

# VPPA

## Virtual Power Purchase Agreements

June 2023

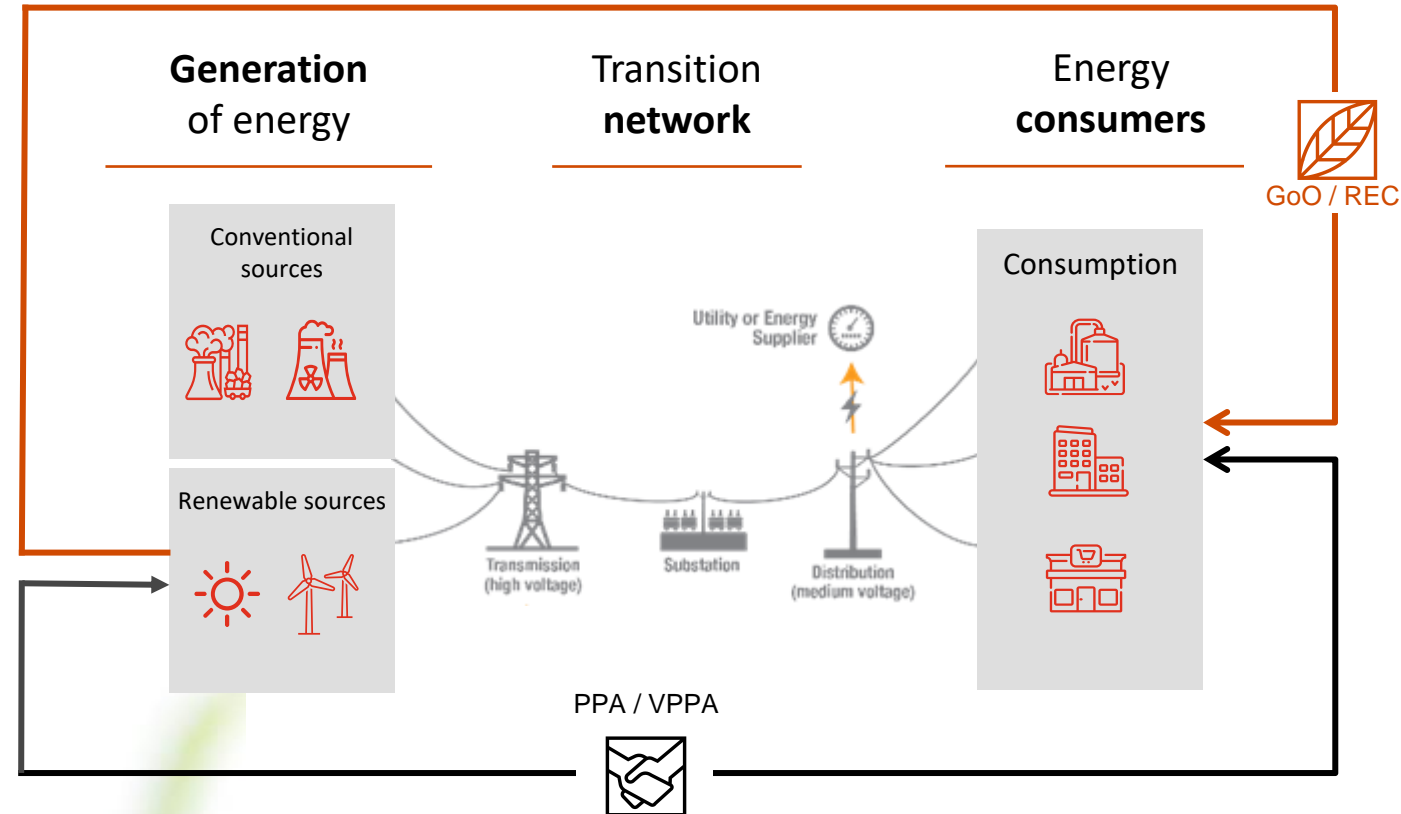


# Power purchase agreements

## Why and How?

### Use of green energy

1. **Purchase of renewable energy certificates** ('GoOs or RECs') on a stand-alone basis in the market.
2. **Physical power purchase agreements ('PPAs')** for green electricity. The entity also purchases RECs based on the electricity produced by the generation facility.
3. **Financial settlement of green electricity through a virtual power purchase agreement ('VPPA')** and purchase of RECs from a generator.



