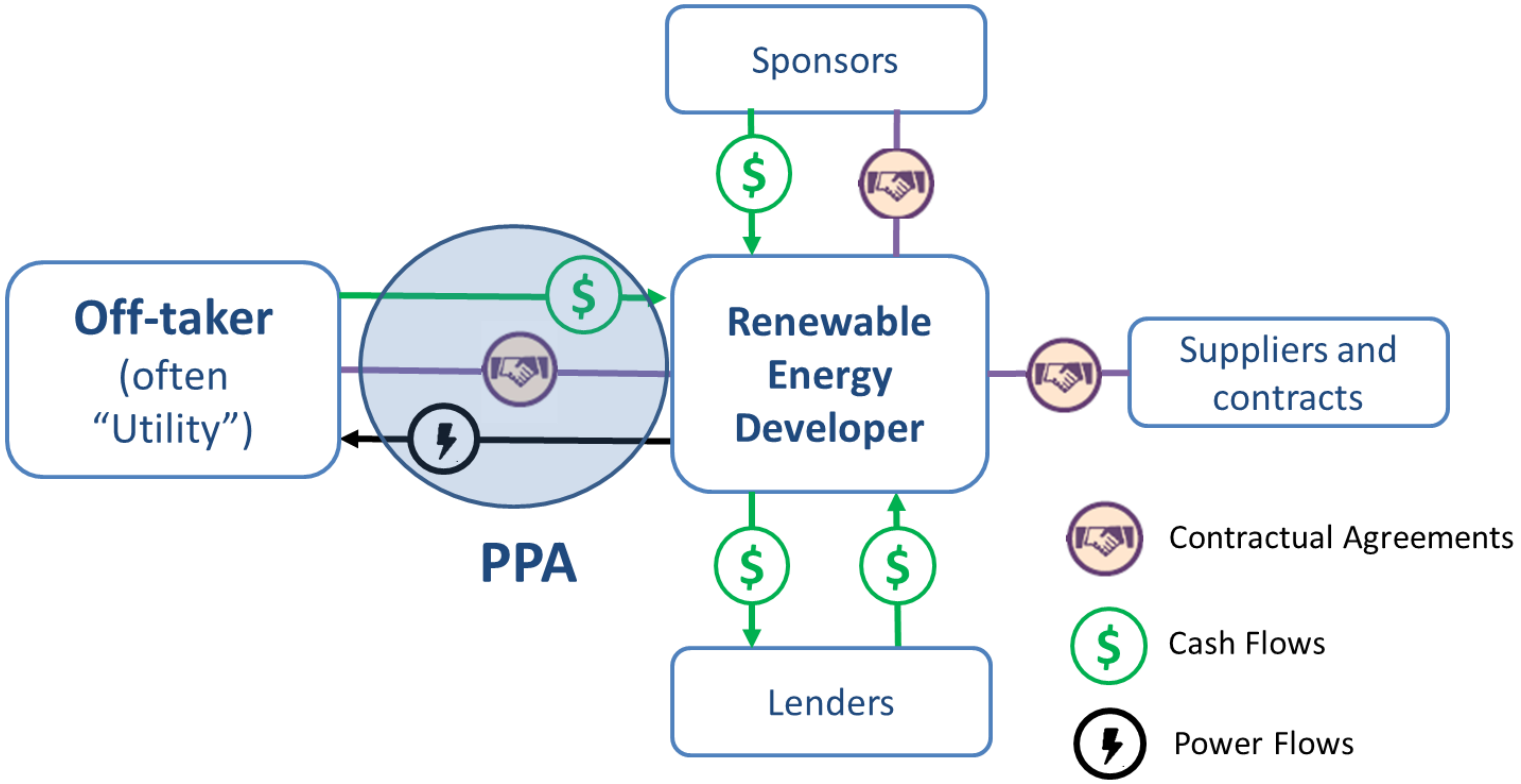
Power Purchase Agreements for Variable Renewable Energy

