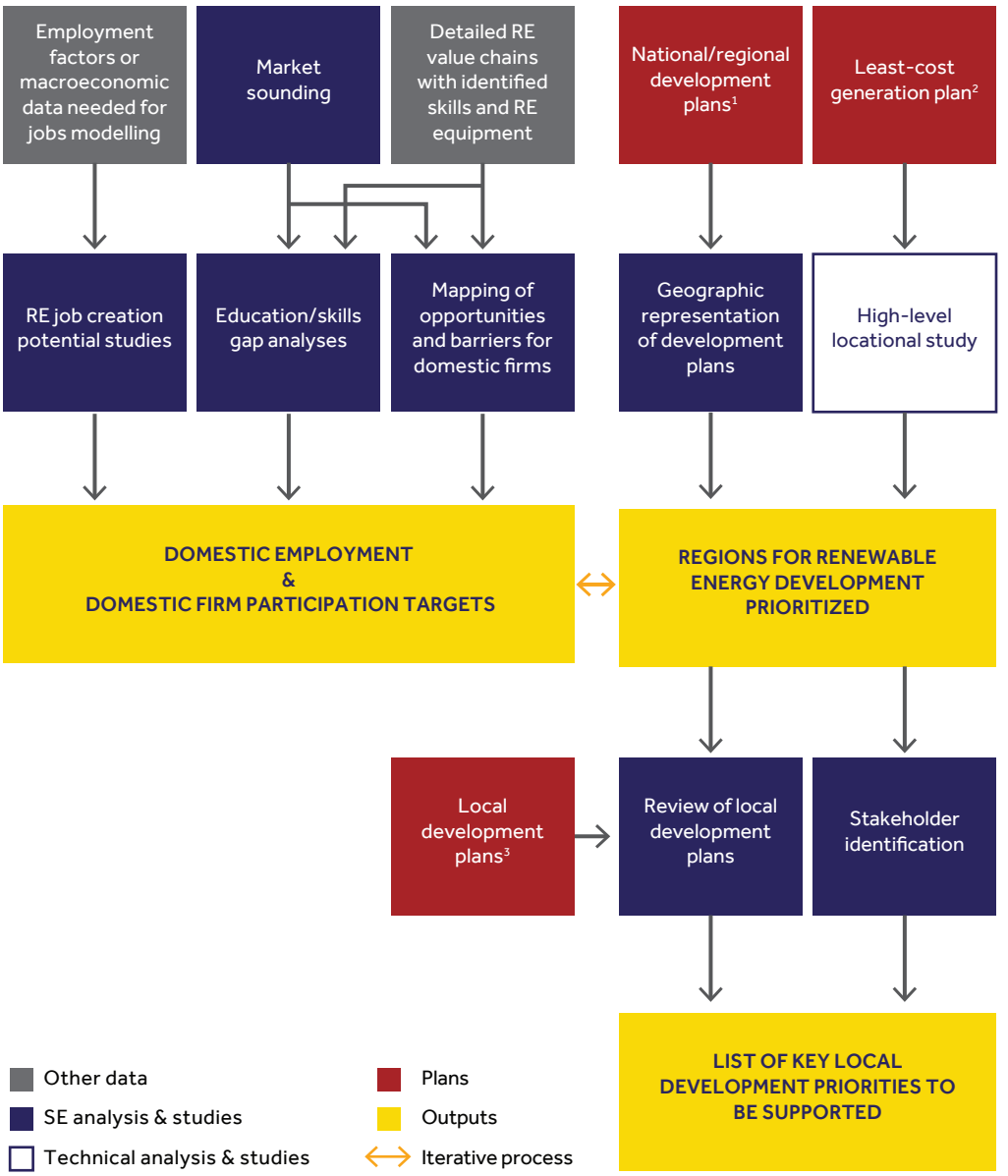


Figure 3.1 • Overview of the planning phase



Source: Original compilation for this report.

Note: Across all activities, the collection of disaggregated data should focus on documenting the barriers to women and disadvantaged groups.

1. Result of national and regional inter-sectoral government processes
2. Result of technical analysis and studies
3. Result of local government and community processes

3.2 UNDERSTANDING RELEVANT RE VALUE CHAINS

For governments to realize the full SE benefits of RE deployment, they must have clarity on the inputs provided by public and private sectors. Technology-specific value chains (i.e., solar photovoltaic [PV], onshore wind, etc.) need to be documented and analyzed.

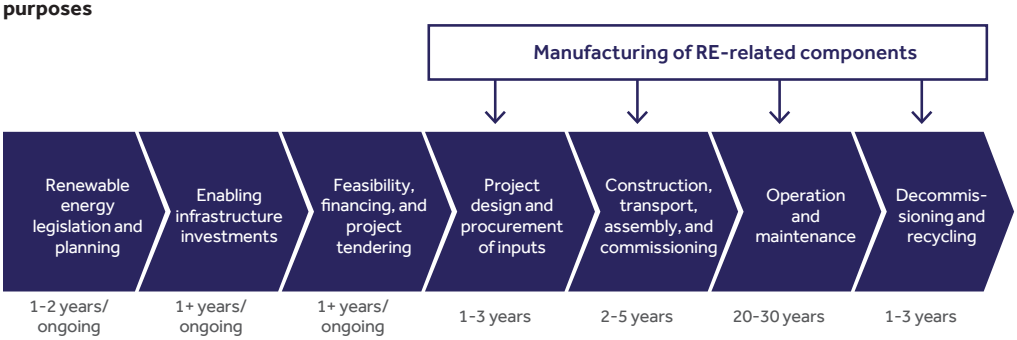
A value chain comprises the business activities and processes involved in creating a product. In the case of the RE industry and these guidelines, the end product is a RE power plant or facility that will produce clean power. The RE value chain has segments. A technology-specific value chain contains all inputs required to constitute a segment, including the necessary goods (raw materials, equipment, etc.), services, and labor.

Activities in each segment of the value chain that can be done within the country, or "localized," will add value to a country's GDP. Depending on a country's existing resources, availability of firms that can provide goods and services, the labor pool and skill base, as well as the scale of the RE capacity considered, some countries may have comparative advantages over others in specific segments. In other words, they may be more easily able to localize activities along the value chain in a manner that is cost competitive with the international/global market.

Well-documented value chains for all RE technologies can be found in existing literature. These can be used by governments to understand the required inputs, take note of any comparative advantages, and begin to see where support might be required in order to harness additional domestic value creation. Feedback from the private sector is important, along with continual updates to documentation of the value chain, as RE technologies and markets evolve.

Manufacturing, for example, usually requires a sizable regional RE market with consistent demand and a clear and long-term policy. For most developing countries without a manufacturing base, this segment of the value chain offers no comparative advantage. Project-driven manufacturing is not sustainable over the long term. Perhaps if a large pipeline of projects is identified for a given country, and that country saw clear potential for comparative advantage, then it might make sense to develop local capabilities for that part of the value chain. For example, South Africa offers such a case for battery manufacturing (box 3.1).

Figure 3.2 • Proposed overview of the segments of the renewable energy value chain for illustration purposes



Source: Original figure developed by authors for this report.
Note: In the context of these guidelines, manufacturing of RE equipment (ex., solar panels or wind turbines) is considered upstream of the value chain because it is usually situated geographically separate from the investment location.

Governments can choose to focus on segments of the value chain where the most added value can be captured. For example, operation and maintenance is a segment of the value chain that can almost always be localized if proper plans are in place to upskill the domestic labor force (as exemplified for solar PV in as figure 3.3). This segment of the value chain creates jobs that will last upwards of thirty years, contributing greatly to domestic value creation.

In contrast, solar PV manufacturing does not create sizable added value or jobs for most countries, as materials are imported and most production processes are highly robotized. Solar PV manufacturing is highly concentrated, with only a handful of countries able to compete at the global level. China's share in all the manufacturing stages of solar panels (such as polysilicon, ingots, wafers, cells and modules) exceeds 80 percent (IEA, 2022). Box 3.2 illustrates how manufacturing and consequent supply of RE equipment has been impacted by the recent COVID-19 crisis, as well as the war in Ukraine.

BOX 3.1. SOUTH AFRICA'S COMPARATIVE ADVANTAGE IN BATTERY MANUFACTURING

Over the next two decades, energy-storage deployments are set to grow from 17 gigawatt-hours in 2018 to more than 2,850 gigawatt-hours by 2040 (Henze 2019). South Africa has some of the world's richest deposits of minerals and metals required for battery production (vanadium, platinum, nickel, manganese, copper, and cobalt). For decades, these metals were mined in South Africa and shipped to other markets for processing.

South Africa could capture the energy storage value chain by exporting the minerals needed for battery production, as well as develop vertically integrated production of energy-storage technologies. For South Africa to capture as much of the value chain as possible requires a well-developed national strategy. This national strategy would include accelerating access to financing, supporting research and innovation, addressing shifting labor demand and skills needs, and facilitating interindustry communication.

Sources: World Bank market sounding 2021; World Bank 2021a.

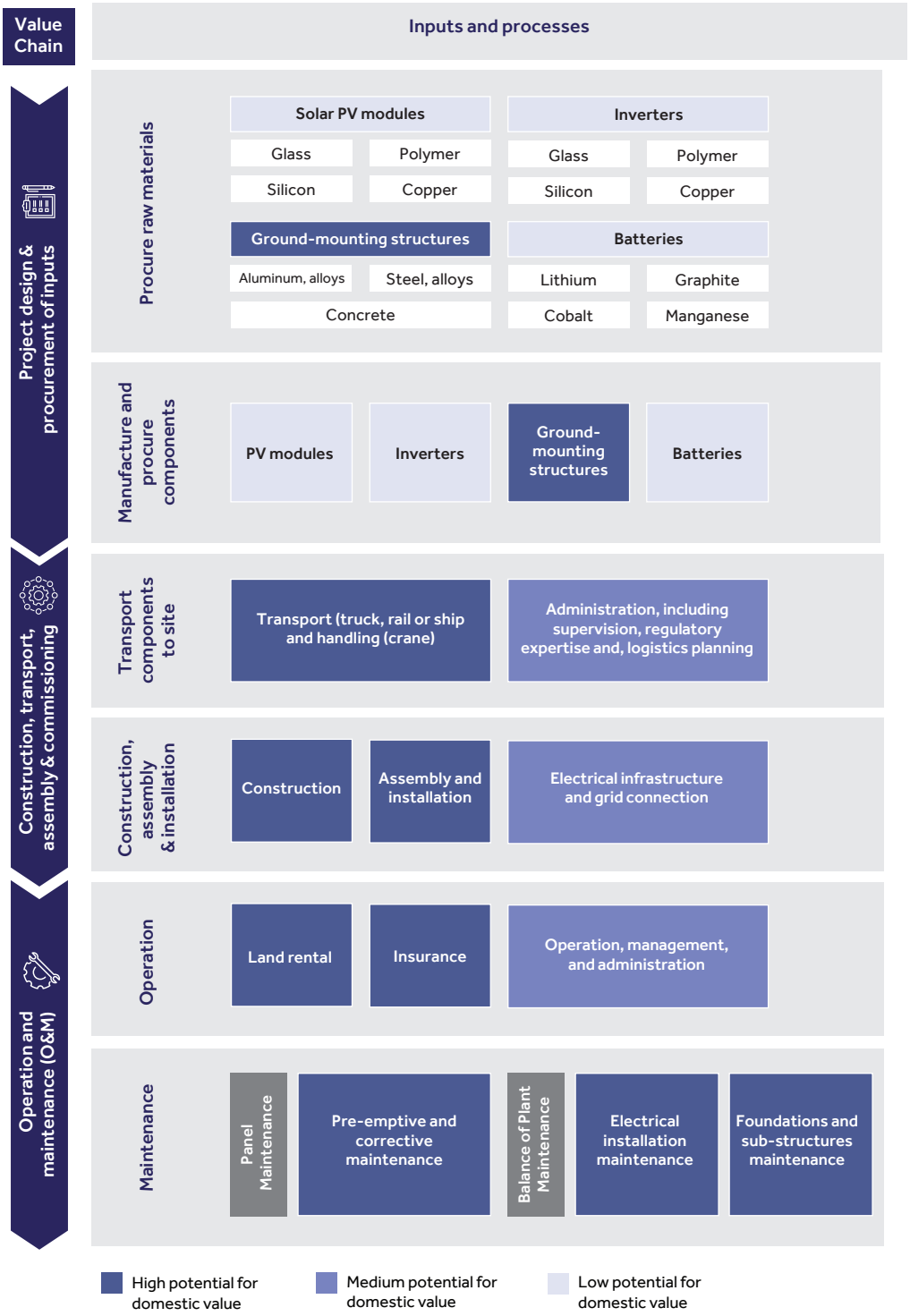
BOX 3.2 • RENEWABLE ENERGY SUPPLY CHAIN CHALLENGES

In recent years, the COVID-19 crisis and the war in Ukraine have shown that the renewable energy (RE) industry, similar to many others, can easily face challenges in supply chains. In the early stages of the pandemic, there was an increased demand for RE technologies. Investments in supply chains could not keep up and resulted in supply shortages. Supply challenges were also exacerbated by COVID-19–related regulations, such as plant closures and reduced staff capacity.

Delays in shipping, generalized across the globe, have also caused delays in deliveries of RE equipment. The war in Ukraine is impacting not only shipping routes but also the availability of steel and aluminum in certain regions, needed for structural parts of RE projects.

Source: IEA, 2022

Figure 3.3 • Potential for domestic value creation exemplified for solar photovoltaic



Sources: Original figure prepared by the authors for this report based on IRENA (2014, 2017a, 2021) and Aldieri et al. (2020).

As governments examine inputs along the RE value chain, they need to consider the range of services that domestic firms could provide in a competitive manner. See section 3.3 for ways to best assess the capabilities of domestic firms and to understand barriers to their participation.

3.2.1 UNDERSTANDING LABOR INPUTS TO THE VALUE CHAIN

Jobs are one of the main SE benefits of RE deployment. Investments in renewable energy generate employment through three channels—direct, indirect, and induced jobs—as defined in table 3.1.

Direct jobs are created along the entire value chain for any RE project or a larger program comprised of multiple projects, as shown in figure 3.4. RE projects offer opportunities for a range of workers, from high-skilled engineers and legal experts to electricians and operators, to construction-site laborers.

Most of those jobs are performed on-site, or in-country for preconstruction tasks like legislation or planning. Many jobs span the entire duration of an RE program. Construction and decommissioning jobs are an exception; these last only a few months or years on a given site. But if an RE program contains a series of projects and the workforce is mobile, such jobs could span the life cycle of a government's RE program.

RE projects create indirect jobs through equipment manufacturing, many concentrated in the middle-income or developed countries that ship the equipment across the globe. For example, China produces most of the world's solar PV panels. But a number of countries have local capabilities to produce electric wiring or mounting structures for solar PV.

As governments undertake technical studies about least-cost pathways to RE development, they may simultaneously consider the impacts of least-cost RE scenarios on employment creation. Details on how countries go about developing least-cost scenarios can be found in the World Bank (2022a) technical guidelines, *A Sure Path to Sustainable Solar, Wind and Geothermal*. When making strategic decisions regarding a least-cost scenario, job creation may be one factor among many for governments to consider.

In the planning stage, governments can conduct theoretical job modeling. Once governments have selected a scenario, they can invest the resources to collect more data and create a more detailed and accurate job model. Section 3.4 highlights several methodologies that governments can use to model the high-level job-creation implications of their least-cost scenarios.

Likewise, as governments examine jobs generated by renewable projects, they will need to consider which domestic jobs can be provided in a competitive manner. Section 3.5 contains detailed guidance on how countries can approach such analysis.

Table 3.1 • Renewable energy jobs: Direct, indirect, and induced

TYPES OF JOBS	DEFINITION
Direct	Design, development, management, construction/installation, and maintenance of projects and project facilities.
Indirect	Manufacturing of equipment and materials used for the facility, the supply chain that provides raw materials and services to these manufacturers, and the finance and banking sectors that provide services for the construction and operation of a facility.
Induced	Jobs resulting from earnings spent by those directly and indirectly employed by renewable energy projects (for example, in food provision, transport, lodging, etc.).

Figure 3.4 • Typical value chain of a renewable energy project

Job years per MW Share of total jobs created by value chain segment (excluding manufacturing) over 20-30 year power plant life span	Solar PV 2–6	CSP 5–10	Onshore wind 4–7	Geothermal energy 2–5	Critical public sector jobs	Critical private sector jobs
Renewable energy legislation and planning 1-2 YEARS/ONGOING	0–1%	0–1%	0–1%	0–1%	• Policy makers • Energy sector planners • Energy modelers • Energy regulation experts • Environment, social and gender experts • Legal experts	• Energy modelers • Environment, social and gender experts • Policy experts • Legal experts
Enabling infrastructure investments 1+ YEARS/ONGOING	0–1%	0–1%	0–1%	0–1%	• Public procurement experts • Power system technical experts • Environment, social and gender experts • Public finance experts	• Power system technical experts • Investment/Finance experts • Environment, social and gender experts • Legal experts
Feasibility, financing, and project tendering 1+ YEARS/ONGOING	0–1%	0–1%	0–1%	0–1%	• Renewable energy technical experts • Public procurement experts • Legal experts • Public finances experts • Environment, social and gender experts • Monitoring and evaluation experts	• Financial advisors • Transaction advisors • Renewable energy technical experts • Environment, social and gender experts • Legal experts • Monitoring and evaluation experts
Project design and procurement of inputs 1-3 YEARS	0–5%	0–5%	0–5%	0–5%	• Renewable energy technical experts • Legal and taxation experts • Environment, social and gender experts	• Renewable energy technical experts • Logistics experts • Environment, social and gender experts
Construction, transport, assembly, and commissioning 2-5 YEARS	20–30%	60–70%	30–40%	50–60%	• Renewable energy technical experts • Monitoring and evaluation experts • Environment, social and gender experts • Health and safety experts • Compliance experts	• Renewable energy technical experts • Environment, social and gender experts • Construction workers • Electricians • Mechanics • Quality control and monitoring and evaluation experts • Community engagement experts
Operation and maintenance 20-30 YEARS	70–80%	10–20%	40–60%	20–30%	• Renewable energy technical experts • Monitoring and evaluation experts • Environment, social and gender experts • Health and safety experts • Compliance experts	• Renewable energy technical experts • Environment, social and gender experts • Operators • Technicians • Electricians • Health and safety experts • Monitoring and evaluation experts • Security
Decommissioning and recycling 1-3 YEARS	0–5%	10–15%	5–10%	10–20%	• Renewable energy technical experts • Regulatory experts • Environmental, social and gender experts • Health and safety experts • Compliance experts	• Technical experts • Civil engineers • Environmental, social and gender experts • Health and safety experts • Laborers

Source: Original figure prepared by the authors for this report for illustration purposes.
Note: Such an analysis has to be done on a case-by-case basis for each RE project, considering the specific context of the country and various parameters.

3.3 MAPPING DOMESTIC FIRMS AND UNDERSTANDING BARRIERS TO THEIR PARTICIPATION

Once a government has a grasp of the inputs needed along the value chain, it can begin to identify existing domestic firms able to provide the required goods and services. In some cases, these will be firms already operating in the RE sector. But many firms will be from other sectors that can either provide the service in question or adapt their business operations to take advantage of emerging opportunities. Botswana offers a good example of this process (box 3.3).

Market soundings can help governments assess interest in the RE market across sectors by documenting barriers to participation. The market sounding conducted for these guidelines found that domestic firms in developing countries face a number of barriers to participate along the value chain, as do IPPs in procuring goods and services from these firms. Those barriers are detailed in table 3.2.

BOX 3.3 BOTSWANA'S ACTION PLAN: REALIZING THE SOCIOECONOMIC BENEFITS OF DEPLOYING RENEWABLE ENERGY

The government of Botswana, in partnership with the World Bank, assessed the socioeconomic benefits of developing renewable energy projects in the country. The study mapped domestic firms that could offer goods and services (in both the short and medium terms) at various points along the value chain, from site selection and acquisitions, through to engineering, procurement, and construction, and to operations and maintenance. It consulted a diverse array of domestic firms to identify barriers to their participation. The degree to which such firms were likely to participate was then ranked high, medium, or low, based on their capabilities and barriers.

The study found that the implementation of a multifaceted action plan, for specific scenarios considered, could greatly boost the participation of domestic firms, creating many more jobs both during development and construction phase as well as during operation and maintenance phase of the plants. Among actions outlined, key to boosting the involvement of domestic firms are tailored financial products, partnerships with foreign firms to upskill domestic ones, and design of a project pipeline that grows in size and complexity, allowing local players to ramp up their participation over time.

Source: World Bank, 2022d

Table 3.2 • Barriers and challenges for domestic firms and independent power producers (IPPs)

BARRIER/ CHALLENGE	SUPPLY-SIDE CONSTRAINTS (DOMESTIC FIRMS)	DEMAND-SIDE CONSTRAINTS (IPPS)
Lack of knowledge about, and access to, the domestic renewable energy (RE) value chain	Domestic firms are unaware of opportunities. Where awareness exists, limited access to financing to scale or adjust business operations is a key barrier. For example, a small company that wishes to bid on a multiyear operation and maintenance contract with certification requirements for staff might need additional financing for staff training and purchasing new equipment. This barrier is more pronounced for firms led by women and socially disadvantaged groups.	Unaware of domestic firms and services, or their capabilities and track records. Where they are aware of local players, sometimes simple challenges, such as supplier access to technology, prevent them from connecting.
Lack of clarity on, or confidence in, the country's pipeline of projects	Domestic firms require confidence in the long-term domestic/regional RE market to invest in scaling or adapting their business operations.	IPPs are less willing to build supplier relationships in the country if they do not see opportunities for future projects.
Lack of relationship between domestic firms and IPPs	Domestic firms lack a record of accomplishment on projects of similar scale and are therefore unable to get a foot in the door to build the experience needed for future projects.	IPPs prefer to work with known suppliers in whom they have developed a degree of trust.
Gap between domestic firm capabilities and those that are required by the industry	Inferior quality is a challenge often reported by IPPs operating in developing countries; certification is one way to overcome this challenge. Unrealistic costs of certifications often push smaller domestic players out entirely. IPPs also report issues such as some domestic firms not respecting national laws, including those in place to protect worker safety; on site, teams can lack skills and experiences to perform in professional settings.	IPPs cannot secure domestic suppliers that meet their quality expectations, including certification (of products, or production processes, or special certification for labor), and resort to foreign firms. This is often because they are under contractual obligations and immense pressure to deliver an operational project and cannot compromise on cost, delivery schedule, or quality.
Timing required for IPPs to secure new suppliers	Domestic firms struggle to scale given the short lead time.	Some IPPs have a minimum eight-month window to approve new suppliers. In some instances, IPPs are simply unable to meet the timelines expected by governments.
Barriers for women and disadvantaged businesses	Barriers include social expectations and norms, discrimination, lack of mentors/sponsors, and limited access to professional networks and resources (financing, skills building) and information. Women often start businesses in industries not dominated by men—health, education, and social services. These require smaller investments and see less growth than the manufacturing, construction, and mining sectors (Rosa and Sylla 2016). In RE, women-led firms capture a small percentage of the overall value of investments made.	IPPs have limited experience targeting firms led by women or disadvantaged individuals by making changes in their sourcing practices. Procurement from firms led by women tends to be limited to businesses in traditionally female fields. Many IPPs note that local cultures and societal norms (e.g., domestic roles and cultural expectations, social behaviors) limit women's entrepreneurial efforts in developing countries. Overall, too little focus is given to supporting women-owned firms to enter and access market opportunities.

