

Understanding the renewables power purchase agreements market

Fields marked with * are mandatory.

The following survey has been designed on behalf of the European Commission. The objective is to shape a thorough understanding of the current state of the Power Purchase Agreement (PPA) market in Europe, including market dynamics and challenges, as well as opportunities and future developments. Your valuable contribution in this effort will ultimately contribute to informed policy-making and strategic decisions at the European level.



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Contact Info

* Country

Austria

- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxemburg
- Malta
- Netherlands
- Norway
- Other
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- UK

* Name of organization: BDEW

Name of the respondent: Krassimir Stantchev

Respondent's department: Department of Energy Trading

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Email address: Krassimir.stantchev@bdew.de

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Correspondent's business group

* In which of the following categories would you identify your area of business?

- Group 1: **Market participants** (e.g. offtaker/corporate energy buyer, developer, utility company, etc.)
- Group 2: Entities supporting market participants for PPA business-related topics** (e.g. advisory, legal services, **trade association**, bank, etc.)
- Group 3: **Other relevant stakeholders** (e.g. NEMO, TSO, NRA, ministry, academia, think tank, etc.)

* Which of the following better describes your area of business?

- Developer
- State Authority/ Ministry
- Portfolio Manager/ Aggregator
- Utility Company/ Supplier
- Transmission
- Legal Service
- Trader
- Distribution
- Think Tank / Advisory / **Association**
- Consumer
- NEMO
- Other
- Regulatory Authority
- Financial Institution

* Which **side** of the PPA market would you most identify with?

- Buyer
- Seller**
- Enabler
- Other

General information of the stakeholder

* How **many** persons does your organization employ?

- 1-19
- 20-99
- 100-499**
- 500+

PPA Experience

What are the primary **areas** on which you are seeking information and/or support regarding PPAs?

- Costs** and **benefits** of PPAs
- Options and deal **structures**
- Economic or **financial** aspects
- Legal** and **accounting** issues
- Electricity** markets
- Strategies for securing internal **support**
- