SolarPower Europe

INTERNATIONAL SOLAR ALLIANCE

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Solar For All:

Boosting Solar Investment in Least Developed Countries and Small Island Developing States

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List of Acronyms

ADB
Asian Development Bank

AFD
French Development Agency

AOSIS
Alliance of Small Island States

ASEAN
Association of Southeast Asian Nations

ASPIRE
Accelerating Sustainable Private Investments in Renewable Energy

ATI
African Trade Insurance Agency

BESS
Battery Energy Storage System

CARICOM
Caribbean Community

CCREEE
Caribbean Centre for Renewable Energy and Energy Efficiency

COMESA
Common Market for Eastern and Southern Africa

ECOWAS
Economic Community of West African States

EIB
European Investment Bank

EMDC
Emerging markets and developing countries

EPC
Engineering, Procurement and Construction

ESMAP
World Bank's Energy Sector Management Assistance Program

EU
European Union

GHG
Greenhouse gas (GHG) emissions

GIZ
German development agency (Deutsche Gesellschaft für Internationale Zusammenarbeit)

IDA
International Development Association

IEA
International Energy Agency

IFIs
International financial institutions

IPP
Independent Power Producer

IRENA
International Renewable Energy Agency

ISA
International Solar Alliance

KfW
KfW Development Bank

LCOE
Levelised cost of electricity

LDCs
Least developed countries

MIGA
Multilateral Investment Guarantee Agency

NDCs
Nationally Determined Contributions

O&M
Operation and maintenance

OGEF
Off-grid Electricity Fund

PAYGo
Pay-as-you-go system

PPA
Power Purchase Agreement

PPA
Pacific Power Association

PV
Photo voltaic

RE
Renewable energy

REFiT
Renewable Energy Feed-in Tariff

SDGs
UN Sustainable Development Goals

SEIAPI
Sustainable Energy Industry Association of the Pacific Islands

SHS
Solar home system

SIDS
Small islands developing states

UN
United Nations

Executive Summary

The UN Sustainable Development Goal 7 (SDG 7), "ensuring access to affordable, reliable, sustainable and modern energy for all", is a key objective for least developed countries (LDCs) and small islands developing states (SIDS) and can provide a significant boost to economic growth. Solar has a great potential in LDCs and SIDS and harnessing energy from the sun plays a critical role in meeting electrification goals, cost-effectively diversifying countries' energy mixes and reducing greenhouse gas emissions. To achieve these objectives, investments must be scaled up. Achieving universal electrification and transitioning away from fossil fuels will require catalytic public finance and supportive regulatory frameworks to unlock further investments from the private sector.

This document addresses the challenges of investment mobilisation and deployment of solar energy projects in LDCs and SIDS. Underlying market barriers and a perception of high risk constrain the development and financing of solar energy projects. While technology costs have plummeted, solar projects are still not developed at scale in LDCs and SIDS. This is due to high project costs resulting from regulatory, technological, and financial barriers.

Policy makers, international partners, and international financial institutions (IFIs) can address key investment risks, with a targeted approach developed through five strategic objectives.

- **Create an enabling environment for private investments:** Policy makers, with the support of international partners and IFIs, should improve the framework conditions for doing business and investing in solar energy. They should develop a foreign investment strategy around solar energy, and limit market distortion towards fossil fuels. Standardisation of administrative documents, streamlined procedures, and technical assistance facilities contribute to reducing transaction costs and enhancing predictability for project developers. Policy makers should enhance their partnership and collaboration with the private sector.
- **Enhance access to affordable finance:** Access to non-sovereign guarantees from IFIs is crucial to mobilising private investments. IFIs should simplify procedures to increase the use of risk mitigation instruments. Financial incentives for solar should be developed.
- **Increase regulatory and administrative coordination and competences:** Capacity building for national energy actors and technicians will support the growth of the solar market. Policy makers, with the support of international partners, should assess human resources needs and develop an institutional capacity strategy for the solar energy sector, with a dedicated unit in the relevant Ministry dealing with energy.
- **Integrate solar energy into the grid:** Challenges for integrating solar into the grid can be mitigated with adequate measures, including priority dispatch and upgrades. Transparent auction processes will also increase the uptake of solar. International partners

should support these upgrades with technical assistance and funding.

- **Leave no one behind:** Off-grid solutions and end-user subsidies are essential to ensuring universal electricity access and reach the most vulnerable.

With appropriate measures and instruments, private investments in solar energy can be scaled up. An enabling policy environment, access to funding and financial guarantees provide essential support to the development of a modern, clean energy system in which solar is the dominant technology. The energy transition will enable LDCs and SIDS to reach their electrification, development, and industrialisation objectives in a sustainable manner.

Introduction

The UN Sustainable Development Goal 7 (SDG 7), "ensuring access to affordable, reliable, sustainable and modern energy for all", is a key target for the sustainable development of low- and middle-income countries. There are currently around 733 million people without access to electricity globally. The impact of the COVID-19 pandemic and the increase of oil and gas prices in 2021 has slowed progress towards achieving SDG 7, especially in the most vulnerable countries.[1] Solar energy presents many benefits such as ensuring access to affordable, reliable, and sustainable energy for all in countries in Sub-Saharan Africa, Pacific and South Asia regions and Latin America.

Solar energy can help countries mitigate greenhouse gas (GHG) emissions and diversify their energy mix, thus contributing to energy security. Emerging markets are characterised by a dependence on fossil fuel imports. High and volatile prices, result in expensive electricity rates for consumers, which are unable to pay. Hence, developing solar energy projects provides economic benefits for investors and governments, as well as, for consumers benefiting from low-cost and reliable electricity. Indeed, solar has a crucial role to play in the energy transition and to support industrialisation in emerging economies in a sustainable manner.[2]

A substantial increase in investments is required to accelerate the energy transition. According to the International Energy Agency (IEA), clean energy spendings in emerging markets and developing countries (EMDCs) need to amount to more than USD 1 trillion annually to

[1] IEA, IRENA, UNSD, World Bank, WHO, 'Tracking SDG 7: The Energy Progress Report'

[2] IRENA, 'World Energy Transitions Outlook 2022: 1.5°C Pathway', 153

[3] IEA, 'Financing Clean Energy Transitions in Emerging and Developing Economies', 26.

reach net-zero objectives by 2050.[3] According to the International Solar Alliance (ISA), in 2021, USD 200 billion were invested in the solar sector globally, of which only 5% in Africa. The global green transition requires both catalytic public funding and sustained private investments to be fully realised. Policy support for solar energy is crucial to enabling its deployment and attracting a wide range of investors.

Least developed countries (LDCs) and small islands developing states (SIDS)

While being responsible for a small share of historical GHG emissions, least developed countries (LDCs) and small islands developing states (SIDS), are among the territories most affected by climate change.

LDCs are low-income countries facing severe structural barriers to sustainable development and are highly vulnerable to economic and environmental shocks. LDC status is assessed by the Committee for Development Policy (CDP) of the Economic and Social Council (ECOSOC) of the United Nations (UN), based on three criteria: gross national income per capita, a human assets index, and an economic and environmental vulnerability index. The list of LDCs is reviewed every three years, enabling countries to graduate to developing country status. LDCs have exclusive access to certain international support measures in particular in the areas of development assistance and trade. There are 46 LDCs distributed among Africa, Asia, the Caribbean, and the Pacific regions.[4]

The UN identifies fifty-seven countries or entities as SIDS located in the Caribbean, the Pacific, and the Atlantic, Indian Ocean and South China Sea. For the purpose of this Guidance Document, only states will be considered (37). Contrary to LDC status, SIDS status is self-appointed. However, SIDS were recognised as having unique environmental and development challenges at the 1992 United Nations Conference on Environment and Development (Rio de Janeiro, Brazil).[5] SIDS represent a heterogeneous group, with great variations of population size (from a few thousand inhabitants to more than 10 million), income levels (some are low-income and others are high-income countries), and geographical location. Nonetheless, SIDS face similar challenges due to their size, remoteness, and high exposure to external economic and environmental shocks, as well as their vulnerability to climate change.

This Guidance Document aims to address the challenges of deploying and mobilising investments for solar energy projects in LDCs and SIDS.[6] This grouping is a very heterogeneous group of countries, with a wide range of national circumstances, income levels and starting points. While every national situation is different, developing an enabling policy and regulatory environment is key to attracting investment and boosting the deployment of solar, contributing to just energy transitions and achieving SDG 7.

Energy sector in LDCs and SIDS

LDCs and SIDS account for around 15% of the world's population. They are very heterogeneous, including in their access to electricity. On average, 91.8% of the population in SIDS has access to electricity, ranging from 33.3% in Guinea-Bissau to 100% in Antigua and Barbados, for instance. In LDCs, on

[4] United Nations, Department of Economic and Social Affairs, 'Least Developed Countries (LDCs)'. A detailed list of LDCs and SIDS is available on Annex I.

[5] United Nations, Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, 'Small Island Developing States'.

[6] The list of countries considered in the document is available in annex.

[7] World Bank, 'Access to Electricity (% of Population)', World Bank Global Electrification Database.

[8] Christiaan Gischler et al., 'Challenges and Opportunities for the Energy Sector in the Eastern Caribbean: Achieving an Unrealised Potential', [10].

[9] International Monetary Fund, Unlocking Access to Climate Finance for Pacific Island Countries, [10].

[10] IRENA, 'Renewable Energy Market Analysis: Southeast Asia'.

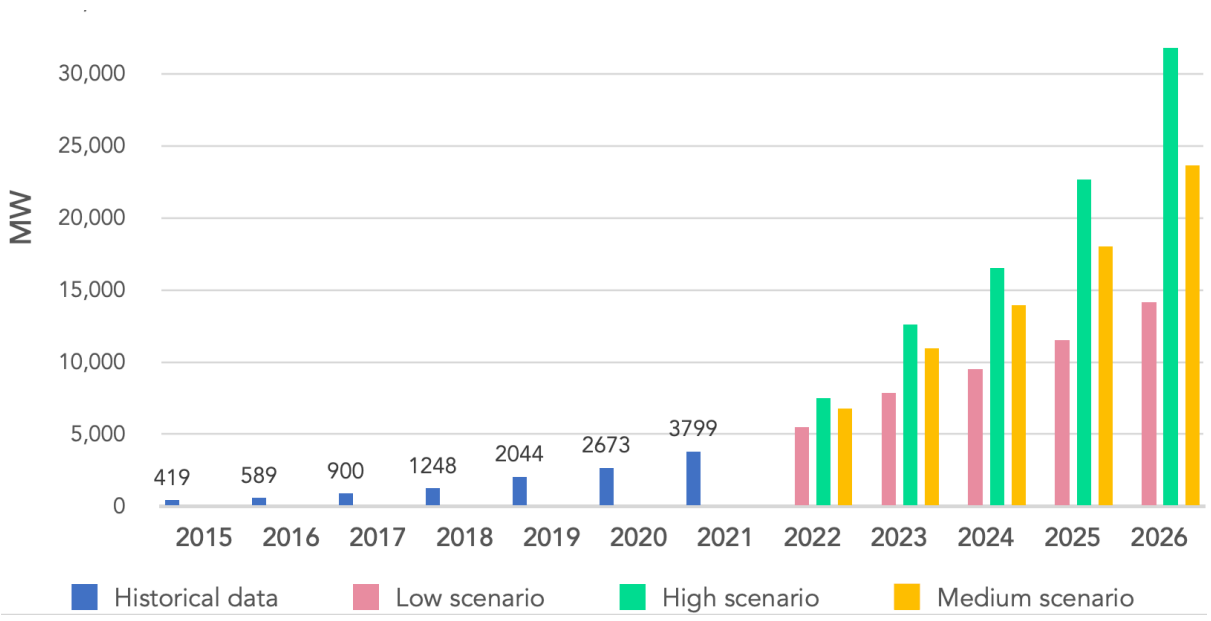
average, 53.5% of the population has access to electricity, ranging from a minimum of 7.2% in South Sudan to 100% in Bhutan.[7] There are also significant differences between urban populations, with higher income and access to electricity grids, and rural populations, with lower income, informal jobs, and less access to the national electricity grid.