Source: World Bank market sounding 2021.

After mapping the availability and capabilities of domestic firms, and consulting with them, governments can begin to classify which goods and services:

- Can be provided competitively in the country as is;
- Can be provided in the short to medium term if pursued through a clear strategy and potentially subject to governmental support; and
- Cannot be provided in the short or medium term because of significant barriers.

Mapping exercises allow governments to assess what can be localized. Mapping also identifies areas where, with support, the government could unlock additional benefits.

3.4 JOB CREATION, ADDED VALUE, AND FISCAL REVENUES: EVALUATING POTENTIAL

Building the business case for RE deployment and its SE benefits can create more political support and consensus around the actions needed to maximize them. Governments can therefore assess the contributions of RE deployment to GDP, fiscal revenues, and employment during the planning phase.

The methods for assessment will depend on data availability and quality for the given country, time, and resources available for the analyses, and scope of assessment, needed. Table 3.3 presents different methods of assessing the employment impacts of RE programs/projects.

For macroeconomic parameters beyond employment (including GDP, fiscal revenues, and trade balance), two methods can provide information: input-output tables and computable general equilibrium models. Results will depend, however, on the model's level of detail and its input data. Econometric assessments may provide more expansive results but will depend on the data inputs and model setups, which vary from one econometric model to another.

Table 3.3 • Employment impact-assessment methodologies: A comparison

METHODS	DATA REQUIREMENTS	TECHNICAL COMPLEXITY	STATIC VS DYNAMIC	JOB CREATION SCOPE ASSESSED	IMPLEMENTATION IN A DEVELOPING ECONOMY
Bottom-up engineering	**Moderate** Engineering assessments rely on fairly common technology assumptions (e.g., employment factors)	**Low**	**Static or Dynamic**	**Direct**	**Adapted for developing countries**—The technology assumptions on which bottom-up models rely are often not country-dependent, making them useful in data-poor environments. Provided a limited number of assumptions, this approach can yield results from simple investment figures.
Input-output (IO) tables	**High** Relevant results on renewable technologies require the corresponding sectors to be identified in the IO table. This entails sectoral disaggregation.	**Moderate**	**Static**	**Direct** **Indirect**	**Difficult** IO tables are collected by national statistical offices. This is a long and difficult process carried out only every 5 or 10 years in industrial economies. As such, the data are often missing or may already be out of date.

METHODS	DATA REQUIREMENTS	TECHNICAL COMPLEXITY	STATIC VS DYNAMIC	JOB CREATION SCOPE ASSESSED	IMPLEMENTATION IN A DEVELOPING ECONOMY
Econometric models	**High** Econometric assessments rely on high-quality microdata. Even though the method allows for assessment after project implementation (ex post) data collection generally requires deliberation before an investment is made.	**Variable**	**Static**	**Direct**	**Difficult** Microdata requirements make implementation of econometric assessments hard, particularly when causal links need to be identified. Data collection should be integrated from the start because few contexts lend themselves to quasi-experimental assessments after the fact. However, econometric modeling is the only methodology allowing ex post assessments, making it highly desirable.
Computable general equilibrium (CGE) models	**Very High** CGE models extend the data requirements of IO models with a complete parameterization of elasticities of substitution among various factors of production, imported and domestic goods, and intermediate consumptions.	**High**	**Dynamic**	**Direct** **Indirect** **Induced**	**Very difficult** As the most demanding of all four methodologies (data and complexity), it is the toughest to implement in a developing-economy context. CGEs are therefore hard to justify for the evaluation of impacts of small, discrete projects, as the general equilibrium effects of such projects are probably second order and negligible.

Source: Adapted from World Bank (2022c).

A bottom-up engineering analysis tends to be universally applicable. It estimates employment across different segments of the value chain of a given technology. Jobs are expressed as full-time equivalent (FTE) units to guarantee comparability across the value chain and are presented per megawatt of capacity installed.[2]

To estimate employment, RE capacity projections/scenarios could be enough with the application of employment factors. This is the method widely used in many countries, including Pakistan (box 3.4), and is well documented in the literature.

In addition to the models discussed above, several public good models have been developed by the World Bank. The Clean Energy Employment Assessment Tool (CEEAT) is an Excel-based input-output model that can simulate the economy-wide net direct, indirect, and induced employment impacts of clean energy technology pathways. The World Bank used CEEAT to assess, for example, the job creation potential of Morocco's and Egypt's ambitious RE and energy-efficiency targets.

2 *Some literature presents FTE per monetary unit spent, but this measure is unstable over time, since RE costs are declining. An additional drawback of measures per monetary unit spent is that differences in salaries between countries affect such measures (e.g., a PV maintenance worker can be paid much more in the United States than in India or Sub-Saharan Africa). Measures per megawatt are also subject to change over time as technologies improve, but those changes are slower. Therefore, the measure is more stable in time and across countries, allowing for more meaningful comparisons.*

BOX 3.4 • ESTIMATING THE NUMBER OF RENEWABLE ENERGY JOBS IN PAKISTAN: MULTIPLE SCENARIOS

A recent World Bank study estimated current and future employment in renewable energy (RE) occupations in Pakistan under several RE technology mix scenarios. The aim of the study was to showcase job creation resulting from RE deployment and to identify gaps in the RE labor market and RE education/training programs.

The study developed unique employment factors for Pakistan, based on data collected through interviews with industry representatives from the solar PV and onshore wind sectors. The factors centered on four segments of the value chain: manufacturing, development, construction, and operation and maintenance. They were validated by comparing them to other South Asian countries with similar demographic and economic profiles, and comparable literacy and labor productivity rates. The resulting employment factors are presented in table B3.4.1.

Jobs were estimated by multiplying the employment factors by megawatt of installed RE capacity. Current RE capacity was sourced from the Electric Power Regulatory Authority report, while projections for grid-connected renewable were derived based on the national RE targets from the Indicative Generation Capacity Expansion Plan for 2021–30 (IGCEP). The data were compared with two scenarios (high wind and high solar pathways) compatible with RE Policy 2019, which is more ambitious regarding renewables deployment than IGCEP, but does not specify the precise RE mix. The high wind scenario reflected the current trend of Pakistan's RE mix, mostly dominated by onshore wind; the high solar PV scenario assumed that given the rapidly decreasing cost of solar, the technology can dominate the RE market over time; table B3.4.2).

Job projections for the RE program varied in the three deployment scenarios, with the high solar pathway creating most jobs due to the high employment factor associated with distributed solar PV installations.

Table B3.4.1 • Pakistan-specific employment factors for multiple renewable energy technologies and value chain segments

EMPLOYMENT FACTORS	ONSHORE WIND	SOLAR PHOTOVOLTAIC (GRID-SCALE)	SOLAR PHOTOVOLTAIC (DISTRIBUTED)
Manufacturing	0.2	4.4	4.4
Development	1.2	0.2	5
Construction	3.3	5.9	11
Operation and maintenance	1.9	0.8	2.0

Note: The units are estimated full-time equivalent units per megawatt.

Table B3.4.2 • Summary of capacities installed under different scenarios and their direct employment implications

PATHWAYS		ONSHORE WIND	SOLAR PHOTOVOLTAIC (GRID-SCALE)	SOLAR PHOTOVOLTAIC (DISTRIBUTED)
IGCEP pathway	Capacity additions (MW)	3,722 MW	7,533 MW	1,390 MW
	Direct jobs created (FTE jobs)	105,521 FTE jobs (of which 9,240 permanent)		
RE policy 2019, high wind pathway	Capacity additions (MW)	9,807 MW	5,140 MW	1,390 MW
	Direct jobs created (FTE jobs)	11,7832 FTE jobs (of which 14,819 permanent)		
RE policy 2019, high solar pathway	Capacity additions (MW)	4,902 MW	9,454 MW	1,983 MW
	Direct jobs created (FTE jobs)	140,295 FTE jobs (of which 12,229 permanent)		

Note: Operation and maintenance jobs are considered permanent. Jobs related to manufacturing, development, and construction are considered temporary. FTE = full- time equivalent; IGCEP = Indicative Generation Capacity Expansion Plan; MW = megawatt.

Source: World Bank 2022b

3.5 MAPPING DOMESTIC SKILLS AND IDENTIFYING SKILLS SHORTAGES

Once governments have modeled the employment impacts of their RE program, they will have a good sense of the potential for domestic job creation. To gain a better idea of the number of jobs that can be actualized, governments will need to consider the availability of skilled professionals domestically to fulfill labor requirements.

The following section outlines several key steps that governments can follow to identify the capabilities of the domestic labor force, document skills gaps, and prioritize areas where support will be required. The steps are summarized in figure 3.5.

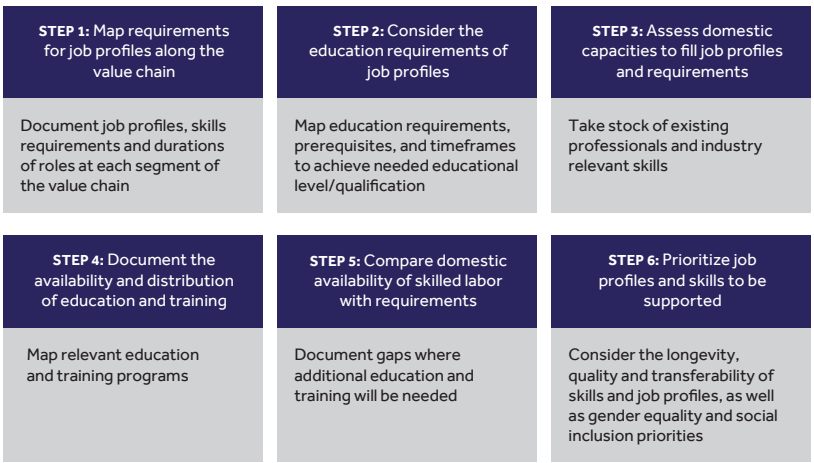
As a first step, governments can map the job profiles and accompanying skills needed at each segment of the value chain. Importantly, this must also include skills required within the public sector to design and implement a sustainable RE program.

The literature documenting skills requirements along RE value chains can be enriched through consultations with the public and private sector in a given country, to understand skills that are in high demand but may be difficult to find in the national (and sometimes local) market. Governments will not only need to know the types of job profiles that will be in demand, but also the jobs' duration, skills requirements, and prerequisites.

While documenting job profiles along the value chain, governments may also want to consider the education pathways required to fulfill their requirements. Studies of the human resource requirements of the solar PV and onshore wind industries show that over 60 percent of the workforce requires minimal formal training (IRENA and ILO 2021). Approximately 30 percent requires a degree in fields such as science, technology, engineering, and mathematics (STEM), while highly qualified non-STEM professionals (such as lawyers, logistics experts, or marketing professionals) make up only roughly 5 percent (IRENA and ILO 2021). The geothermal industry has a similar breakdown.

Governments should understand what skills can be developed on the job and what jobs require technical and vocational education and training, and higher education; they also need to know about the prerequisites required to build up these skills, the costs associated, and the time frame required for upskilling.

Figure 3.5 • Steps to map domestic skills and identify skills shortages



Source: Original figure developed by authors for this report.

Table 3.4 • Private sector experiences in domestic renewable energy recruitment

ROLES THAT CAN TYPICALLY BE FILLED BY DOMESTIC CANDIDATES	ROLES THAT OFTEN REQUIRE FOREIGN CANDIDATES OR FOR WHICH TRAINING MUST BE PROVIDED TO UPSKILL DOMESTIC CANDIDATES
Site selection, land acquisition and permitting professionals	Resource analysis specialists
Geotechnical experts	Project financiers
Social and environmental experts	Testing experts
Transport and logistics professionals	Experienced renewable energy engineers
Community liaison officers	Project managers
Lawyers	Mechanics and electricians with specialized skills/ knowledge on substations
Health and safety professionals	Operators of specialized photovoltaic cleaning trucks/ robots
Construction workers	Supervisory control and data acquisition system operators
Mechanics	Operation and maintenance contract administrators
Electricians	Performance managers

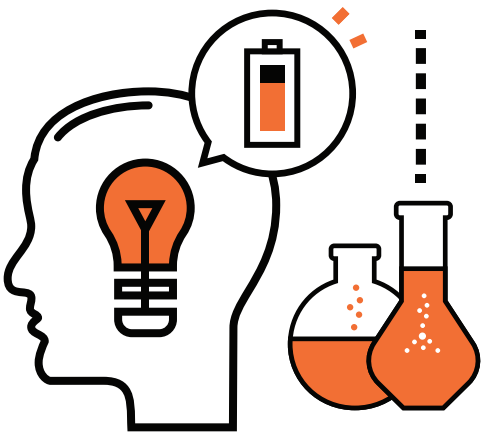
Source: World Bank market sounding 2021.
Note: The table lists selected roles along the RE value chains, reflecting those most often reported during the market sounding.

As a next step, governments should assess domestic capacities to fulfill the job profiles required for the planned RE deployment. Doing so will require a stocktaking of the existing professionals and industry-relevant skills in the country. While some countries may already have centralized statistics on the distribution of their labor force from statistical offices and information on relevant curricula from educational institutions, other countries will need to rely on surveys and data collection.

In addition, attention should be paid to opportunities to enhance the female talent pool through a focus on supply and demand dynamics around education, recruitment, retention, and advancement of women in the sector. Where possible, governments should aim to collect data disaggregated by gender, ethnicity, age, and geographic location to visualize gaps and benchmark future progress in skill and workforce equality.

Governments should also have a critical look at the availability of skills within the public sector, essential to executing RE programs such as energy planning, management of electricity networks, dispatch, energy regulation, and contracting the private sector for delivery of energy projects, typically undertaken by public-private partnership offices or utilities.

As a fourth step, governments can document the availability and distribution of education and training in the country, and/or within nearby countries. Doing so will help governments to understand the capacity available to address RE skills gaps at various locations in the country. Once again, Pakistan offers an informative example (box 3.5).



BOX 3.5 • PAKISTAN'S RENEWABLE ENERGY SKILLS-DELIVERY SYSTEM

When the government of Pakistan conducted a study of its renewable energy (RE) skills-delivery system, mapping both technical and vocational training institutes (TVETs) and higher-education institutions, it uncovered a disparity between locations where skills were being acquired and where developing solar and wind power plants was most feasible.

Although Sindh and Balochistan have the potential to accommodate more than 10,000 megawatts each by 2030, relatively few universities or training institutions offer RE courses. In contrast, the provinces of Punjab and Khyber Pakhtunkhwa have a higher number of RE programs but less potential for utility-scale RE projects.

Pakistan has enough TVET and higher-education institutes to expand renewable programs to levels that can meet anticipated demand for skills in these provinces.

Table B3.5.1 • Pakistan's renewable energy skills delivery system

LOCATION	RE LOCATION POTENTIAL (MW)	UNIVERSITIES OFFERING RE RELEVANT COURSES	TRAINING INSTITUTES OFFERING RE RELEVANT COURSES
Balochistan	10,196	1	14
Khyber Pakhtunkhwa	280	2	50
Punjab	3,290	8	70
Sindh	10,035	5	27

Source: World Bank 2022b.

BOX 3.6 • A SUSTAINABLE APPROACH TO TECHNICAL ASSISTANCE IN TUNISIA

Technical assistance is a vital component of the services that development finance institutions provide to emerging and developing countries and that can be critical to implementing reforms and modernizing the public sectors of these countries. Such programs, however, have a history of being unsustainable, with support being delivered via consultants who implement the project and then leave the country. A new model for technical assistance, which promotes self-sufficiency rather than constant reliance on external partners, is greatly needed.

Such an approach is being implemented in Tunisia. The Tunisian electric system was originally modeled with a proprietary software to which the national utility did not have access. A sustainable long-term approach to energy planning would involve domestic access to this software, so countries do not have to consistently revert to an external party; several development financial institutions are now joining forces to support the country in acquiring the software in-house and build the capacity of a technical team to utilize it within the utility.

Source: World Bank 2022c.

As a next step, governments should compare the domestic availability of skilled labor with the requirements mapped along the value chain. This comparison will tell governments where they may need outside knowledge and expertise, or where education and upskilling might expand their domestic pool of talent. Tunisia is taking such an approach (box 3.6).

Once governments have documented the job profiles required on the value chain, the domestic capacities available to fill these roles, and any gaps that exist, **the final step would be to prioritize which skills to focus on and develop**. To do so, governments will need to make use of the findings from the studies outlined in 3.2 and 3.4.1. Mainly, they will need to consider:

- The number of skilled professionals that will be required to deliver on planned RE projects; and
- Segments of the value chain that will be supported domestically because there is (1) a high potential for domestic value creation, or (2) an existing comparative advantage (or both).

In addition, governments may want to consider the following three points, each of which is explored in greater detail in the subsections that follow:

- Quality and duration of job profiles, and whether certain profiles may contribute more significantly to the development goals of the country;
- Transferability of skills to other sectors; and
- Potential for increasing the number of women in the talent pool and to advance opportunities for them in the RE workforce.

QUALITY AND DURATION OF JOB PROFILES

Governments may wish to consider the trade-off between the quality and quantity of jobs supported, as well as the longevity of roles. While some jobs may be easier to generate, as they require less upskilling, they may not be quality jobs and may contribute little to a country's overall goals of poverty alleviation and economic development. Higher-quality jobs are often required in smaller numbers but may have more sustained impact, and support countries in unlocking greater domestic value creation in the long run. Planning for, and investing in, a high-quality workforce can create a virtuous cycle where growth in productivity and investment leads to an increased number of quality jobs (World Bank n.d.).

TRANSFERABILITY OF SKILLS TO OTHER SECTORS

Governments can consider skills within a broader context, and within multiple sectors, not only to understand the potential to reskill individuals from other sectors to fill gaps, but also to understand how skilled people may move among sectors. This is particularly important in immature RE markets, where a sustainable pipeline of projects has not yet been established and workers must shift among sectors for continuous employment. This is also true for short-term jobs, such as those in construction.

A focus on trade workers (e.g., welders and electricians) should typically benefit most countries. These are highly adaptable skills that will allow workers to transition among sectors as the RE market matures.

Governments may also consider how skills in other energy industries can be applied in the RE sector. Interviews conducted with geothermal developers in Indonesia, for example, revealed that skills shortages are not an issue, largely because of the breadth of local expertise in oil and gas that can be transitioned with minimal reskilling required. Interesting lessons also exist around a just transition away from coal mining. In Poland, for example, a study has shown that women were more willing to consider job options in other sectors compared to their male counterparts (World Bank 2018).

Figure 3.6 illustrates how governments can map transferable skills and job longevity for these roles.

Figure 3.6 • Examples of potential transferability of skills among sectors

Job Profile	Education & Training Required	Longevity on an RE project	Synergies		
			Conventional Power Generation	Mining	Construction
Driver	Basic	Short-term	✓	✓	✓
Cleaner	Basic	Long-term	✓	✓	✓
Welder	Vocational	Short-term	✓	✓	✓
Renewable Energy Technician	Vocational	Long-term	🎓		
Health & Safety Expert	Higher Education (non-STEM)	Long-term	🎓	🎓	🎓
Gender Expert	Higher Education (non-STEM)	Short-term	✓	✓	
Public Relations Officer	Higher Education (non-STEM)	Long-term	✓	✓	✓
Site Operations Manager	Higher Education (STEM)	Long-term	🎓	🎓	🎓
Electrical Engineer	Higher Education (STEM)	Long-term	🎓	🎓	🎓

Short-term 1-3 years, only project development

Long-term 25+ years, O&M or throughout

STEM Science, Technology, Engineering and Mathematics

✓ Strong synergies with little need for reskilling

🎓 Strong synergies but will require reskilling, either on-the-job or in the classroom

Source: Original figure prepared by the authors for this report.

POTENTIAL FOR INCREASING THE NUMBER OF WOMEN IN THE RENEWABLE ENERGY TALENT POOL

Women are underrepresented in the RE work force, and the gender imbalance is particularly pronounced in on-site roles and those requiring a STEM background (Schomer and Hammond 2020). Women face barriers to advancement throughout the sector (see figure 3.7), from skills development and education, to recruitment, career progression, and promotion.

Figure 3.7 • Barriers for women in renewable energy

Main barriers for women in renewable energy	Roles				
	On-site roles in traditionally male-dominated environments	Roles where women are underrepresented with opportunities for high-quality and high-paid jobs			Off-site roles with large talent pool of women but recruitment and progression barriers remain
		On-site skilled workers	On-site higher education STEM	Off-site higher education STEM	
Education					
Social and gender norms and perception of gender roles limit women's access to STEM education			●	●	
Gaps in access to internship, apprenticeship and vocational jobs	●	●			
Recruitment					
Lack of awareness about employment opportunities and career information and lower access to professional networks	●	●	●	●	●
Recruitment practices biased toward hiring men and lack of gender targets lead to discrimination in the recruitment process	●	●	●	●	●
Retention and advancement					
Mobility and remoteness requirements	●	●	●		
Lack of basic facilities for women, (separate toilets or changing rooms) and appropriate clothing on-site	●	●	●		
Male-dominated environments and lack of corporate GBV policies can limit focus on safety culture and enhance risk of GBV	●	●	●		
Inadequate workplace policies and practices (flexibility, parental leave. equal pav. etc.	●	●	●	●	●
Discrimination in the career progression process and lack of training opportunities	●	●	●	●	●
Lack of mentorship opportunities	●	●	●	●	●

Source: Original figure prepared by the authors for this report based on World Bank market sounding 2021.

