RES4Africa Foundation
Knowledge Platform

Power Purchase Agreements: a key tool to ensure bankability and mitigate risk

AFRY Management Consulting
The RES4Africa Knowledge Platform offers a set of content-driven, technical-functional training

The aim of the RES4Africa Knowledge Platform is to establish a public platform of technical training content, usable by third parties in accordance with the Foundation’s core principles of a think tank and open hub for knowledge sharing.

The purpose of the Platform is to offer a set of technical-functional content, organized in sharp modules covering renewable energy and more in general the key topics part of the energy transition.

The modules will be also delivered to on-request professionals of the energy sector (e.g., Energy Ministries, Regulatory Authority, vertically integrated incumbents, Associations, other relevant parties).
The Platform covers all the key areas of energy transition, with a comprehensive perspective across the value chain.

The Platform covers the following thematic areas:

**Technologies**: a comprehensive understanding of different technological options and features / potential is a pre-requisite for a successful planning and implementation of fully functioning energy systems.

**Policies and regulations**: must go hand in hand with measures ensuring that industrial and other economic capabilities are aligned with sustainable development and climate priorities.

**Access to market**: Successful deployment of RES and flexibility technologies depends on how effectively MWh produced can be sold on the market and to what extent risk is properly hedged.

**Permitting**: one of the key hurdles that developers face, especially for utility-scale RES projects. Key common issues can be identified, and proper management principles can be set up.

**Financing**: bankability is one of the highest impact factors to ensure that utility-scale RES projects are successfully deployed. Compliance with requirements from international funding entities is fundamental.

**Operation**: considering the level of maturity reached by RES technologies, a significant share of the value that can be extracted by RES projects stems from an advanced asset management approach.

**Sustainability**: is progressively becoming a top priority for investors and energy industry stakeholders in assessing investment opportunities. A more comprehensive evaluation approach must be adopted.
Power Purchase Agreements are progressively becoming one of the key routes to market for IPPs globally

The Platform covers the following thematic areas:

- Technologies
- Policies and regulations
- Access to market
- Permitting
- Financing
- Operation
- Sustainability

**Power Purchase Agreements: a key tool to ensure bankability and mitigate risk**

- **What is the context:** successful deployment of RES generation and flexibility technologies depends strongly on how effectively MWh produced can be sold on the market. Proper commercial tools need to be deployed to facilitate interaction between involved stakeholders and ensure that risk is properly hedged.

- **Why is this relevant:** at the earliest stage of RES deployment, subsidies were meant to protect RES operators from market risks by preventing the participation to the wholesale markets. Today long-term PPAs are emerging as valid hedging tools, allowing for the deployment of merchant RES projects.

- **What are the key questions:**
  1. Which are the key categories of PPA?
  2. How do they work?
  3. What are the prevailing trends at international levels?
  4. What are the key features of a bankable PPA?
  5. Which are the main risks to be covered?
Power Purchase Agreements are bilateral contracts that mitigate risks of RES producers when entering the market

**DEFINITION OF PPA**

PPAs are bilateral contracts between two counterparties, of which one produces electricity (the “Seller”) and another purchases the electricity (the “Buyer” or the off-taker):

- Typical duration 1 year+
- Buyer and seller negotiate on price (rarely fixed)
- Responsibility on forecast and the party that will incur imbalance costs are also disciplined in contract clauses

**PPAs AS HEDGING TOOLS**

- RES projects are particularly exposed to market risks (typically volume and price-related risks)
- At the same time, RES deployment is necessary for the future and expected to grow significantly
- Within this context, PPAs essentially represent a risk management tool that can help address such risks and secure access to market
Over the years, RES supporting schemes in EU evolved towards a greater market integration, implying higher risks.

**RISK EXPOSURE UNDER DIFFERENT SUPPORTING SCHEMES**

- **FiT implies a guaranteed off-take:** no market risk
- **Under these subsidy schemes, projects need to find a route to market for their electricity (and green benefits): exposed to (at least some) market risk**
- **Merchant RES are by definition integrated in the market:** exposed to market risk

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1) E.g., Small-scale FiT schemes in Italy; 2) E.g., “Green Value” from certificates
The PPA market is emerging worldwide, with differences among regions due to diverse energy market organization.