The energy markets of LDCs and SIDS are broadly characterised by a dependence on petroleum fuel imports and prohibitive costs of electricity, due to low power demand, and high costs of transmission and distribution. Electricity tariffs also vary unpredictably depending on international oil prices.[8] The high cost of electricity impedes business growth, contributes to energy poverty in households, disproportionately affecting the most vulnerable and restrains economic development.[9] Southeast Asia, Cambodia and Laos rely heavily on coal in their energy mix, and gas represents an important share of the energy mix in Myanmar.[10] Additionally, fossil fuel subsidies distort prices, negatively affecting competition with renewables and significantly impacting government finances.[11]

Most LDCs and SIDS have significant global horizontal irradiation levels.[12] Solar energy represents an opportunity to reduce dependence on expensive fuel imports, thus reducing energy costs for households, businesses, and public entities, and enabling greater access to electricity. By reducing governments' expenditure on electricity, their fiscal headroom will increase and allow them to focus on other essential services.[13]

According to SolarPower Europe, LDCs and SIDS accounted for 3.8 GW of cumulative installed solar capacity in 2021, this cumulative

Figure 1: Total installed solar capacity in SIDS and LDCs with market scenarios (2022-2026)[17]



[11] IEA, 'Financing Clean Energy Transitions in Emerging and Developing Economies', 62.

[12] Marcel Suri et al., 'Global Photovoltaic Power Potential by Country'.

[13] Gischler et al., 'Challenges and Opportunities for the Energy Sector in the Eastern Caribbean: Achieving an Unrealised Potential', 7.

[14] SolarPower Europe, 'Global Market Outlook for Solar Power 2022-2026', 2022. Based on available data from Afghanistan, Angola, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Chad, Congo DR, Cuba, Dominican Republic, East Timor, Eritrea, Ethiopia, Gabon, Gambia, Guinea, Guinea-Bissau, Haiti, Jamaica, Laos, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Myanmar, Nepal, Niger, Papua New Guinea, Rwanda, Senegal, Sierra Leone, Singapore, Somalia, South Sudan, Sudan, Togo, Trinidad and Tobago, Uganda, Zambia, Zimbabwe Solar

installed capacity could reach 14 GW in a low scenario and up to 31 GW in a high scenario, by 2026.[14]

This market outlook illustrates the immense potential of solar in LDCs and SIDS markets. Additionally, SIDS, through the SIDS Lighthouse Initiative and with the support of the Alliance of Small Island States (AOSIS), have set a target of 10 GW total installed RE capacity by 2030.[15] Similarly, in the Green Recovery Action Plan (2021-2027), the African Union (AU) has set a target of 300 GW of RE installed capacity by 2030 for the continent.[16]

The Guidance Document delineates market segments relevant to the achievement of SDG 7, including grid connected and off-grid installations. Policy (regulatory), technological and financial barriers to investments in solar in LDCs and SIDS are defined and assessed, taking into account previous recommendations and analyses done in EMDCs, as well as stakeholder consultations. Initiatives to mitigate these barriers are analysed using case studies, focusing on programmes designed to address common issues in nascent solar markets. Based on these studies, recommendations to policy makers and international partners are presented. Finally, these recommendations are transposed onto an implementable roadmap composed of five strategic objectives. For each objective outlined, specific actions to be implemented, the responsible energy authority per each action, and appropriate indicators to measure outputs have been identified.

[15] AOSIS, 'SIDS Target 10 GW Total Installed Renewable Energy Capacity by 2030'

[16] African Union, 'Green Recovery Action Plan 2021-2027'

[17] SolarPower Europe, 'Global Market Outlook for Solar Power 2022-2026', 2022.

Opportunities for Solar: Market Segment Assessment

The ISA has nine dedicated programmes including Solar Applications for Agriculture Use, Solar Mini-Grids, Solar Rooftop, Solar Parks, Solar based E-Mobility and Storage, Solarising Heating and Cooling Systems, Solar PV and Waste Management, Solar Green Hydrogen and Affordable Finance at Scale. Enhancing access to affordable electricity is a priority for LDCs and SIDS, hence this section focuses on solar applications contributing to achieving SDG 7, putting aside productive use and commercial and industrial installations. Additionally, specific solar applications can be supported in LDCs and SIDS only once the market has matured enough, including application for e-mobility, green hydrogen, and waste management. This section delineates market segments relevant to the achievement of SDG 7 and outlines the state of grid connected solar installations, including solar parks and rooftops, as well as off-grid solar equipment. Affordable finance at scale is a challenge in both segments and is tackled throughout the Document.

Grid-connected

Grid-connected solar covers utility-scale solar parks, as well as rooftops. The former is planned by professional project developers and includes large- and small-scale ground-mounted projects. The latter deal with roof-mounted projects, usually for self-consumption either for commercial or industrial entities, or for residential buildings.

In general, in LDCs and SIDS electricity generation,

[18] GET.invest, 'Burundi', Market Information, https://www.get-invest.eu/market-information/burundi/.

[19] GET.invest, 'Uganda', Market Information, https://www.get-invest.eu/market-information/uganda/.

[20] Pacific Power Association and Pacific Region Infrastructure Facility, '3rd Pacific Energy Investors Forum: Report and Forum Outcomes', 4.

[21] GET.invest, 'Renewable Energy Market Segments in Sub-Saharan Africa: Outlook & Challenges'.

transmission and distribution is undertaken by subsidised state-owned utilities. The level of openness to private participation of the energy sector and experience with Independent Power Producers (IPPs) vary depending on the country. For instance, in Burundi, private sector participation in the sector is limited, transmission and distribution of electricity is handled by the state-owned utility and electricity sales to third parties are prohibited.[18] In Uganda, the sector is fully unbundled, with significant private sector participation in bidding processes.[19] In SIDS, Pacific utilities often have limited experience working with and involving the private sector, while Caribbean utilities have more experience working with the private sector.[20]

Intricate financial and legal structures increase perceived risks for IPP projects and result in lengthy development timeframes, especially regarding land leasing, generation licences, utility and IPP obligations and grid connections.[21] Small-scale IPPs face specific challenges, due to difficulties accessing finance, as well as logistical issues in remote locations, making it difficult to carry out effective operation and maintenance of assets.[22] Constrained economic resources of the utilities also result in suboptimal maintenance, poor expansion, and upgrade planning of the national grid.[23]

In most LDCs and SIDS, support schemes for solar-produced energy are limited. For instance, most countries do not have a feed-in tariff or have inappropriate ones, not providing a reasonable return on investments. A feed-in tariff refers to a guarantee by a government of a fixed rate for purchasing electricity generated from renewables. They are designed by governments to promote renewable energy (RE).

Off-grid solar

Due to dispersed small populations, a large share of the inhabitants of LDCs and SIDS live in rural, off-grid areas. Therefore, mini-grids and off-grid solar products for domestic use play a significant role in countries' electrification strategies.

Off-grid solar installations are equipment not connected to a utility grid, such as solar home systems and small-scale applications and mini-grids. SHS are stand-alone systems supplying power for lightning and appliances in off-grid households or as a backup in connected areas. Mini-grids are small-scale networks supplying electricity to a group of customers, often in remote areas without access to the grid.

The global solar off-grid market represented nearly 10 GW of cumulative capacity in 2020 and could reach up to 27 GW by 2025.[24] In 2021, over 490 million people accessed electricity via SHS.[25] Sub-Saharan Africa and the Asia-Pacific represent the majority of the off-grid market and showcase high potential for further growth in the sales of off-grid solar systems. Indeed, reduction in hardware costs, digitalisation of payment mechanisms and innovative business models have been converging, increasingly unleashing the potential of off-grid solar systems.

Mini-grids

According to the World Bank's ESMAP Programme, in 2022, 21,557 mini-grids were installed around the world, providing electricity to 47.9 million people, and an additional 29,353 mini-grids are planned, and expected to provide electricity to a further 35 million people.[26] In more detail, mini-grids provide electricity to about 18 million people in Asia, 27 million people in Africa, and 2 million people in Latin America. Still, according to ESMAP, in 2030, 490 million people have the potential to be connected to

[22] Pacific Power Association and Pacific Region Infrastructure Facility, '3rd Pacific Energy Investors Forum: Report and Forum Outcomes', 13.

[23] International Monetary Fund, Unlocking Access to Climate Finance for Pacific Island Countries, 12.

[24] SolarPower Europe, 'Global Market Outlook for Solar Power 2021-2025', 38.

[25] Lighting Global/ESMAP, GOGLA, Efficiency For Access, Open Capital Advisors, 'Off-Grid Solar Market Trends Report 2022: State of the Sector', 12.

more than 217,000 mini-grids at a cumulative investment cost of approximately USD 127 billion.[27] Therefore, the market potential for solar mini-grids is immense.

Mini-grid installation . encompasses specific challenges, especially unfit regulatory frameworks. A recent survey of 24 African countries shows that in case of grid expansion, many countries do not have legal regulatory frameworks for protecting mini-grids developers, lack specific mini-grid technical requirements, lack legal protection, such as permits and licences, of mini-grid systems and lack appropriate financial compensation mechanism for mini-grids developers.[28] A lack of mini-grid regulation deters private investments.

Solar home systems (SHS)

SHS are usually about 12 V or less and deal with lightning and mobile phone charging. Larger SHS can power small appliances such as refrigerators, TVs, radios, internet hotspots for the usage of small businesses and middle-income households. SHS companies are usually local entities with limited financial and technical capacities. Companies also struggle to access additional financing from local financial institutions to support their receivables and assets.

Digitalisation has transformed the use of off-grid services, with mobile payment, real-time monitoring, and smart meters enabling reliable electrification at lower tariffs.[29] While small SHS products still require upfront cash payments in most cases, new business models based on a pay-as-you-go (PAYGo) system have developed.[30] Lease-to-own and perpetual lease models offer reduced upfront costs for households and increase the affordability of off-grid systems and access to electricity. However, the most remote areas in Pacific SIDS lack access to digital infrastructures, limiting the use of mobile money.

The SHS market is largely unregulated resulting in the spread of low-quality components and limited consumer protection. Standards and quality assurance mechanisms have emerged, such as Lighting Global and Verasol (see Box 1), but they are not universally recognised. Duties on imported components also hamper the growth of the market, increasing system prices to compensate for these taxes.

Off-grid solar installations are key to increasing electricity access in remote areas and coping with unreliable grid connection, especially for businesses and productive use activities, in LDCs and SIDS. Reduction of the cost of equipment and the development of sustainable business models such as PAYGo are key for off-grid market growth and contribute to achieving universal energy access.

[26] ESMAP, 'Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers', 30.

[27] ESMAP, 35.

[28] Christopher Mambwe et al., 'Benchmarking and Comparing Effectiveness of Mini-Grid Encroachment Regulations of 24 African Countries'.

[29] UNDP & ETH Zurich, 'Derisking Renewable Energy Investment: Off-Grid Electrification', 33.

[30] SolarPower Europe, 'Global Market Outlook for Solar Power 2021-2025', 47.

Box 1: Promoting quality standards: Lighting Global and Verasol

Risks addressed: procurements risks; lack of clear procedures; land risks; lack of energy policy and planning

ESMAP and the International Finance Corporation partnered in 2009 to create Lighting Africa which aimed to develop a commercial market for the production and sale of solar lanterns in Sub-Saharan Africa. Lack of quality standards was identified as a major issue, so ESMAP created Lighting Global standards. Lighting Global has programs in nearly 40 countries in Africa, Southeast Asia and the Pacific and is referenced by 24 national governments in their policies. In 2020, Lighting Global was rebranded as VeraSol, which is operated by CLASP, an expert in appliance energy performance and quality, and the Schatz Energy Research Centre.

The quality assurance process has played a key role in facilitating the emergence of the off-grid market. As of 2022, more than 60 million VeraSol-certified products have been sold, benefiting 180 million people worldwide. Sixteen countries have adopted quality standards and test methods for solar energy kits that are harmonised with the International Electrotechnical Commission (IEC TS 62257-9-8 and IEC TS 62257-9-5). The Common Market for Eastern and Southern Africa (COMESA) and the Economic Community of West African States (ECOWAS) are working on the adoption of regional standards for solar kits harmonised with Verasol requirements.

Challenges for Solar: Broad Assessment

Underlying market barriers and a high level of perceived risks constrain the development and financing of solar energy projects. Project developers first consider the bankability of a project and its cost of capital. These two elements are undermined by regulatory, technological, and financial barriers in LDCs and SIDS. These barriers are highlighted in the following section.