Research shows that even when women possess the same or superior qualifications and work experience, they are seen as less skilled than men and less able to hold technical positions (Baruah 2016). On-site employment is disproportionately allocated to men during the construction phase of projects owing to the widespread assumption that most on-site roles require physical strength. But many tasks are now mechanized and automated, reducing the importance of physical strength.

Mapping jobs (asking whether they are on- or off-site and what are their education requirements) could help governments better understand the specific barriers women face in job profiles, decide where to focus education and training efforts, and rank the actions needed to close the gender gap in RE. Figure 3.8 offers an example of how job profiles can be mapped across these dimensions.

Along with gender equality, youth employment and the inclusion of disadvantaged groups are key to building a workforce that both reflects society and brings SE benefits. Diversifying the RE workforce is critical not only for equality but also for deepening the talent pool. The RE sector needs a diverse, representative sector in order to be competitive, innovative, and customer facing.

Figure 3.8 • Sample of women's representation across different categories of renewable energy jobs

	Basic education	Vocational training	Non-STEM higher education	STEM higher education
On-site jobs	Truck Driver, Construction Worker, Security Guard	Crane Operator, Electrician, Welder	Health and Safety Expert, Land Use Negotiator, Site Inspector	Project Manager, Electrical Engineer, Environmental Expert
Off-site jobs			Social Expert, Public Relations Officer, Lawyer	Energy Modeler, Physicist and Geophysicist

On-site roles in traditionally male-dominated environments

Roles where women are underrepresented with opportunities for high-quality and high-paid jobs

Off-site roles with large talent pool of women but recruitment and progression barriers remain

Source: Original figure prepared by the authors for this report.

Note: This figure is suggestive; governments and companies should analyze their specific context to refine the various job categories.

SETTING REALISTIC TARGETS FOR JOB CREATION AND THE PARTICIPATION OF DOMESTIC FIRMS

From the technical studies conducted, including the least-cost generation plan and the analysis suggested in sections 3.4.2 and 3.4.3, governments will learn the following:

- The types and number of jobs needed for the least-cost scenarios that have been modeled and prioritized;
- The country's capabilities at both the worker and firm levels, and the gaps that exist;
- Segments of the value chain with the highest domestic value-creation potential, and those that can most realistically be localized in a competitive manner;
- Prerequisites for greater participation of domestic firms and labor.

Based on the information collected, realistic program-level targets can be defined for domestic job creation and firm participation. It would also be helpful to scale targets over time, based on an assessment of the time needed to address the skills gap and other barriers for local workers and firms. It is also important to recognize that these are moving targets that will need to be adjusted as the domestic RE market evolves.

Targets that specify the number and type of jobs for women, as well as the participation of women-owned and women-led companies, can be a way to support gender equality. To monitor progress, it is important to collect disaggregated baseline data and to set targets that are appropriate and realistic in the domestic context.

Setting targets will require ministries to coordinate with those responsible for RE development and those that oversee industry and commerce, labor, education and skills development, social and economic development, and gender affairs. Establishing an RE task force with these different stakeholders would provide an opportunity to develop a long-term vision and to conduct workforce planning at a national level. For example, the Indian Skill Council for Green Jobs is an initiative of the Ministry of New and Renewable Energy, the National Skills Development Corporation, and the Confederation of Indian Industry. The council acts as a bridge between the government of India, state governments, and industry to develop strategies and implement programs for skills development pertinent to industry needs and aligned to best international practices. Upon establishing the needs within an industry, the council leverages the capabilities of various ministries to map occupations, analyze the skills gaps, develop curricula, train teachers, conduct assessments, and provide the necessary skills to the workforce to increase employment (Tyagi et al. 2022).

Similarly, in Morocco, the public party plays a catalytic role in maximizing benefits from RE programs, including in the areas of job creation, skills development, and women's employment in projects. A dual committee was set-up to ensure quick operationalization of the first large-scale solar program and its alignment with the country's strategic priorities. Key public stakeholders at different levels were involved.

- At the strategic level, key ministers were represented on the supervisory board of the public procuring entity. The board was chaired by the managing director of the utility and included the minister of finance, the minister of energy, the minister of industry and trade, the minister of economy, the minister of education and training, and other public representatives.
- At the operational level, representatives from key ministries formed an inter-ministerial committee charged with monitoring the entire RE bidding process.
- At the technical level, ad hoc committees were formed on specific matters such as government contractual support.

Such a clear governance framework involving all key public stakeholders improved the coordination amongst the stakeholders at the launch of the program and enhanced synergies (World Bank 2021b).

3.6 SELECTING REGIONS FOR DEVELOPMENT AND PRIORITIZING INITIATIVES

Renewable energy projects have immense potential to contribute to regional development if conscious efforts are made. Projects designed to exploit that potential accelerate SE development through the creation of direct and indirect jobs and new enterprise opportunities at the country, regional, and local levels. Also, when planned correctly they can lead to significant upskilling, funding for infrastructure projects and the provision of new services (e.g., health, education, etc.) and/or revenues to local communities through joint ownership or benefit-sharing schemes.

Local initiatives have become commonplace as a way to secure and maintain a "social license to operate," gain public acceptance, and provide tangible benefits to local communities (IFC 2019). In many countries, however, SE considerations at the site level are examined only through environmental and social impact assessments, which take place just prior to project construction and focus on how projects may adversely affect communities. It can often be left to developers to forge ahead with their own corporate social responsibility priorities to gain local community support. Rather than taking a reactive approach to settle disputes as they arise, governments can take a proactive approach at the outset, planning an RE program inclusively so livelihoods in local communities improve, while also promoting the participation of women and disadvantaged groups.

While governments assess least-cost electrification, generation, and transmission plans to arrive at realistic capacity targets for RE, they can also take the opportunity to understand development priorities at the national and regional levels. In doing so, governments can identify key stakeholders to be consulted so beneficial outcomes are fully realized. The early identification of these priorities improves opportunities to leverage synergies in a country's overall development objectives. But such an approach requires close coordination among key public and private sector stakeholders to ensure that national development and RE objectives are aligned.

The key steps to link technical goals to the wider development goals of the country are mapped below. Such actions will enable sustained impacts both at the national and local levels and help to inform the requirements that will be designed for developers in the project tendering process.

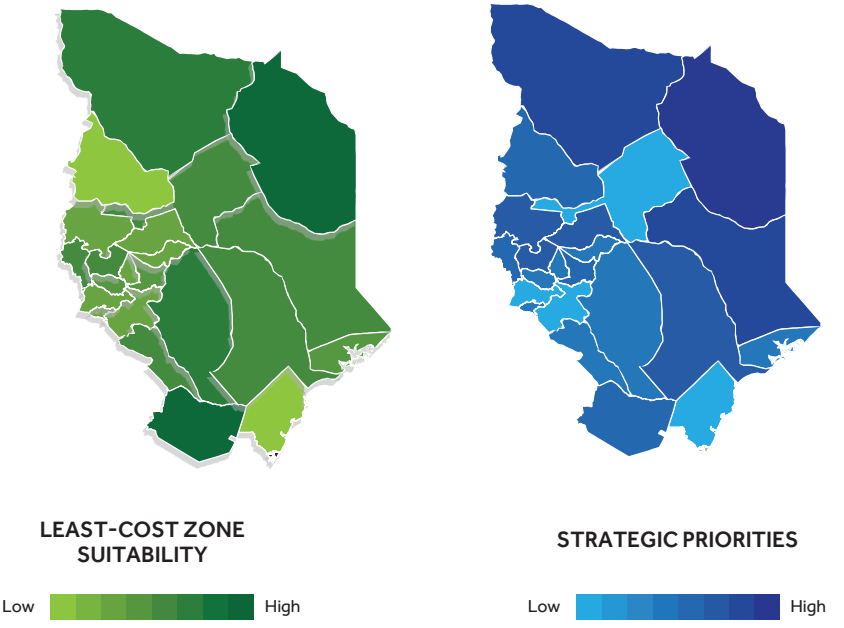
As a first step, governments can document and map the SE priorities in national and regional development plans. If plans do not exist, national governments can work with subnational entities to conduct assessments to arrive at these priorities.

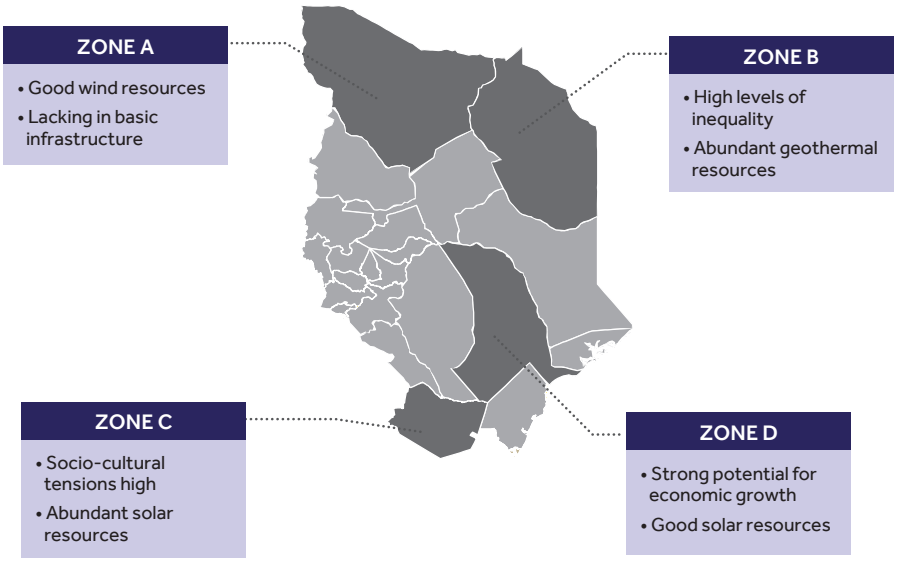
A country's macro-level SE priorities can then be mapped using geospatial models. These models are useful, however, only if they are built on accurate data and assumptions. Thus, the relevant planning authority in government will need to coordinate data and information sets with the regional governments. These needs will be further defined and prioritized in the strategy phase and can eventually provide direction to developers for specific support toward regional and local development priorities. Figure 3.9 provides a fictional example of how a country might map its development priorities.

The World Bank–ESMAP, in partnership with the University of California at Santa Barbara, has developed an RE zoning tool, an interactive, web-based platform utilizing geospatial datasets and baseline industry assumptions as default values for economic calculations (REZoning n.d.). The platform allows entities to identify, visualize, and rank zones that are most suitable for the development of solar and wind projects in a set of countries. The tool allows users and decision makers to obtain insights into the technical and economic potential of RE resources for countries. Details can be found on the REZoning tool website.

Spatial representations of the country's development needs can then be compared with a country's least cost-generation plan and high-level locational study. In doing so, governments may identify synergies to be leveraged between least-cost regions and those in need of development. The need might

Figure 3.9 • Prioritizing locations for renewable energy projects based on least-cost generation planning and regional development needs assessments





Source: Original figure prepared by the authors for this report.

be to strengthen local economies, especially if they are underdeveloped, improve the economic situation of communities (e.g., high unemployment of women and the disadvantaged, migration of workers out of local areas), or to contribute to the resolution of social and/or political issues (e.g., support to disadvantaged communities). In other cases, the drivers may be strictly political. Such findings may inform final decisions on the prioritization of regions for RE development.

Once regions for RE development have been ranked, governments can begin to examine needs at a more local level, borrowing from the local development plans of selected regions. Governments can also draw lessons learned in the RE sector with regard to local development, and from experiences outside the RE sector, to assess what public and private sector actions have worked well in maximizing SE benefits at the local community level.

Once governments have gained an understanding of the SE development needs and priorities in the regions that have been prioritized for RE development, they can take the further step of identifying key stakeholders with whom to engage. Examples of important stakeholders include local/regional governments, community-based organizations, NGOs, community development associations, women's groups/committees, regional utilities, and business associations. The mapping of relevant stakeholders allows identification of the key players to be engaged in the support of local development for consultations in the strategy phase.

Specific measures should be taken to ensure that women and socially disadvantaged groups are identified as key stakeholders. For example, efforts should be made to seek out and identify diverse leaders that are representative of the social fabric of the communities, specifically ensuring input from female leaders, women's groups or organizations, and those with disabilities.

BOX 3.7 • SOUTH AFRICA'S EFFORTS TO BALANCE REGIONS FOR A JUST ENERGY TRANSITION

In South Africa, the government has identified and approved a total of eleven RE development zones (REDZs) to guide choices of investment locations. Eight of these zones were identified through a 2.5-year-long strategic environment assessment. The assessment considered which form of large-scale wind and solar PV development would be most appropriate to expand South Africa's energy mix and help the country move away from reliance on coal. Environmental, social, and economic considerations were also factored in. The methodology imposed raw data on wind and solar resources over information on transmission infrastructure and local municipalities with a high development potential (including social need and priority areas for RE manufacturing) to achieve layers of development potential. This was followed by assessing environmental constraints to rule out areas that were highly sensitive (e.g., protected areas, agricultural areas). Consultations with developers, provincial governments, and the public further informed the refinement of the strategic geographical areas, which were labelled REDZs.

In 2021, three additional REDZs were declared. One is in Emalahleni, a municipality in Mpumalanga province at the heart of the country's dominant coal industry, which produces 80 percent of the country's total coal. A phase-out of coal in the province is expected to lead to substantial socioeconomic losses. Operating under the principle of a just energy transition that includes social inclusion, decent work for all, and poverty reduction, the utility (Eskom) is considering options for repurposing coal-fired power plants scheduled to be decommissioned. This fits well with provincial governments' own efforts toward green prosperity through the Mpumalanga Green Growth Strategy, Green Economic Cluster, and a trade and industrial policy strategy.

Sources: Cape-Ducluzeau and van der Westhuizen 2015; IASS/IET/CSIR 2022.

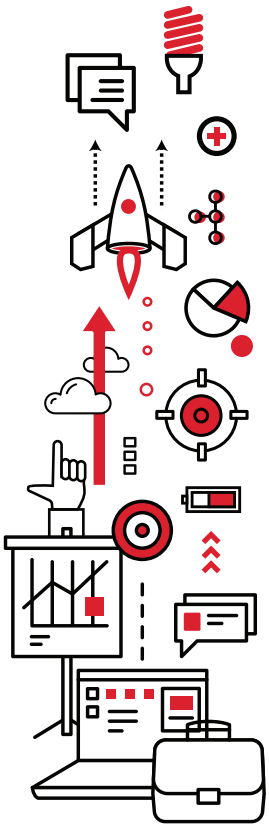
4

PHASE 2: SETTING A STRATEGY

4.1 OBJECTIVES

The focus of the strategy phase (summarized in figure 4.1) is to develop a long-term socioeconomic roadmap to consolidate priorities and ensure that they are taken into consideration as the overarching RE program is being designed and implemented. Such roadmaps should outline objectives and define paths, indicating how countries can scale actions so that beneficial outcomes endure.

The SE roadmap should show targets for domestic employment and spending to be directed towards goods and services from domestic firms, as well as priorities for local development. The roadmap also identifies the support programs needed to reach these targets. Within the roadmap, specific action plans are laid out for domestic firms (section 4.2), skills development and employment (section 4.3), and local development (section 4.4).

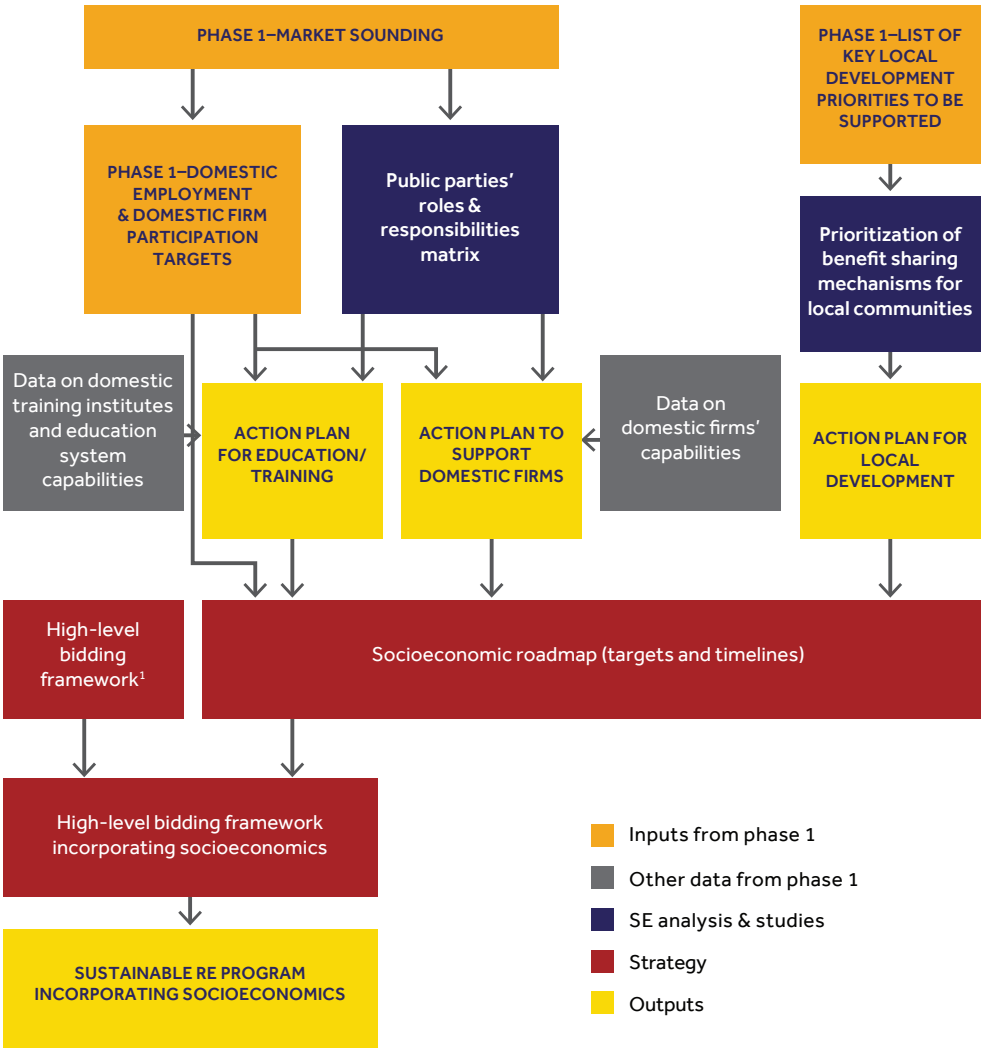


An SE roadmap should inform the competitive-bidding framework through which the government will procure RE projects, identifying mechanisms to encourage private sector commitment to the desired and prioritized local outcomes (section 4.5).

Key questions in the strategy phase include:

- What can governments do to stimulate the development of new domestic firms and help existing domestic firms assess opportunities to participate in the renewable energy value chain?
- What strategic actions can governments take to foster skills development—at both the individual and firm levels—to meet SE roadmap targets?
- What capacity-building programs can governments set up to encourage more equitable and inclusive workforce participation? What education and training are required within the public sector to ensure that the SE roadmap can be implemented effectively?
- What benefit-sharing priorities and associated mechanisms can governments develop to ensure that communities at the local level benefit from RE deployment and operation?
- What roles and responsibilities can key stakeholders take on to deliver on SE targets and action plans?
- How can the government design a competitive-bidding framework that will secure the desired SE benefits, including inclusive gender and social gains?

Figure 4.1 • Overview of the strategy phase



Source: Original compilation for this report.

Note: Across all activities there should be a focus on collecting GESI-disaggregated data documenting barriers to women and disadvantaged groups.

1. Result of technical analysis and studies

4.2 MAXIMIZING THE PARTICIPATION OF DOMESTIC FIRMS IN THE RE VALUE CHAIN

During the strategy phase, governments should develop a concrete plan with actions to enable domestic firms to enter and/or scale up their provision of goods and services to the renewable energy sector. To do so, it will be necessary for governments to revisit findings from the planning phase, such as the following:

- Comparative advantages of domestic firms—advantages that are present and possible to achieve in the short to medium term;
- Challenges faced by domestic firms (and, to the extent applicable, firms owned or led by women or disadvantaged groups) to participate in the RE value chain; and
- Challenges that IPPs face in procuring goods and services from domestic firms.

These opportunities and barriers will be used to devise efficient and effective interventions/programs so that domestic firms can identify new business opportunities, improve their capabilities, and increase their participation in the RE value chain. The action plan could also highlight specific programs required to support firms led by women and socially disadvantaged groups.

These programs will also include, to the extent possible, key information needed for implementation, such as timelines, costs, roles and responsibilities, and geographic locations, and will feed into the SE roadmap, ensuring it becomes a central piece of the overarching RE program.

TRANSPARENT INFORMATION FOR DOMESTIC FIRMS AND IPPS TO PARTICIPATE IN THE RE VALUE CHAIN

To maximize the participation of domestic firms, individuals interested in starting businesses and existing firms need to be made aware of the opportunities that currently exist and will materialize as the RE program is rolled out by the government.

Once finalized, the national RE program can be communicated and promoted, for example, at forums and trade shows at the regional, national, and international level. Such communication should outline clear targets for technology, capacity, and time frames. Transparency around the design of the program will help to build confidence, a key requirement for any business looking to engage in a new sector or to scale up existing operations, giving domestic firms the time to prepare and react to emerging opportunities. Box 4.1 describes the successful effort to instill confidence in Australia's RE market.

Such openness and communication around the RE program will build confidence among developers regarding long-term/medium-term prospects in the country for RE (a pipeline of projects rather than a standalone project) and may encourage IPPs to invest in the development of local supply chains.

A transparent and credible flow of data and information—including the relevant studies and local assessments from the planning phase on the potential for domestic firm participation—will be useful for domestic firms positioning themselves along the RE value chain. Such studies, if possible, should be conducted by a reputable third party to build confidence in the market.

BOX 4.1 • BUILDING CONFIDENCE IN AUSTRALIA'S RE MARKET

The Industrial Capability Network (ICN), an independent membership organization in Australia and New Zealand, builds confidence in the domestic RE market. It communicates emerging opportunities in the sector and supports domestic firms as they seek to access these opportunities. For example, the ICN hosts online conferences for the construction, engineering, manufacturing, and services sectors on the latest RE project and procurement information. The events aim to stimulate procurement and business development and bring together a multitude of stakeholders to understand the latest challenges and developments along the supply chain. For illustration purposes, an event held in 2022 brought together 15 major developers that represented a potential $A 5 billion in procurement opportunities.