**UNITED STATES**
One of the most ‘mature’ regions for use of RES PPAs. Rationale dictated mainly by complex nature of trading arrangements (regional markets, with varying degree of vertical integration), and tax-/rebate / RECs subsidies.

**CHINA & INDIA**
Slow opening of the wholesale market, with expected opportunities for independent RES producers for more market-based PPAs. Currently, still a high degree of vertical integration. Most of cPPAs activities in Asia are located here.

**SOUTHEAST ASIA**
Most markets are vertically integrated, and RES enter into Government-back contracts via local utilities. Limited to no exposure to volatility of electricity prices. So, market-based PPA are not really in use, lots of price volatility where wholesale markets are in place (e.g., Japan or Philippines).

**EUROPE**
Use of RES PPAs is less widespread than in the US, with some markets where this is standard practise, and other recently emerging. RES subsidies have historically dictated whether RES producers need a PPA or not.

**SOUTH AFRICA & MIDDLE EAST**
High degree of vertical integration, but prospects of market liberalisation. Most RES developed via Gov-baked programmes. SA corporate PPA deals emerging strongly via progressive changes in the market arrangements to bypass traditional utilities.
New phenomenon of direct green procurement has expanded the pool of buyers under PPAs globally.

GREEN ELECTRICITY PROCUREMENT ROUTES

A. TRADITIONAL SUPPLY AGREEMENTS
   A corporate consumer buys RES electricity via its supplier / utility by entering into a specifically-designed green contracts, such as green tariffs.

B. UNBUNDLED GREEN CERTIFICATES
   A corporate consumer buys green certificates separately from the underlying power, such as Guarantees of Origins (EU).

C. POWER PURCHASE AGREEMENTS
   A corporate consumer enter into a bilateral agreement with a RES producer and commits to buy electricity at an agreed price and for a certain duration. Physical and financial options are both utilised.

D. EQUITY INVESTMENTS IN RES CAPACITY
   A corporate consumer invests its own equity into RES generation capacity. Assets can be located either onsite or offsite, and volumes are typically used for self-consumption.

GLOBAL CORPORATE PPA VOLUMES

- Cumulative
- EMEA
- APAC
- AMER

Additional volume (GW)

Cumulative volume (GW)


0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

2012 2013 2015 2020

+61%


0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32


0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110

The increased global appetite for PPAs is leading to innovation of offerings and origination techniques

4 OVERARCHING GLOBAL TRENDS ARE RESHAPING THE PPA MARKET

1. GROWING NUMBER AND TYPES OF PLAYERS
   New ‘buyers’ are available – in particular corporate consumers and aggregation businesses – and more of the same kind – i.e., utilities / traders – are offering PPA-products

2. WIDER GEOGRAPHICAL SPREAD
   Push for full market integration of RES has driven changes in RES regimes, thus in more and more geographies there is a need for entering into PPAs (or similar agreements). Additionally, with introduction of markets and market liberalisation, more jurisdictions globally will require the use of PPAs

3. GREATER VARIETY OF OFFERINGS
   More differentiated needs and risk appetite of RES electricity sellers have prompted buyers to diversify from traditional products. Greater variety of offerings is available to meet these needs. This relates both to pricing terms, duration, and other key commercial terms

4. INNOVATION IN ORIGINATION AND NEGOTIATIONS TECHNIQUES
   In addition to the traditional origination methods, such as bilateral negotiations and tenders, new techniques and tools have been made available to those seeking to sell or buy. For instance, a proliferation of online platforms for deal matching, price discovery and transparency are adding competitive pressure on traditional players with limited innovation capacity
PPAs can be broadly clustered based on the type of delivery of energy and on the type of off-taker

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<thead>
<tr>
<th>Type of delivery</th>
<th>Physical</th>
<th>Financial</th>
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<tbody>
<tr>
<td>The producer delivers the electricity to the consumer through the public grid</td>
<td>The producer agrees to settle payments based on a defined price and volume mechanism with respect to the underlying generation assets.</td>
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<table>
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<tr>
<th>Type of off-taker</th>
<th>Utility/Wholesaler</th>
<th>Corporate</th>
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<tr>
<td>The off-taker is a Utility/Wholesaler that buys the electricity from the producer and resells it into the market to other traders or utility companies</td>
<td>The off-taker is Corporate end-user, and the seller can be either a producer or an energy trader.</td>
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Contracts with a Corporate end-user as counterparty are generally referred to as Corporate PPAs.