# Power purchase agreements

## Why and How?

### Physical energy purchase

Those entities entering into the VPPA aims to purchase the physical energy for their actual energy consumption at spot prices (i.e. - **pay spot price**)

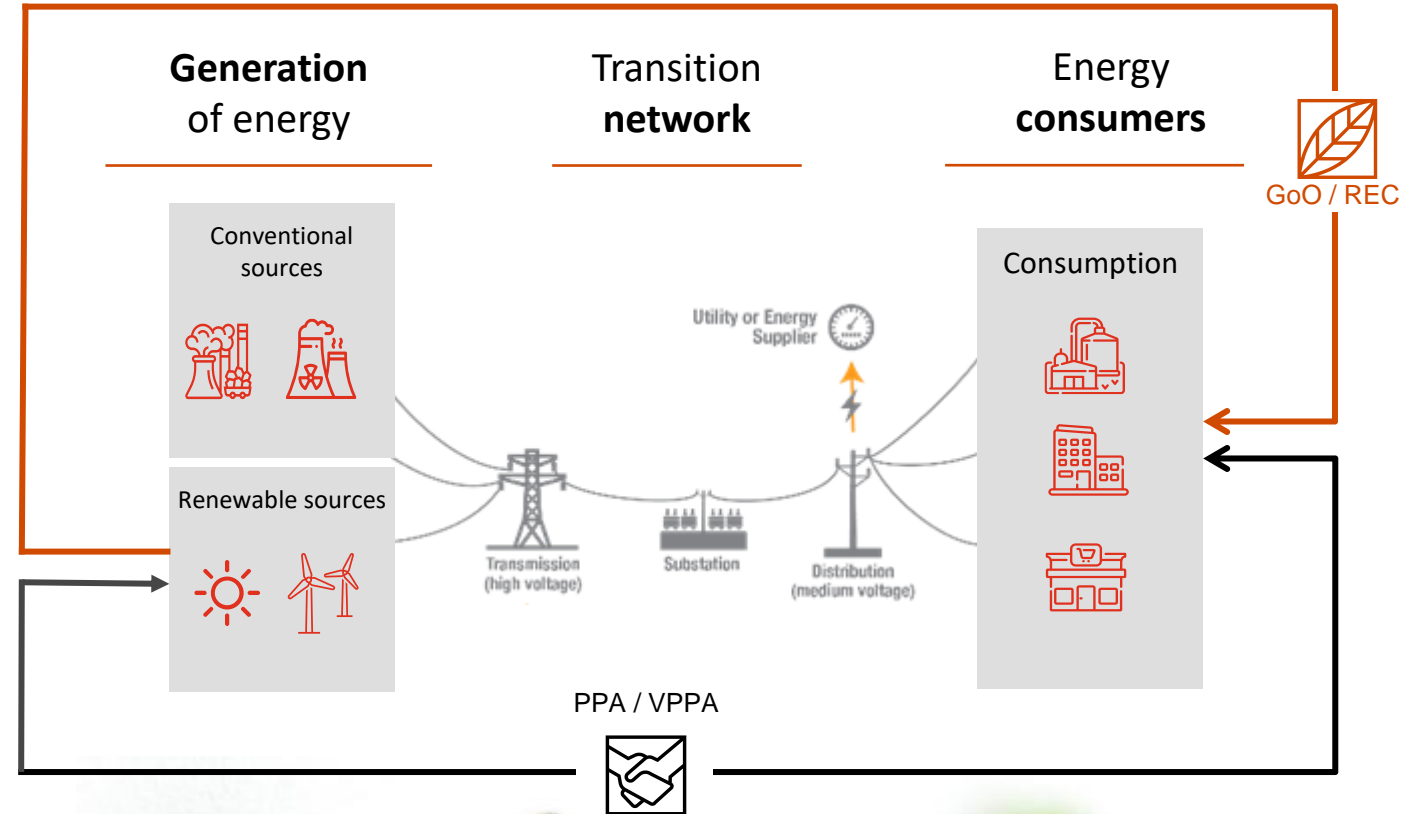
On its own, this would create a risky exposure for the actual and potentially highly volatile market prices of energy, which would lead to completely unpredictable costs of energy consumption.

### VPPA settlement

The cash-flows from the VPPA helps to reduce or eliminate this risk. VPPA is structured as a financial swap on which the purchasing entity:

- **pay fix price** for a volume of generated energy
- + **receive spot price** for a volume of generated energy

**The sum** of the above highlighted cash-flows for the purchasing entity **is the „pay fix price“** in accordance with the price contracted within the VPPA.