Sources: Original research conducted for this report based on ICN 2022

Governments can also empower national industry organizations, business associations, and chambers of commerce to communicate opportunities that exist along the RE value chain to domestic firms. Women's business associations can also be engaged to raise awareness of emerging opportunities and encourage women entrepreneurs and business owners to pursue opportunities.

Such organizations may play a role in creating and maintaining an open and regularly updated online directory that lists domestic firms and their products and services, credentials, and experience. This can help developers identify qualified domestic firms, understand the goods and services they can supply, and assess their capabilities. Often chambers of commerce are a useful resource on how to gain access to databases that may include breakdowns by gender and different social inclusion metrics (including details of subsector focus, ownership, and leadership that can be utilized to target specific preferential procurement objectives and targets).

BOLSTERING THE CAPABILITIES OF DOMESTIC FIRMS

Governments can support industry associations or similar bodies to ensure that existing domestic firms have the capabilities to meet the standards of IPPs. Further, support for intermediary institutions or direct support for grant programs can help fund business innovation and technology transfer. These actions enable domestic firms to build a track record and compete on a level playing field with international suppliers.

Specific programs could also be created to fund domestic firms, allowing them to upskill their workforce to deliver new services and improve their current offerings. Funding for career-development programs could help ensure that domestic firms retain and advance quality employees. Funding for specific training, such as business development and marketing skills, may directly strengthen revenue generation. Governments may also consider how they can develop human resource tools that connect domestic firms with qualified domestic labor. An example from South Africa is described in box 4.2.

BOX 4.2 • THE SOUTH AFRICA PV GREENCARD

South Africa's PV GreenCard was developed to ensure consistent quality among solar installers and technicians. The program, sponsored by the South African Photovoltaic Industry Association, has created a set of industry occupational standards, around which it has designed certification programs. Certified installers and technicians are then entered into the PV GreenCard database, a publicly accessible resource that provides contact information for all registered individuals and companies, as well as their past project experience.

The website also publishes any tender where the PV GreenCard certification is listed as a requirement. While the program has been designed primarily for rooftop solar, such a program could be expanded to support larger companies with contracts for utility-scale projects to source qualified labor.

Source: Original research conducted for this report based on PV GreenCard 2022

Seed funding for startups may be particularly important for countries looking to develop their domestic RE industry. Developing, promoting, and funding prizes and competitions can encourage new market entrants and be targeted to support entrepreneurs who face additional barriers, such as firms owned by women and other disadvantaged groups. It is important to consider that while such programs may not yield results in the short term, over the lifetime of the RE program, startups can evolve and grow to become industry players.

Support programs like those mentioned above could be offered directly by government agencies or through third-party organizations like industry associations. RE clusters are an effective way to strengthen capabilities and make domestic firms more competitive. An example from Morocco is described in box 4.3. Many countries have invested in innovation hubs as a way to promote joint ventures, research collaboration, and knowledge exchange, and to deliver industrial and supplier development programs (IRENA 2015b).

Certification schemes help standardize quality across goods and services and IPPs often require suppliers bidding on their tenders to guarantee such certifications. Obtaining and maintaining the certifications, however, places an additional financial burden on firms, particularly on small and medium enterprises (SMEs). Governments could consider how they might help domestic firms in the certification process, for example, through grant funding obtained for this purpose from donors.

BOX 4.3 • MOROCCO FOSTERS THE PARTICIPATION OF DOMESTIC FIRMS IN THE RE VALUE CHAIN

Morocco has set a target that 52 percent of the country's total installed generating capacity will be powered by renewables by 2030, which would represent 12,000 megawatts (MW) of renewable energy (RE). The Noor Ouarzazate complex was the country's first operationalization of this ambitious strategy and is now the largest concentrated solar power (CSP) complex in the world, with 510 MW of CSP with thermal storage and an additional 72 MW of solar PV. In addition to generating clean power and reducing reliance on imported fossil fuels, fostering the participation of domestic firms and strengthening domestic capabilities in RE were central to the strategic plan.

The market soundings conducted by the Moroccan Agency for Sustainable Energy (MASEN)—which was in charge of the procurement of the CSP projects—have shown that the private sector have neither the means nor the time to identify local stakeholders that are not already known, qualified, or vetted. MASEN helped to connect prequalified bidders and the domestic firms with support from the Moroccan Solar Cluster, an association grouping key players in RE-related sectors with over 200 members. Joining forces with the public procuring entity, the cluster played a critical role in advancing toward RE targets by providing:

- **Capacity building** for domestic firms, including technical support, peer-to-peer learning, and training. As of 2020, 70 beneficiaries had taken advantage of training opportunities to improve their capabilities in commercial strategy and business development. The cluster offers an incubation program called Ecostart that has coached 50 entrepreneurs and startups, and, for more mature firms, a "Green Business Booster" program.
- **Networking opportunities** facilitating market access for domestic players and creating opportunities for joint ventures and joint research. The Solar Cluster hosts an open and regularly updated website that lists the profiles and details of all domestic firms active in the RE sector and provides support at the project level to match developers with domestic firms.
- **Business intelligence**, including sector studies and webinars to help domestic players learn about emerging business opportunities and effectively position themselves along the RE value chain.

By 2020, the Cluster had strengthened the competency of more than a thousand companies and actors.

Sources: World Bank market sounding 2021; Cluster Solaire 2022.

DESIGNING AN ENABLING ENVIRONMENT TO MAXIMIZE THE PARTICIPATION OF DOMESTIC FIRMS

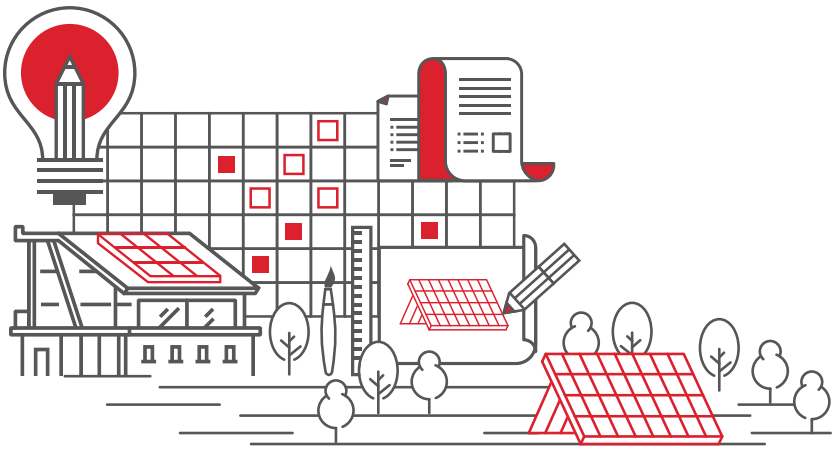
Interventions at the firm level alone may not produce optimal results to maximize the participation of domestic firms in the RE value chain. Fostering their competitiveness and access to local and regional markets will also require an enabling environment, including favorable regulatory and financial frameworks. Building this enabling environment will take a collaborative approach among the ministry responsible for RE and those responsible for the economy, industry, and enterprise development, among others.

Even if firms have the capabilities needed to provide goods and services along the RE value chain, they still may not be able to capitalize on opportunities for lack of access to the finance. For example, they may need upfront capital to stock required materials and products, or access to capital to expand their team to deliver on a contract within the specified period. They also may face challenges to meet the requirements set out by developers, such as the need for a bond or letter of credit.

Governments may consider the creation of tailored financial tools to support domestic firms as they scale up their operations and compete with foreign firms. Examples include help in obtaining bonds and letters of credit, loan guarantees, and low-interest loans. Such programs could also provide additional incentives to domestic firms led by women or individuals from disadvantaged groups that typically face heightened barriers when seeking financing.

Governments may also consider how the design of their RE programs, including project pipelines, may affect the procurement opportunities that domestic firms might access. For example, in a country with a nascent RE industry, ramping up the size and complexity of projects gradually may benefit smaller and less-experienced domestic firms seeking to build a track record. Likewise, governments should consider the timelines of their competitive-bidding process to procure RE projects (detailed in chapter 5). They also need to anticipate whether and how prospective bidders are likely to engage domestic suppliers of goods and services.

Many domestic firms will require specific support with the procurement processes of larger international IPPs. Governments can consider how the support programs they devise can target majority women-owned firms and small businesses, as well as firms led by disadvantaged groups, as the case may be.



4.3 CREATING AN ACTION PLAN TO ADDRESS SKILLS GAPS AND MAXIMIZE DOMESTIC EMPLOYMENT

A lack of skilled domestic labor is a major barrier to maximizing the value creation of RE deployment. Industry surveys suggest that skills shortages are intensifying, even in high-income countries with mature systems for anticipating demand for skills (IRENA 2021). These shortages are likely to become more widespread unless proactive measures are taken. The lack of technical skills is even more pronounced in developing countries, which have fewer higher-education graduates and sometimes less-developed skills-development systems.

In addition, without a focus on women's employment (and equality more generally), the talent pool shrinks while talent retention falters. These deficits limit RE sector operations, financial returns, innovation, and risk management (Schomer and Hammond 2020).

Maximizing job creation therefore hinges on a government's ability to provide relevant education and training for the labor force suitable for RE employers, attract fresh graduates to the sector, and facilitate labor mobility from other sectors to RE.

During the planning stage, countries will have assessed their domestic talent pool and identified and prioritized gaps requiring action. In the strategy phase, countries can conceptualize support programs to address these skills gaps. Countries could also create an action plan for education and training, reskilling, and labor programs. Such a plan should take the following into consideration:

- Technical studies on the distribution of RE resources and development potential;
- Outcomes of job-projection models;
- Key decisions on segments of the value chain to be supported/developed domestically;
- Priorities for education and training as decided in the planning phase; and
- Timelines, costs, roles and responsibilities, and geographic locations of planned interventions.

A holistic approach will help ensure that the plan is well integrated with industrial policies, labor market policies, diversity and inclusion programs, and economy-wide skills development and retraining strategies.

Governments should consider multiple pathways to skills delivery, prioritizing them based on where the greatest potential lies given the country's circumstances. The pathways include:

- **Technical and vocational education and training** (TVET) related to specific professions, which are often hands-on in nature, including programs and upskilling/reskilling short courses;
- **Apprenticeships and on-the-job training** offered on- or off-site by employers, sometimes in partnership with educational institutions; and
- **Higher education**, including bachelor's, master's, and doctoral-level programs taught at universities.

Skills development can be offered by a multitude of stakeholders, including public institutions, private education providers, civil society organizations, and private sector employers. The action plan should outline the desired pathways and providers for RE skills development, as well as programs that will support labor mobility into the RE sector.

The sections below present potential solutions to increase awareness of RE career opportunities, improve the quality of RE education and training, and expand access to skills-development opportunities. These solutions may help to inform components of a government's own action plan.

COMMUNICATING RENEWABLE ENERGY CAREER OPPORTUNITIES TO THE DOMESTIC WORKFORCE

Governments can support RE employment by raising awareness of job opportunities in the sector and sharing information about the qualifications and expertise needed to secure a position. Ministries responsible for RE can work with the ministries of education, women's affairs, and private sector stakeholders working to promote GESI, among others, to ensure that children (and particularly girls) are exposed to STEM and RE curricula and aware of career opportunities.

To encourage equitable workforce participation, governments must also address underlying social norms that create additional barriers for women and disadvantaged groups. Underinvestment in educational aspirations and environments is one such barrier. Although the gender differences in math and science performance have narrowed and even closed, women and girls still underestimate their capabilities, in part because of internalized perceptions about their competence (Schomer and Hammond 2020). Internships, mentorships, and especially sponsorships can help women and disadvantaged groups embark on a career, build connections, and progress. A Canadian program to open doors to young people—including indigenous youth—is described in box 4.4.

In countries with shortages of skilled labor, the RE industry will rely on skilled professionals transitioning from other industries. Raising awareness of career opportunities is therefore not only important to encourage the education-to-work transition into the RE sector but also unemployment-to-work and job-to-job transitions (box 4.5).

BOX 4.4 • OPPORTUNITIES FOR YOUTH—AND THEIR EMPLOYERS—IN CANADA

In 2021, Relay Education provided hands-on renewable energy curricula to more than 12,700 primary and secondary students in Canada. Using fun programming, such as designing solar-powered vehicles and field trips to explore wind and solar farms, they spark curiosity about the RE industry.

Relay Education's Indigenous Green Careers program provides targeted mentorship and networking opportunities to indigenous youth ages 15 to 29, helping them to explore how their skills and personal interests can align with jobs in renewable energy, learn about the educational requirements of various careers, and assess financial and social factors when choosing a career path.

The organization is also an implementing agency of the Science and Technology Green Internship Program, a joint initiative of the Canadian Ministry of Natural Resources and the Ministry of Employment and Social Development. The program provides wage subsidies to eligible employers in clean energy across Canada to hire and mentor youth. A key component of the Canadian government's Youth Employment and Skills Strategy, the program introduces young people to opportunities in the sector and kick-starts their careers. Results from 2018 indicate the success of the program, with 82 percent of the participants finding full-time work upon completion. Nearly two-thirds of participants belong to one or more employment-equity groups (including women, aboriginal peoples, persons with disabilities, and members of visible minorities).

Sources: Relay Education 2022; Government of Canada 2022.

BOX 4.5 • SKILLS SYNERGIES BETWEEN OIL/GAS AND GEOTHERMAL

Geothermal and the oil and gas sectors have many skills overlaps, in both skilled and unskilled labor. Drilling jobs are a focus, of course, but other skills are valuable for geothermal, from design, manufacturing, and installation to operation. Countries can draw on skilled labor in the oil and gas (and to a lesser extent coal) sector.

- **Project planning:** During project planning, surface studies, drilling of test wells, and reservoir models are needed in both sectors to evaluate underground resources. Services in geoscience (e.g., geophysics, geochemistry, geology) and expertise in environmental and social evaluation are also required. Even though many aspects of these energy sectors are the same, unique conditions need to be understood (Umam et al. 2018). A reskilling of labor from the oil and gas sector toward geothermal will focus on specific geothermal conditions such as rock type, chemistry, pressure, and temperature, and the interpretation of information.
- **Design and manufacturing:** The greatest difference from conventional power plants is the gathering system (steam and brine), which requires specific knowledge to optimize the geothermal energy produced and to prevent scaling and erosion by identifying material and operation practices. Another special geothermal design condition is the noncondensible gas content in the steam, which has to be released. Because the steam is saturated, it can degrade turbines, pipes, and other equipment. The manufacturing and design of equipment for geothermal power must therefore follow specific protocols to fight scaling and erosion. Reskilling will be needed for design teams in particular.
- **Installation and operation/maintenance,** regardless of technology, require similar shares of skilled and unskilled workers. Sector-specific knowledge is required in the environmental, health, and safety aspects particular to a resource, as well as specific know-how for operating geothermal fluid-gathering systems and geothermal flash turbines. However, the reskilling of engineers, mechanics, and electricians need not be extensive.

Sources: Original research conducted for this report; Umam et al. 2018.

Ministries responsible for RE may consider working with ministries overseeing labor and skills development to leverage unemployment and job transition services and raise awareness about RE careers. For example, reskilling workers in the declining fossil fuel industries could offer a dual benefit of mitigating the SE drawbacks of the energy transition by filling skills gaps in the RE sector. For this transition to occur, however, workers in declining industries need to know about opportunities in RE. Strategies that have proved effective for workers transitioning out of coal mining include labor exchanges, which allow workers to gain short-term experience in the new sector; vocational counseling, where workers are assisted in assessing the transferability of their skills; and mobility assistance, including reimbursements for transport costs and housing subsidies (World Bank 2018).

A study by the World Bank in Botswana showed that the development of the mining sector contributed to the emergence of specific low-, medium-, and high-skilled capabilities and jobs locally, including some that could potentially be relevant to RE projects. Table 4.1 summarizes some of the key capabilities of the value chain and corresponding skills that could be transferable.

Table 4.1 • Potential for transferring capabilities from mining to RE in Botswana

PHASE	TRANSFERABLE ACTIVITIES	TRANSFERABLE SKILLS		
		LOW	MEDIUM	HIGH
Development	• Technical studies • Environmental and social impact assessment • Site preparation, clearing, grubbing, etc.	• Laborer • Machine operator	• Measurement expert • Data acquisition expert • Work driver	• Geological expert • Water specialist • E&S consultant, naturalist • Grid-modeling expert • Land-use negotiator
Equipment manufacturing and assembly	• Assembly of specific components	• Assembly operator		
Engineering, procurement, construction	• Procurement of components • Construction • Civil works	• Logistic operator • Construction worker • Transportation worker • Laborer • Machine operator	• Specialized driver • Welder • Electrician • Mechanic worker	
Operation & maintenance	• Basic operations • Site cleaning • Site safety • Regular mechanical maintenance • Regular electrical maintenance	• Production operator • Plant worker • Cleaning operator • Site maintenance operator • Logistics operator • Engine driver	• Mechanical operator • HSE specialist • Administrative staff	

Source: World Bank, 2022d

DESIGNING EDUCATION AND TRAINING TO MEET THE EXPECTATIONS AND NEEDS OF THE RE INDUSTRY

Employers in the RE sector consistently report that skills being developed within education and training institutions, particularly in developing countries, are not meeting their needs. This is a barrier to domestic recruitment and the overall maximization of domestic employment.

To address this challenge, governments can facilitate collaboration among RE firms, education and training institutions, and relevant ministries to ensure that educational programs are developing industry-relevant skills (Nishimura and Rowe 2022).

Many countries have national standards that define skills requirements for jobs across the economy, particularly where a professional license/certification is required (for example, engineers, electricians, etc.). Creating skills standards allows governments to create assessments and certifications and to design standardized national curricula for teaching and training.

Where standards exist to develop skills, countries can then adopt new standards specific to RE job profiles. This evolution in standards ensures that workers are equipped with the competencies they and their employers need to perform to a high standard. Doing so also:

- Reduces the costs to educational institutions to establish innovative programs, as they will already have a curricular blueprint;
- Renders skills more portable across regions, as certifications will be recognized at the national level; and
- Supports the private sector in assessing the quality of domestic skills and provides a degree of comfort about the capabilities of the domestic labor force.

Countries may also wish to consider adapting existing standards for roles that often transition across multiple sectors, such as electricians and welders (IRENA 2021). Doing so would ensure that these workers are trained to a level where they can work in the RE sector without the need for an additional qualification. Such standards, and accompanying certifications, need continuous updating owing to the rapidly evolving nature of the sector.

Where national skills standards are not in place, governments can look to international standards and certifications (box 4.6) or choose to officially recognize those in use in other countries. Another approach can be to work with the private sector to develop accreditation schemes for their workers. For example, an IPP that has worked with government entities in both Egypt and Senegal offered certification to workers who completed the construction phase of their projects. The goal of such certification is to help these workers move on and secure future opportunities in the sector.

Even where curricula are standardized, education providers may need help with implementation to ensure that quality expectations are met. Particular attention may be required in rural areas, where instructors with practical expertise, equipment, and materials are in short supply. Governments should consider how they might involve the private sector to address these shortages.

Workplace learning opportunities (such as apprenticeships or short-term placements) can be an effective strategy to provide real-world experiences to learners. For example, a geothermal IPP in Ethiopia hired a foreign company to do its drilling work but required it to commit to training domestic staff on-site. The IPP hired 15 Ethiopian nationals as assistants, who shadowed expert drillers and learned on the job. The expectation is that the local participants will have the skills to become drillers within five years.

BOX 4.6 • GLOBAL CERTIFICATION SCHEMES FOR THE WIND AND SOLAR INDUSTRIES

The Global Wind Organisation (GWO) is a nonprofit body founded by wind turbine manufacturers and owners. GWO has designed and launched numerous training standards with its industry members to align skills being developed by training institutes with the requirements of employers in mind.

Globally, GWO has accredited more than 400 training institutes to deliver their training. Any individual with a GWO certificate is considered competent according to the learning objectives of that standard, and GWO members accept the certificate as confirmation that the individual possesses the knowledge described in the standard.

The North American Board of Certified Energy Practitioners® (NABCEP®) is the most widely recognized certification organization for professionals in the field of solar energy. Launched in 2003, NABCEP has created and maintained eight board certification programs and three associate credentials designed to standards of the American National Standards Institute (ANSI). Certifications include the PV Installer Specialist and the PV Commissioning and Maintenance Specialist. While NABCEP originated in the United States, the organization now enables professionals to take board certification exams in 370 cities in 97 countries. Certification involves demonstrating class and site experience; individuals must be recertified every three years.

Sources: GWO 2022; NABCEP 2022.

Communication with the private sector can also lead to joint skills-development initiatives, targeting specialized skills needs and research in specific areas. Examples include:

- The Australian National University in Canberra, which worked with a domestic IPP that constructed a 200 MW wind farm in the region to implement a jointly run graduate-level wind-energy course within the Department of Physics. Their scientific cooperation now extends beyond the classroom, with students able to undertake research internships with the developer as part of their master's degree requirements (ANU 2022).
- An IPP that developed a project in the Benban Solar Park in Egypt worked with the Egyptian Ministry of Education and Technical Education and the Aswan Educational Directorate to create a summer training program for students and teachers of the Benban Solar Institute. The program, which trained a total of 96 students, provided not only theoretical in-classroom training but also critical hands-on experience by giving the classes access to the IPP's solar PV facilities (Alcazar Energy 2019).

If new or expanded training programs are to be responsive to industry needs, it is important that they target not only technical skills but other skills that are difficult to hire for. For example, employers may struggle to recruit workers with adequate soft skills such as teamwork, diligence, and problem-solving. Thus, improved technical skills are necessary but not always sufficient in meeting employers' needs. RE education and training programs should seek to impart the core soft skills that are required across all professions (World Bank market sounding 2021).

As an example, the International Institute for Water and Environmental Engineering (2IE) in Burkina Faso invites RE companies active in the region to participate in its annual curriculum review. Companies are requested to send a senior member of their human resources team so they can communicate both the technical and behavioral skills they seek. The teaching faculty then assesses how to adapt existing courses to deliver these skills.

EXPANDING ACCESS TO RE EDUCATION AND TRAINING

To respond to emerging needs and expand access to skills development, higher education and TVET institutes will need support to upgrade existing courses and programs and implement new ones. This may involve financial support to hire new teaching staff or upskill current staff, expand facilities, and purchase new equipment. Technical support will also be needed to design new curricula and programs.

