Power Purchase Agreement
A European Perspective

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GE Renewables - Commercial Partnering and Development

From early to late stage development and across a diversity of global markets, we seek to approach each project in a tailored manner as we pull together the right combination of technical and commercial tools.

**Development capital and expertise**
We offer development capital and expertise to our partners, as well as credit support for auctions, grid or planning requirements.

**Development loans and equity**
We customize our development funding solutions and can provide development loans or equity, adapting to the structure of each deal and the needs of our customers.

**Power Purchase Agreements and complex offtake**

**solutions**
Our dedicated PPA team has in depth expertise in originating and negotiating Power Purchase Agreements and arranging complex offtake solutions.

**Financial structuring and capital syndication**
Either through our own network of partners, or our dedicated Energy Financial Services (EFS) team we provide financial structuring expertise and access to a global network of investors and lenders as well as ECAs and DFIs.
AGENDA

1. What is a PPA?
2. Development of PPAs in Europe
3. PPA Structures
4. 2020 – Key themes
A Power Purchase Agreement is a contract between the generator of electricity and a consumer of electricity for the sale, purchase and delivery of electricity. The Electricity is purchased by the buyer at a pre-agreed price structure for an agreed volume and tenor.

### Developers & investors in renewable generation
- Removal of government subsidies
- Unpredictable political policy changes
- Volatile market conditions

### Electricity Consumers/ Corporations
- Rising wholesale electricity prices
- Volatile market conditions
- Conscious support for carbon free energy

### Trends

### Outlook
- Changing business and revenue models
- Drive to secure long-term and predictable revenues
- Increased visibility and stability in energy procurement
- Commit to renewable energy and reliable power generation assets
- Reduce environmental impact and improve sustainability measures
Physical Power Purchase Agreement

- A Physical or ‘sleeved’ PPA is a contract between the generator and the consumer for the sale, purchase and delivery of electricity. Electricity is purchased by the buyer at a pre-agreed price structure for an agreed volume.
- The generator delivers electricity to and the buyer receives electricity from the grid.
- The electricity is delivered or ‘sleeved’ through the grid by either a utility, third party or by the relevant grid operator (depending on jurisdiction).

### Advantages

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<tr>
<th>Advantage</th>
<th>Disadvantage</th>
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<td>Allows the ‘direct’ delivery of power from the generating station to the point of consumption and increased the transparency around consumption of green electricity.</td>
<td>Geographically restrictive - Requires the consumer to have a load corresponding to the grid through which the power is delivered.</td>
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<td>The contract can be structured so that green certificates can be transferred to the offtaker</td>
<td>Needs to be accommodated within existing electricity supply arrangements.</td>
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<td>Electricity produced and consumed in the same market/price zone increases hedge effectiveness considering price and volume.</td>
<td>Requires a licensed third party to ‘sleeve’ electricity across the network bringing additional cost. The allocation of cost needs to be agreed between the parties but typically met by the consumer.</td>
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<td>Easier to contract with multiple projects for a single load or loads.</td>
<td>Extra resource required to administer the contract in addition to the existing supply arrangements.</td>
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A Financial or virtual/synthetic PPA is a financial contract for difference, also known as a fixed for floating swap. The generator and the buyer enter into an agreement to settle against an agreed price structure for an agreed underlying volume of electricity. The generator sells electricity produced into the wholesale electricity market and the consumer buys power through its existing arrangements. The contract is settled at agreed intervals where the direction of payment is determined by the difference between the contracted price and the wholesale market or reference price.

### Advantages

- Flexible contract that allows the buyer to aggregate load within or across markets, for example, buyers with consumption across multiple sites.
- Buyers not restrained by geography and can access a wider pool of generators in different markets with more suitable projects.
- No disruption to existing electricity supply arrangements.
- The contract can be structured so that green certificates can be transferred to the offtaker.

### Disadvantages

- A financial PPA is considered as a financial instrument and may trigger specific accounting treatment and derivative reporting requirements.
- Can lead to basis risk where generation and consumption are priced in different markets impacting the hedge effectiveness of the PPA.
- Less tangible as there is no physical delivery of electricity to and from the buyer and generator.
- Counterparty credit risk.
- Counterparty credit risk. Extra resource required to administer the contract in addition to the existing supply arrangements.
European PPA Market

- Corporate renewable Power Purchase Agreements (PPA) in Europe have grown to a cumulative capacity of over 8GW for offsite projects, notably in the Nordic counties and Spain.
- 1.1 GW Capacity of PPAs agreed in 2020 to date including > 500MW in Spain, 200MW in Finland and 100MW in Sweden.
- Mix of Solar and Wind

Source: BNEF
PPA Structures – Fixed Price

A Fixed Price PPA allows sellers to secure a fixed revenue stream for the duration of the contract. Buyers benefit from a hedge against future volatile electricity prices

- Contract Price – Agreed fixed price for the duration of the contract.
- Settlement – Wholesale market index (Hourly, Daily, Monthly)
- Delivery – Pay as Produced, fixed volume (Hourly, Monthly)
- Indexation - % to be agreed
- Tenor – 10/12/15 Years
PPA Structures - Revenue Sharing

Sellers benefit from future forecast increases in wholesale prices
Buyers gain discounted or capped power prices and can share in lower prices at points during the contract

**Discount to Market with Floor**
- Contract Price – Discount to wholesale market with a floor.
- Settlement – Wholesale market index (Hourly, Daily, Monthly)
- Volume – Pay as Produced, fixed volume (Hourly, Monthly)
- Indexation - % to be agreed

**Cap and Floor**
- Contract Price – Wholesale market subject to Cap and Floor.
- Settlement – Wholesale market index (Hourly, Daily, Monthly)
- Volume – Pay as Produced, fixed volume (Hourly, Monthly)
- Indexation - % to be agreed

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![PPA Price Mechanism - Floor Price with Discount to Market](chart1)

![PPA Price Mechanism - Zero Cost Collar](chart2)
2020 – Key Themes

1. Market post COVID and Economic downturn
2. Routes to Markets
3. Standardization
4. Innovation
Bjorkvattnet Vind AB
The first Nordic Windfarm to be built using the GE Cypress turbines

GE ORIGINATED, STRUCTURED AND NEGOTIATED A 10-YEAR PAY AS PRODUCED POWER PURCHASE AGREEMENT WITH GOOGLE

175-MEGAWATT
33 5.3MW
Cypress Wind Turbines

WILL GENERATE ENOUGH POWER TO SUPPLY THE EQUIVALENT OF 175,000 HOMES IN SWEDEN
MARKBYGDEN ETT (Norsk Hydro) originated, structured and negotiated a 19-year fixed-volume power purchase agreement that will generate enough power to supply the equivalent of 100,000+ homes in Sweden. The 650-megawatt, €800 million onshore wind deal is Sweden's largest single onshore wind installation in Europe.
PROJECT GOYA (Forestalia), largest onshore wind installation in Spain

GE STRUCTURED AND NEGOTIATED A 12-YEAR FIXED-VOLUME, FLOOR PRICE POWER PURCHASE AGREEMENT, LARGEST HEDGE IN THE SPANISH MARKET

300-MEGAWATTS
310M€ ONSHORE WIND DEAL

WILL GENERATES ENOUGH POWER TO SUPPLY THE EQUIVALENT OF 46,000 HOMES IN SPAIN AND CAPTURE 314,000 TONS OF CO2 PER YEAR

300-MEGAWATTS
310M€ ONSHORE WIND DEAL

Project Goya (Forestalia), largest onshore wind installation in Spain.

GE structured and negotiated a 12-year fixed-volume, floor price power purchase agreement, largest hedge in the Spanish market.

300-megawatts
310M€ onshore wind deal

Will generate enough power to supply the equivalent of 46,000 homes in Spain and capture 314,000 tons of CO2 per year.
TULLAHENNEL, 1st wind farm in Europe to integrate a battery into each turbine, 1st corporate PPA for Microsoft in Europe

37-MEGAWATT TULLAHENNEL ONSHORE WIND FARM, KERRY, IRELAND

50KW STORAGE SOLUTION INTEGRATED AT THE TURBINE LEVEL PAIRED WITH SOFTWARE APPLICATIONS TO PROVIDE VALUABLE DATA ON ENERGY STORAGE

GE ORIGINATED, STRUCTURED AND NEGOTIATED A 15-YEAR CORPORATE RENEWABLE POWER PURCHASE AGREEMENT (PPA) USING AN INNOVATIVE STRUCTURE TO ADDRESS REGULATORY OBSTACLES

PPAS
Offtake Advisory Services

- The PPA market is complex & opaque, there is no transparent marketplace for PPAs.
- GE’s Unique Skillset - Developer, investor, financier, OEM and electricity consumer

GE will originate PPAs and other offtake agreements including Balancing Services Agreement and Contracts for Sale of Green Electricity Certificates.

We will work with our customers to:

- Prepare project information
- Identify and approach off-takers to determine opportunities
- Support and advise in finding the best structure for each project
- Assist in completing the negotiation of the agreements
- Assist with communication to stakeholders including debt providers and equity investors