# VPPA - Virtual Power Purchase Agreement

## Key terms and conditions

### Purchase of GoOs

One of the key contract element is the purchase of the GoOs, which represents a „**host contract**“ for the accounting and reporting purposes.

- GoOs at fixed price
- **1 GoO = 1MWh** of electricity generated
- Fulfills the definition of derivative under IFRS 9, but **own use exemption applies** due to the cancelation on purchase / transfer

### Electricity - volume

The second crucial part of the contract is the „**virtual purchase**“ of **electricity**. In fact, no electricity is purchased (transferred from seller to buyer), but the volume of the electricity generated by the asset forms a basis for a financial settlement between the seller and buyer.

- Volume defined „**pay-as-produced**“ i.e. any volume generated by the asset will be subject to the financial settlement
- **Expected volume is p50**
- **Minimal volume is p90**
- Max volume – would be possible, but not included in current contracts

### Electricity - price

The contract requires a financial settlement based on the price differential multiplied by volume of electricity generated by the asset.

The price differential is calculated between the contractually defined electricity price index (FLOAT) and contractual FIX price.

This element of the contract, together with the volume, defines the embedded derivative, which requires a separation from the host contract (GoOs) and requires recognition at fair value.

- **FIX price** (paid by Buyer)
  - step-ups on yearly
  - indexation by CPI
- **FLOAT price** (received by Buyer)
  - floored at zero (can not be negative)
  - can be subject to various adjustments (for example national price zones)

# VPPA - Virtual Power Purchase Agreement

## Real life example - Contract terms and economics



### Contract terms

- VPP
  - Brewery is the buyer
  - Electricity company is the seller
- Volume: Defined „pay-as-produced“
- Key terms:

Buyer pays Seller receives	FIX price at 55 €/MWh
Buyer receives Seller pays	FLOAT price Hourly spot price
Settlement:	Volume * (FLOAT – FIX)
Duration:	10 years (2020 – 2029)

### Other contract structures seen in the market:

- Volume fixed or fixed within a range
  - Price fixed or within a range
  - Underlying price indexed to e.g. FX, Interest rate, GDP, etc....
- and all combinations thereof....

### Economics

Buyer:

- Value = Market price - 55 €/MWh – premium

Seller:

- Value = 55 €/MWh - Market price + premium

### Risks:

Value is at risk since market price is floating and production cost to a larger extend fixed

### The numbers... what does that mean?



# VPPA - Virtual Power Purchase Agreement

## Fair value calculation and its movements

### Accounting Methodology:

- **Host contract (GoO)**
- **Embedded derivative (electricity swap):** recognized at fair value.  
The fair value is calculated using simple DCF
  - *highly volatile, its main driver is electricity market price*
  - *for example the change in price of electricity by 1EUR/MWh had impact of 800 000 EUR*
- **Future cash-flows estimation:**
  - *estimated volume of electricity generated by the asset and*
  - *future electricity price.*

### Input data:

- **Generation volume estimates:** from history?
- **Future price estimates:** sources?
- **Other:** discount curve, counterparty credit spread

# VPPA - Virtual Power Purchase Agreement

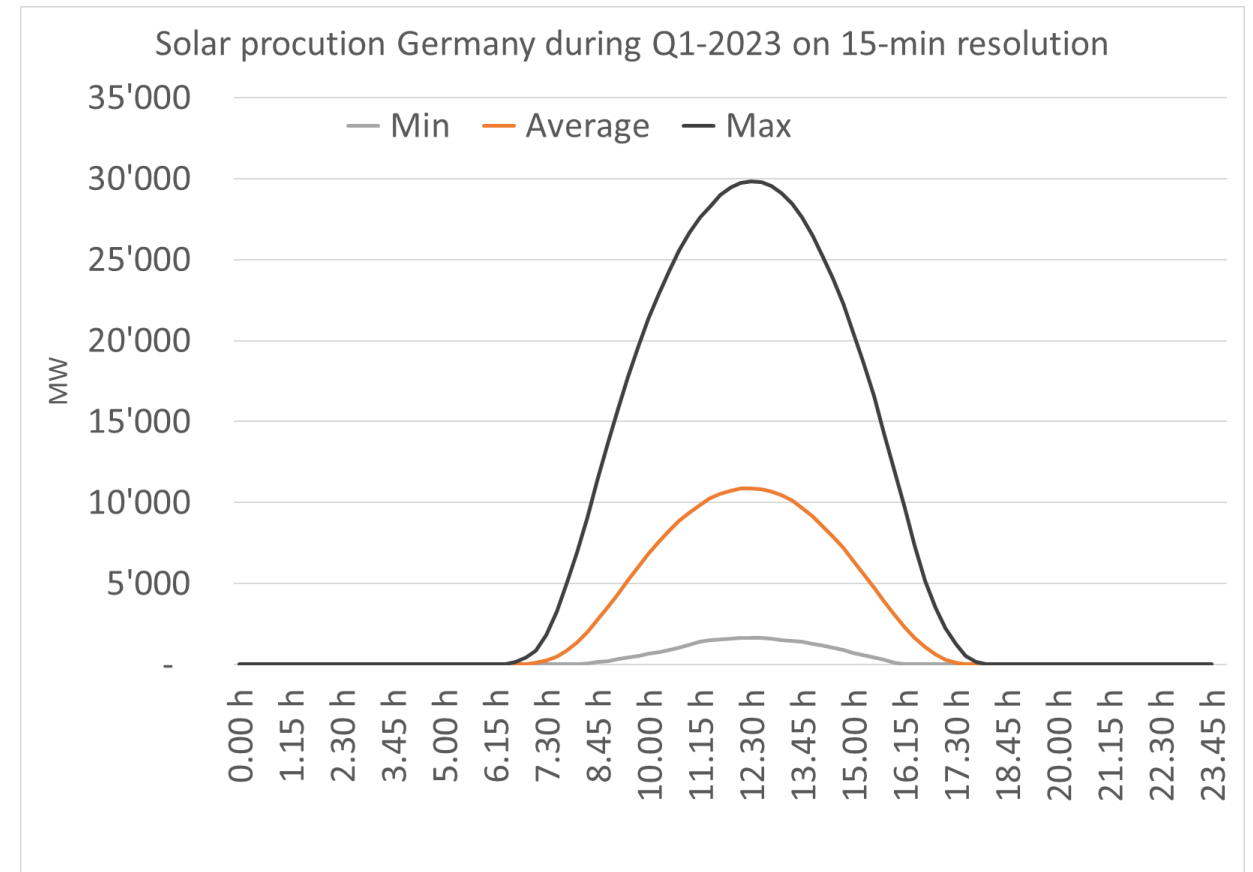
## Real life example – solar energy production

### Observable data:

- Production output from Solar
- have a well known pattern - day and year
- have low uncertainty start and end of the day
- have high uncertainty during peak production

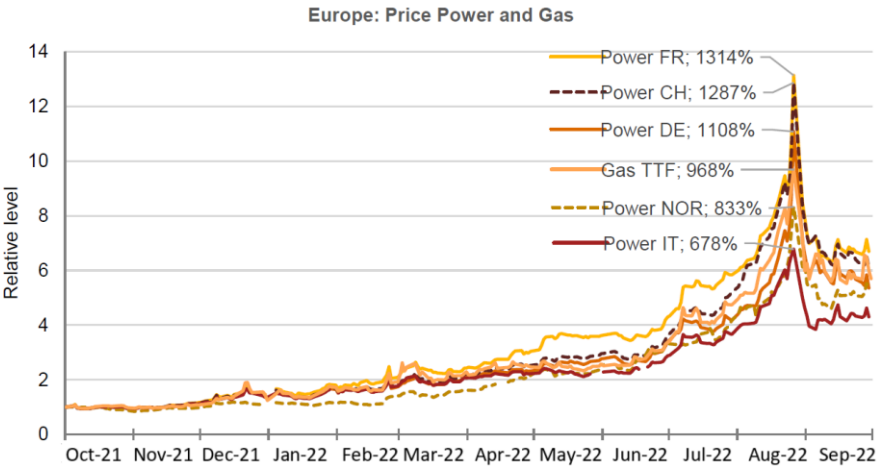
### Consequences for pricing

- Since power prices during working hours are higher than during non-working hours, valuation based on a lower granularity would be wrong.