Governments should consider the geographic diversity of programs to be adapted or implemented. Large urban centers have the most diverse talent pools, but utility-scale RE projects will likely be built in rural areas. While some skills can be brought in from other regions, the greatest benefits are derived from developing local talent at these project sites. These benefits include expanding employment in rural communities and improving the participation of women and socially disadvantaged groups that might otherwise face mobility and cultural barriers that prevent them from studying or working away from home. The development of skills in construction and O&M will be particularly important in regions with high RE development potential, as these roles have a high likelihood of being fulfilled by local community members if sufficient training is accessible.

Three examples of how to widen opportunities for training are described in boxes 4.7, 4.8, and 4.9.

Governments should also consider setting participation targets for women and disadvantaged groups in public education and training programs, as well as targeted scholarships to encourage equitable access. Attracting applicants from these groups depends on recruitment advertisements and notices that (1) encourage applications from women and diverse applicants; (2) use gender-neutral terms; (3) outline benefits from the training; (4) provide safe and respectful learning environments and facilities; and (5) ensure that policies and procedures are in place to address gender-based violence. It is also important to ensure that women have access to practical industry-learning opportunities while studying.

BOX 4.7 • ENSURING ACCESSIBLE TRAINING PROGRAMS IN INDIA

The Suryamitra Skills Development Program administered by India's Ministry of New and Renewable Energy is a 600-hour course designed to train skilled technicians in the installation, commissioning, operation, and maintenance of solar PV technologies. The program includes free room and board for eligible students at more than 228 vocational training institutes across the country, both in cities and rural areas. Since the program's inception in 2015, more than 78,000 trainees have been certified by the government of India, with a key focus on training unemployed individuals, youth, women, and members of the Scheduled Castes and Scheduled Tribes.

To determine the success of the program, the Indian Skill Council for Green Jobs conducted an impact assessment in 2020. Of the 1,004 certified Suryamitra trainees surveyed, 95.7 percent reported an improvement in their technical know-how; 88.5 percent reported more job opportunities; and 99.3 percent reported an improvement in their quality of life.

Based on the program's success, a similar program for wind energy installers, called Vayumitra, has been launched.

Source: Tyagi et al. 2022.

BOX 4.8 • PAN-AFRICAN INITIATIVE ON HUMAN RESOURCES AND SKILLS DEVELOPMENT

The African Network of Centers of Excellence in Electricity (ANCEE) is a pan-African training initiative that addresses shared challenges in human resources and skills development across the electricity sector in Africa, including:

- A low representation of women in technical and decision-making positions;
- An aging, rapidly retiring workforce;
- The presence of young graduates eager to work in the sector but who lack on-the-job experience and specific technical skills;
- The scarcity of skills in RE and energy efficiency.

ANCEE pools training resources in the sector through its network of ten centers of excellence and makes this training accessible across the continent. During its first phase, from 2015 to 2021, at least 33 percent of training courses were reserved for women and 50 percent for employees from vulnerable contexts. Approximately 2,400 women have been trained to date.

The next phase of the program will add training for the human resource departments of utilities to better plan their resources and skills needs. It will also provide support to the network's ten training centers to design and adapt training to meet the specific needs of regional utilities.

ANCEE is supported by the Agence Française de Développement and the African Development Fund of the African Development Bank Group. It is led by the Association of Power Utilities in Africa.

Sources: ANCEE 2022; World Bank market sounding 2021.

Any expansion of RE education and training, through financial or technical means, needs to be grounded in the skills-needs assessment completed by the conclusion of the planning phase (section 4.1.2). While governments want to improve access to RE-relevant skills development, they also need to avoid over-training. Mobile training courses—in which trainers move from location to location—could be considered to widen the accessibility of TVET training in regions where demand will not warrant a dedicated institute or program. Governments may also want to consider options for online learning (see box 4.9).

With respect to higher education, governments may choose to take a more regional approach, looking to centers of excellence in nearby countries for established programs that could support their needs for skills development. For example, the Inter-African Electrical Engineering College in Bingerville, Côte d'Ivoire, played a critical role in creating a pool of electrical engineers in West Africa, training more than 250 engineers between 1979 and 2000. Many graduates of the school went on to work for national utilities, creating a close-knit network of cooperation between different countries to solve common energy planning and grid operation challenges (CPCS 2020).

BOX 4.9 • INCREASING ACCESS TO RE TRAINING THROUGH ONLINE TVET PROGRAMMING

The COVID-19 pandemic has forced education systems around the world to shift rapidly to online learning and to reassess how skills will be taught in the future. While this has presented a significant challenge in many countries, educational technology is evolving rapidly to offer new opportunities.

Online learning platforms offer a scalable solution to overcome capacity constraints, particularly in developing countries, as they can be developed and implemented more efficiently than through brick-and-mortar institutions. Educational technology may also give national TVET delivery systems in developing countries the chance to take advantage of programming created in developed markets. Opportunities can also be made more accessible to remote communities with low rates of internet access. In Tanzania, for example, the Vocational Education and Training Authority teamed up with a large telecommunications provider to deliver TVET training via a mobile application.

For women and disadvantaged groups, greater internet access and more quality providers of online education can vastly expand access in equitable ways. Online learning tends to be less costly, reduces travel and relocation costs, provides scheduling flexibility, and can be adapted to students' learning needs.

A suite of technology solutions offers the potential to simulate hands-on classroom learning. In the Republic of Korea, the Korea University of Technology and Education and the Korean Ministry of Employment and Labor partnered to offer the Online Lifelong Education Institute, an online hub with over 200 free vocational-training courses in technology and engineering. Using simulators, emulators, and virtual reality software, students learn how to stay safe in dangerous work settings and gain experience with expensive equipment that most institutions would not be able to afford.

To improve the inclusivity of digital service provision, further efforts are needed to ensure that everyone has the necessary skills and access to digital technology.

Sources: World Bank 2021a; Airtel Africa 2016.

4.4 STRENGTHENING LIVELIHOODS AND INCREASING COMMUNITY PARTICIPATION

By the conclusion of the planning stage, countries will have identified key stakeholders to be consulted, along with regional and local development priorities, when prioritizing sites for RE development. In the strategy phase, countries are then able to develop an action plan to define and prioritize local SE initiatives.

Consultations with IPPs in the preparation of this guide revealed that local development initiatives brought improvements to the process of conducting business at the local level, enhanced working relationships, and benefitted project outcomes. Local development initiatives often serve the priorities of both the public and private parties involved. Where synergies between developers and government entities can be leveraged, and forces joined, even greater, longer-lasting impacts can be generated on the ground.

Beyond compensation, ensuring that additional benefits are conferred on the communities also reduces conflicts and the time required for consultations and the need for security around RE project sites. In rural settings, initiatives to improve livelihoods and connectivity can contribute to resilience and improve social cohesion. Trust is more likely to develop when benefit-sharing pathways are discussed at early stages and local stakeholders involved in decision making (table 4.2).

"Local development" is an overarching theme. Action plans should strive to achieve stronger local communities through benefit-sharing mechanisms. While developing the local development action plan, governments are encouraged to consult with key stakeholders identified in the planning phase and to map and prioritize appropriate benefit-sharing approaches and mechanisms to match local SE needs. They should set out a clear benefit-sharing action plan to fit within the SE roadmap. This plan could take into consideration:

- Detailed stakeholder engagement at the regional and local levels close to potential RE development sites. Specific community-level consultations depend on the deployment schemes after the RE project locations are known; they are usually conducted during the implementation phase.
- Synergies that can be leveraged at the local and/or regional level to maximize the impact of local development initiatives—namely, through leveraging ancillary infrastructure investments in roads, water, etc.
- Motivations among IPPs (and associated schemes) to develop and implement local development initiatives.
- Benefit-sharing mechanisms that can be employed to improve community well-being and resilience.
- Timelines, costs, roles, responsibilities, and geographic locations of planned interventions.

Table 4.2 • Compensation and benefit-sharing explained

COMPENSATION	BENEFIT SHARING
• Cash or in-kind replacement cost of the acquired assets (e.g., land, productive resources) • One-time payments • Often negotiated within a legal framework that establishes rights and payment levels; at times negotiated among relevant parties as per market/demands/local situation	• In addition to compensation, project proponents use mechanisms whereby benefits are shared with local communities affected by the infrastructure projects; • Longer-term investment in shared outcomes • Often monetary mechanisms are provided directly to individuals/communities or indirectly through support programs • Mandatory or voluntary • Opportunity to maximize and distribute development benefits across affected communities/stakeholders

Source: Prepared by the authors for this report

PUBLIC SECTOR CONSULTATION WITH KEY LOCAL AND REGIONAL STAKEHOLDERS

When developing a local development action plan, it can be helpful to draw upon local expertise to uncover nuances of local economies, customs, and the political landscape. Consultation with stakeholders held by the public sector will assist in clarifying the appropriate approaches that can be tailored for defined regions and local areas. For example, in Morocco's Noor Ouarzazate solar complex, consultations were held after completion of a study to refine the understanding of the history and social structures of local communities, including their perceptions of the solar project. The same study provided better information on ways to improve communication and participation of local communities in potential local development initiatives. Such an understanding, anchored in local culture, encourages greater acceptance and better results from local development efforts.

Detailed consultation is also needed during the beginning of the strategy phase, with local stakeholders identified during the planning phase, including NGOs, community support organizations, regional and local authorities, local chapters of business associations, indigenous organizations, women's groups, and regional utilities.

Background consultations can highlight the activities (ongoing and planned) of various stakeholders, keeping redundancy out of local development initiatives. Working closely with identified stakeholders may ease co-financing for programs and leverage synergies and joint actions to maximize impact. The participation of women and disadvantaged groups is essential to engagement efforts and in the proposed actions. The gender-differentiated use of information and communication channels and potential gaps in access to communication outlets should also be considered in engagement strategies to the extent possible. To encourage meaningful participation of women and disadvantaged groups, governments can hold separate consultations with men and women, provide childcare during meetings whenever possible, and offer transportation stipends.

BOX 4.10 • EXCHANGING BEST PRACTICES ON BENEFIT SHARING IN THE GEOTHERMAL SECTOR

Participatory models range from full participation to receiving royalties from a developer (McLoughlin, Campbell, and Ussher 2010). An example of equitable benefit sharing is the model from New Zealand.

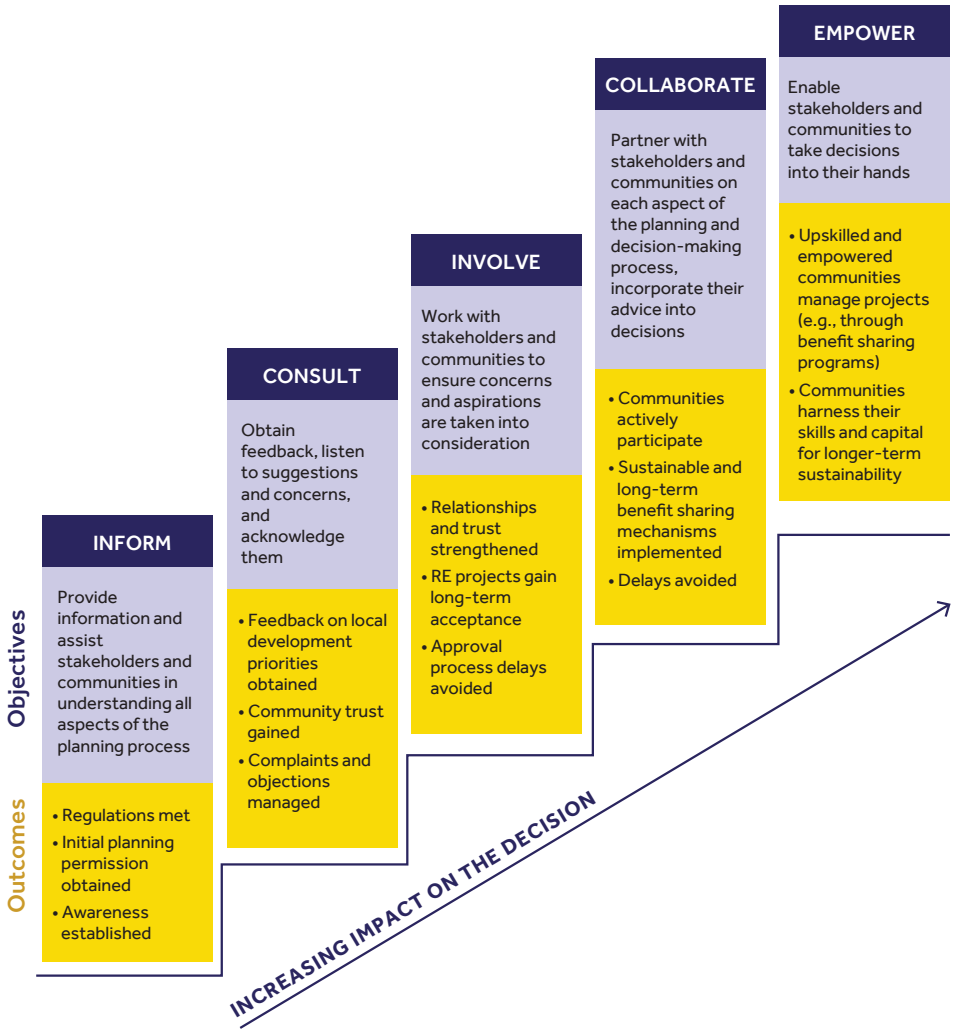
In New Zealand, all uses of geothermal resources are governed by the country's 1991 Resource Management Act, which places a strong emphasis on stakeholder engagement and benefit sharing. This has led to the development of geothermal projects which generate commitment and pride among the stakeholders, including the indigenous Māori (*tangata whenua*), who are considered custodians of the land and its resources. Māori collectively own and manage much of the land situated above geothermal systems through land trusts across the country. Ownership of the land gives Māori the opportunity to participate in geothermal projects. Between 2007 and 2014, trusts earned US$4.1 million, which is invested in education and health of the community (Blair 2016).

The lessons learned have been shared with stakeholders in Kenya. Contact Energy (a leading electricity provider), Tauhara North No. 2 Trust, and Ngati Tahu Tribal Land Trust have been collaborating with KenGen to learn about the New Zealand developer's successful partnership with the indigenous Māori people, which has served as a model to emulate with the Maasai people of Kenya. Four learning exchanges between KenGen, Maasai representatives, and their New Zealand counterparts focused on resettlement, land ownership, and community engagement (Smith, Palmateer, and Stonehill 2017).

Source: Reproduced from ESMAP (2019).

The model presented in figure 4.2 can be adapted to the prioritization of local development initiatives and the associated action plan. The model reflects the various degrees of influence and control given to stakeholders through the process of participation. To achieve genuine community buy-in (for the design of implementation projects in particular), governments are encouraged to aim for the right-hand side of the spectrum. Lack of leadership readiness (skills and experience) and interest among local community women represent a structural barrier to ensuring women's meaningful participation in decision-making, particularly among women from marginalized groups. Tailored capacity-building efforts are vital to support women's ability to engage in and influence decision making.

Figure 4.2 • Effective approaches to community engagement



Who participates? At each stage, ensure that women and disadvantaged groups actively participate in the process and that their voices are heard.

Source: Adapted from the International Association for Public Participation (2018).

The perspectives of international IPPs and domestic firms are useful at this point: What are their key drivers and motivations for ensuring development initiatives at the local level? An IFC study (2019) found that while solar and wind developers viewed local development as important, the goal was often separate from the company's mission or its operational goals. A strong business rationale for local development was needed to integrate these dimensions. A list of common drivers of integrated local-development activities was compiled, among them compliance with legal and regulatory requirements, ability to access resources (including land), meeting industry standards and benchmarks, reaping reputational benefits that could provide competitive advantage, and above all securing and maintaining a social license to operate. Governments need to be aware of these drivers within the local context and find ways to bridge the information and coordination gaps that often exist between IPPs/domestic firms and relevant local stakeholders. IPPs' views of benefit sharing in local communities are further explored in box 4.11.

BOX 4.11 • MOTIVATIONS FOR BENEFIT SHARING IN LOCAL COMMUNITIES: REFLECTIONS FROM IPPS

Project developers who approach communities as partners rather than adversaries and are willing to adjust siting decisions based on a community's cultural relationships with the land and to discuss socioeconomic benefits—including for women, focusing on experiences and impacts—are more likely to build trust, minimize social risks, and ensure successful project outcomes (ESMAP 2019). By adopting approaches that focus on livelihoods and participation of local communities from the outset, developers can improve risk management and performance, increase community buy-in (and thus reduce the likelihood of social discord), and achieve a more balanced allocation of employment opportunities, contributing to local community development priorities and more successful, equitable project outcomes. Below are some reflections shared by IPPs with regard to benefit sharing.

Motivations to fulfill required/mandatory obligations

- To achieve compliance with government regulations and requirements of lenders (to secure financing);
- To demonstrate community engagement in order to obtain planning permissions and permits;
- To improve environmental and social governance ratings (for publicly listed companies).

Voluntary motivations

- To deepen engagement to obtain a "social license" to operate;
- To enhance the corporate image and be a front runner in supporting local communities;
- To empower communities to become more resilient and self-sustaining.

Source: Original research conducted for this report.

4.4.1 PRIORITIZING BENEFIT-SHARING MECHANISMS

During the planning phase, governments should have reviewed national, regional, and local development plans (as applicable) and identified high-level priorities for SE development in the regions with high RE potential. Simultaneously, they should have taken development considerations into account when deciding where to site future RE projects.

In the strategy phase, governments can play a lead role in identifying the SE needs of local sites. With the information derived from consultations, synergies with other local development initiatives (whether ongoing, planned, or awaiting funding) can be developed at this stage. Deployment schemes for RE projects (location agnostic, substation model, RE park)—as detailed in technical guidelines—are being considered, and each consideration may lead to different strategies to achieve SE outcomes. For example, a solar park model allows governments to prepare intensively and, in the process, produce plans that are suitable for community needs and provide guidance to IPPs on actions to take. An example from Egypt is presented in box 4.12.

Identified SE needs at the local level can translate into benefit-sharing approaches and associated mechanisms (Wang 2012).

- **Monetary mechanisms:** Direct payments through revenue sharing and/or dividend payments from equity shares; preferential electricity rates;
- **Nonmonetary mechanisms:** Indirect support to communities via improvements to local infrastructure, support for health and education programs, and improvements to environmental systems.

BOX 4.12 • STRATEGIC ASSESSMENTS IN PLANNING FOR THE BENBAN SOLAR PARK, EGYPT

Located in the Aswan province of Egypt, the Benban Solar Park houses more than 32 solar PV projects with a total capacity of about 1,465 MW. It is one of the world's largest solar parks. In the course of its design, the New and Renewable Energy Authority of Egypt conducted a study of local socioeconomic opportunities. The study involved consultations with multiple stakeholders at the local and regional levels, including local heads of government, nongovernmental organizations, health authorities, and community development agencies, to identify actions and initiatives that should be prioritized by independent power producers (IPPs) developing projects. The study examined the need for education and training, the potential for job creation, and roles for local community members.

The outcome of the study included a common corporate social responsibility guide, which outlined the priority actions and estimated costs of each initiative. The goal of developing such a document was to streamline the process for incoming IPPs to identify the needs of the local communities and coordinate with other IPPs implementing similar initiatives. A key recommendation was that a Benban developers' association be formed to coordinate and centralize ongoing community engagement and the implementation of local development activities.

Such a model could support IPPs, whose core business is the provision of power and electricity rather than community upliftment, to better deal with local development and coordinate more effectively with subnational governments.

Sources: New and Renewable Energy Authority and EcoConServ Environmental Solutions 2016; World Bank market sounding 2021.

A key challenge of both mechanisms is the equitable distribution of benefits across multiple groups and stakeholders. For ease of design and prioritization, local development projects can be further categorized into three benefit-sharing categories based on potential needs, each with a further subset of mechanisms that can be utilized for implementation:

- Enhancement of skills and capabilities at the community level through funding for education programs or direct training;
- Improvement or new additions to services and local infrastructure such as roads, schools, health centers, and environmental services;
- Revenue- and ownership-sharing arrangements, including payments into, or equity shareholding by, community entities, such as community trusts, cooperatives, or nonprofits. This does not include payment for land, which is a compensatory mechanism.

Table 4.3 maps the three categories and associated monetary and nonmonetary mechanisms with examples.

Table 4.3 • Benefit-sharing categories and mechanisms with examples

BENEFIT-SHARING CATEGORIES	POTENTIAL BENEFIT-SHARING MECHANISMS			
	MECHANISM	MONETARY	NON-MONETARY	EXAMPLES OF MONETARY AND NONMONETARY MECHANISMS
Improved local skills and capabilities at the community level	Funds for education and training		X	**South Africa:** A bursary program to support studies in 15 community-based secondary schools was launched by an IPP and investment corporation in three provinces where solar and wind projects were implemented. Its criteria favored female students and academically deserving learners from households with annual incomes of less than R 650 000 (~$42,800) (World Bank market sounding 2021).
	Training to build RE-specific skills		X	**Egypt:** An IPP developing a project in the Benban Solar Park in Egypt worked with the Egyptian Ministry of Education and Technical Education and the Aswan Educational Directorate to create a summer training program for students and teachers at the Benban Solar Institute. A total of 96 students received theoretical classroom training, supplemented by critical hands-on experience at the IPP's solar PV facilities (Alcazar Energy 2019).
	Training to build career skills		X	**Senegal:** An IPP built an IT center at a local high school. Equipped with 32 computers, the center trains students in IT literacy and online research skills (Lekela 2021).
	Training to improve income generation (including productive use and enterprise development)	X	X	**El Salvador (productive use):** The Berlin geothermal power plant in El Salvador provides 15 local communities with free geothermal steam and surplus condensate, as well as access to training, seed capital, and infrastructure necessary to dry fruits and vegetables. The program has a focus on the livelihoods of women (UNFCCC n.d.).
			X	**Indonesia (enterprise development):** A geothermal developer is helping farmers to improve the quality of their coffee crops. They are also offering equipment, technology, and training to local women's groups to process and package the beans and link the groups with overseas buyers.

