Power Purchase Agreements for Variable Renewable Energy

August 2018
Power Purchase Agreements (PPA)

- Power purchase Agreement (PPA) is an important contract that governs the sale and purchase of power
- Key to bankability of the project
- Provides reliable long-term clarity on roles, responsibilities, costs, revenues as well as probability and significance of associated risks for stakeholders
Roles of PPA in the renewable energy sector

<table>
<thead>
<tr>
<th>For Funding</th>
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<tbody>
<tr>
<td>PPA Price ($/MW)</td>
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<tr>
<td>Equity &amp; debt</td>
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<td>Guarantees</td>
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<th>During construction &amp; commissioning</th>
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<tr>
<td>Technical details</td>
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<tr>
<td>Interconnection</td>
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<tr>
<td>Commissioning</td>
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<td>Timing</td>
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<th>During operation</th>
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<tr>
<td>Generation</td>
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<tr>
<td>Curtailments</td>
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<td>Regulatory Changes</td>
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<td>Risks outside parties’ control</td>
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<th>Dealing with end of life of plant</th>
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<tr>
<td>Off-taker/ Government purchase</td>
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<td>Decommissioning</td>
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PPAs for Wind and Solar PV

Three unique generation characteristics of wind and solar PV

- Variability (how much generation and at what time)
- Uncertainty (how predictable the generation)
- Location-constraint (how to coordinate grid and generation)

→ Supply and purchase commitments
→ Curtailment clauses
→ Requirements for dispatch procedures
**PPA Design Details**

**PPA design details vary**
*examples for wind projects*

- **Price (USD/MWh)**
  - Brazil: 53.9
  - Chile: 45.3
  - Mexico: 35.8
  - Panama: 90.6

- **Tenure (years)**
  - Brazil: 20
  - Chile: 20
  - Mexico: 15
  - Panama: 15

- **Supply Commitment**
  - Brazil: annual
  - Chile: 3 daily blocks
  - Mexico: annual
  - Panama: monthly, 24/7

**Others** include price adjustment; currency risk; policy/regulatory risks; dispute settlement; ownership transfer
IRENA’s PPA Work

Central America Clean Energy Corridor (CECCA)
• Regulatory component focused on analyzing PPA designs.

West Africa Clean Energy Corridor (WACEC)
• Capacity building activity to provide training on PPAs for renewable energy projects

Global Solar Energy Standardization Initiative
• Developing a simplified and streamlined contractual framework (including PPAs) for Solar projects
CECCA Technical Component

CECCA Regulatory Component

Assessing Investment Incentives through PPAs in Panama

- Market review: Jun-Sep 17
- Excel tool: Sep 17-Apr 18
- Best practice: Jan-Mar 18
- Dissemination: May 18
Assessing Investment Incentives through PPAs - Panama

- Assess current renewable energy PPAs
- Identify potential design improvements based on regional and international best practices
- Develop financial model to analyze PPAs
- Analyze financial implications of suggested rule change

Develop financial analysis to assess the impacts of different rule changes
The assessment tool was developed to analyze the financial implications of design changes to PPAs.

Developed in Excel for greater flexibility and acceptance. Designed from the ground up by IRENA in collaboration with consultants.

Outcomes:
- Best RE PPA practices from the region and EU compiled and analysed applied to the Panama context using the tool.
- Contracts that accommodate the seasonality and daily cycles of RE production are key to enhancing investment incentive and reduce wholesale market interfaces (risk).
**WACEC Capacity Building on RE PPAs**

- Approved by the Directors of Energy of ECOWAS in April 2016 in Dakar
- Adopted by the Ministers of Energy in December 2016 in Conakry
- Endorsed by the Heads of State and Government in June 2017 in Monrovia and annexed to the ECOWAS Treaty

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<tr>
<th>SCOPING</th>
<th>TRAININGS IN 2018</th>
<th>FOLLOW-UP PROGRAMME (2019)</th>
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<th>1st Series</th>
<th>2nd Series</th>
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<td>Regional market design</td>
<td>Stakeholder responsibility and outcomes</td>
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<td>Procurement processes for RE projects</td>
<td>Default, non-default, and dispute resolution</td>
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<td>Pricing of RE IPPs</td>
<td>Agreements with important interactions with the PPA</td>
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<td>Risk allocation</td>
<td>PPA negotiation</td>
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**ACEC**
- Eastern Africa Power Pool (EAPP)
- Southern Africa Power Pool (SAPP)

**WACEC**
- West African Power Pool (WAPP)
Global Solar Energy Standardization Initiative

Minimizing transaction costs to lower the cost for solar power
By designing a simplified and streamlined contractual framework – establishing a balanced risk allocation and reducing project development time

Simplicity
- Lean structure
- Clear assumptions
- Easy-to-understand & implement

Innovation
- Building on experience
- System-wide approach
- Rethinking existing practices

Contracts
1. Power Purchase Agreement
2. Implementation Agreement
3. Supply Agreement
4. Installation Agreement
5. O&M Agreement
6. Finance Facility Agreement
7. Project Development Guideline

Balance
- Balanced and fair risk allocation
- Well-defined risks
- Risks being assumed by parties best able to manage them

Collaboration
Engage:
- Government
- Industry
- Financial institution
- International organizations
- Law firms
Summary

➢ PPA is the most important agreement that governs the sale and purchase of power between the renewable energy producer and the off-taker

➢ It is the key to bankability of the project

➢ Variable Renewable Energy technologies are different from conventional generations, and PPAs should be designed based on the unique characteristics of the technology and the market

➢ Analysing different PPA designs to identify the most effective configuration is critical for effective renewable energy deployment
Thank you!