A particular type of physical Corporate PPA called sleeved PPA is encountered when a Utility is intermediate between producer and off-taker.
Focus on physical PPA: the wholesaler is the interface for the end-user for RES energy procurement

- In a sleeved PPA, an intermediary Utility company handles the transfer of money and energy to and from the producer/generator on behalf of the buyer
- The Utility takes the energy directly from the generator and “sleeves” it to the buyer at the point of delivery
- The Utility supplies also the integration energy, and provides balancing services
- Sleeve fee can either be paid by the Corporate end-user, or under an alternative arrangement by the RES Generator
Focus on financial PPA: the implementation of a financial PPA requires the compliance with IFRS standards

The Financial PPA is a financial contract with no physical exchange of electricity, to hedge the price of the produced volumes, typically with respect to wholesale electricity market price.

It is typically referred to a relevant market price index.

As physical PPAs, financial PPAs refer to a fraction of the expected generation of RES plant.

For a Corporate PPA, the end-user purchases electricity “from a conventional supplier” and hedges the price with the Financial PPA.

The RES Generator needs in any case to set up a route to market for its electricity.

A current limitation to the diffusion of financial PPA is the still unresolved...
The definition of the contractual terms is the result of an agreed risk allocation between counterparties.

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<th>Volume-related risks</th>
<th>Regulatory risks</th>
<th>Price-related risks</th>
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<td><strong>Resource risk</strong>: typically, weather-related generation volatility</td>
<td><strong>Change in law</strong>: e.g., change in the market structure, negative prices…</td>
<td><strong>Liquidity risk</strong>: risk of not being able to achieve the desired reference price from trading into the market</td>
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<td><strong>Availability risk</strong>: typically, unplanned outages</td>
<td><strong>Market scheduling and dispatching risk</strong>: ability to find a buyer and to be dispatched</td>
<td><strong>Market price risk</strong>: exposure to changes in market prices, for both electricity and GO certificates</td>
</tr>
<tr>
<td><strong>Network curtailment risk</strong>: local network issues, emergency TSO instructions to cut-off output, lack of compensation</td>
<td><strong>Imbalance volume risk</strong>: risk of over/under-generating vs. contracted volumes</td>
<td><strong>Shape risk</strong>: revenue cannibalization risk, or basis risk due to location / market price indices difference</td>
</tr>
<tr>
<td><strong>Imbalance volume risk</strong>: risk of over/under-generating vs. contracted volumes</td>
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<td><strong>Imbalance price risk</strong>: exposure to fluctuations in imbalance price</td>
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**Risks to be allocated**

- Risks that can be partially / totally mitigated via a PPA
- Unresolved topics
A typical PPA has several building blocks, from counterparty identification to definition of guarantees

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<th>PPA building blocks</th>
<th>Description</th>
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| **COUNTERPARTIES AND OBJECT** | - Parties’ identification  
- Products (electricity, GoO)  
- Characteristics of the facility, e.g., installed capacity, grid connection, etc. |
| **PRICE AND PAYMENT TERMS** | - Pricing terms, such as any market reference price, any hedging mechanism and any other parameter used in the formula for the calculation of payments from the Buyer to the Seller for the delivery of electricity and any other attached product (e.g., GoO with hidden or evident pricing)  
- Schedule for invoicing, settlement and any reconciliation cash flows are also provided |
| **VOLUME AND PROFILE** | - It defines which is the volume covered by the contract (e.g., net metered, pre/post losses, PXX), the product(s) that are to be transferred and the contractual & physical delivery terms  
- Reference delivery profile: pay-as-produced vs baseload or other |
| **TENOR** | - It specifies the period of validity of the contract and any sub-period whereby applicability of terms and/or responsibilities of the parties may differ |
| **IMBALANCES** | - Definition of the Balancing Responsible Party and allocation of the Balancing Responsible Party roles and consequent pricing  
- Imbalance cost and pricing for the service could be hidden or evident in the price structure |
| **OTHER CLAUSES** | - Curtailment management  
- Change in law  
- Guarantees |