Whilst all countries and solar applications will have unique elements, there are several common barriers to investments in emerging markets that can be clearly identified. Risks faced by the industry in developing and investing in solar have been identified by taking stock of previous recommendations and reports focusing mainly on emerging markets. These challenges have been fine-tuned to the context of SIDS and LDCs with extensive stakeholder consultations. [31]

Three categories of barriers have been identified: policy (regulatory), technological and financing. These categories are not exclusive and overlap in some cases. Nonetheless, they provide a good basis for an analysis. Barriers faced by investors have been divided into fifteen sub-categories of risks to ease the prioritisation analysis (see Table 1). It must be noted that other risks exist, such as climate, environmental and political risks, however, they are not addressed in the analysis as they fall outside of the scope of the document.

Policy (regulatory) barriers

Policy risks are multi-faceted, interconnected and oftentimes overlapping. Regulatory risks deal with unexpected changes in energy policies and legal frameworks (e.g. incentive

[31] The list of stakeholders and a detailed methodology are available in Annex II

[32] Anil Cabraal et al., Living in the Light: The Bangladesh Solar Home Systems Story, 69.

programmes, permitting processes). Regulatory or policy changes during the operational phase of a project have detrimental effects on revenue streams, thus on the bankability of the project, which is designed to last for 20 years or more. Drastic retroactive changes discourage future investors as the market appears unstable and unpredictable.

Additionally, a lack of clarity on medium and long-term energy policy and planning is detrimental to attracting investors. Planning for demand growth, capacity addition, environmental and climate goals, as well as the capacity of the grid to manage new electricity inputs is crucial to increase the confidence of investors. A lack of coordination and planning can undermine electrification efforts and revenue streams. For instance, in Bangladesh, the Government launched the Infrastructure Development Company Ltd (IDCOL) SHS programme in 2003.[32] The programme is a success and has provided electricity services to about 20 million people. However, SHS sales through the programme slowed down from 2013 onwards, due to a lack of coordination in electrification efforts, the expansion of the national grid and the development of a parallel programme distributing SHS for free to low-income populations.

The scaling up of solar energy comes with technical challenges to integrate this energy into the national grid. The ability of the grid to integrate solar is crucial for project developers looking to ascertain whether the grid operator will buy the electricity their project generates. Hence, grid regulations and rules for connection, dispatch priority, and access, should be clear. Otherwise, they bring uncertainty to projects and represent a risk.

Land risks deal with a lack of spatial planning and site selection, as well as land use conflicts, which lead to high uncertainties and lengthy planning processes for project developers. The lack of institutional capacity of local institutions, banks, and utilities, also threaten investments. A lack of knowledge and experience with solar energy, combined with a limited number of professionals, results in administrative delays, lengthy processes, and reduced financing opportunities. Hence, capacity risks are intertwined with and exacerbate other process-related issues.

Additionally, procedural risks deal with poorly defined administrative procedures for obtaining licences and permits, and a lack of standardised and harmonised procedures and documents. This results in prolonged and expensive permitting processes for project developers.

A solar-specific procedural risk includes energy generation procurement risks. In LDCs and SIDS power off-takers have limited experience in procuring generation capacity involving private actors and in entering long-term power purchase agreements (PPAs). A lack of an efficient, effective, fair, and transparent procurement system is seen as an uncertainty and a risk by investors. These categories of risks affect the feasibility of a project as they increase transaction costs, delays, and uncertainties. Clear and transparent procedures and decision-making processes are essential to creating an enabling investment environment, building a track record of successful IPP projects in LDCs and SIDS and to increasing investors' confidence in the market. According to PPA Watch, several LDCs score poorly in terms of PPA transparency. Sometimes, IPPs directly negotiate PPAs with the government, wherein the terms of the PPAs, the financial support provided by the Ministry of Energy and the information on tariffs paid to generators are not disclosed.[33] Such proceedings can have detrimental effects for investors as well as for the government. Project developers, fearing potential unfair treatment, might avoid investing in solar in the country. An absence of proper due diligence can, in turn, cause projects to not be

[33] Energy for Growth Hub, 'Malawi PPA Transparency Snapshot'.

implemented. Therefore, there is room for improvement in this regard to increase investors' confidence and the attractiveness of PPAs, an essential tool to boost investments in solar.

Technological barriers

A lack of access to accurate information and data, on grid regulations and effective documentation systems, can also be a barrier to investments by limiting investors' confidence. Risks also can occur during project execution. For example, local engineering, procurement and construction (EPC) companies may not possess lengthy track records or may not be financially solvent. A lack of local value chains also impacts project execution. A lack of technical capacities, that is to say a lack of a skilled workforce and access to capacity building programmes, further hamper the deployment of solar. The scarcity of skills in solar and RE in general is a global challenge, which will be increased with the further deployment of solar. According to McKinsey, between 2022 and 2030, the global renewables industry will need an additional 1.1 million workers to develop and construct wind and solar plants and another 1.7 million workers to operate and maintain them.[34] Given the growth of the solar sector, developing a skilled workforce is crucial to enable the green energy transition.

Infrastructure issues deal with a lack of grid infrastructures and technical limitations. Solar energy is characterised by its variability, due to the temporal availability of resources. Therefore, it requires specific measures to be integrated into current power systems. Increasing the share of electricity generated by solar energy requires adapting the current grid, its design, operation, and planning, to increase flexibility. Unequal quality in solar equipment and services is a challenge for the sector, as well as a lack of reliability and transparency in the electricity distribution sector. The African continent showcases high levels of network losses, which averaged 15% in 2020, about twice the global average of 8% and up to 24% in certain cases.[35]

Financing barriers

A key concern for any investment is whether a given project is bankable, that is to say investors must be sure a project will be profitable and perform as planned during the financing period. Risks must be minimised as far as possible to ensure investors' confidence and willingness to invest in a project. In this context, PPAs play a key role. PPAs are contracts for electricity supply between a party generating and selling electricity, and a party purchasing electricity. The PPA defines the conditions of the agreement, such as the amount of electricity to be supplied, point of interconnection, applicable rate schedule, production guarantees and penalties for non-compliance.

Several LDCs have been classified by the IMF as being in, or at a high risk of, debt distress.[36] As such unsustainable debt levels hamper countries from accessing financing, as investors consider a government as being at significant risk of defaulting. Hence, a lack of financial guarantees from governments deters investors. In most LDCs and SIDS, state-owned utilities play a prominent role in electricity transmission and distribution and are also characterised by high levels of debt.[37] The financial health of the off taker determines PPA bankability and increases investors' confidence. The World Bank's ESMAP Programme conducted a study on 76 utilities across 45 Sub-Saharan African countries over the period 2012-18 and established that less than 50% of all utilities are profitable, about 33% incur net losses of more than 20% and that fewer than 40% recover their operating and debt-service costs.[38]

[34] McKinsey & Company, 'Renewable-Energy Development in a Net-Zero World: Overcoming Talent Gaps'.

[35] IEA, 'Africa Energy Outlook 2022' (Paris, France: IEA, 2022), 130.

[36] International Monetary Fund (IMF), 'List of Low-Income Countries Debt Sustainability Analysis'.

[37] IEA, World Energy Investment 2022, World Energy Investment, 215.

[38] Ani Balabanyan et al., Utility Performance and Behavior in Africa Today, ESMAP Papers.

Investors operating across different countries face currency risks, that is to say unpredictable gains, or losses due to changing or volatile foreign exchange rates. Foreign exchange reserves allow us to keep the domestic currency at a fixed rate, maintain liquidity in case of an economic crisis, meet international finance obligations and fund projects. They contribute to reassure foreign investors. A lack of foreign exchange reserves and limits on the expatriation of funds add to currency risks. SIDS and LDCs are among the countries with the lowest foreign exchange reserves, and in some cases restrict repatriation of profits out of the country.

Payment risks arise from electricity tariffs and end consumer ability and willingness to pay for electricity. Such risks arise from non-cost reflective tariffs for electricity generated from solar, especially when mini-grid tariffs are bound to on-grid ones by the regulator. As a result, these non-cost-reflective electricity tariffs hamper mini-grid projects to be profitable, hence limiting investors' appetite to develop projects.[39] End consumer payment risks arise when payment mechanisms are too complex or customers are unable or unwilling to pay, resulting in liquidity risks and revenue shortfalls. Indeed, according to the Global Multidimensional Poverty Index, 83 % of poor people live in Sub-Saharan Africa and South Asia, where most LDCs are located.[40]

Risk prioritisation framework

The framework shown in Figure 1 represents the risks discussed ranked in terms of their impact on project development and their likelihood of occurring. The framework was developed considering existing data and evidence gathered through a series of discussions with experts. Data gathering was based on an extensive review of relevant studies and available secondary data, such as reports and recommendations issued by international and regional development institutions, websites and documentation of dedicated programs supporting energy access, reports on policy initiatives to improve market entry and ease of doing business. The collected data, often focused on one region or solar technology, was then aggregated to encompass all solar applications and geographic coverage.

As it covers a wide range of countries and solar PV installations, the framework presents common challenges faced by LDCs and SIDS. While each country and market segment have unique features, the framework is a good starting point from which to analyse barriers to investments in solar in LDCs and SIDS and to understand how to mitigate such risks. Focusing on a specific country or market segment may generate a different framework.

[39] Elias Zigah, Mamadou Barry, and Anna Creti, 'Are Mini-Grid Projects in Tanzania Financially Sustainable?', 233–61.

[40] United Nations Development Programme and Oxford Poverty and Human Development Initiative, 'Global Multidimensional Poverty Index 2022: Unpacking Deprivation Bundles to Reduce Multidimensional Poverty'.

Figure 2: Risk prioritisation framework of challenges to scaling up solar investments in LDCs and SIDS

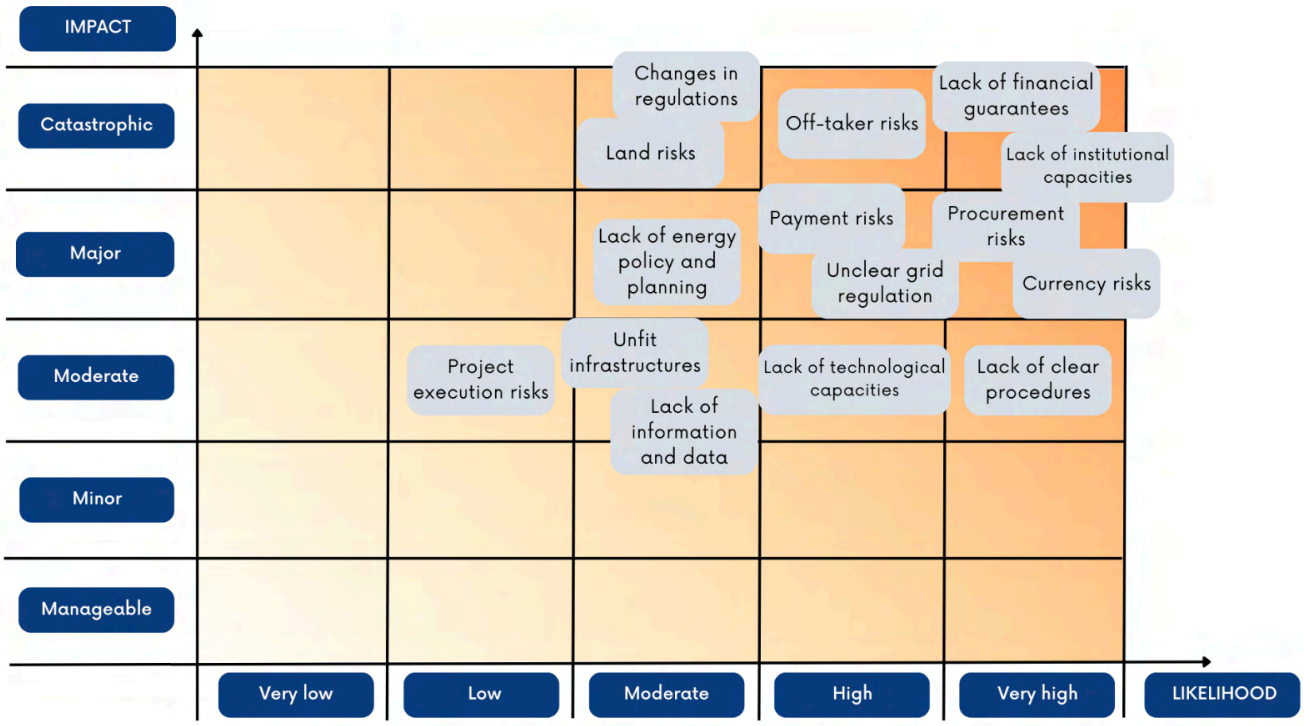


Table 1: Summary of policy (regulatory), technical and financial barriers to boosting solarisation in LDCs and SIDS

Policy (regulatory) Barriers

 **Changes in regulations**	Unexpected or retroactive changes in energy policies, market design.
 **Lack of energy policy and planning**	Lack of RE targets, electrification planning, energy regulations, planned approach to strengthen grid, competing subsidies (fossil fuels), lack of incentives (feed-in-tariff, renewable energy certificates, tax incentives, financial programmes)
 **Unclear grid regulation**	Unclear rules on grid access, connection, curtailment contingencies
 **Procurement risks**	Lack of efficient, effective, fair, and transparent procurement systems and processes, low quality and credibility of evaluation and adjudication of bids
 **Lack of clear procedures**	Poorly defined administrative procedures for obtaining permits, lack of standardised procedures and documents
 **Land risks**	Lack of spatial planning and site selection, land use conflicts
 **Lack of institutional capacity**	Limited knowledge of RE, lack of experience dealing with IPPs (institutions, utilities). Lack of experience of local financial institutions.