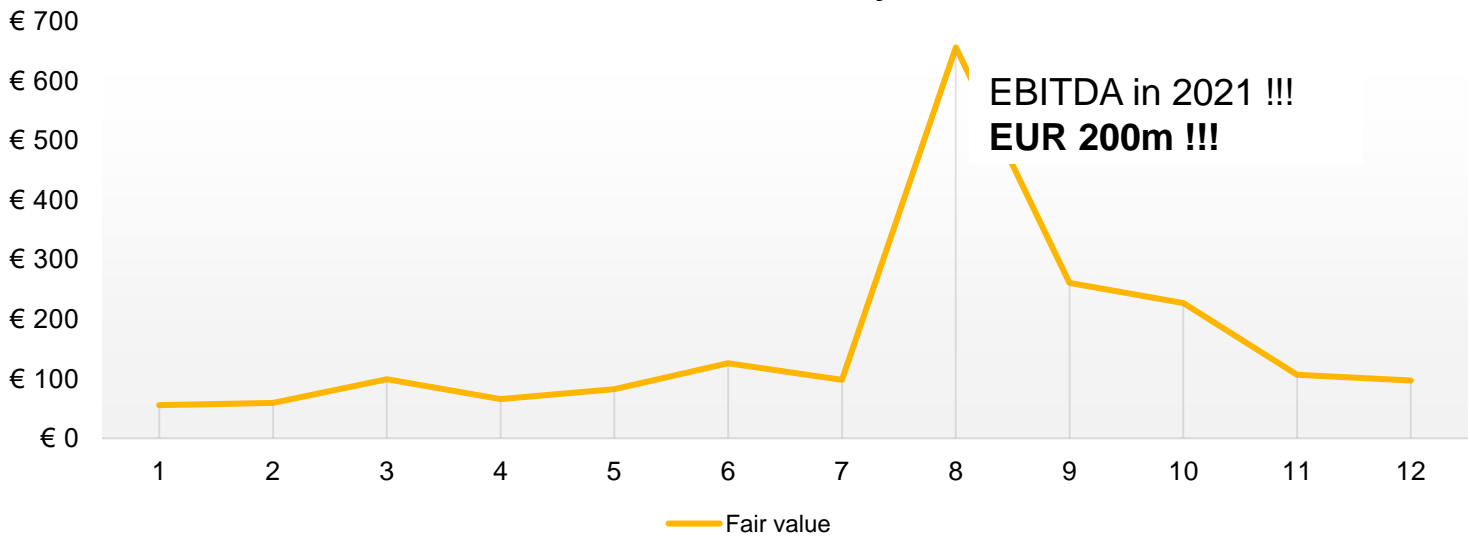


# VPPA - Virtual Power Purchase Agreement

## Fair value calculation and its movements



VPPA fair value / monthly in 2022





# Power purchase agreements

## Hedge accounting - basis for designation

### Hedge accounting

The accounting scheme presented on a previous slide is a **cash-flow hedge** in which the VPPA is a hedging instrument used to hedge the spot purchases of physical energy. **The offset** between the energy produced by a green energy source and the energy consumed by the brewery **is not perfect**; in accounting worlds this is called ineffectiveness which has two key sources in case of ASAHI:

### Volume & profile

Sources of green energy are usually do not generate energy whole day long or with the same volume throughout the whole day, while the brewery energy consumption is more or less continuous during day.

For example, **the solar power plant does not produce any energy during the night, while the brewery still consumes.**

The same applies for a yearly seasons. For example, the wind power plant produces more energy during the winter and less during the summer months, while the brewery yearly consumption profile is opposite.

### Price index

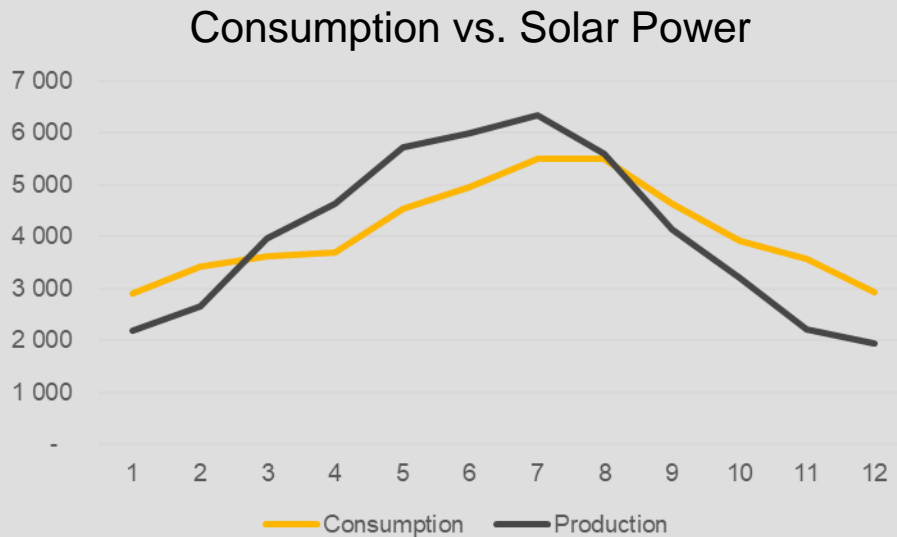
All of the similar green energy sources within similar location produces the energy in the same hours, for example when the sun shines or wind blows.