BENEFIT-SHARING CATEGORIES	POTENTIAL BENEFIT-SHARING MECHANISMS			
	MECHANISM	MONETARY	NON-MONETARY	EXAMPLES OF MONETARY AND NONMONETARY MECHANISMS
Improved or new services and infrastructure at local/ community level	Improving existing infrastructure		X	**South Africa:** An IPP refurbished a derelict community building in Loeriesfontein and converted it to a business center that can be used as an office space for small enterprises and a location to provide training to the local community (Lekela 2021).
	Support toward local infrastructure build		X	**Senegal:** The developer of the wind project Parc Eolien Taiba N'Diaye supported the establishment of a marketplace, as requested by a local women's association, to support long-term entrepreneurship. Female traders formed an organization to maintain the new facility (IFC 2019).
	Environment enhancement activities		X	**Egypt:** An IPP helped to establish a center for training in bird monitoring in the Gulf of Suez. Trainees were helped to find work as bird observers on wind farms being developed in the region (Lekela 2021).
Revenue- and ownership-sharing arrangements with communities at project sites	Equity stake by community trust	X		**South Africa:** The Solafrica Bokpoort concentrated solar power plant is jointly owned with the !Kheis Community Trust (5 percent) as well as a national nonprofit organization called LoveLife (5 percent). Community ownership was funded by the Public Investment Corporation at a fixed interest rate of 8 percent amortized over 15 years. Income generated through the community fund's equity stake is then redirected to community development programs (World Bank market sounding 2021).
	Equity sharing with local individuals	X		**Uruguay:** The National Administration of Power Plants and Electrical Transmission created three successive funds to finance the wind power projects of Arias (70 MW), Pampa (147.5 MW), and Valentines (70 MW). Eighty percent of the equity was reserved for retail investors with investments ranging from USD 100 to USD 2,000 (World Bank market sounding 2021).
	Community debt instruments	X		**Canada:** A nonprofit RE cooperative raised over Can$ 65 million in community financing from over 2,000 community investors through the use of solar bonds. The bonds have a 4 percent annual return over five years, backed by developers that hold 20-year contracts with the province, allowing for a shorter-term financial stake in projects. To date community investors have earned a total of Can$9 million in interest payments (SolarShare n.d.).
	Dedicated funds via third party	X		**El Salvador:** The LaGeo's Berlin and Ahuachapan geothermal plants have funded activities in the community for more than a decade, through dedicated funds administered by the FundaGeo foundation. Each year, the neighboring communities, which have nearly 75,000 inhabitants, present proposals for local development projects. Community associations that include assembly-elected representatives from the communities then vote on the proposals and decide which ones to implement (World Bank market sounding 2021).

BENEFIT-SHARING CATEGORIES	POTENTIAL BENEFIT-SHARING MECHANISMS			
	MECHANISM	MONETARY	NON-MONETARY	EXAMPLES OF MONETARY AND NONMONETARY MECHANISMS
Revenue- and ownership-sharing arrangements with communities at project sites *(Continued)*	Community investment fund	X	X	**Chile:** The developer of an 84 MW wind farm signed a long-term agreement with six rural communities to support community development during the operational phase through a community investment fund managed by the IPP, which allocated capital to local development projects, including environmental and resource protection, primary and technical education, and RE-related training (World Bank market sounding 2021).
	Committed socioeconomic development contribution	X	X	**India:** Section 135 in the Companies Act 2013 mandates certain large companies to spend 2 percent of average net profits from the preceding three years on corporate social responsibility programs or projects. Most funds go toward basic infrastructure (e.g., electricity connections, hospitals, schools), with some companies working through nonprofits to create dedicated community programs (World Bank market sounding 2021).
	Sharing of proceeds	X		**El Salvador:** A tender for 100 MW of solar and wind power systems required that developers invest 3 percent of revenue in social projects in the adjacent communities. **Ecuador:** As part of the country's previous feed-in tariff, RE projects receiving the tariff had to contribute an amount (per kilowatt-hour) to social and community development projects (World Bank market sounding 2021).

Once the potential benefit-sharing mechanisms are mapped against the local SE needs, a prioritization process can be undertaken to create an action plan. While short-term community gains are often desirable to increase social acceptance of the IPP and project, efforts should also be made to support long-term, sustainable local development outcomes. It is important that the decision-making process be inclusive and transparent. The criteria used in Morocco are described in box 4.13.

The local development action plan will outline the prioritized benefit-sharing mechanisms, both monetary and nonmonetary, to be carried out during the implementation phase.

The proposed set of actions can be incorporated or coordinated with the selection of RE deployment schemes and a program-wide high-level bidding framework. Governments can also include the database of relevant stakeholders in the action plan.

BOX 4.13 • CRITERIA FOR RANKING OR SCORING LOCAL DEVELOPMENT PROJECTS: AN EXAMPLE FROM MOROCCO

The socioeconomic needs in project areas can be vast. Prioritization is essential to maximize sustained impacts over the long term. This can be done by ranking or scoring based on predetermined criteria. In Morocco, a scorecard methodology was used by the public procuring entity MASEN to optimize the selection of local development projects in the vicinity of the Noor Ouarzazate projects.

Various techniques used at local levels were reviewed to develop the scorecard methodology, which applied a scoring and weighting system to prioritize actions. Two key subsets of indicators were adapted to local development needs:

CONTINUE >

- **Technical and organizational feasibility indicators** to assess the viability of projects and the probability of their success; and
- **Strategic relevance to local development objectives and overall mission** of the public procuring entity

Specific indicators are listed in table B4.13.1.

Table B4.13.1 Examples of indicators used to prioritize projects

INDICATORS FOR LOCAL DEVELOPMENT PROJECTS		SCORING AND WEIGHTING		
Technical and organizational feasibility				
Technical constraint	Degree of mobilization of local development team to carry out the project (i.e. the existence of local champions to lead initiatives).	**High = 1** Need for new skills in addition to mobilization over time	**Average = 2** Need for long-term mobilization	**Low = 3** Low mobilization of team
Budget	Investment required to carry out the project. Thresholds were defined (the lower the investments, the higher the score).	**Strong = 1** Greater than DH 500,000	**Medium = 2** Between DH 150,000 and 500,000	**Low = 3** Less than DH 150,000
Partnerships	Local, reliable, and credible partners, based upon their administrative and technical capacity, history, and past relationship.	**Low = 1** No relevant partners identified	**Average = 2** Relevant partners identified	**Strong = 3** Relevant partners identified and interested
Strategic relevance				
Consistent with the local development strategy	Consistency of the proposed action with three intervention areas: to open up the territory, to improve social impacts for the populations, and to develop the territories.	**Low = 1** Inconsistent with strategy	**Average = 2** Partial consistency	**Strong = 3** Total consistency
Synergies with other proposed actions	Synergies between the initiative being evaluated and past or future initiatives, including complementarity of actions with other projects carried out or in progress.	**Low = 1** No synergies	**Average= 2** Some synergies	**Strong = 3** Major synergies
Longevity	Duration: the longer actions last, the more they are favored.	**Weak = 1** One-time action	**Medium= 2** Medium-term action	**Strong = 3** Long-term action
Target importance	Thresholds based on the number of beneficiaries.	**Low = 1** < 30	**Average = 2** Between 30 and 100	**High = 3** > 100
Integration of women	Scoring favors women's participation (including governance) or indirect contributions to women in target areas.	**Low = 1** No particular involvement	**Average= 2** Only as direct beneficiaries	**Strong = 3** Women carrying out the action
Significance of expected impacts	Measures the results and effects of an activity, to justify the costs; in other words, to what extent does the action make a difference?	**Low = 1** Low impact expected	**Medium = 2** Medium-sized impact expected	**High = 3** High impact expected

Source: MASEN 2021.

A traffic-light system is used for final scoring, as follows:

Scoring 1	Rating 2	Rating 3
25 to 27	20 to 24	< 19
Actions with high added value (preselected)	Good actions in terms of opportunity and return on investment (preselected)	Inappropriate actions (eliminated)

Once projects are finalized and scored, the internal Governance Committee of the public procuring entity approves the final selection.

4.5 DECISION ON BIDDING FRAMEWORK TO SUPPORT SE BENEFITS

As part of the strategy phase, the government now must decide (1) how to leverage the RE program design to maximize the SE benefits triggered by RE deployment and (2) how the design of the bidding framework used to procure RE projects will accommodate SE targets. For example, small projects procured regularly can facilitate the participation of domestic firms in the projects procured and allow them to build a valuable track record.

Action plans will become essential inputs into the design of the bidding framework for the following purposes:

- To maximize the participation of domestic firms along the RE value chain (section 4.2);
- To maximize job creation and skills development (section 4.3);
- To enhance the livelihoods and participation of local communities (section 4.4).

From these plans, governments can prioritize categories of SE benefits that they want to have supported by the private sector, such as job creation and gender equality. Box 4.14 outlines the broad SE development categories that have been defined for South Africa's RE procurement program.

Governments will then need to decide how these SE categories will be supported in the bidding framework through incentives, targets, thresholds, or requirements (see table 4.4). Governments should consider the benefits and drawbacks of each approach, balancing private sector interests with SE needs. Governments should also weigh the need for upskilling to build capacity in the public procurement agencies. Establishing an interministerial committee or RE task force, as discussed under the planning phase, can also improve coordination and ensure that the bidding framework is as efficient and transparent as possible.

Feedback on the bidding framework can be sought from the private sector through a market sounding to test whether the approach is realistic and achievable. Findings should then be used to refine the criteria to ensure that the RE program is attractive to developers as detailed in Chapter 5.

Gaining political buy-in at the program level is critical for a bidding framework. It will save time and money and enhance synergies at the points where governments launch project tenders. Chapter 5 will highlight how this bidding framework guides individual tenders at the project level. The framework should define capacities, technologies, and timelines, as well as specific SE parameters tailored to the domestic RE market, as reflected in the bidding provisions and associated processes. Implementation of successive tenders, with their associated criteria, will, over time, achieve the overarching SE targets of the RE program.

BOX 4.14 • SOCIOECONOMIC CATEGORIES DEFINED IN SOUTH AFRICA'S RENEWABLE ENERGY PROCUREMENT PROGRAM

Independent power producers (IPPs) have been critical drivers of South Africa's capacity expansion in renewable energy. In the first four bidding windows, 112 RE IPPs were procured and as of May 2021, 76 active projects totaled 4,949 MW.

South Africa's renewable energy procurement program was designed not only to procure renewable energy but also to contribute to broader national development objectives:

- **Job creation**—encouraging employment opportunities for South African citizens, especially Black individuals and people in local communities;
- **Local content**—requiring bidders to comply with local content designations under South African procurement law and to direct a certain percentage of total procurement spending to South African firms;
- **Ownership**—ensuring co-ownership with South African entities and local communities in the project company, and ownership by Black South Africans in the project company and in the construction and operations companies;
- **Management control**—ensuring that Black South Africans hold director and senior management roles within the project company;
- **Skills development**—requiring the project company to commit funds to improve the skills of employees, allowing more South Africans to pursue higher education, and training disabled people;
- **Enterprise and supplier development**—requiring project companies to procure from enterprises owned by Black people and Black women, and committing to supporting the development of new enterprises;
- **Socioeconomic development**—requiring that funds be allocated to address socioeconomic needs within the communities surrounding RE projects.

As a result of the Department of Mineral Resources and Energy defining these categories and establishing criteria for IPPs, the country has achieved:

- 52 percent equity in IPPs by South African Entities, and 34 percent ownership in IPPs by Black South Africans.
- 57,236 jobs created for South African citizens.
- R1.8 billion spent by IPPs on socioeconomic development and enterprise development initiatives in local communities.

Sources: IPP Office 2020; DMRE 2021.

Table 4.4 • Comparison of bidding framework approaches to generate SE benefits

APPROACHES	DESCRIPTION	BENEFITS/DRAWBACKS	EXAMPLE
Incentives	Rewards (typically financial) for IPPs that demonstrate an ability to generate a desired SE benefit. Incentives do not factor into the evaluation criteria for bidder selection, and there is no penalty to IPPs that do not generate the desired SE benefits.	Allows IPPs to innovate on their own and make the bidding process less burdensome but gives governments less control over final SE benefits delivered. Incentives can place an additional financial burden on governments to reward IPPs.	In Canada, the Ontario Large Renewable Procurement programs included the "aboriginal price adder," which provided an automatic tariff boost to projects where Indigenous communities had an equity stake greater than or equal to 10 percent (Hoicka, Savic, and Campney 2021).
Targets	Targets set out a desired SE benefit that a government wishes IPPs to achieve and that can be thought of as a voluntary guideline. Bidder performance in meeting targets is often scored as part of an evaluation criteria when selecting a winner.	Creates an incentive to IPPs to generate SE benefits, but at the same time allow IPPs to focus where they feel they can perform best and thus receive the most points in the evaluation of their proposal. Targets have less impact on tariffs but also give governments less control over the final SE benefits delivered.	In Morocco, the procuring entity set voluntary local content targets for the Noor Ouarzazate solar projects underpinned by analysis on the competitiveness of the country in the solar value chain. In the bidding document, developers were required to propose a voluntary target that was to become a contractual commitment for the selected bidder (not included in the evaluation formula). The selected bidder was to report against this contractual commitment, and a remedy mechanism was planned in case of nonachievement of the committed target (World Bank market sounding, 2021). All results registered in projects exceeded committed targets.
Thresholds	Mandatory minimums that must be met for a bidder to move forward in the procurement process. Bidders, when able and willing, can choose to go beyond thresholds and, depending on the design of the evaluation criteria, receive further points toward their proposal.	Does not allow any flexibility for IPPs and should therefore be designed carefully so as to ensure that the market is sufficiently mature to allow targets to be met, not negatively impact tariffs, and not deter prospective bidders. Thresholds should be realistic, to ensure a minimum desired benefit is achieved, and reward IPPs that go above thresholds to achieve additional benefits.	Namibia has set a minimum threshold of 30 percent ownership and shareholding in projects by disadvantaged Namibians, with an emphasis on women and disabled individuals (IRENA 2019).
Requirements	Mandatory conditions that must be fulfilled if a bidder is to move forward in the procurement process. Typically, requirements fit a yes/no criterion.	Requirements do not allow any flexibility for IPPs and should therefore be designed carefully so as to ensure that the market is sufficiently mature to allow targets to be met, not negatively affect tariffs, and not deter prospective bidders.	South Africa's Renewable Energy Independent Power Producer Program (REIPPPP) bid window 5 required bidders to procure a list of specific components domestically. If components were unavailable, bidders could apply for an exemption through the Department of Trade, Industry and Competition (IPP Office 2021).

5

PHASE 3: IMPLEMENTATION

5.1 OBJECTIVES

The decisions and plans made in the planning and strategy phases become operational during the implementation phase, when action is taken on the socioeconomic (SE) roadmap. The roadmap takes a multipronged approach to support and build the capacities of the domestic workforce and firms, and to deliver on the needs of local communities surrounding renewable energy (RE) project sites. At this stage, governments will have formed a political consensus on their RE programs, including the SE objectives, and will be preparing to procure RE projects. This phase will last for the duration of the program. The implementation phase is summarized in figure 5.1.

As the SE roadmap identifies actions to be carried out by the private sector, its implementation is to be closely coordinated with the design of the competitive procurement process to select independent power producers (IPPs). Through each subsequent tender, selected projects will support the program's SE targets. In doing so, the government will address energy needs while supporting SE development.

Actions and support programs identified in the roadmap as being best led by the public sector must be financed and implemented in partnership with other government agencies and private sector partners, as applicable.

Throughout implementation, the government should monitor and evaluate progress toward SE targets. To ensure that targets are achieved in the medium to long term, tenders and support programs to develop domestic capabilities must be adjusted continuously in accordance with monitoring and evaluation (M&E) findings and the maturity of the market.

Key questions to be answered during the implementation phase include:

- How can procurement processes and contracts maximize SE benefits such as job creation (including from the perspectives of gender equality and social inclusion)?
- How can governments implement support programs for RE development in ways that catalyze positive SE outcomes?
- How can governments monitor SE outcomes (including gender equality and social inclusion) by the private sector?
- What indicators will be used to measure SE benefits—both at the project level and for the entire RE program?

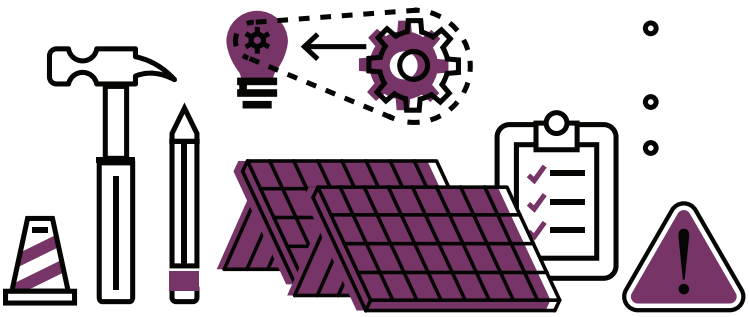
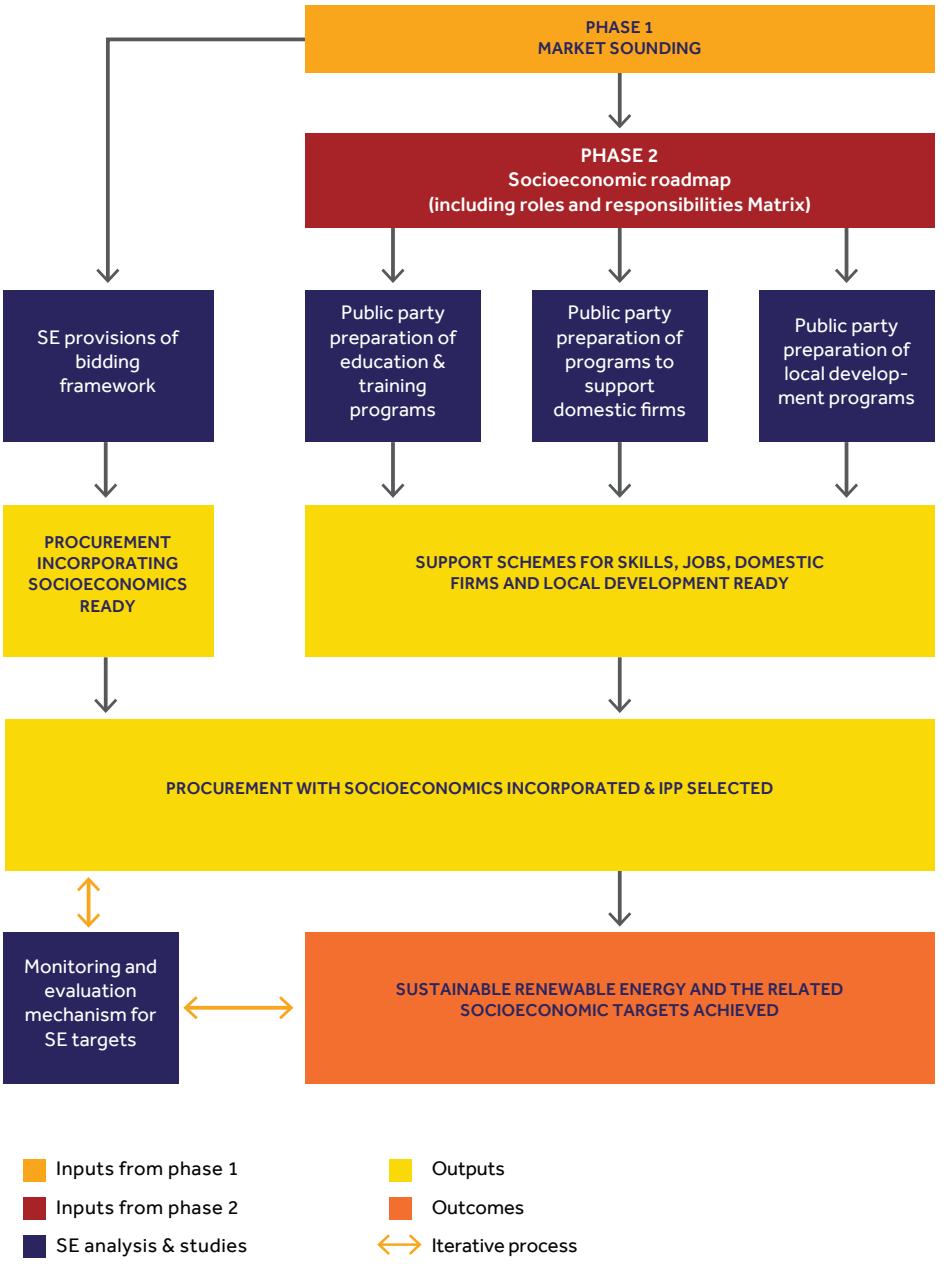


Figure 5.1 • Overview of the implementation phase



Source: Original compilation for this report.

Note: Across all activities, GESI-disaggregated data should be collected, while the barriers faced by women and disadvantaged groups need to be documented.

SE = socioeconomic.

5.2 OPERATIONALIZING SE BENEFITS WITHIN THE COMPETITIVE BIDDING FRAMEWORK

To achieve the technical and SE targets of the RE program, the government can begin to procure projects through the competitive bidding framework agreed upon during the strategy phase (section 4.5) as further detailed in the technical guidelines.

Each successive tender will contribute to the targets of the program. Each will also have an accompanying evaluation formula, outlining how the government will select winners. This formula will typically detail the weighting of technical/financial criteria vs. SE criteria, as well as the grading of SE incentives, targets, thresholds, and requirements, as applicable. There is no one right way of creating an evaluation formula, as it must fit within the national context and the specific objectives of the tender, both for RE and SE benefits.

The government can also decide to apply lessons learned from the selection process and adjust the formula with each subsequent tender, allowing the government to adapt to changes in the market and lessons learned from previous tenders (box 5.1). Often, governments will set increasingly challenging targets over time, allowing all players time to ramp up before achieving the overall targets laid out in the renewables and SE roadmaps.

To support this phase, it is critical to conduct a market sounding specific to the contemplated project(s). The market sounding assesses the private sector's views of the opportunities and barriers associated with specific targets. It also generates insights into the procuring entity's intended requirements on measures to support SE benefits. This consultative process helps governments ensure that evaluation criteria and contractual provisions are realistic and achievable and do not present unacceptable risks to IPPs. The consultation has the additional benefit of drawing international attention to the RE program and the upcoming tender.

Once the evaluation criteria are set, the tender is launched, and one or more IPPs are selected, depending on the number of RE projects in the tender. The commitments that IPPs have made in their bid proposals will be included as clauses within their contractual agreements, along with details on penalties for not meeting SE commitments as the case may be. Contracts will also include requirements for reporting, regularity of monitoring, and baseline data, which are required for ensuring successful monitoring of the SE targets.

The bidding process includes four stages, from pre-bidding to project implementation, as described in figures 5.2 and 5.3 and in the sections below.

Figure 5.2 • Key steps and documents in the competitive bidding process

Source: Original figure developed by authors for this report

BOX 5.1 • EVOLUTION OF THE SOUTH AFRICAN RENEWABLE ENERGY INDEPENDENT POWER PRODUCER PROCUREMENT PROGRAM

South Africa has adjusted the thresholds of subsequent bids to adjust to market conditions (table B5.5.1). Of note are the progressive thresholds for job creation and domestic ownership of firms and contractors from bid window 4 to 5. In several categories—management control, preferential procurement, and enterprise development—targets have been adjusted to a threshold. To qualify, bidders must meet that threshold.