Technological Barriers

Lack of access to information and data	Outdated grid data, lack of effective documentation system, lack of information on demand growth
Lack of technical capacities	Lack of qualified workforce and access to capacity building programmes, brain drain
Unfit infrastructures	Lack of grid infrastructure. Grid unable to integrate RE-produced electricity, ineffective grid management, operational challenges, lack of maintenance capacities. Lack of quality standards
Project execution risks	Lack of reliable Engineering, Procurement and Construction firms (financially credible, track record)

Financing Barriers

Lack of access to information and data	Lack of creditworthiness of the off-taker, risk of defaul
Currency risks	Volatile exchange rates, lack of foreign exchange reserves
Lack of financial guarantees	Lack of financial guarantees by governments
Payment risks	End consumer payment: complex payment mechanism, customers not able to pay Electricity tariff risks: non-cost reflective tariffs

Scaling Up Solar Energy: Overcoming Investment Barriers

Solar energy can contribute to climate change mitigation and provide low-cost electricity to all. High connection costs, prohibitive cost of electricity supply in rural and remote areas, a lack of appropriate incentives to attract private investors and a lack of technical capacities and standards are challenges in reaching this objective. Increased electricity generation from solar PV installations can contribute to reaching universal access to electricity. Solar PV is the cheapest option for new power generation, helping to decrease electricity prices in LDCs and SIDS. In turn, lower tariffs will enable a higher share of the population to purchase electricity. Private utility-scale projects and distributed solar PV systems should be developed in parallel to unlock the full potential of solar.

An enabling policy environment, access to funding and financial guarantees are essential in supporting the development of a modern, clean energy system in which solar is the dominant technology. As described previously, the current state of the solar market in LDCs and SIDS is undermined by underlying regulatory, technological, and financial barriers and a perception of substantial risks, thus constraining the development and financing of solar energy projects. Appropriate policies, initiatives and specific measures implemented by policy-makers and financial institutions can mitigate risks and enable investments to be scaled up. The following section outlines such initiatives, which can be adapted and replicated in other countries facing similar challenges.

Policies and initiatives to overcome regulatory challenges

Enabling policies and regulations contribute to creating a stable, predictable, and thus attractive environment for investments. Political risk insurance, comprehensive policy planning, standardised documents and procedures contribute to securing revenue streams for solar projects, as developers and investors first consider the bankability of a project and its cost of capital.

Regulations and policy planning

Political risk insurance is crucial in avoiding risks from unexpected changes in regulations. In LDCs and SIDS, governments do not always have the ability to issue such risk insurance, hence international financial institutions can step-in. For instance, the African Trade Insurance Agency provides investment insurance to protect projects against political risks, including expropriation of assets, currency inconvertibility or transfer restrictions, and trade embargoes (see Box 4).

A lack of visibility in electrification planning deters investors. Planning including all types of solar installations brings more certainty and visibility to investors. For instance, in Haiti, the Ministry of Public Works, Transport and Communications, the Ministry of Economy and Finance and the National Energy Sector Regulatory Authority launched the PHARES Programme to increase the electricity access of the rural population through the planning of mini-grids in areas unreached by the national grid.[41] Project developers provide a "succinct proposal" including site selection, support from local stakeholders and experience dealing with solar projects. The energy unit of the Ministry of Public Works, Transport and Communications assesses the proposals. If the assessment is positive, candidates submit an "integral proposal" including technical and financial information. The whole process is centralised on a single online platform. The Inter-American Development Bank and World Bank support the Programme by providing funding for electricity subsidies, and USAID provides technical support to developers for their application. The PHARES Programme is an example of including off-grid equipment in national electrification planning, as the projects are developed for a 20-year period. Undifferentiated procedures, not taking into account project size, do not ease the scaling up of solar projects. To solve this issue, Tanzania has introduced specific frameworks and standardised PPAs for projects with a total capacity of more than 10 MW and smaller projects, ranging between 100 kW and 10 MW. Standardised documents include applicable tariffs, prerequisites for grid connection, operating and reporting requirements and necessary environmental clearances.[42] While all RE projects require an operating licence, isolated projects, and small projects in rural areas, representing less than 1 MW, are exempt but still need to register. However, despite a supportive policy framework to streamline project development, little progress has been made on increasing private sector participation in energy generation, with publicly funded projects favoured instead. Tanzania has experienced unexpected regulatory changes impacting agreed tariffs and threatening financial viability of mini-grid projects. In practice, a limited number of grid connected small-scale projects have been commissioned. Hence, supportive regulatory frameworks must be accompanied by practical changes to enable the deployment of solar projects.

Procedures: procurement and licencing

Tenders and auction processes are often associated with high transaction costs for small-scale project developers due to complex

[41] Autorité Nationale de Régulation du Secteur de l'Energie, 'Lancement Du Programme PHARES'.

[42] GET.invest, 'Tanzania', Market Information, https://www.get-invest.eu/market-information/tanzania/market-segments/.

administrative procedures and requirements, including pre-feasibility studies and land use permits. Competitive auctions can also lead to underbidding, when a project developer bid too low, resulting in low returns on investments, and inability to realise the project. Effective auction design can prevent such risks. For instance, the PROLER Programme in Mozambique has designed a tendering system, with a pre-qualification phase (see Box 2). During this stage projects are evaluated based on bidders' experience as well as financial and technical capacities to ensure the project reaches financial close.

Box 2: Promotion of Renewable Energy Auction (PROLER) in Mozambique

proler

Risks addressed: procurements risks; lack of clear procedures; land risks; lack of energy policy and planning

The Government of Mozambique sought to develop a robust regulatory framework to increase private investments in renewable projects and reach its target of integrating a 20% share of renewable energy into the national grid. One of these initiatives is the development of renewable energy auctions, trough the PROLER Programme. The Programme involves both the Energy Regulatory Authority (ARENE), the procuring authority, and the national power utility Electricidade de Moçambique (EdM), responsible for generation, transmission and distribution of electricity.

The PROLER Programme aims at selecting Independent Power Producers (IPPs) for solar photovoltaic and wind projects with a total capacity of around 120 MW, divided in 3 solar and 1 wind each of it with a unit installed capacity of 30MW/40MW. A tender is launched for each project covered by the initiative. The first pilot project was launched in 2020, the Dondo Solar Power Station (40 MW) in the Sofala Province in Central Mozambique. Two other projects were launched in November 2022, the Chimbunila Solar project (30 MW) and the Manje Solar project (30 MW) in the North and centre of the country. The Inhambane Wind Power Plant project (40 MW), in Southern Mozambique, is also planned.

The initiative addresses procurement and procedure risks by providing a transparent and effective tender system, with standardised documents, such as power purchase agreements (PPA), concession agreements and contracts for grid connection. The tender design mitigates auctions-specific risks with the pre-qualification phase during which the experience, financial and technical capacities of the bidders are evaluated to ensure the project reaches financial close.

The auction process also includes the selection of locations for projects. The site is selected by EdM based on pre-feasibility studies considering environmental and social impact of the project, its integration into the national grid, as well as national electrification plans. Locations are issued a guaranteed land use right ("DUAT"). Hence, the Programme addresses land risks and issues linked to a lack of energy policy and planning.

Box 2: Promotion of Renewable Energy Auction (PROLER) in Mozambique

For this programme, the Government of Mozambique is receiving funds from the European Union and the AFD (Agence Française de Développement, French Development Agency). The AFD provides EdM and the Mozambican authorities with technical assistance for preparing and launching calls for tenders, including conducting feasibility and preliminary environmental and social studies. The Agency also proposes a guarantee mechanism to IPPs.

Effective tendering processes can support project development, attract investments, and lower electricity prices, as it was the case in Maldives. The World Bank Accelerating Sustainable Private Investments in Renewable Energy (ASPIRE) Project was launched in 2014 with the aim of increasing private sector investments in PV infrastructures in Maldives. The ASPIRE project provided guarantees and risk mitigation measures for investors, including a guarantee from the Multilateral Investment Guarantee Agency/ International Development Association (MIGA/IDA) which was available to cover the risk of termination of PPAs. PPAs also included a USD denomination and a currency convertibility clause. High level of involvement of international partners through technical assistance, including capacity building and investments in grid modernisation, combined with risk mitigation measures, made the Maldives solar market attractive. Competitive auctions also resulted in lowered electricity prices (see Table 2).[43]

Table 2: PV auctions under the World Bank ASPIRE Programme in Maldives (2014-2022)

Date	*2014*	*2020*	*2022*
Capacity (MW)	1.5	5	11
Price (USD/kWh)	0.21	0.102	0.098
Number of bidders	4	25	63

Policies and initiatives to overcome financial challenges

Scaling up solar energy investments requires mitigating risks to attract private investors, with non-sovereign guarantees and liquidity guarantees. Mobilising capital market investments requires the creation of specific and innovative financing schemes such as on-lending and result-based financing and engaging local financial institutions to unlock access to finance. Ensuring cost-reflective tariffs and introducing VAT and import waivers contribute to facilitating investments. End-user subsidies also have the potential to increase electricity access.

[43] Guangzhe Chen, Amit Jain, and Simon Stolp, 'Why the Maldives [5] MW Solar Project Is a Game Changer', World Bank Blogs.

Box 3: International Solar Alliance (ISA): affordable finance at scale

Risk addressed: lack of financial guarantees; off-taker risks

The International Solar Alliance (ISA) aims to mobilise USD 1,000 billion of investments in solar energy solutions by 2030, while delivering energy access to 1,000 million people using clean energy solutions and resulting in installation of 1,000 GW of solar energy capacity. The Alliance has a particular focus on delivering impact in LDCs and SIDS. Currently, the ISA has 9 comprehensive programmes, including one to mobilise affordable finance at scale. To palliate for the limited investment flows in Africa, the perception of high-risks by investors and constrained regulatory frameworks, the ISA launched the Solar Facility at COP27 in 2022. The Solar Facility aims to catalyse solar investments across solar technologies, off-grid, rooftop, productive use and utility scale, across the African continent through a country specific approach. The Facility comprises three components: Solar Payment Guarantee Fund, the Solar Insurance Fund and the Solar Investment Fund. The Solar Payment Guarantee Fund supports projects at the risk of default and reduces risk of early bankruptcy of projects by providing partial guarantee. The Solar Insurance Fund aims to reduce the burden of insurance premiums for solar developers up to the loan-repayment phase of the project by partially offsetting the cost of insurance. Projects participating in the Guarantee Fund or Insurance Fund can benefit from the Investment Fund, which provides financing for up to 10% of project costs. Through the Facility, ISA provides technical assistance and acts as an investor. It has a bankable project pipeline of around 9 GW across Africa.

The ISA is dedicated to developing innovative financing instruments. Hence, at COP27, the ISA launched the SolarX Grand Challenge, alongside Invest India and the Children Investment Fund Foundation (CIFF). The aim of the programme is to accelerate investments in solar by creating a pool of entrepreneurs and start-ups in the solar energy sector of ISA member countries. The first edition of the Challenge is focused on Africa. The objectives of the programme are threefold: to attract investments in solar, to close the energy gap and develop innovative solutions in Africa. The 20 winning startups were announced during the G20 Energy Ministerial in July 2023, with a wide range of innovative solutions from SHS to grid integration.

