INTERNATIONAL SOLAR ALLIANCE

Module Outline

POLICIES AND REGULATIONS

Disclaimer

Relevance and Background

Solar PV has several advantages at a local level (like energy access) as well as global level (reduced carbon emission). However, the sector does face a few challenges for deployment (like infirm generation). Policy and regulations thus play a major in overcoming the challenges so that the benefits of solar PV can be tapped.

Solar PV has different needs vis-à-vis conventional energy sources, so would require a different policy and regulatory regime for large-scale deployment, depending on the resource availability and the need in the region. Since solar PV can be deployed at utility scale as well as decentralized scale, the policy and regulatory regime generally includes both these aspects.

Theme – Policymaking
Competency – Policymaking
Code of the Module – T05C11M29

Learning Outcomes

At the end of the presentation, the participants will be conversant with the:

- Challenges with solar PV deployment,
- Need for policy and regulation,
- Identification of broad scope of policy and regulations,
- Several policy instruments to promote solar PV

Method of Delivery

Duration	Resource Code	Resource Delivery
60 min.	M29 L01	Lecture on Policy and Regulations

M29 L01: Lecture Presentation

The MS PowerPoint presentation will cover the challenges stakeholders are facing to deploy solar PV. It then outlines the role of policy and regulations to overcome these challenges.

The presentation will then discuss the major aspects of policy and regulation in some detail, such as, identifying the applications for promotion and setting milestones; incentives that can drive the deployment of solar PV for these applications; infrastructure for solar PV deployment; laying the processes and procedures for procurement of energy generated from solar PV plants; and finally the capacity building needed for the implementation of policy and regulations.

Key Topics to be Covered

1 Role of Policy and Regulation
2 Trends in Policy and Regulations
3 Case Studies

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1 Role of Policy and Regulation

As with the power sector, policy and regulations play a critical role in solar PV deployment and in addressing the challenges. Long-term policy and supporting actions like allotment of budgets and declaration of schemes provide visibility and stability for all stakeholders, which will ease the adoption of solar PV. Some important provisions required are:

- *Identified applications for promotion and targets*
- *Incentives*
- *Infrastructure requirement and allotment*
- *Process and procedures*
- *Capacity building*

1.1 Identified Applications for Promotion and Targets

Policy identifies the need for solar energy. The needs can be (1) Adoption of green energy (2) Reduction of energy cost, and (3) Improving energy access. Basis the needs, policy should identify the applications like utility-scale, solar pumps, and mini-grids, along with the targets and trajectory for each of the identified applications. The targets can be defined in terms of purchase obligations as a percentage of total procurement, installed capacity in MW or number of units installed.

To meet the energy and capacity targets, the policy makes provisions for development of a local ecosystem, which includes promoting local manufacturing, capacity building and entrepreneur development.

1.2 Incentives

Incentives for solar PV can be broadly segregated into (1) Sale of electricity - Feed-in tariffs (FiT) or Generation-based incentive (GBI), (2) Tax incentives - lower rates, tax holidays, accelerated depreciation, etc., (3) Fiscal incentives - capital subsidies, interest rate subvention, partial credit risk guarantee, etc., and (4) Bilateral trading - carbon credits and renewable energy certificates, among others.

1.3 Infrastructure

Suitable land banks and transmission networks are the major infrastructure requirements for solar PV deployment. A policy identifies the availability, requirement, and gaps for the infrastructure to meet the targeted deployment. It includes (1) A plan for meeting the gaps (2) Making the data publicly available, and (3) Smooth and transparent processes for allotting the infrastructure at a cheaper cost.

1.4 Standard Processes and Procedures

The deployment of solar PV projects necessitates the development of processes and procedures tailored to the specific requirements of these projects. To ensure the smooth deployment of solar PV, it is essential to have well-defined policies and regulations in place. These policies and regulations should encompass the following areas:

- **Utility-Scale Projects**
  - **Eligible Generators:** Eligibility criteria for generators permitted to produce solar energy for sale to energy utilities must be explicitly outlined. These criteria may include considerations for licensed generators, government-owned utilities, or private entities.
  - **Tariff:** The agency responsible for determining the tariff and the associated processes should be clearly defined to bring transparency and clarity to the pricing structure.
  - **Project allocation process:** The entity responsible for allocating projects and the selection process should be explicitly detailed. This could be based on principles like "first-come-first-serve" or competitive bidding such as reverse bidding or auctions.
  - **Model power purchase agreement (PPA):** The model PPA should provide comprehensive guidance for both the buyer and project developers. It should specify the agreement's duration, tariff rates, billing cycles, commissioning procedures, penalties, and other relevant aspects.
  - **Grid synchronization process:** Procedures for ensuring the seamless integration of solar power into the electrical grid should be well-documented.
  - **Safety of the grid:** Ensuring the reliability and security of the electrical grid is of paramount importance to safeguard against potential disruptions.
- **Distributed solar PV Projects**
  - **Business models:** Distributed solar PV projects can adopt one of three primary business models, each with its unique characteristics:
    - **Utility-Owned:** This model restricts solar energy generation and sale to licensed or government-owned utilities.
    - **Private Developer-Owned:** This model allows private entities can generate solar energy for sale to energy utilities or consumers.
    - **Consumer-Owned:** This model allows consumers to generate solar energy for self-consumption and enables them to sell excess energy to utilities.
  - **Capital Subsidy:** Specifics regarding the amount of capital subsidy, milestone requirements, the roles of nodal agencies, and the application process for subsidies should be outlined.
  - **Tariff:** Guidelines for setting tariff rates for distributed solar PV projects should be well-defined.