Bid window 5 has also included several new categories, including employment of the country's Black youth and women, in addition to South Africans with disabilities. Although there was no minimum threshold for people with disabilities in this round, the IPP office chose to include this indicator to signal its importance to the market and to highlight the potential for the future inclusion of a minimum threshold, allowing the market time to react and prepare for subsequent rounds

Table B5.1.1 • Adjusting South Africa's thresholds in bid windows 4 and 5

CATEGORY	CRITERIA	DOMESTIC VALUE	LOCAL DEV'T	GESI	THRESHOLDS	
					BID WINDOW 4	BID WINDOW 5
Job creation	Employees who are citizens[a]	✓			50	65
	Employees who are Black people[a]	✓		✓	30	40
	Skilled employees who are Black people[a]	✓		✓	18	20
	Employees who are Black people with specialized skills (e.g., engineering)a	✓		✓	NA	10
	Employees who are citizens from local communities[a]	✓	✓		12	20
	Employees who are Black youth[a]	✓		✓	NA	30
	Employees who are Black women[a]	✓		✓	NA	10
	Employees who are people with disabilities[a]	✓		✓	NA	0[c]
Local content	Local content spend during the construction period and operating period for solar PV	✓			45	45
	Local content spend during the construction period and operating period for onshore wind	✓			40	40
Ownership in the seller (IPP)	Shareholding by Black people in the seller	✓		✓	12	30
	Shareholding by local communities in the seller	✓	✓		2.5	2.5
	Shareholding by Black women in the seller (IPP)	✓		✓	NA	5

CATEGORY	CRITERIA	DOMESTIC VALUE	LOCAL DEV'T	GESI	THRESHOLDS	
					BID WINDOW 4	BID WINDOW 5
Ownership in the material contractors	Shareholding by Black people in the construction contractor / operations contractor	✓		✓	8	25
	Shareholding by Black women in the construction contractor / operations contractor	✓		✓	NA	5
Management control	Black people in top management			✓	0 (40 target)[c]	Category divided as below
	Black board directors			✓	NA	25
	Black executive management / senior management			✓	NA	30
	Black women board directors / executive management / senior management			✓	NA	8
Skills development	Skills-development contributions[b]	✓	✓		NA	0.05
	Bursaries for Black students at higher education institutions[b]	✓	✓	✓	NA	0.05
	Skills-development contributions toward Black disabled employees[b]	✓	✓	✓	NA	0.005
Preferential procurement	Broad-based economic empowerment procurement	✓		✓	0 (60 target) [c]	30
	Black enterprise procurement	✓		✓	NA	10
	BBEE procurement from qualified small enterprises and exempted micro enterprises	✓	✓		0 (10 target) [c]	5
	Procurement spend on Black women owned vendors	✓		✓	0 (5 target)[c]	3
Supplier development	Supplier development contributions during the construction period[b]	✓			NA	0.1
	Supplier development contributions during the operating period[b]	✓			NA	0.1
Enterprise development	Enterprise development contribution[b]	✓	✓		0 (0.6 target)[c]	0.6
Socioeconomic development	SE development contribution[b]		✓		1	1.1

Sources: Adjusted from Eberhard and Naude (2017); IPP Office (2021).

a. Employees based in South Africa.

b. As a percentage of revenue.

c. No minimum threshold has been set, rather a nonmandatory target has been suggested. In the case of employment for disabled people, there is no set threshold or suggested target. The purpose of its inclusion is to raise awareness among IPPs that this may become a future requirement.

Figure 5.3 • Socioeconomic elements in each phase of the bidding process

Procurement/ Selection of IPP	Pre-bidding	Pre-qualification	Bidding & Winner Selection	Project implementation
Objectives	• Inform market about upcoming tender • Test high-level risk allocation of the RE projects planned • Discuss proposed socioeconomic framework through an informed market sounding	• Pre-qualify bidders based on technical, financial and socioeconomic criteria as applicable • Ensure bidders understand the socioeconomic targets of the government	• Select most qualified bidder (in terms of financial, technical, and socioeconomic criteria as applicable) • Come to agreement with IPP on contractual obligations • Set key performance indicators and reporting requirements	• Implement support schemes to maximize socioeconomic benefits • Monitor and evaluate progress toward socioeconomic targets
Government actions needed to support socioeconomic benefits	• Communicate socioeconomic priorities at the project level • Solicit feedback on potential socioeconomic requirements from the market • Share information on domestic firms and their capabilities	• Define socioeconomic evaluation criteria as applicable • Prequalify bidders meeting the criteria including socioeconomic criteria as applicable • Provide prequalified bidders with information to determine what can be sourced domestically in a competitive manner • Connect prequalified bidders with domestic firms and other relevant stakeholders	• Check compliance with socioeconomic requirements and score bids relative to the socioeconomic evaluation criteria as applicable • Select bidder that offers most advantageous offer • Solidify socioeconomic commitments and obligations within legal contracts • Set out project-level key performance indicators and reporting requirements	• Prepare support schemes for skills, jobs, domestic firms, and local development in a timely manner • Conduct regular monitoring to ensure socioeconomic criteria are met and developers meet contractual obligations • Coordinate development initiatives to enhance impact • Adjust the RE program and associated socioeconomic actions to leverage lessons learned

Source: Original figure developed by authors for this report.
Note: IPP = independent power producer.

5.2.1 PREBIDDING

At the prebidding stage, the procuring entity informs the market about the RE project(s). In communicating about upcoming projects, the government will need to relay both its commitment to RE targets for technology, capacity, and timing.

In addition to sharing technical information, the procuring entity should:

- **Communicate project-level targets and thresholds for SE benefits as part of a request for expression of interest.** To ensure a transparent flow of data and information, the request could also include links to all publicly accessible information about the domestic market. For example, this might include a link to a database of domestic suppliers compiled by a local industry association or business cluster or a list of stakeholders in the potential project area or country. The provision of such information at an early stage is important, as it will allow more time for IPPs to assess the potential for sourcing in-country. This will also reduce their costs of doing this research on their own, in addition to directing them to reliable sources of information, thus improving the accuracy of their projections.
- **Seize the opportunity to speak with market players,** as usually the procuring entity will not be allowed to communicate one-to-one with prospective bidders once the tender is officially launched. Speaking with market players allows the procuring entity to:
  a. Present the proposed RE project and test the high-level risk allocation; and
  b. Discuss the proposed SE targets, their feasibility, and appropriate mechanisms to reach them.

This dialogue can take place through questionnaires filled out by the market players, through general meetings organized with all interested market players, or through a set of focused, one-to-one meetings with selected entities. For mandatory and newer requirements (which may be unfamiliar to players), this dialogue is important to test the feasibility of the proposed approaches and identify any project-specific barriers. Such consultation can also help to inform the prequalification requirements and identify potential adverse impacts on tariffs.

5.2.2 PREQUALIFICATION

At prequalification, countries can define technical and financial criteria as well as socioeconomic criteria, as applicable. These criteria ensure that only those bidders that are able to design, finance, build, and operate (as applicable) the RE projects advance in the bidding process. The steps to be taken are described below.

As a first step, governments can prepare a request for qualification that clearly communicates defined criteria. Steps to preparing the technical and financial criteria for a request for qualification can be found in the SRMI technical guidelines. Prequalification can, and occasionally does, incorporate nonnegotiable SE requirements. For example, as part of the process, it is possible to ask bidders to include a domestic firm (either as a financial, technical, or silent partner) in their consortium. This is one way to help domestic firms build capacity and a track record. For example, bid window 5 of South Africa's Renewable Energy Independent Power Producer Procurement Program (REIPPPP), launched in 2021, required that bidders have a South African entity participation of at least 49 percent (IPP Office 2021).

At this stage, governments can also communicate the SE criteria and scoring mechanism they intend

to include in the final request for proposal (RfP) for the selection process, as informed by any surveys and consultations occurring during the expression-of-interest process. For example, a requeFst for qualification might inform bidders of the expected percentage of revenues to be set aside to support a local development program. Alternatively, it might detail the percentage of funds that will go to support local initiatives uplifting women and disadvantaged groups. Only if IPPs are capable of delivering on the targets does it make sense for them to commit to the costs required to prequalify.

As a next step, the government can, for informational purposes, **provide bidders with the assessments that underpin the desired SE outcomes.** These include studies of the capabilities of the domestic workforce and domestic firms conducted during the planning phase. At this stage, governments may also share information about public sector programs that support skill building and labor transitions/placement, which IPPs can tap into.

Governments may also play a role in connecting prequalified bidders with domestic firms—including women-led or -owned businesses—that could provide them with goods and services. This may be done through conferences, roadshows, site visits, or B2B meetings. For example, the RE-focused Cluster Solaire in Morocco connected prequalified bidders with domestic firms. The cluster created a portal on its website where companies could provide their profiles. Prequalified bidders could use the portal to easily identify suppliers and could procure subcontractors directly through the platform. Finally, the cluster organized B2B meetings for the Noor Ouazarzate projects, designating time slots for suppliers to meet with developers and present their business offerings.

Governments can also support coordination between prequalified bidders and local community stakeholders already identified (and consulted) in the strategy phase. Such consultations will help to define appropriate development initiatives—budgeting them to strengthen synergies and maximize impact. An example from South Africa appears in box 5.2. It is important to identify what local authorities, utilities, and other stakeholders are already planning to do in the communities surrounding RE project sites and how their work can be supported through the RE projects, while managing the expectations of community members.

BOX 5.2 • LEVERAGING LOCAL DEVELOPMENT SYNERGIES AMONG IPPS TO FIGHT COVID-19 IN SOUTH AFRICA

With the emergence of the COVID-19 pandemic, health care has become an even more pressing item on the agendas of regional and local governments. The experience in South Africa has shown that early government intervention to identify the common needs of affected municipalities can produce greater synergies in the private sector. Interventions meet these needs while minimizing community competition for resources.

A coalition of wind independent power producers (IPPs) in the Northern Cape and the Western Cape led a joint COVID-19 response initiative to donate and distribute personal protective equipment to more than 60,000 residents, ensuring equitable distribution of resources. As part of the South African Wind Energy Association Economic Development Working Group, they realized that joint actions have greater impact and better potential for collaboration with government. As nearby IPPs began to work together, they noted better social cohesion and less local competition for resources from the IPPs among communities in the region.

Many communities where RE projects are sited are sparsely populated and with a fixed capacity to absorb all benefits flowing in from IPPs. Major influxes to communities, in terms of funding for new infrastructure and programs, among other things, can result in tensions with surrounding communities, or an unsustainable influx of new population to areas benefiting from new RE project developments. Success stories of joint initiatives, such as the one above, highlight the government's important role in convening and encouraging IPPs to collaborate so resources are efficiently accessed and equitably spread through surrounding localities.

Source: World Bank market sounding 2021.

5.2.3 AUCTION AND SELECTION

The public procuring entity, in partnership with all relevant ministerial stakeholders (i.e., those included in the task force or interministerial committee identified in the planning phase), defines requirements for the project tender in an RfP, in line with the bidding framework for the renewable energy program. The metrics used to evaluate the bids need to be defined clearly to allow for transparent, fair assessments. Minimum requirements and incentives for exceeding those requirements should be distinguished. The latter might be achieved using a scorecard approach, where bids are scored higher based on their targets and action plans. This allows IPPs to innovate and assess what they can do cost-effectively.

The RfP should set out:

- Clear SE targets, including those on gender equality and social inclusion, as applicable;
- An evaluation formula/scorecard approach;
- Consequences for noncompliance;
- A list of documents that bidders should submit to demonstrate how the project will support SE targets; and
- Annexes with templates of the targeted reporting framework and financial consequences for noncompliance.

Table 5.1, while not exhaustive, outlines SE elements that could be included in the RfP alongside the evaluation formula. The country context would determine whether these elements are voluntary or mandatory. Targets included in bidding documents should be underpinned by solid analysis.

Once submitted, bids are scored according to the evaluation approach that was communicated to bidders. In the case of South Africa's REIPPPP, for example, the bidders are scored on a curve, taking the highest bidder as the reference point. The bidder who exceeds thresholds with the highest spending on each component is awarded full economic development points; the remaining, compliant bidders are graded relative to that high score and the threshold. Scoring is weighted at 10 for SE commitments vs. 90 for price (DMRE 2021). The scoring could be weighted to favor bidders that have the optimal mix of low tariffs and SE benefits.

BOX 5.3 • THE STATE OF VICTORIA, AUSTRALIA: COMMUNITY ENGAGEMENT AND BENEFIT SHARING IN RE DEVELOPMENT

The state of Victoria in Australia has set an ambitious goal to have renewables account for 40 percent of power generation by 2025. Toward that end, it has designed a competitive auction scheme to procure RE projects.

As part of the auction, the government offers a community engagement and benefit-sharing guide for bidders. It lists the documentation to be submitted and describes its expectations of how the auction will be assessed against criteria for community engagement and benefit sharing. The guide also proposes best practices for possible replication.

Central to the guide is the importance of community empowerment. While the guide takes a flexible approach—providing suggestions rather than requirements—it does highlight the centrality of community-led decision-making by genuinely representative local stakeholders.

Source: State Government of Victoria 2021.

Table 5.1 • Possible SE benefits to focus on in the RfP

SOCIOECONOMIC BENEFITS	GENERAL REQUIREMENTS	CROSS-CUTTING ELEMENTS TO IMPROVE GENDER EQUALITY AND SOCIAL INCLUSION (GESI)
Domestic participation in the RE value chain	• Ask bidders for their plan to engage domestic firms along their supply chains • Require bidders to name a domestic partner (technical, financial, and/or silent partner) • Set a target or threshold for procurement from domestic firms • Require bidders to commit a certain percentage of revenue to build capacities of domestic suppliers • Ask bidders for their plan to upskill domestic labor and maximize domestic job creation • Require bidders to set aside a certain percentage of revenues for upskilling domestic labor • Set a target or threshold for domestic employment	• Set a target for procurement from firms led by women and those belonging to disadvantaged groups • Set a target for domestic employment and skills development among women and disadvantaged groups • Request bidders to submit information on their management structures, disaggregating data by gender, race, ability, etc. • Require bidders to provide safe and equitable working conditions for women (e.g., separate toilets, safe transportation to and from the project site, etc.) • Request bidders to submit information on their gender equality and social inclusion policies and plans • Require bidders to commit to the implementation of codes of conduct and policies against discrimination and sexual harassment
Local development	• Ask bidders to submit a detailed community engagement plan with proposed actions and intended results (see example in box 5.3) • Request bidders to submit their past track record of community engagement and local development • Request or require bidders to set aside a budget to support local development in communities in the vicinity of the RE project site • Require that local communities have an ownership stake in the project • Set a target or threshold for the employment of local community members	• Ask bidders to submit information on their GESI policies and plans (see box 5.4) • Require bidders to submit a plan for how they intend to prioritize community development initiatives with a focus on benefits for women and disadvantaged groups (based on their feedback and aspirations) • Set targets for employment and skills development among women and disadvantaged groups from local communities • Require bidders to commit to the implementation of codes of conduct and policies against discrimination and sexual harassment

Source: Authors compilation for this report

Depending on the country context, the selected bidders will enter into a contractual relationship with the offtaker (utility) and the government. The agreement between the offtaker and the IPP is usually a power purchase agreement (PPA) on "take or pay" terms that outlines the public offtaker's commitment to purchase power from the IPP at the proposed tariff. In addition to a contract with the offtaker, the IPP will also require assurances from the government that it will not make decisions that negatively affect the IPP's revenue. This government contractual support can take a variety of forms, from a letter of comfort to a guarantee that includes contingent liabilities.

The governments may choose to include SE obligations—along with penalties for not meeting them—in either the PPA or the government support contract. It can also stipulate a schedule for reporting SE metrics and the baseline data. Annexes may also be attached to the PPA, for example, detailing requirements that IPPs must pass on to subcontractors, such as to engineering, procurement, and construction companies. Lastly, it may impose penalties for breach of contractual commitments, such as offsetting the penalties against payment of the tariff by the public offtaker.

BOX 5.4 • ASSESSING GENDER-BASED VIOLENCE RISKS AND PREVENTION MEASURES

Governments need to adopt best practices to prevent GBV at the outset of project design and during the early stages of the project feasibility and tendering processes. Gender-based violence (GBV) affects those who, because of their sex or gender, are disproportionately targeted by acts that inflict physical, mental, or sexual harm or suffering; threats of such acts; and coercion and other deprivations of liberty occurring in public or private settings.

Infrastructure projects and civil works are known to increase GBV risks in at least two ways:

1. The influx of workers increases interactions with local residents; and
2. Land redistribution or compensation renders women more vulnerable to GBV, especially when the legal system prevents them from holding land titles.

GBV is typically directed at women on company staff or working in supply chains. It also occurs at the local level between workers and the local community, especially women and children in remote or vulnerable communities; among users of services or infrastructure; and in workers' households.

Once project locations are established, governments need to assess the GBV risks and map out prevention measures. These measures should be spelled out in the environmental and social impact assessment and plan. To ensure accountability, they should also be integrated in the procurement and evaluation processes (and the bidding documents). Ideally, the contractor should develop a budget for a GBV action plan and assign staff with requisite expertise and skills to oversee practices at the site level.

Mitigation and response measures may include:

- Efforts to raise awareness about GBV rates and risks among ministries, utilities, project managers, and contractors;
- A code of conduct regarding the minimum age of consent (18 years, even when the in-country age of consent is lower);
- Signed code-of-conduct agreements and completed certificates of training on GBV terms and concepts, including company-level incident responses;
- Provision of basic infrastructure such as adequate lighting, female restrooms, and so on;
- Survivor support services (e.g., medical, legal, and psychological) and clear procedures outlined on the intake form and in case-management documents;
- Company actions to communicate GBV commitments at the site and in the community;
- Monitoring and reporting of GBV mitigation and response measures.

Measures should be designed and implemented in collaboration with stakeholders. Women should participate in the design and ensure that safety concerns are accounted for in decision-making processes.

The private sector counterpart and the relevant engineering, procurement, and construction contractors (and all relevant subcontractors) should commit to GBV-related requirements when bidding for RE projects.

Sources: EBRD, CDC Group, and IFC 2020; World Bank 2020.

5.2.4 PROJECT IMPLEMENTATION

Once the winning bidders have been selected and the contractual agreements signed, continued coordination will be needed between the public procuring entity, the selected bidder(s), and relevant stakeholders to ensure that:

- The committed targets of the selected bidder are well articulated with the ongoing plans of the public parties; and
- Project-level support programs defined in the socioeconomic roadmap are collaboratively rolled out and communicated to the public.

The Noor Ouarzazate Solar Park in Morocco provides a good example of coordinated action at the project level to maximize SE benefits (box 5.5). Each action is supported by multiple partners—including private sector players, public entities, local government agencies, and NGOs.

Once RE projects are commissioned, the government's role is to ensure that the IPPs deliver on their technical and SE commitments. In many countries, monitoring performance in this area is weak, creating opportunities for noncompliance. Monitoring can be improved by translating the desired impacts into measurable metrics and by communicating reporting requirements (see section 5.3). Necessary details include who the monitoring agency is; who needs to report; what information must be reported, in what format, and how often; and what penalties apply for nonreporting. When defining reporting requirements for local development targets, close cooperation with local authorities and other local stakeholders is critical.

To improve with each bidding round, the governmental entity responsible for M&E can draw lessons from compliance/noncompliance and the practical issues faced while monitoring IPPs. Such qualitative information can then inform the future design and implementation of projects.

BOX 5.5 • ACTIONS TO MAXIMIZE SE IMPACTS IN THE NOOR OUARZAZATE SOLAR PARK IN MOROCCO

INTENDED IMPACT	ACTIONS	EXAMPLES
Maximize domestic participation in the RE value chain	Team up with selected bidder to train local people	Coordination between MASEN, the Office of Professional Training and Work Promotion, and the private engineering and construction group SENER led to the training of 100 local people in solar thermal energy. Training supported careers such as electrical and mechanical technicians and control room and field operators. Almost half the trainees were hired at the Noor Ouarzazate solar plants.
	Engage the public employment agency to ensure that local residents are hired	MASEN connected selected developers and their subcontractors to the National Agency for the Promotion of Employment and Competencies (ANAPEC). These developers/contracting firms then submitted job opportunities to ANAPEC. ANAPEC supported job seekers to prepare their CVs and applications and suggested potential candidates to the contracting firms.

INTENDED IMPACT	ACTIONS	EXAMPLES
	Connect bidders with domestic firms	During site visits, MASEN connected prequalified bidders with domestic firms that could provide them with goods and services. The Moroccan Solar Cluster facilitated the connections and organized events where domestic firms could set up booths and engage in prearranged business-to-business meetings.
Local development	Foster information sharing and dialogue to improve local inhabitants' satisfaction with project implementation	MASEN placed a local team on site in Ouarzazate that was available to collect complaints from the local population, resolve disputes, and monitor and evaluate local development projects. MASEN also installed a mailbox on the premises to collect complaints anonymously.
	Leverage synergies between public entities and the local development plans of private sector players	MASEN joined forces with the public water and electricity utilities as well as with the private developers and their subcontractors. Joint projects led to the provision of potable water to 26 villages and over 5,800 people, and the electrification of 8 schools and an orphanage.
	Prepare the community for job losses at the end of the construction phase	A study of employment demographics analyzed the prerequisites for individuals to reenter the job market upon completion of the construction phase, or upon plant closure. The study recommended for example that the National Agency for the Promotion of Employment and Competencies set up a service counter near the project site so that exiting employees could access employment services. It also called for skills certification and training in various sectors (agriculture, construction, crafts, services, etc.) and entrepreneurship support to create new opportunities for those unwilling or unable to relocate.
Gender equality and social inclusion	Identify international financing opportunities to maximize the impact of local development initiatives on the lives of women	Women Organizing for Change in Agriculture and Natural Resource Management created the W+ standard, a set of project design and implementation requirements to measure women's empowerment. W+ was used by the independent power producer (IPP) to ensure that local development initiatives associated with the Noor Power Plants increased local women's income and improved their livelihoods. Awarded W+ certificates could then be sold (for example, to companies that want to enhance their CSR activities) with the intent that the IPP would reinvest 90 percent of profits from the sales back into local communities, triggering a virtuous cycle.
	Leverage the private sector to finance local development initiatives that enhance the livelihoods of local women	Early public consultations with a local women's association highlighted the need to support income-generating activities. This finding was reflected in a scorecard that MASEN developed to prioritize local development initiatives. As a result, funds committed by the IPP were leveraged to finance a program to train local women in weaving, dressmaking, carpet weaving, embroidery, and knitting. The Traditional Art Institute of Ouarzazate was brought in as the project lead and training provider.

Sources: World Bank market sounding 2021; MASEN 2014; Stitou 2019.

5.3 MONITORING, EVALUATION, AND COMPLIANCE AT THE PROJECT AND PROGRAMMATIC LEVELS

An M&E framework must be in place to assess project delivery by the private sector, and the RE program delivery by the public sector. This framework then tracks SE activities (and outputs) and ensures contractual compliance. The approach requires defining indicators, setting baselines, and verifying that rates of domestic participation in the RE value chain, local development initiatives, and efforts toward gender equality and social inclusion are in line with the objectives of the SE roadmap and specific project-level tenders.

To accurately assess progress against SE benefit indicators, methods for collecting data—including, importantly, baseline statistics—need to be considered early. For example, baseline data may be collected from official statistics, market soundings, or by adding targeted questions to existing industry surveys.

It is also critical to designate the monitoring authority for the respective indicators developed, so as to ensure that indicators are consistently measured and reported. For example, the monitoring on an indicator to measure the total procurement going to domestic firms may be the responsibility of the public procurement entity. Likewise, an indicator on the development of new RE education and training may be the responsibility of the ministry of education or skills development; the monitoring indicator for job

BOX 5.6 • REPORTING REQUIREMENTS FOR REIPPPP IN SOUTH AFRICA

The South African Department of Mineral Resources and Energy issues quarterly reports on the Renewable Energy Independent Power Producer Procurement Program's (REIPPPP) performance; the reports outline how the program has performed against targets and highlight key findings. Several important lessons that have been documented through these reports over the past two years include:

- A need for improved alignment between provincial energy strategies, spatial planning, and development plans to optimize the benefits of the REIPPPP to provinces;
- A need to investigate alternative vehicles that could produce a more even distribution of revenue from community ownership stakes in projects to initiatives that benefit communities;
- A need to further develop woman-owned firms in order to improve preferential procurement outcomes from these entities;
- IPPs' commitments on socioeconomic development need to be better coordinated, monitored, and aligned with existing financing mechanisms and methods for assessing needs so as to discover synergies and maximize impact.

Efforts have already begun. For example, the Initiative for Social Performance in Renewable Energy (INSPIRE) is an industry-led innovation and learning hub launched in 2021. INSPIRE has initiated a series of courses, including (1) a program that focuses on managing community relations and stakeholder engagement for RE projects and (2) another on managing community investments from RE projects.

Sources: DMRE 2020; INSPIRE n.d.

creation may be the responsibility of the ministry of labor. For each country, the context will be unique to the roles of their respective government entities.

Monitoring and reporting requirements (including the format and reporting schedule) should align with national development planning cycles; findings should inform updates. IPPs should be required to state their commitments as part of the bidding process and then be further required to submit regular reports (box 5.6). Where possible, reports should disaggregate indicators for gender and other relevant categories, such as ethnicity, ability, age, citizenship status, and geography.

While many countries have established requirements for IPPs to report on job creation and skills development, local development initiatives tend to have few, if any, M&E requirements. M&E should be prioritized to ensure long-term impact in communities surrounding RE projects and to enable quick adjustments as needed (box 5.7). Close cooperation with local authorities and relevant stakeholders is crucial, as ministries responsible for RE and utilities may not be best placed to define and assess progress.

Reported data could be audited by an independent party to improve compliance and accuracy. Penalties for nonreporting could then be spelled out in the contract and enforced. Adequate resources, both human and financial, will need to be allocated for M&E, to ensure that findings are used to inform future project and program design.

Examples of indicators that could be tracked within a country at the program and project level are detailed in Annex II.

Insights into the performance of an RE program can improve future projects. An understanding of support mechanisms that have worked in the past can inform future project design and implementation. Government will benefit from systematically collecting data and regularly updating their RE program, while accounting for efficiency gains, for progress made against the SE targets, and for changing environments. M&E should feed into policies and strategies to ensure that the most appropriate RE strategy for securing SE benefits is devised.

BOX 5.7 • REASSESSING JOB PROJECTIONS IN SOUTH AFRICA'S WIND SECTOR

In 2012, an assessment of South Africa's need for training and skills in the wind sector was conducted by an external entity. Initial job projections suggested that South Africa would face a shortage of skilled wind technicians. Six years into the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), the study was reviewed and found to have overestimated the need for skilled technicians, in part because jobs were measured according to the quantity of megawatts and not by the number of turbines. The results imply a reduction in the need for specialized training for wind technicians.

The 2017 update also found that training for O&M is largely being done in-house by the private sector and that the absence of a legislative requirement for certification has lowered demand for specialized vocational programs.

One area where there has been a shortage of educational offerings is in short courses for the benefit of local government officials, community representatives, and industry representatives. As a result of the strong socioeconomic focus of the REIPPPP, there is a need for more training of municipal officials (such as local economic development officers) and industry professionals (such as economic development auditors and managers, community liaison officers, and project trustees) on the economic implications of the REIPPPP, with specific emphasis on socioeconomic development, enterprise development, and community ownership structures.

These findings emphasize the need for governments to reassess job-creation projections and skills needs as RE programs are rolled out, scaled, and made more efficient.

Sources: Original compilation for this report, based on AltGen Consulting (2012, 2017); original research conducted for this report.

6

CONCLUSION

This document presents key steps governments can take to maximize socioeconomic benefits triggered by renewable energy (RE) deployment, specifically addressing:

- The inclusion of domestic firms and labor along the RE value chain, when this can be done in a competitive manner, to maximize job creation, skills development, and knowledge transfer;
- The involvement of local communities in implementing projects that strengthen their resilience and livelihoods;
- Gender equality and social inclusion, so that women and disadvantaged groups benefit equitably from renewable energy programs and projects.

Governments may adopt specific steps dependent on each country's circumstances, strategic goals, and priorities. To maximize the socioeconomic benefits of RE deployment and achieve established socioeconomic targets, various studies and actions should be completed during the successive phases of the approach detailed in this report (planning, strategy, and implementation). The actions needed and targets set are typically summarized in a cross-cutting socioeconomic roadmap developed by the government, which helps to steer the whole process in time and across the various entities that must be involved to ensure successful implementation.

By the close of the implementation phase, a country will have a sustainable and bankable pipeline of RE projects. "Sustainable" means that the program/project will leverage competitive procurement processes to reap full socioeconomic benefits; "bankable" means that it will be able to attract the private sector under favorable conditions.

Through utilizing these guidelines, governments will be better positioned to:

- Assess the magnitude of socioeconomic benefits that RE deployment may generate under a range of least-cost scenarios, and identify competitive advantages that may exist domestically;
- Identify gaps that are limiting domestic participation in RE value chains, and help to upskill individuals and firms to maximize domestic value added of RE deployment;
- Identify the needs of communities and opportunities for local development surrounding RE project sites, uncovering synergies and communicating these needs to the private sector;
- Address gender gaps and improve opportunities for disadvantaged groups by better understanding the barriers that these groups face and creating action plans to minimize the hurdles they face;
- Improve coordination among public agencies, community stakeholders, and private sector players;
- Understand how the private sector can be encouraged to generate socioeconomic benefits, in particular, through the evidence-based design of a competitive RE procurement process; and
- Create a measurement and evaluation framework that can be used to track progress against socioeconomic targets for RE deployment.

Governments can additionally capitalize on the implementation of their RE program to:

- **Improve energy security and increase self-sufficiency of the country**
  By harnessing domestic resources, renewables can vastly improve national energy security. If, additionally, countries succeed in localizing segments of the value chain for renewable energy, they can develop cheaper, faster, and better renewables that contribute more to the domestic economic growth and prosperity. The pandemic and the war in Ukraine have been reminders to many countries about the dependence of RE value chains on a few and geographically concentrated suppliers and the relative fragility of their business models. By localizing parts of various value chains, these tensions can be at least partially alleviated.

- **Support energy transitions that are just and equitable**
  Increased uptake of RE in developing countries contributes not only to climate goals but also to uplifting local populations, through capacity development and greater economic opportunity. By investing in domestic supply chains and supporting local development, populations benefit not only from the final product (electricity) but also from projects and programs that enhance their livelihoods and resilience. These activities offer opportunities to equitably involve women and disadvantaged groups in RE development, leading to a more just energy transition.

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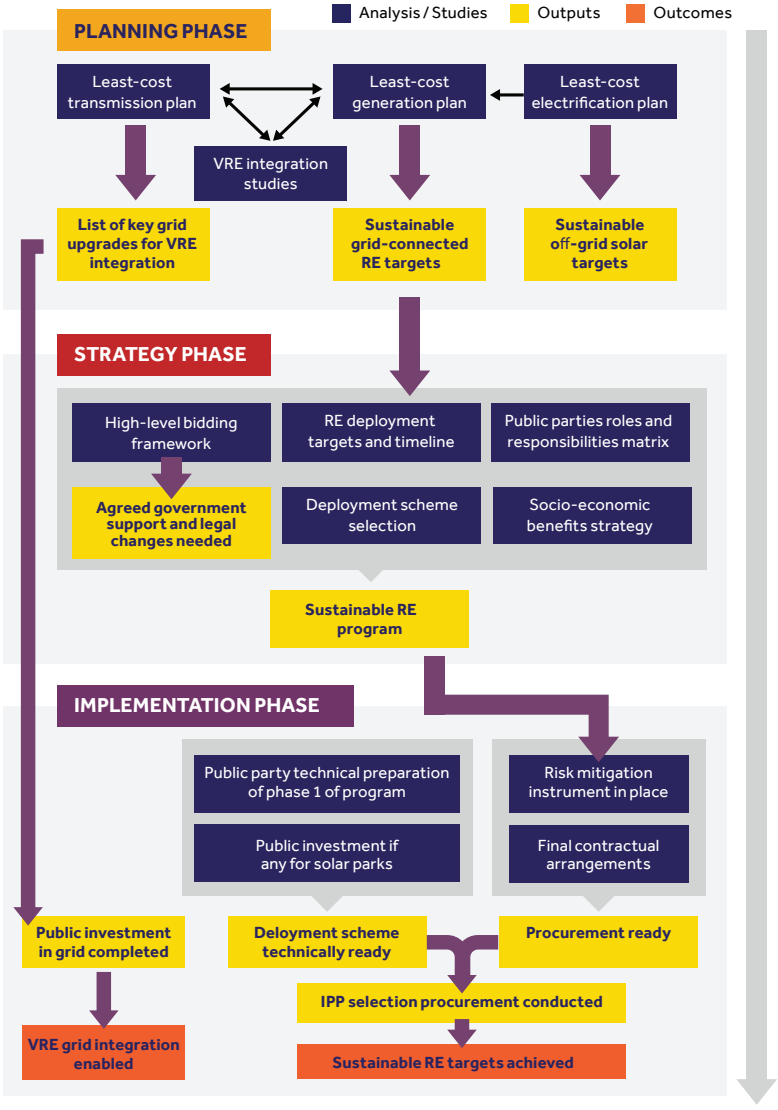
ANNEX I
SRMI TECHNICAL GUIDELINES THREE-PHASE APPROACH



Source: World Bank 2022a.
Note: IPP = independent power producer; RE = renewable energy; VRE = variable renewable energy.

ANNEX II
EXAMPLES OF MONITORING INDICATORS

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Domestic participation in RE value chains including gender equality and social inclusion						
Economic and fiscal impact	Contribution to national gross domestic product	X		Contribution of the RE program to the growth of national gross domestic product.	Calculated through a general equilibrium model.	n.a.
	Contribution to fiscal revenue (USD/%)	X	X	National government revenue (USD or local currency) gathered from tax (e.g., taxes on income, profits, license fees, excise taxes, custom duties, etc.) and nontax sources (e.g., royalties) as a result of RE project development.	Calculated/verified from government (national/ provincial/municipal) financial reports.	National/provincial/municipal levels
Job creation	Total number of direct jobs (full-time equivalent, FTE)	X	X	Jobs that are generated directly by the core activities of RE projects/ programs. FTE hours per week will depend on local definitions and standards as per country.	Collected from employment records of the given companies/entities.	(1) technology type, (2) segment of the value chain, (3) jobs in the public sector vs. private sector, (4) citizenship (i.e., domestic vs. international labor), (5) geographies, and (6) gender. Depending on the country context, data could be further disaggregated by (1) ethnicity, (2) age, and (3) (dis) ability.
	Total number of indirect jobs created and supported by RE programs/projects	X	X	Jobs that result from additional upstream industries that are not directly involved but support the supply and core activities of the RE programs/projects. These jobs may be created as a result of manufacturing inputs for RE, or through financial and other services.	Typically estimated using employment factors. For specific local industries, additional surveys can give better data but with higher associated costs.	Segment of the value chain. If surveys are used, data can be further disaggregated by (1) segment of the value chain, (2) citizenship (i.e., domestic vs. international labor), (3) gender, (4) ethnicity, (5) age, and (6) (dis)ability.

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Training the domestic workforce	Total number of people trained	X	X	Total number of people trained as a result of RE education and training initiatives.	Regular government monitoring of education providers, including IPPs and their subcontractors, educational institutions, and civil society stakeholders.	(1) topic (e.g., policy, gender, O&M, etc.) and (2) technology type (e.g., multitechnology, solar, wind, etc.). Further disaggregated by: (1) gender, ethnicity, age, and (dis)ability of participants; (2) education (e.g., higher education, TVET, short-term courses, etc.); and (3) sector of participant, if applicable (e.g., public sector, private sector, civil society).
	Number of individuals employed after training		X	Total number of people trained that receive employment on the project upon completion.	Regular monitoring and evaluation of projects by government, IPPs, and their subcontractors.	(1) gender, ethnicity, age, and (dis) ability of participants; (2) role; and (3) duration of employment on project.
	Total number of new partnerships between educational institutions and industry	X	X	Total number of new partnerships between educational institutions and industry to collaborate on educational programs and/ or research (e.g., through a memorandum of understanding, agreement to cofinance, etc.).	Regular government monitoring of education providers, including IPPs and their subcontractors, educational institutions, and civil society stakeholders.	(1) type of educational institution (e.g., higher education, TVET, etc.) and (2) focus of partnership (e.g., provision of training, research, etc.).
	Number of educational programs targeting women	X	X	Number of programs with a quota for the participation of women.	Regular government monitoring of education providers, including IPPs and their subcontractors, educational institutions, and civil society stakeholders.	(1) topic (e.g., policy, O&M, etc.); (2) technology (e.g., multitechnology, solar, wind, etc.); and (3) education (higher education, TVET, short-term courses, etc.).

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Capacity building/ technology transfer to domestic firms	Total number of domestic firms that participated in capacity development programs	X	X	Total number of domestic firms that participated in capacity-building programs to improve their business skills (e.g., business development, marketing, human resources recruiting, etc.), adjust their operations (e.g., scale up production), and increase their participation in the RE value chain.	Regular government monitoring of capacity-building providers, including IPPs and their subcontractors, business associations, and clusters.	Program type (e.g., technical assistance, skill building, etc.). Further disaggregated by ownership of the firms that participated (e.g., gender, ethnicity, [dis]ability).
	Total number of programs developed specifically to foster female-owned enterprises across opportunities in the RE value chain	X		Total number of international or domestic firms that participated in capacity-building programs designed specifically to address barriers facing female-owned firms competing for opportunities to participate in the RE value chain (e.g., business development, marketing, human resources recruiting, etc.).	Regular monitoring by government or IPPs of capacity-building providers.	Female-owned firms: (1) size, staffing, and regional focus; and (2) targeting of capacity building at different stages of the RE value chain and bidding opportunities.
	Number of new organizations to support industrial development in the RE sector	X		Number of new organizations (e.g., industry associations, business clusters, etc.) to support the establishment and development of domestic businesses partaking in the RE value chain.	Government monitoring of RE organizations/ associations/ clusters	Technology type (e.g., solar, wind, etc.)
	Total funds spent on the development of domestic firms in the RE sector	X		Total funds spent on the development of domestic firms that could contribute to the RE value chain. Could include funds spent on suppliers' development programs, as well as financial support in the form of grants, subsidies, seed funding, etc.	Government monitoring of programs to support domestic firms led by the private sector, the public sector, and/or civil society organizations.	The provider of funds (e.g., government ministries, IPPs, business associations, etc.). Further disaggregated by (1) the beneficiary of funds (e.g., female-led firms, etc.) and (2) the segment of the value chain in which they participate.

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Ownership and management	Total number of joint ventures between international companies and domestic firms	X	X	Total number of joint ventures between international and domestic firms, excluding local representatives of international firms.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) technology type, (2) segment of the value chain, (3) ownership of the firm (e.g., gender, ethnicity, (dis)ability, etc.).
	Average percentage shares owned by domestic firms in RE project development	X	X	Percentage shares owned by domestic firms in companies set up for the RE project development.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	RE technology type (e.g., solar, wind, etc.).
	Total number and percentage of women/ disadvantaged employees that hold decision-making roles in the project developer company and subcontracting companies	X	X	Total number of executives and board-level decision-makers that are women or representatives of disadvantaged groups.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) firm type (e.g., IPP; engineering, procurement, and construction contractor; O&M contractor) and (2) employee level (e.g., board or executive level, STEM or non-STEM expert). Further disaggregated by (1) gender, (2) ethnicity, and (3) (dis)ability.
Procurement spending	Total procurement spent (USD/%) on goods/services from domestic firms	X	X	Total USD (or local currency as applicable) spent on goods and services from domestic firms in the implementation of RE projects.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) segment of the value chain, (2) ownership of the firms (e.g., gender, ethnicity, [dis]ability).
	Share of total procurement sourced from micro, small, and medium-sized enterprises (MSMEs)	X	X	Total USD (or local currency as applicable) spent on goods and services from MSMEs in the implementation of RE projects.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) segment of the value chain, (2) ownership (e.g., gender, ethnicity, [dis]ability), and (3) location of the enterprise.

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Procurement spending	Total procurement spent (USD/%) on goods/services from domestic firms	X	X	Total USD (or local currency as applicable) spent on goods and services from domestic firms in the implementation of RE projects.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) segment of the value chain, (2) ownership of the firms (e.g., gender, ethnicity, [dis]ability).
	Share of total procurement sourced from micro, small, and medium-sized enterprises (MSMEs)	X	X	Total USD (or local currency as applicable) spent on goods and services from MSMEs in the implementation of RE projects.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) segment of the value chain, (2) ownership (e.g., gender, ethnicity, [dis]ability), and (3) location of the enterprise.
Local development including gender equality and social inclusion						
Local development	Total amount (USD) or revenue (%) committed to local development initiatives by IPPs	X	X	Total USD (or local currency as applicable) or percentage of revenue generated by RE projects committed to local development initiatives.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	n.a.
	Total number of local development projects implemented and their total cost	X	X	Total number of local development projects and their associated costs.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	Use of funds (e.g., education and training, local infrastructure, social and environmental services, local enterprise development, etc.).
	Total number of local development projects designed specifically to benefit women	X	X	Total number of community initiatives that aim to uplift women through economic empowerment, health care, etc.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	Use of funds (e.g., education and training, local infrastructure, social and environmental services, local enterprise development, etc.).
	Number of formalized partnerships between developers and local stakeholders on local development initiatives			Number of formalized partnerships with local stakeholders (e.g., women's organizations and community development organizations) on local development initiatives.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	Organization type (e.g., women's organization, community development organization, etc.).
	Total number of people benefiting from local development initiatives	X	X	Total number of people that directly benefit from local development initiatives (categories mentioned above) from RE projects.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	Benefactors (e.g., age, gender, ethnicity, [dis]ability).

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Community ownership	Number of community entities with equity in RE projects and their percentage shareholding	X	X	Total number of community entities holding shares in the project company, as well as their percentage of ownership.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	Community entity type (e.g., community trust, cooperative, nonprofit, individual, women's group, etc.).
	Annual dividends paid out to community entities	X	X	Total USD (or local currency as applicable) received by community entities each financial year.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	n.a.
Additional—Gender equality and social inclusion (cross-cutting)						
Gender equality and social inclusion (general); **gender-based violence (GBV)**	Gender equality and social inclusion policy/strategy adopted for RE sector	X	X	National policy/strategy and company/project-level strategy adopted to focus on gender equality and social inclusion issues (including jobs, skills development, entrepreneurship and firm ownership, access to finance, local development, community ownership) and consumer-facing issues.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) technology type, (2) segment of the value chain, (3) jobs in the public sector vs. private sector, (4) citizenship (i.e., domestic vs. international labor), and (5) geographies as far as possible.

KEY SOCIOECONOMIC INDICATORS	SUBINDICATORS	PROGRAM LEVEL	PROJECT LEVEL	DEFINITIONS	MEASUREMENTS	
					METHODS	DATA DISAGGREGATION BY:
Gender equality and social inclusion (general); **gender-based violence (GBV)** *(continued)*	GBV risk screening completed	X	X	Risk investigations and screening to include levels of gender inequality such as gender stereotypes, multiple and intersecting forms of discrimination, and gender-based power relations; levels of services to address GBV and harassment; worksite arrangements; labor influx/use of transient workers; use of military or private security forces; and heightened fragility due to recent or ongoing conflict.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) age, gender, ethnicity, and (dis) ability); and (2) by region.
	GBV action plan for mitigation and response adopted	X	X	Action plan to include the risk rating of the project, details of mitigation and response actions such as codes of conduct (with details on age of consent), grievance redress mechanisms, community engagement and awareness-raising activities, training, survivor support, and monitoring and evaluation.	Regular monitoring by government; IPPs and their contractors report on contractual obligations.	(1) age, gender, ethnicity, and (dis) ability); and (2) region.

Source: Original compilation by authors for this report.
Note: IPP = independent power producer; O&M = operation and maintenance; RE = renewable energy; STEM = science, technology, engineering, and mathematics; TVET = technical and vocational education and training
n.a. Not applicable.

ANNEX III
TERMS OF REFERENCE
ASSESSING AND MAXIMIZING SOCIOECONOMIC BENEFITS TRIGGERED BY RENEWABLES

A template Terms of Reference for a country-level consultancy for "Assessing and Maximizing Socioeconomic Benefits Triggered by Renewables" is available on the SRMI website. **Click here to go to the template**.

SRMI Sustainable Renewables Risk Mitigation Initiative

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