Financial guarantees

LDCs and SIDS, as well as state-owned utilities, present prominent levels of debt, hence, financial guarantees are key to attract investments. When states or utilities cannot lower their risk profile and satisfy investors, international financial institutions can provide non-sovereign guarantees. The EU promotes the use of financial guarantee schemes to enhance private sector electricity generation from RE in Sub-Saharan Africa with the European Guarantee for Renewable Energy (EGRE). EGRE is set as a platform of collaboration for guarantees for sustainable energy projects jointly proposed by the French Development Agency (AFD), KfW (the German Development Bank), CDP (Cassa Depositi e Prestiti), and the EIB (European Investment Bank). It addresses the lack of credit worthiness of the off taker with non-sovereign financial guarantees. The ISA is also active in providing guarantees and insurances for project development, through its Solar Facility (see Box 3). Additionally, the African Trade Insurance Agency (ATI) addresses liquidity risks with its Regional Liquidity Support Facility, which also collaborates with the KfW-supported GET.FiT Zambia programme (see Box 4).

Box 4: African Trade Insurance Agency (ATI): Tackling liquidity risks in Africa

Risks addressed: lack of financial guarantees; off-taker risks; unexpected changes in regulations

The African Trade Insurance Agency (ATI) is a pan-African institution with a commercial and development mandate, supported by the World Bank and the African Development Bank. ATI provides trade credit insurance against non-payment risks and political risk insurance against any unfair political action.

In 2017, ATI and KfW Development Bank launched the Regional Liquidity Support Facility (RLSF) to support renewable energy projects in ATI member countries and address short-term liquidity risks faced by independent power producers (IPPs) selling electricity to state-owned utilities. RLSF provides cash collateral up to the equivalent of 6 months of the IPP's revenue, supporting small- and mid-scale renewable energy projects with an installed capacity of up to 50 MW (and in exceptional cases up to 100 MW).

The RLSF has supported renewables projects for a total installed capacity of 116.3 MW in Burundi, Malawi, and Uganda. Phase 2 of RLSF was launched in February 2022 with the support of the Norwegian Agency for Development Cooperation (Norad), now issuing guarantees directly to IPPs without the involvement of an issuing bank for greater efficiency and contract flexibility. The RLSF supported the national power utility in Malawi, ESCOM, by providing liquidity cover amounting to a total of USD 8.9 million for three projects, Golomoti (20 MW), Nkhotakota (21 MW), and Salima (60 MW) solar plants. These projects were the first solar IPPs developed in the country.

Access to Finance

Access to finance is challenging, especially for smaller scale projects. While international organisations and financial institutions are involved in LDCs and SIDS, their funding has difficulties reaching project developers. The EU-funded GET.invest programme addresses this challenge by linking project developers with financiers (see Box 5).

Box 5: GET.invest: Mobilising investment in renewable energy

Risk addressed: lack of access to information and data; lack of institutional capacity; lack of financial guarantees

GET.invest is a European programme supported by the European Union, Germany, Sweden, the Netherlands, and Austria that mobilises investment in renewable energy. The programme targets private sector businesses and project developers, financiers, and regulators to build sustainable energy markets in partner countries. Services include market information, a funding database, matchmaking events and access-to-finance advisory. Since 2022, GET.invest powers the Team Europe One Stop Shop for Green Energy Investments, an access point for information about and facilitated access to European support and financing instruments for energy projects and companies in Africa GET.invest's scope covers various market segments of decentralised renewables, such as small on-grid independent power producers (IPPs), commercial and industrial energy, mini-grids, small standalone solar systems including solar home systems, clean cooking solutions, as well as e-mobility and green hydrogen.

The GET.invest Finance Catalyst links renewable energy projects and companies with finance opportunities and vice versa, targeting small- and medium-scale renewable energy opportunities in sub-Saharan Africa, the Caribbean, and the Pacific. It provides advisory support in the areas of investment strategy, business case structuring and financial modelling, as well as accessing finance and transaction support through a team of dedicated experts with extensive experience. In turn, the GET.invest Finance Readiness Support enables locally owned and managed clean energy businesses to access finance. Launched in 2021, this service provides early-stage micro-, small- and medium-sized energy companies in the same regions with hands-on, in-depth business development advice and coaching along their fundraising journey.

In addition, GET.invest provides market and funding information, including a high-level and quick overview of renewable energy markets in 15 countries, with key information such as electricity tariffs and import duties and VAT, as well as market segments analyses. The GET.invest Funding Database compiles an up-to-date list of 100+ financing instruments for decentralised renewable energy projects and businesses in sub-Saharan Africa, providing information regarding eligibility criteria and documents required

Continued

Box 5: GET.invest: Mobilising investment in renewable energy

to apply.

Since 2016, GET.invest has supported more than 370 projects and created a strong and vibrant cooperation network with associations, financiers, and peers. GET.invest delivers through strong partnerships, working closely with national and international partners and initiatives, and contributing to major political initiatives of its donors. To ensure a good flow of information, and to build sustainable market structures, the programme cooperates with industry associations, at an international and a national level, in partner countries and regions. Besides partnerships with industry associations, GET.invest draws on effective and flexible cooperation with a broad range of other development programmes and initiatives. By working directly with financiers, it ensures their requirements and expectations in terms of project proposals are met.

On-lending or financial intermediary lending can increase the financial capacities of local financial institutions to finance small- and medium-scale solar projects. For instance, in Tanzania, the World Bank and the Tanzania Energy Development and Access Project (TEDAP), with the support of the Global Environment Facility, provide credit lines to eligible commercial banks via on-lending. That is to say, with a loan provided by IFIs to eligible intermediaries for onward lending to project developers. Under this scheme, developers of small-scale rural renewable energy projects request a loan to an eligible bank. The bank evaluates the project and requests a corresponding credit line from the TEDAP administrator. The on-lending scheme allowed for interest rates to be reduced from 6.24% to 5.61 % in 2011.[44]

The Off-grid Electricity Fund (OGEF) in Haiti provides results-based financing (RBF) to companies to reduce risks and help them scale up their activities in challenging market sectors and contribute to the government's rural electrification strategies (see Box 6). Another example is the Beyond the Grid Fund in Zambia, initiated by Sweden in 2016 and designed and implemented by the Renewable Energy and Energy Efficiency Partnership (REEEP). It incentivised off-grid solar companies to operate in remote regions, which are not commercially viable without a subsidy. By 2022, electricity access had been delivered to over one million people. Based on this success, the Beyond the Grid Fund for Africa (BGFA) programme has been launched in Burkina Faso, Liberia, Mozambique, and Uganda.[45]

[44] IRENA, 'Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance', 41.

[45] BGFA, 'Beyond the Grid Fund for Africa (BGFA)'.

Box 6: Off-grid Electricity Fund: Developing off-grid local companies in Haiti

Risk addressed: lack of financial guarantees; unfit infrastructure (quality standards)

The Off-grid Electricity Fund (OGEF) is an initiative of the Government of Haiti to bring electricity to communities suffering from a lack of access to electricity. It consists of an investment fund dedicated to supporting developers of off-grid electrification projects. The fund shares the risk of the companies by mobilizing three different types of tools: equity, debt, and grant investments. OGEF aims to contribute to the energy transformation of Haiti by electrifying at least 200,000 homes and businesses within 10 years. To achieve this goal, OGEF invests in sustainable off-grid electricity local companies operating from renewable energy sources.

OGEF is managed by the Fonds de Développement Industriel (Haiti Central Bank's industrial development fund) and Bamboo Capital Partners (private impact investment fund) and supported by the World Bank. OGEF combines local expertise and international best practices for sustainable investments.

OGEF provides debt and equity funds, as well as short-term funding for working capital needs. OGEF supports distributors of certified solar products (Verasol/Lighting Global), installers of SHS and C&I, as well as mini-grid developers (see Box 1).

The Fund also provides results-based funding grants for certified products only. Such grants are a private sector support mechanism designed to reduce or mitigate commercial market failures by providing financial incentives to the private sector. These grants are paid only when the recipient has achieved the objectives of the grant.

OGEF has also launched a catalytic grant program to enable companies to meet the qualitative requirements of the program and to help them overcome country-specific obstacles as well as the launch of a new activity.

Financial capacity building

Scaling up solar projects requires having the right capacities to do so throughout the lifecycle of the project. Project preparation can be supported with capacity building and dedicated programmes, as well as with enhancing the capacities of local financial institutions. For instance, the Credit Risk Abatement Facility of the Caribbean Community (CARICOM) provides technical assistance to local financial institutions so that financiers can assess RE projects and provide adequate financing. International programmes can support capacity building of utilities and energy-related ministries (see Box 7). As administrative experience grows by holding auction processes and dealing with IPPs, investors' confidence in the timely and transparent completion of procedures will increase.

Box 7: Credit Risk Abatement Facility (CRAF) in the Caribbean Community (CARICOM)

Risk addressed: lack of financial guarantees; lack of institutional capacity

The Credit Risk Abatement Facility (CRAF) was established by the CARICOM Development Fund (CDF) with assistance from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the Caribbean Community (CARICOM) Energy Unit. The CRAF contributes to the transition to a low carbon economy in the Caribbean by encouraging additional lending to financial institutions within CDF's Member States, for renewable energy (RE) and energy efficiency (EE) investments.

CRAF aims to overcome barriers including access to finance and a lack of technical capacity to assess RE and EE projects. It seeks to provide an incentive for financial institutions to provide additional lending to SMEs for RE/EE initiatives to enhance the uptake of these technologies in the region.

CRAF is developed as an ecosystem of SMEs, financiers, energy service providers and other industry partners in a symbiotic manner that contributed to its success. CRAF consists of three integrated pillars: Credit Risk Instrument (CRI), A Technical Assistance Program (TAP) and a Monitoring and Evaluation Framework (M&E).

Under its CRI, a credit enhancement instrument, CRAF issues, as the first product, partial guarantees to financiers, intermediaries, Energy Service Companies, or funds interested in extending financing for RE and EE projects. The CRI acts as collateral for SMEs, thus comforting financiers who would normally be unwilling to provide additional lending.

The CRAF TAP aims to address knowledge gaps in the RE/EE sector to bring bankable projects to the market. It targets capacity building to service providers and intermediaries, such as trainings for loans officers encountering RE/EE projects from SMEs. The TAP also functions to stimulate demand for RE and EE interventions among SMEs and increase the technological capacity. The CRAF M&E aims at assessing CRAF's impact in incentivising additional lending, in order to improve CRAF's effectiveness.

CRAF contributes to unlocking liquidity in the financial sector and to building an energy market through stimulating demand, building capacity and improving access to finance. It aims to enhance social and economic development, increase resilience, and contribute to climate change mitigation.

Financial incentives

The establishment of cost-reflective tariffs promotes the development of the solar market. The Government of Zambia has launched a Renewable Energy Feed-in Tariff (REFiT) Strategy to develop a feed-in tariff for RE generated electricity. Such tariff structures provide developers with stable and predictable revenues.

The Government of Maldives launched a net metering regulation in 2015. Under this system, electricity can flow in both directions via a bi-directional meter. The electricity, produced by a privately owned solar panel, which is not consumed on-site is injected into the grid and sold to the utility. The net energy recorded on the meter is used to calculate the consumer's bill. Net metering policies encourage a greater adoption of solar energy, while minimising land use. However, as of 2019 only 367 kW of solar PV rooftop systems had been installed since the adaptation of the regulation in Maldives. The low development of solar rooftops despite the policy was due to limited financing options for households and businesses, and the utility's hesitation to facilitate agreements. With the support of the World Bank, the legislation was revised to overcome these challenges in 2020. The new regulation allows for individuals to be paid within 6 months for their excess electricity produced.[46]

Other incentives exist, such as VAT and import waivers on solar equipment, supply-side subsidies, and end consumer subsidies. As most PV components are imported, import duty waivers can reduce costs and encourage a greater adoption of solar. For instance, Uganda has introduced VAT exemptions on key components such as PV modules, batteries and SHS kits.[47]

End-user subsidies are intended to act as an enabler to expanding a long-term, sustainable, off-grid solar market to all households, especially in remote areas or when customers are unable to afford electricity. In Bangladesh, in 2003, the Government launched the Bangladesh Solar Home Systems (SHS) Program implemented by the Infrastructure Development Company Ltd (IDCOL).[48] The Programme is based on financial intermediary lending, it enables international loans to the Government to reach rural customers in the form of micro-loans, transiting from IDCOL to rural microfinance institutions. Additionally, IDCOL ensures that monthly consumer payments for SHS account for the same amount as fossil fuels expenditure for lighting. The SHS programme is a success. Since 2003, it has provided electricity services to about 20 million people with grants and loans provided by development partners, including the World Bank. The programme also resulted in net gains for the government, due to saving from avoided kerosene subsidy. However, SHS sales through the programme stalled from 2013 onwards, due to a lack of coordination in electrification efforts, the expansion of the national grid and the development of a parallel programme distributing SHS for free to low-income populations.[49] The SHS programme managed to overcome these challenges by integrating the new programme in its structure and the creation of a government authority to coordinate electrification efforts.