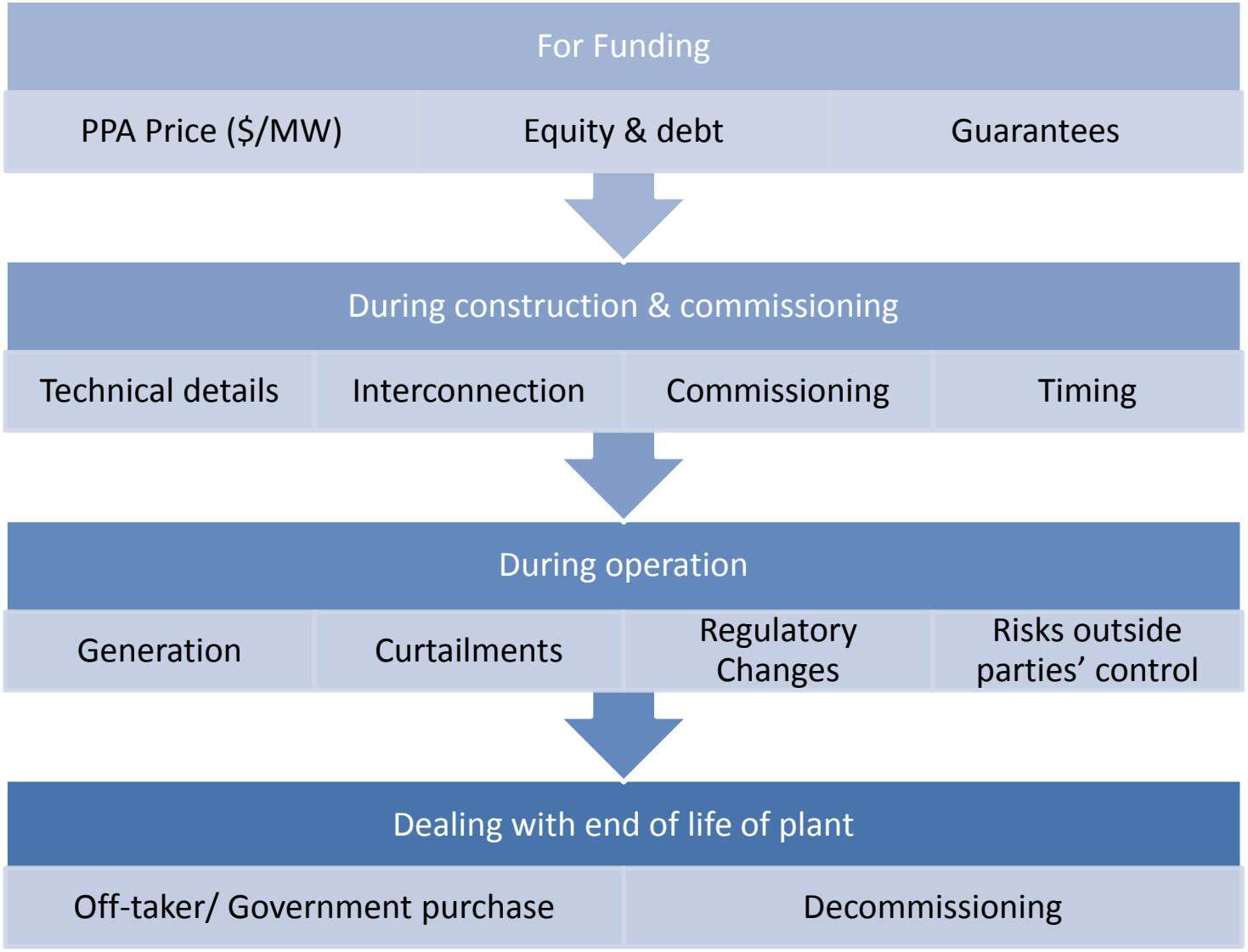
August 2018

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



PPAs for Wind and Solar PV

Three unique generation characteristics of wind and solar PV

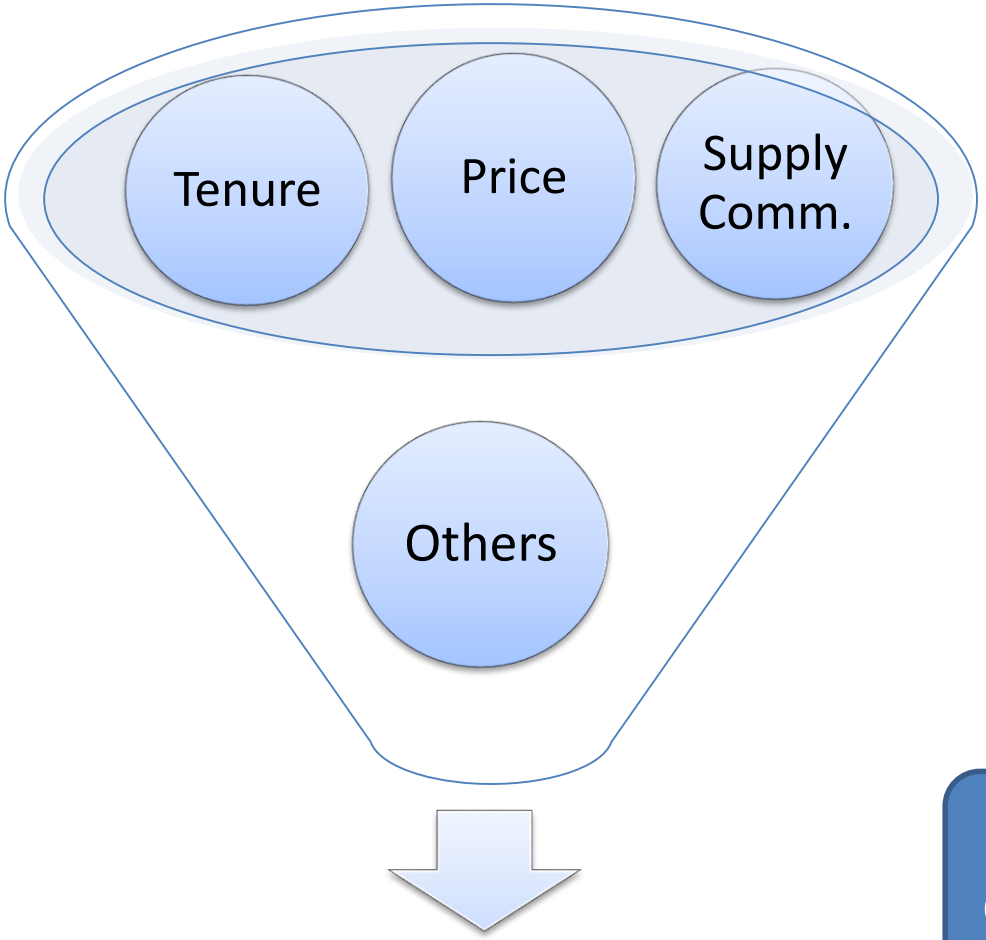
- Variability (how much generation and at what time)
- Uncertainty (how predictable the generation)
- Location-constraint (how to coordinate grid and generation)

→ 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

PPA Work in Central America CEC

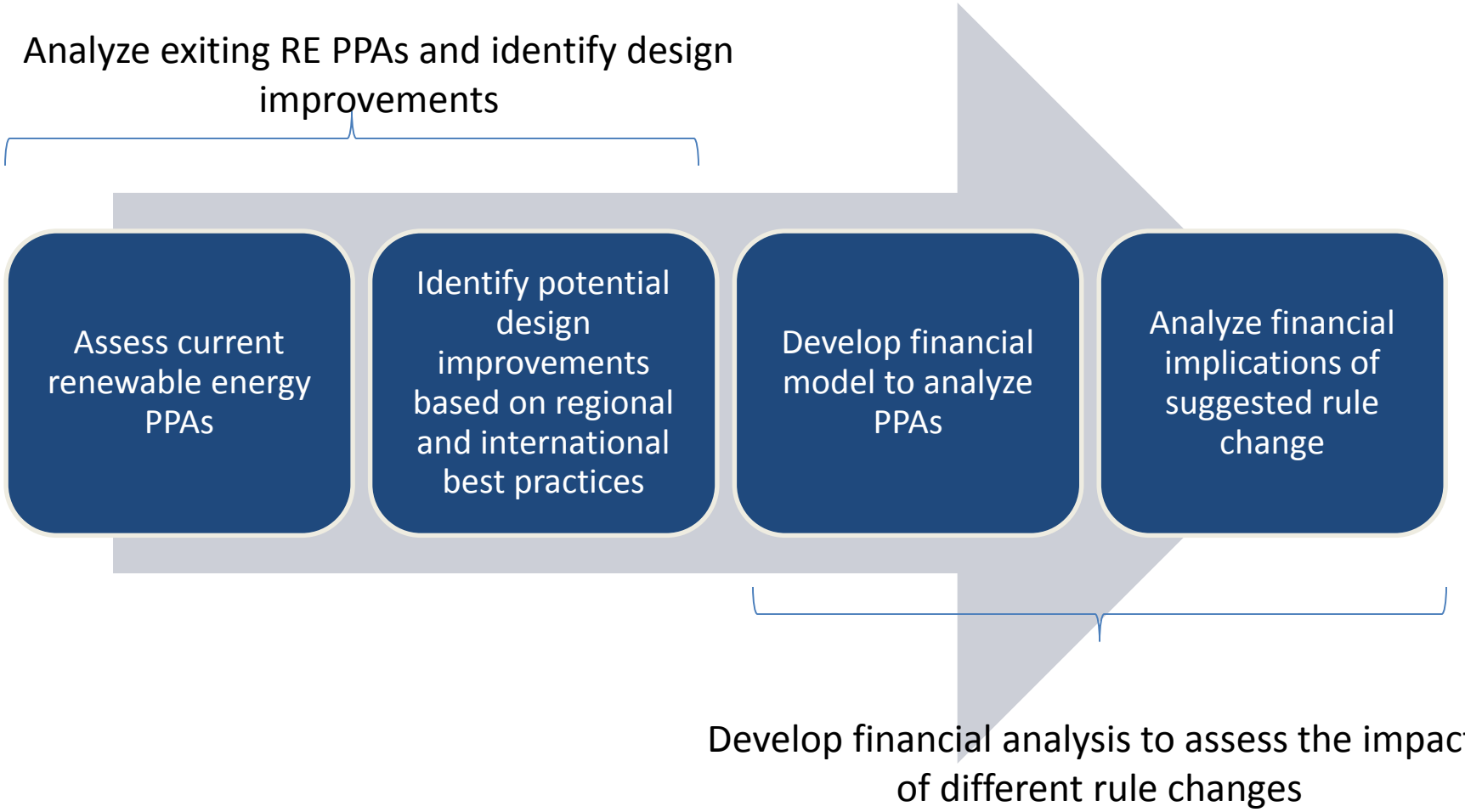
CECCA Regulatory Component

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**

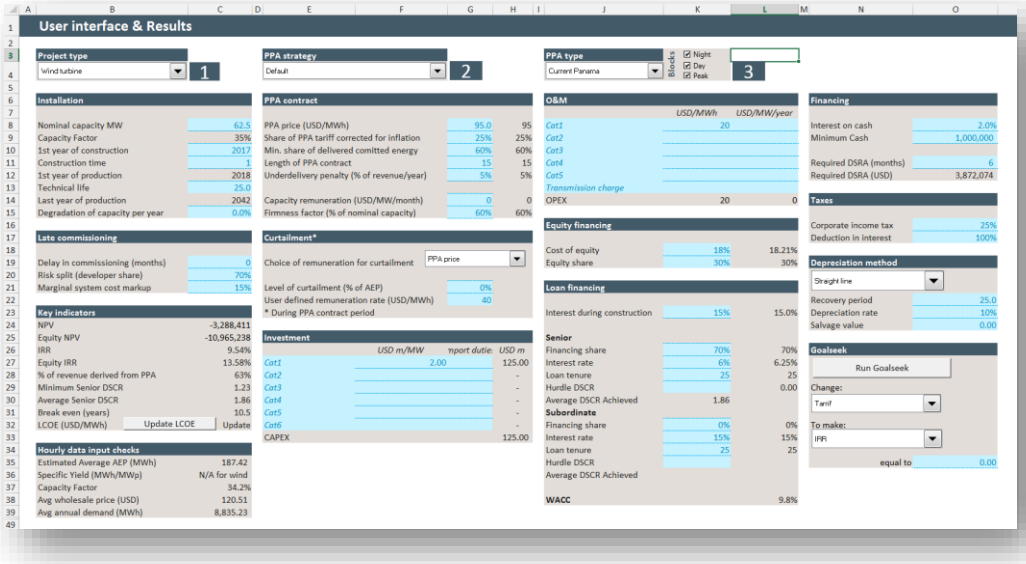
CECCA Technical Component

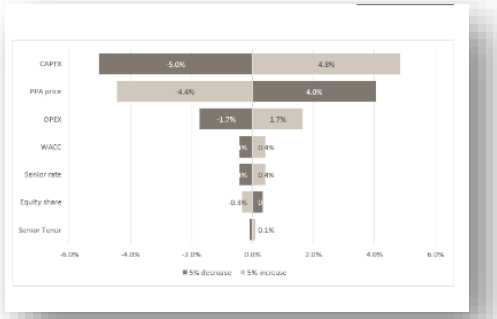
Assessing Investment Incentives through PPAs - Panama

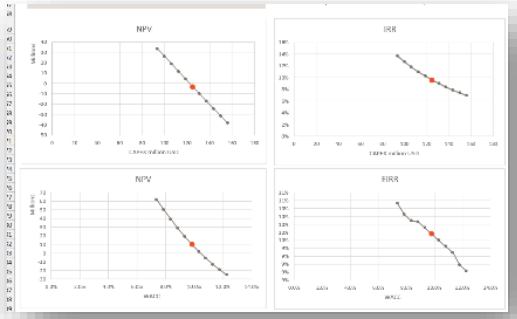


IRENA – PPA Assessment Tool

- 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)





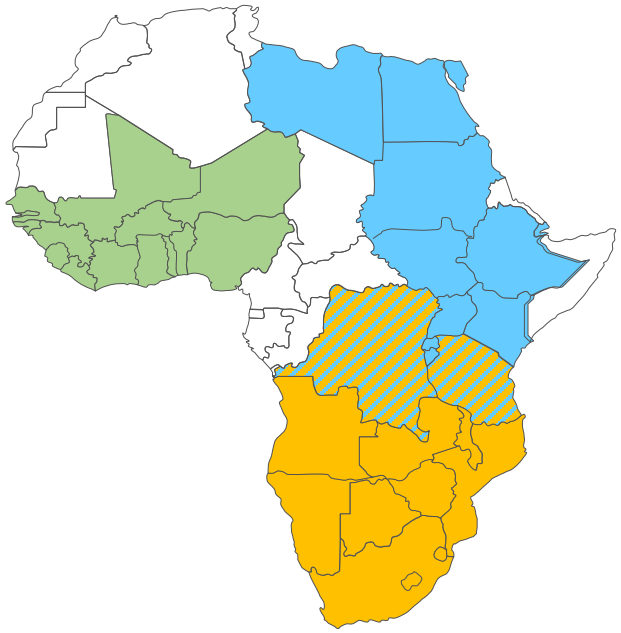


WACEC Capacity Building on RE PPAs

- 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

SCOPING → TRAININGS IN 2018 → FOLLOW-UP PROGRAMME (2019)

1st Series	Regional market design
	Procurement processes for RE projects
	Pricing of RE IPPs
	Risk allocation
2nd Series	Stakeholder responsibility and outcomes
	Default, non-default, and dispute resolution
	Agreements with important interactions with the PPA
	PPA negotiation



ACEC: Eastern Africa Power Pool (EAPP); Southern Africa Power Pool (SAPP)

WACEC: West African Power Pool (WAPP)

Global Solar Energy Standardization Initiative

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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!

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