- **Project allocation process:** Processes for the allocation of projects, whether on a "first-come-first-serve" basis or through competitive bidding, should be transparent.
- **Model PPA:** Model power purchase agreements should be established, providing clear terms and conditions for energy sales and purchases.
- **Connectivity to the grid:** For grid-connected distributed solar projects, such as solar rooftops and solar pumps, connectivity to the grid is essential. This may involve mechanisms like net metering, net billing, or gross metering to facilitate energy transfer between consumers and utilities.
- **Technical Standards for Equipment:** Set standards for the equipment used in solar PV projects to ensure quality and safety.
- **Grid Synchronization Process:** Detailed procedures for synchronizing the solar PV system with the electrical grid should be well-documented.
- **Safety of the Grid:** Ensuring grid safety remains a key concern for the operational integrity of distributed solar PV projects.

1.5 Capacity Building

The absence of adequately trained personnel presents formidable challenges across the spectrum of stakeholders involved in solar PV deployment. This deficit in trained manpower has the potential to jeopardize the entire policy framework. Hence, capacity building assumes a pivotal role by conducting an in-depth evaluation of the current situation and anticipates future skill requirements. This involves pinpointing the areas that necessitate training. The policy is instrumental in discerning these training needs and formulating a comprehensive framework for the training programs. It encompasses the intricate processes associated with their implementation and lays out a vigilant strategy for continuous monitoring.

1.6 Local Manufacturing

Local manufacturing emerges as a critical facet in the quest to reduce project costs and foster indigenous capabilities for the development of novel equipment and products. The policy plays a pivotal role in designating the specific components and the incentives tailored for promotion. Moreover, it provides detailed insights into the processes and procedures essential for availing these incentives.

2 Trends in Policy and Regulations

Over the last few years, there has been a discernible downward trajectory in the costs of solar modules and batteries. Notably, certain applications, such as utility-scale solar PV, have transitioned into the mainstream or are on the cusp of doing so. In response to these evolving trends, governments have taken steps to rationalize incentives. This rationalization often includes partial or complete withdrawal of support for specific applications.

For instance, until a few years ago, governments extended support to utility-scale solar PV projects with mechanisms like higher Feed-in Tariffs (FiTs) in comparison to conventional energy sources or through capital subsidies, sometimes employing a combination of both. Project allocation was typically based on a first-come-first-serve approach. However, with the emergence of independent power producers and increasing expertise in solar project development, governments have shifted towards the allocation of projects through reverse bidding and auction processes. In these processes, projects are awarded to developers quoting the lowest tariff or seeking the least amount of subsidy. This approach has been exemplified by initiatives like Uganda's Global Energy Transfer Feed-in Tariff (GET FiT) program and India's Viability Gap Funding.

A similar transformation is observable in the case of small rooftop solar (SRT) installations. Capital subsidies for larger installations are gradually being phased out, while smaller capacities continue to receive support. Conversely, applications like mini-grids and solar pumps are still backed by higher tariffs and capital subsidies. However, it's important to note that the support for these applications is subject to regular reviews and revisions to align with the prevailing market conditions.

Consequently, it becomes imperative to design tailored interventions that align with the solar sector's stage of development within a given country. These stages can span from being in a nascent phase, progressing through initial stages, scaling up, reaching mainstream status, or achieving advanced levels of development.

3 Case Studies

a. Solar Energy Policy in Uzbekistan - A Roadmap (https://read.oecd-ilibrary.org/energy/solar-energy-policy-in-uzbekistan_d7cc3daf-en#page1)
International Energy Agency and the European Union developed a roadmap for solar energy deployment in Uzbekistan. The document covers the targets developed, policy landscape, identification of barriers, and roadmap development.

b. PV Rooftop Development in Thailand - Analysis of Regulations and Challenges (https://www.thai-german-cooperation.info/download/20140408_pdp_th_report_pv_regulations.pdf)
GiZ has developed a report analyzing solar PV rooftop development in Thailand. It identified the challenges with the current policy and regulatory framework and recommended solutions to address the same.

Reading Material

1. *Generic tariff order for renewable energy sources for FY 2021-22 by Joint Electricity Regulatory Commission, India.*

   (http://jercuts.gov.in/writereaddata/UploadFile/JERC RE Generic Tariff_1159.pdf)

   The document can be referred to for understanding how tariff for solar PV can be computed.

2. *Renewable Energy Policies in a Time of Transition by REN21 and International Energy Agency (https://www.irena.org/publications/2018/apr/renewable-energy-policies-in-a-time-of-transition)*

   Chapters (4) Power Sector and (5) System Integration of Renewables - Transforming Power Systems, can be referred to for policy incentives and integration of solar PV with power systems.

3. *Grid-Connected Distributed Generation: Compensation Mechanism Basics by National Renewable Energy Laboratory (https://www.nrel.gov/docs/fy18osti/68469.pdf)*

   The document can be referred to, to understand the interconnection compensation mechanisms for distributed solar PV.

4. *Distributed Generation Regulation Library*

   (https://www.21stcenturypower.org/resources/dglibrary)

   The library can be referred to for several aspects of distributed solar PV like tariffs, interconnection, and business models.