[46] Asian Development Bank, 'A Brighter Future for Maldives Powered by Renewables: Road Map for the Energy Sector 2020–2030', 34.

[47] Uganda Solar Energy Association (USEA), Kenya Renewable Energy Association (KEREA), and Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA), 'The East African Regional Handbook on Solar Taxation'.

[48] End User Subsidies Lab, 'How IDCOL Addressed the Affordability Gap: Lessons from Bangladesh's Solar Home System Program'.

[49] Anil Cabraal et al., Living in the Light: The Bangladesh Solar Home Systems Story, 69.

Policies and initiatives to overcome technological challenges

High-quality solar equipment and services can benefit solar projects, including decreasing the Levelised Cost of Electricity (LCOE) and PPA prices, leading to a greater return on investments. The scaling up of RE energy comes with technical challenges related to integrating this energy into the national grid.

Grid integration

The ability of the grid to integrate solar is crucial for project developers. The GET FiT Programme in Zambia addresses capacity and technical constraints for the integration of intermittent RE by providing technical assistance to the state-owned utility, as well as financing to strengthen the grid (see Box 8).

Box 8: GET FiT Zambia: A comprehensive toolkit to facilitate investments

Risks addressed: procurement risks; lack of institutional capacity; lack of clear procedures; unfit infrastructures; lack of technical capacities; lack of financial guarantees

GET FiT Zambia is the implementation Programme for the Government of Zambia's Renewable Energy Feed-in Tariff (REFiT) Strategy that aims to facilitate private sector investment in small- and medium-scale Renewable Energy (RE) Independent Power Projects (IPPs) in Zambia. The Programme was launched in 2018. It is executed by the Zambian Ministry of Energy and implemented by the German Development Bank KfW. Programme funding is provided by the German Government.

GET FiT Zambia has developed a comprehensive set of tools designed to help create an attractive environment for private investors. These tools focus on procurement, debt and risk mitigation, viability gap funding, grid integration and technical assistance.

GET FiT Zambia facilitated the tendering of six solar PV IPP projects, totalling 120MW in 2019. The Programme developed bankable standardised transaction documents and facilitated access to ATI's Regional Liquidity Support Facility to enable bidders to have access to competitive finance (see Box 4). As the GET FiT Programme also seeks to develop domestic skills within the renewable energy sector, the winning projects were required to implement components of local capacity building and training. While the organisation of the Solar PV tender was a success, due to an ongoing debt restructuring process in Zambia, the projects have not yet been implemented.

Regarding grid integration, GET FiT has provided advisory support to the utility, ZESCO, regarding grid integration of solar PV into Zambia's national grid. GET FiT also provides financing for grid integration for selected technologies, such as hydro. Strengthening power grid operations is a basis for integration of even more renewable energy into the future. For this purpose, a short-term grid development study was developed in cooperation with ZESCO.

Regional integration processes

also play a key role to develop renewable energy in LDCs and SIDS. In West Africa, the Economic Community of West African States (ECOWAS) has developed a framework for sustainable energy and is supporting its Member States in developing their energy markets. The Caribbean Community (CARICOM) has among its institutions the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE), aimed at promoting renewable energy and energy efficiency, as well as to develop energy markets. In Southeast Asia, the Association of Southeast Asian Nations (ASEAN) has launched the Power Grid initiative to build regional interconnections and encourage cross-border electricity trading, including in Laos and Myanmar. In effect, a regional electricity connection increases grid flexibility, essential to increasing the share of renewables in energy mixes. However, while regional infrastructures exist, there is no multilateral market and centralised dispatch in place, regional coordination is non-existent and power exchanges are mainly done on a bilateral basis between ASEAN countries.[50]

Technical capacity building and quality standards

LDCs and SIDS are characterised by limited available skills and expertise in solar. Building capacities is key to ensuring the technical sustainability of projects. It also contributes to the development of a highly skilled workforce. The Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) supports its members with capacity building programmes to develop the RE industry (see Box 9). Private investors can also contribute to capacity building. For instance, the GET FiT Programme in Zambia incentivises project developers to enhance local capacity building and training in the energy sector through its tendering process (see Box 8).[51]

Some enabling regulations exist to promote international quality standards on the SHS market and vary from country to country. For instance, Uganda and Kenya have introduced Pre-Export Verification of Conformity to Standards Programme (PVoC) to verify the conformity of solar products and enforce their standards.[52] To ensure high quality standards, OGEF only provides support to distributors of certified solar products, in Haiti (see Box 6).

[50] IRENA, 'Renewable Energy Market Analysis: Southeast Asia', 76.

[51] GET FiT Zambia, 'GET FiT Solar PV Tender Process and Requirements'.

[52] Uganda Solar Energy Association (USEA), Kenya Renewable Energy Association (KEREA), and Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA), 'The East African Regional Handbook on Solar Taxation'.

Box 9: Sustainable Energy Industry Association of the Pacific Islands (SEIAPI): Capacity building and quality standard in Pacific Islands

Risk addressed: lack of technical capacity; unfit infrastructures (quality standards)

The Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) was formed in 2010 with the mission to create an enabling environment for the growth of sustainable energy business entities and sustainable energy equipment and/or energy services in the Pacific Islands.

SEIAPI's certification/accreditation program was launched in May 2012, and it was relaunched in 2014 as the Pacific Power Association (PPA)/SEIAPI certification/accreditation program to increase the competencies of designers/installers. To support the scheme, SEIAPI quickly developed four technical guidelines for solar PV systems that were released in 2012. These were: Design of Off-grid PV Systems; Installation of Off-grid PV Systems; Design of Grid Connected PV systems and Installation of Grid Connected PV systems.

However, the voluntary scheme still has only a few accredited technicians because of the lack of suitable and ongoing training in the Pacific, partly due to the low profile of the scheme. Though several ad hoc courses have been provided by Global Sustainable Energy Solutions Pty Ltd (GSES), a Registered Training Organisation in Australia, SEIAPI is working to establish training courses being operated by in-country training centres within the Pacific countries. SEIAPI is currently working with GSES and the USP to establish a new Sustainable Energy Training Centre with a region-wide outreach.

In 2018, SEIAPI received funding from the World Bank to update its guidelines and develop new ones, for a total of 16 guidelines. Additionally, SEIAPI developed 19 training unit standards, which were approved by the Educational Quality and Assessment Programme (EQAP) for inclusion in the Pacific Register of Qualifications and Standards (PRQS). GIZ has also supported the work of SEIAPI by purchasing a once off licence agreement for the resource material for training courses.

This chapter provided examples of regulations and initiatives to support the deployment of solar projects in LDCs and SIDS. Enabling frameworks only are not sufficient to attract the necessary private investments to develop a modern, clean energy system in which solar is the dominant technology and achieve electrification objectives. These frameworks must be coordinated, appropriate, holistic, and supported by national governments through ambitious political commitments. Capacity-building has a central role to play in ensuring the implementation of these frameworks. All solar equipment, from SHS to grid-connected solar parks, can contribute to electrification objectives and should be integrated into planning in a holistic way. Regulations must be complemented by financial and technological initiatives. While several financing initiatives exist, linking them to project developers remains a challenge, as these schemes might lack visibility and reach. International partners have a crucial role to play to support the energy transition in LDCs and SIDS. They should provide financial and technical assistance for solar, as well as work towards strengthening other relevant sectors, including debt management.

The next sections outline recommendations and an action plan to attract private investments in solar energy and contribute to LDCs and SIDS's development goals.

Recommendations

For Policy Makers

Create an enabling environment for private investments in solar

Transpose ambitious RE deployment targets set out in NDCs into national energy plans and set solar-specific targets for electricity generation. Targets signal the country's long-term political commitment to solar energy, which is needed to attract investments. These targets should be based on informed and coordinated decision making processes, considering energy demand projections, and accompanied by support measures. Such planning provides the industry with time to anticipate and plan for significant investments. Additionally, targets should be updated regularly.

Limit market distortion towards fossil fuels. Developing an exit strategy for fossil fuels and a comprehensive deployment strategy is key to harnessing the potential of solar in LDCs and SIDS. In the long term, carbon pricing schemes, such as emission trading systems and emission reduction funds, could be developed to boost investments in clean technologies and generate additional revenues for governments.

Standardise administrative documents for the development of solar projects. Such documents include power purchase agreements (PPA), concession agreements, contracts for operation and connection to the national grid. Standardised documents reduce transaction costs for project

developers and governing bodies, resulting in reduced administrative delays. Standardisation also enables projects to scale up faster. Standardised PPAs help to mitigate both financing and administrative risks and bring more certainty on investments. PPAs should include provisions on energy purchase requirements and rates, grid interconnection and transmission responsibilities, inflation, and exchange rates, as well as default risks of the off-taker. PPAs should also include fixed exchange rates or adjustment mechanisms to de-risk inflation and currency exchanges.

Promote the deployment of small-scale projects through the establishment of a fast-track approval process and by streamlining procedures and standards. Small-scale grid connected IPP projects represent less attractive investments for large international players. However, such projects are much needed and can provide opportunities for smaller and local developers. Small-scale projects should be unbundled and processed in a separate way. Such measures would reduce transaction costs and enable more projects to be developed.

Create a technical assistance facility or One-Stop-Shop to assist project developers, households, business owners, and financiers. This facility would provide accurate information to developers seeking to invest in projects, such as grid connection, IPP costs, legal requirements, and PPA information dealing with obligations. The facility would provide capacity building to local financiers and support households and business owners to have access to solar installations.

Enhance public partnership and collaboration with the private sector. Project developers and national RE associations can provide valuable inputs to identify barriers to investments and to improve the regulatory framework to scale up investments in solar projects.

Enhance access to affordable finance

Use public finance as a catalyst for private investments. Issuing sovereign green bonds to attract more investments can be a long-term objective. Funding in the local currency should also be enhanced. Financial guarantees should be secured to local banks and institutions. Given LDCs and SIDS limited financial capacities, international financial institutions should also support such endeavours.

Ensure that investors have access to funding and provide financial guarantees. Risk mitigation measures, such as sovereign guarantees, foreign exchange rates guarantees, political risks guarantees, should be issued. Specific solar measures should be developed, including feed-in-tariffs, net metering, and clean energy certificates. They provide developers with stable and predictable revenues and lower the cost of capital of a project. Additionally, regular, and scheduled tariff reviews should be organised.

Develop financial incentives for solar, such as VAT and import exemptions on solar PV equipment, as well as on solar off-grid equipment. Such waivers should only apply to products meeting international quality standards. Reduced cost of solar equipment can be passed on to consumers, therefore, reducing electricity costs. Taxes on renewable energy companies should also be reduced. Supply-side subsidies, such as grants, financing facilities and result-based financing, reduce costs and risks of solar businesses, and

support them in scaling up their operations.

IFIs should be included in PPAs as financial guarantors. Liquidity risks and an absence of financial guarantees deter project developers from investing in solar projects. Given LDCs and SIDS limited financial capacities, such guarantees cannot be safeguarded. Hence, international financial institutions should act as guarantors.

Increase regulatory and administrative coordination and competences

National energy legislation should be complemented by sectoral policies, such as rural electrification legislation, and end use policies (transport, heating, and cooling). State and city-level targets should also be developed. Sector-wide coordination should also be promoted, within the government, among different ministries, agencies, and relevant stakeholders.

Assess human resources needs and develop an institutional capacity strategy for the solar energy sector. Clear roles and responsibilities of the energy actors should be established. National utilities should also be included in planning and programme design, as well as in programmes with development finance institutions and international partners.

Establish a private investment unit in the Ministry responsible for energy policy. The unit will develop a single and clearly defined foreign investment strategy around solar energy, aimed at attracting and retaining private investments.