This results in the over-supply for the energy grid, which pushes the prices of energy down; effect know as „price cannibalization“. For these purposes, the green sources of energy has its specific price estimation indexes, called „capture prices“.

On the other hand, the brewery consumes in majority or all hours during the day, ultimately for different prices, usually estimated by a price index called „base-load“ or „peak-load“

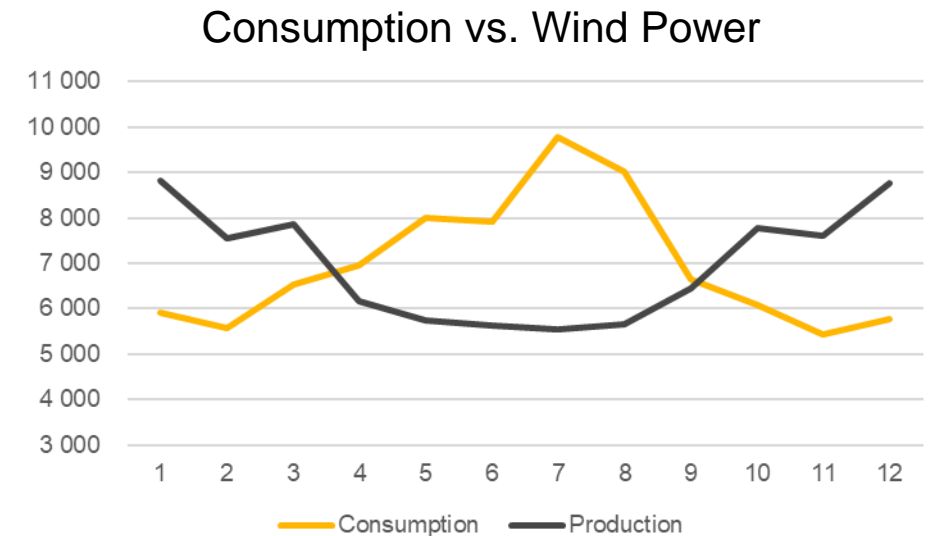
# Power purchase agreements

## Hedge accounting - Volume & Profile ineffectiveness



The graph shows the consumption and solar power plant production volumes in each month during a particular year.

In Winter months the solar power plant output is not sufficient to cover the entire energy consumption of a brewery, while in summer months, the energy generated by a solar power plant exceeds the volume of energy consumed by a brewery, but overall it is obvious that the offset is on acceptable level due to the similar profile of both curves.



The graph shows the consumption and wind power plant production volumes in each month during a particular year.

While the offset of solar power plant production and brewery consumption could be acceptable due to the similar of the profiles, the wind power plant profile is usually opposite to the brewery which could bring significant ineffectiveness.

Celkové načasování procesu: 3-9 měsíců



V PwC máme CEE cPPA Hub - iniciativu, která spojuje týmy PwC z Bulharska, Estonska, České republiky, Maďarska, Lotyšska, Polska, Rumunska, Slovenska, Chorvatska a dalších zemí jižní Evropy, které se podílejí na projektu cPPA.

Provádíme četné věcné workshopy s klientem, které poskytují základ pro efektivní rozhodování v rámci projektu. Během workshopů se snažíme zlepšit klientovo porozumění obchodním, účetním, daňovým a právním důsledkům podpisu smlouvy cPPA. Tento model spolupráce pomáhá zvýšit povědomí klienta o genezi smlouvy, časovém harmonogramu projektu a také nastiňuje cestu kroků na straně klienta, které by měl podniknout, aby podepsal výhodnou smlouvu.

## Jak můžeme pomoci?

Klientům poskytujeme plnou podporu při řešení všech potřeb souvisejících se spotřebou energie - od analýzy potenciálu cPPA společnosti přes proces uvádění na trh, získávání nabídek od uchazečů, analýzu ziskovosti a hodnocení rizik až po podporu při vyjednávání a podpis cPPA s výrobcí.

[Žádost o nabídku >](#)

Úvod

Co je PPA/cPPA?

Druhy cPPA

Objemové vypořádání

Jaké jsou výhody?

Výzvy

Jak můžeme pomoci?

Případová studie Orange Polska

Naše zkušenosti

# Thank you

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