Strengthen utilities capacities to deal with solar projects. As national utilities are generally acting as the single energy off-taker in the country, their capacity to deal with solar projects needs to be enhanced. National utilities should be able to plan, operate, maintain, and adjust their operations if needed. Utilities should be familiar with solar technology and its challenges, as well as develop in-house expertise on dealing with IPPs. Experienced energy professionals should play a key role in policy making in the relevant ministries and utilities.

Promote capacity building and training of the local workforce in solar technologies. In collaboration with universities and national associations, certifications and accreditation programmes should be designed based on international quality standards and enforced accordingly. This will enable the development of a reliable O&M workforce for grid-connected and off-grid installations. International partners and financial institutions have a key role to play in supporting the development of such training programmes. SIDS and LDCs face the challenge of brain drain, boosting the demand for and supply of talent can mitigate this risk. Solar development, rural development strategies, green and digital policies contribute to economic opportunities and growth. Comprehensive growth policies, with the support of the international community, will contribute to retaining talents in SIDS and LDCs.

Integrate solar energy into the grid.

Open and non-discriminatory access to the grid should be secured and governed by an independent electricity regulator. Technical standards for grid connections should be clear and transparent, communicated early in the project development process and be enforced thoroughly.

Grant priority dispatch to electricity produced from renewable sources. Priority dispatch entails that transmission system operators give the priority to electricity generated by RE installations on the system. It facilitates RE integration into the power system and increases grid flexibility by reducing curtailments. Priority dispatch also sends a strong signal to RE investors. Additionally, due to lower prices of electricity generated by RE, long term price security is increased.

Develop effective, non-discriminatory, and transparent tenders or auction processes. They should be based on clear rules and technical parameters including accurate information on size, nature, targets, location, and timeline of a given project. Clarity and transparency of the process ensure expected outcomes are reached and attract investments. Tenders and auction processes should be planned in a systematic and transparent manner, such as on an annual basis. Auction design should include qualification requirements to ensure bidders have the capacity to implement projects timely and at the determined price,, while considering socio-economic benefits to ensure the sustainability of projects. The process to select the winner of the auction must also have clear and transparent rules, including minimal competition requirements, selection criteria, contacts awarding and payment clarifications. High transaction cost can be reduced by creating a single entity in charge of administrative procedures, and of organising, and holding the auctions. Policy makers should work with IFIs and international partners to design auctions based on international best practices.

Undertake grid upgrades to accommodate for solar deployment and establish an efficient electricity-demand and grid management mechanism to reduce peak loads and improve grid flexibility. Grid upgrades should be complemented by the introduction of smart grids and smart meters. When possible, cross-border interconnected electricity markets should be developed to help balance the system, especially during prolonged periods of low solar generation.

Identify locations where the current grid can integrate PV with minimal upgrade and ensure an even distribution on the national territory. Identification should be based on assessments focusing on growth and power demand, industry development and in line with universal electrification objectives. Early identification of suitable locations reduces risks linked to land and permitting, as well as uncertainties. Including local communities and stakeholders in the identification of suitable plots is essential to ensure acceptance and increase ownership. Territories with unresolved land ownership issues should not be considered for building solar projects.

Include energy storage systems and hybrid projects in policy planning to deal with intermittence and enhance grid integration. Storage has many benefits; it can help capture excess electricity and make it available to meet peak demand. Storage can also help in balancing the grid. In case transmission capacity upgrades are not possible, distributed storage, that is to say, located downstream of the transmission constraints, can mitigate those risks. Storage solutions require additional costs and have

specific needs in terms of integration, operation, and maintenance. These challenges will need to be taken into account.

Leave no one behind

Include off-grid planning in electrification strategies. Off-grid solar plays a key role in providing electricity access to remote communities without access to the grid. Therefore, off-grid deployment must be considered as part of a comprehensive electrification plan, with short- and medium-term targets. Setting out off-grid targets complemented by transparent and predictable grid planning can avoid deterring off-grid project investors. Mini-grid project development relies on the clarity of the extension to select suitable locations. Indeed, grid expansion results in revenue losses for mini-grid operators. Therefore, grid expansion should be de-risked by establishing transparent grid planning, ideally for a 10 to 15 years period, thus removing uncertainties. Additionally, designing mini-grids with the potential to interconnect with the main grid from the beginning can de-risk mini-grid investments. Nonetheless, in case of unplanned expansion, financial compensation schemes, such as reimbursement of mini-grid operators for their losses could be developed.

Differentiate on-grid regulations from mini-grid ones. Tailored and standardised compliance and licensing requirements should be developed. Licencing permits should align with tenors and match project financing terms to increase their bankability. A solution to support a faster and more efficient process for mini-grid deployment is the portfolio approach under which a single licence is provided to developers in a given geographic area or for a cumulative amount of installed capacity.

Develop a streamlined permitting process for mini-grids to ease their deployment. Mini-grids can provide electricity to remote areas without access to the grid, and depending on the demand, mini-grid projects can be consequent. Hence, regulations should also accommodate larger scale projects, potentially up to 2 or 3 MW, where demand is high.

Differentiate on-grid from mini-grid tariffs These tariffs should be cost reflective, based on a transparent and clear methodology. Differentiated tariffs enhance affordability of electricity therefore contributing to the government's electrification objectives. Differentiated tariffs could also be applied to the most vulnerable consumer groups.

Develop specific demand side or end-user subsidies for the most vulnerable groups, as well as ease access to finance from local institutions. Consumers lack the capacity or willingness to pay for high electricity prices and equipment. Government should support innovative mobile payment solutions such as PAYGo. Specific support should be provided to remote areas with a lack of mobile and cash payment availability. Subsidy schemes should include a clear exit strategy, so that companies can plan their development and sustainably support the market in the long-term. The international community should support governments in their rural development programmes.

For development partners and international finance institutions

Development partners and international finance institutions (IFIs) are key players in LDCs and SIDS. They should continue to assist countries in developing an enabling environment for boosting investments in solar. Their technical, financial and governance support drives the development of a sustainable market for private investments. International finance can be used as a catalyst to boost private investments in the energy transition, by de-risking investments in emerging markets, by using grants to increase the bankability of energy projects, or by funding renewable energy projects and decommissioning fossil fuel projects. International presence and long-term commitments in countries contributes to enhancing the credibility of national policies and reassures investors.

Technical support to enhance the regulatory framework

Develop holistic support programmes including financial support, technical assistance, and institutional capacity building. Enabling policies create stable investment environments, international partners should continue to provide technical assistance and grant funding to support the development of sound regulatory frameworks. International partners should support local authorities in the development of energy road maps, sectoral policies, RE auction design and procurement structures. They should align their work with local priorities and objectives, while promoting international standards.

Strengthen local capacities to ensure the sustainability of solar policies in partner countries. Capacity building programmes in energy institutions are key to building local expertise. International partners could also provide domestic revenue mobilisation support and budget support to partner countries to enhance their public resources. Programmes can also focus on building capacities in local banks and among financiers. Additionally, technical capacity building focused on training for local suppliers, providers and O&M workforce is needed. Such programmes should work with local training and educational institutions, provide financial support for courses material and training infrastructures, as well as hiring technical experts.

Support renewable energy associations in partner countries. Strong RE industry associations are key for the industry to have a constructive and transparent role in shaping the regulatory environment and creating a more fertile ground for cooperation and business opportunities. Support should focus on policy advocacy, communication, membership development, event organisation and internal governance.

Effectively coordinate actions among development partners and IFIs to avoid duplication of work, maximise synergies and reduce transaction costs for partner countries. Additionally, the development effectiveness principles, namely, ownership, focus on result, inclusive partnerships and transparency and mutual accountability should be upheld.

Enhancing access to finance

At the COP15 in Copenhagen, in 2009, developed countries committed to a collective goal of mobilising USD 100 billion per year by 2020 for climate action in developing countries. In 2015, at COP21 in Paris, the goal was extended to 2025. While mobilised total climate finance has increased, it still falls short of the USD 100 billion goal.[53] Additionally, mobilising climate private finance has been challenging, especially in low-income countries. Developing innovative financial mechanisms better tailored to blending public and private resources is key to unlock access to finance and contribute to the energy transition.

Facilitate access to finance and address investment risks. Blended finance structures need to align with private sector needs to ensure maximum impact and boost private investments in solar, so as to not increase LDCs and SIDS debt levels. Blended finance and innovative instruments are key to maximise the impact of scarce public funds with public-private partnership and risk-sharing.

Provide non-sovereign financial guarantees. Guarantees should be systematically complemented by grants and loans for project preparation and technical assistance. IFIs should provide short-term liquidity guarantees to IPPs to mitigate the risk of default of utilities. Such guarantees should cover at least twelve months' worth of revenue for the IPPs and be renewable until the end of the PPA contract.

Simplify approval processes and funding requirements for low-risk and small-scale solar projects. This will reduce transaction costs for public and private sectors and expand the use of risk mitigation instruments. International partners should continue their efforts to remake the institutions and norms of the global financial architecture, to fit better with the needs of the twenty-first century and scale up financing for the SDGs and climate action.

Ensure international funding reaches the most vulnerable consumers. Enhancing consumers' financial capacities is key to increase the uptake of solar, especially for the most vulnerable.

Strengthen the financial capacities of local financiers. On-lending or financial intermediary lending can increase the financial capacities of local financial institutions to finance small and medium scale solar projects. Facilitating interaction between project developers and financial institutions is crucial to scale up solar investments.

[53] OECD, Climate Finance Provided and Mobilised by Developed Countries in 2016-2020, 5.

Harnessing the Power of the Sun: Action Plan

Based on the recommendations, relevant stakeholders have been identified. The recommendations have been translated into concrete objectives with actionable initiatives to increase private investments in solar in LDCs and SIDS. The Action Plan also includes specific plans to mobilise resources and closely monitor progress. The Action Plan is then summarised in the Tool kit.

Stakeholders' roles

Several stakeholders are involved in LDCs and SIDS energy sector, including national governing bodies, international partners and IFIs, and private investors. The following table briefly describes their roles. The table above outlines their responsibilities in each action. IFIs can provide technical assistance to support many actions outlined in the table.

Table 3: Energy stakeholders' roles and responsibilities

Stakeholders	Roles and responsibilities
Entity responsible for energy policy (ENER)	Formulation and implementation of energy policies, maintaining the energy information system, monitoring of the rural electrification programme
Entity responsible for promoting investments (Inv)	Formulation of investment strategies
Entity responsible for rural electrification (RuE)	Implementation of rural electrification strategy
Utility	Electricity transmission and distribution
Entity responsible for energy regulation (Reg)	Setting energy tariffs, monitor competition, enforcing the terms, and conditions and approving licence and concession contracts
International partners and IFIs (IFIs)	Provide technical, financial support, strengthen capacities, provide financial guarantees
Private sector	Private sector associations: support the development of analysis to formulate better business models, participate in regular public-private dialogues to identify gaps in the regulatorWy environment and suggest solutions Investors: increase investments, job creation, collaborate in addressing issues affecting the business environment, encourage the expansion of investments

Objectives

The Action Plan aims to contribute to the realisation of development targets by strengthening attraction and retention of investments in solar energy. To do so, policy makers should focus on strategic areas of action to increase impact investments in solar. The strategic objectives are to:

- Create an enabling environment for private investments in solar,
- Enhance access to affordable finance,
- Increase regulatory and administrative coordination and competences,
- Integrate solar energy into the grid, and
- Leave no one behind.

Creating an enabling environment with dedicated policies contributes to fostering certainty and predictability of the solar market. Such an environment is enhanced by greater coordination and capacities. Which in turn will facilitate investments, contribute to attracting investors and streamline projects. Access to finance is essential to develop large- and small-scale projects to increase energy generation from solar. To do so, investors need to have access to guarantees and funding. In turn, solar infrastructures, competition, and adequate auction processes will reduce electricity prices, which are then passed on to consumers. Leaving no one behind entails reaching every consumer, by providing electricity infrastructures and the means to access it. The table below summarises actions identified for each of these objectives, with the primary responsible stakeholder for its implementation. Additionally, secondary stakeholders provide support and contribute to the implementation of each action.

Table 4: Strategic Objectives, Actions and Responsible Stakeholders

Strategic objectives	Actions	Primary stakeholder	Secondary stakeholder
Create an enabling environment for private investments in solar	Transpose NDC targets into national energy plans	ENER	IFIs
	Set solar targets for electricity generation	ENER	IFIs
	Develop a Foreign Investment Strategy around solar	Inv	ENER
	Limit market distortion towards fossil fuels	ENER	
	Establish a fast-track approval process for small-scale generation projects	Reg	ENER
	Establish a technical assistance facility or One-Stop-Shop	Reg	IFIs
	Standardise contracts	Reg	IFIs
	Support RE associations in partner country	IFIs	
	Enhance partnership and collaboration with the private sector	ENER	Reg
Enhance access to affordable finance	Use public finance as a catalyst for private investments	ENER	IFIs
	Provide financial guarantees	ENER	
	Provide non-sovereign guarantees	IFIs	
	Develop financial incentives for solar	ENER	
	Include IFIs in PPAs	Reg	IFIs
	Develop the financial capacities of local banks	IFIs	
	Simplify approval processes and funding requirements	IFIs	
Increase regulatory and administrative coordination and competences	Develop sectoral policies	ENER	
	Assess human resource needs	ENER	
	Develop and implement an institutional capacity strategy and action plan	ENER	IFIs
	Define clear roles and responsibilities of the energy actors	ENER	
	Create a private investment unit in the Ministry of Energy	ENER	
	Strengthen utilities capacities	Utility	ENER
	Promote capacity building and training of the local workforce	ENER	IFIs
Integrate solar energy into the grid	Establish an independent electricity regulator	ENER	Reg
	Establish a tender/auction system	Reg	IFIs
	Identify locations for solar electricity generation projects	Utility	RuE, IFIs
	Include energy storage systems and hybrid projects in policy planning	Utility	ENER
	Establish an efficient electricity-demand and grid management mechanisms	Utility	IFIs
	Upgrade the grid	Utility	IFIs
	Establish a priority dispatch for solar/RE	Reg	Utility
Leave no one behind	Differentiate on-grid regulations from mini-grid ones	ENER	RuE
	Include off-grid planning in electrification strategies	ENER	RuE
	Develop a streamlined permitting process for mini-grids	Reg	RuE
	Differentiate off-grid tariffs from grid-connected ones	Reg	Utility
	Create end-user subsidies	ENER	IFIs

Resource mobilisation

Due to the scope of the Action Plan, an estimated budget for its implementation cannot be included. Each country is responsible for identifying the financial resources required to implement the Action Plan, including through domestic and external resource mobilisation from international partners and IFIs. Policy makers should seek already available programmes. International partners and IFIs should work to strengthen domestic resource mobilisation in partner countries and provide adequate financing aligned with national priorities.

Monitoring and evaluation

The following table summarises the key performance indicator (KPIs) to measure the impact of the actions in each strategic objective. As the Action Plan includes a wide range of countries, specific qualitative targets are difficult to develop. Therefore, the focus is given to implementable actions, which represent targets.

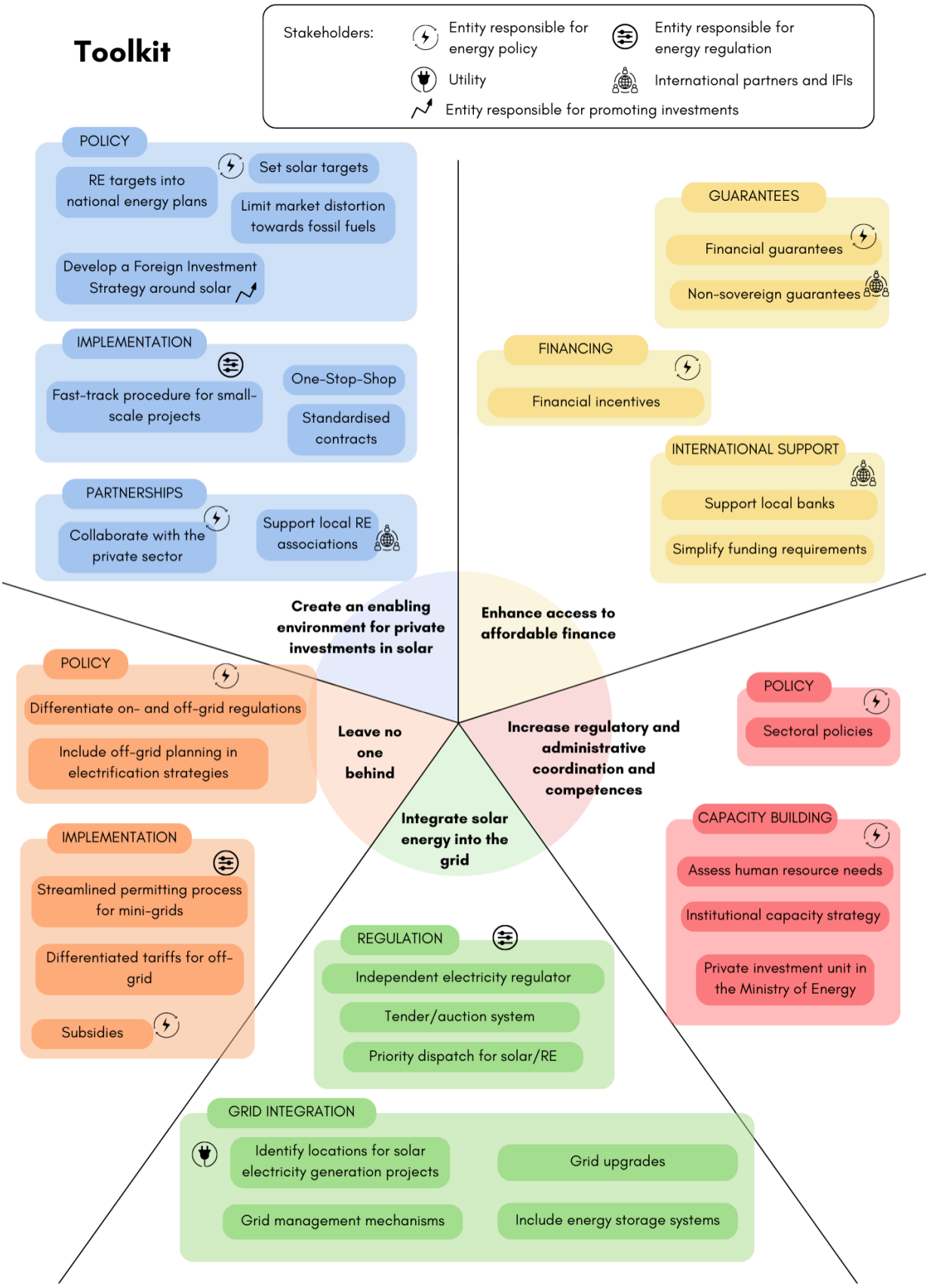
Table 5: Actions and indicators to measure the implementation progress

Strategic objectives	**KPIs (key performance indicators)**
Create an enabling environment for private investments in solar	Ranking in business environment indexes
	Solar targets are set
	Yearly installed solar capacity
	FDI strategy is developed
	Contracts are standardised
	Project approval rates
	Length of approval process
	One Stop Shop is created
	Number of consultations with the private sector
Enhance access to affordable finance	Number of partnerships
	VAT/import waiver in place
	Quantity of regional and international funding used to meet the goals and objectives of the programmes
	Number of local banks able to provide funding for solar projects
Increase regulatory and administrative coordination and competences	Sectoral policies are developed
	Mapping of responsibilities is done
	HR assessment is done
	Strategy is published
	Number of trainings and trained staff
	FDI unit is created

Strategic objectives	KPIs (key performance indicators)
Integrate solar energy into the grid	Independent electricity regulator is created
	Priority dispatch is in place
	Tender/auction system is established
	Number auctions held, number of bidders in the auctions
	Number of smart meters in place
	Number of locations identified
	Effective load carrying capability
Leave no one behind	Electricity access %
	Number of mini grids deployed; total power deployed
	End-user subsidies in place
	Number of people reached by subsidies

Toolkit

The Action Plan is summarised in the Tool kit on the next page. The Tool kit is divided into the five strategic objectives and includes the responsible stakeholders for implementing the recommendations. As LDCs and SIDS are very diverse, their starting points are different, with a diversity of stakeholders.



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Annex I: List of LDCs and SIDS

List of LDCs (46):

Africa (33): Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, **Comoros**, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, **Guinea-Bissau,** Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, **São Tomé and Príncipe**, Senegal, Sierra Leone, Somalia, South Sudan, Sudan, Togo, Uganda, United Republic of Tanzania, and Zambia

Asia (9): Afghanistan, Bangladesh, Bhutan, Cambodia, Lao People's Democratic Republic, Myanmar, Nepal, **Timor-Leste**, and Yemen

Caribbean (1): **Haiti**

Pacific (3): **Kiribati, Solomon Islands** and **Tuvalu**

Countries in **bold** are also SIDS.

List of SIDS, UN-members only (38):

Africa (4): Cabo Verde, Comoros, **Guinea-Bissau, São Tomé and Príncipe**

Caribbean (16): Antigua and Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, **Haiti,** Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad, and Tobago

Asia/Pacific (17): Fiji, **Kiribati**, Maldives, Marshall Islands, Federated States of Micronesia, Mauritius, Nauru, Palau, Papua New Guinea, Samoa, Singapore, Seychelles, **Solomon Islands, Timor-Leste,** Tonga, **Tuvalu,** Vanuatu

Countries in **bold** are also LDCs.

Annex II: Methodology

Data gathering was based on an extensive review of relevant studies and available secondary data, such as reports and recommendations issued by international and regional development institutions, websites and documentation of dedicated programs supporting energy access, reports on policy initiatives to improve market entry and ease of doing business.

A large number of consultations were carried out through phone calls, video calls, and e-mails with regional and national stakeholders, such as national energy associations, national development banks, private commercial banks, and regional institutions. Semi-structured interviews and consultations aimed at filling gaps in data and at improving the understanding of the key constraints and opportunities to boost investments in solar in SIDS and LDCs. These interviews enabled the establishment of the risk prioritisation framework. The collected data, often focused on one region or solar technology, was then aggregated to encompass all solar applications and geographic coverage.

List of Stakeholders Consulted

African Trade Insurance Agency	International Solar Alliance (ISA)
Asian Development Bank	KfW Development Bank
CARICOM Development Fund	Multiconsult
End User Subsidies Lab	Off-grid Electricity Fund
Energy Regulatory Authority (ARENE) Mozambique	Pacific Power Association
ESMAP Energy Sector Management Assistance Program	Pacific Region Infrastructure Facility
European Investment Bank	SIDS Lighthouse Initiative
GET FiT Zambia secretariat	Sustainable Energy Industry Association of the Pacific Islands
GET.invest secretariat	Tanzania Renewable Energy Association (TAREA)
GOGLA	World Bank
IRENA	

Annex III: Outreach plan

The Guidance Document contributes to the EU-funded Project "EU Cooperation with The International Solar Alliance," in particular it strengthens the business component and a wider deployment of solar-based energy production technologies in SIDS and LDCs.

The Document and its Action Plan serves as a basis for EU and ISA engagement with LDCs and SIDS on the topic of solar energy.

Target groups

Primary target groups:

- LDCs and SIDS policy makers, in particular in the field of energy, as well as other relevant sectoral and thematic policies and programmes.
- Regulatory authorities in the energy sector, as well as national utilities.
- International partners active in LDCs and SIDS, in particular with ongoing programmes in the field of solar energy.

Secondary target groups:

- Regional and local policy makers responsible for rural and infrastructure development and involved in the energy sector.
- The private sector.

Dissemination, outreach actions and activities

ISA and EPRD websites: online publication is the fundamental dissemination and communication channel of the Document.

Launch: TBD.

Networking activities: EU and ISA can leverage their partnerships to disseminate the Guidance

- EU-Africa Partnership: EU-Africa Business Summit (22 June 2023), experts' dialogues Africa-EU Energy Partnership (AEEP), Africa-EU Reference Group on Infrastructure (RGI)

- EU-OACPS Partnership
- ISA Corporate Advisory Group: annual meetings
- ISA regional committee meetings: Africa (TBA), Asia and the Pacific (24-26 July 2023), Latin America and the Caribbean (TBA)

Other regional and thematic events and fora can be used to leverage the Guidance

- GET.invest events
- Conference of the Parties (COP): EU and ISA pavilions, International Platform on Sustainable Finance, COP28 (30 November-12 December 2023)
- G20 Energy Transition Working Group Meeting
- SIDS Global Business Network bi-annual forum (2024)
- Green Energy Africa Summit (10-11 October 2023)
- Caribbean Investment Forum (end 2023)
- Caribbean Renewable Energy forum (annual)
- Intersolar events

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SolarPower Europe
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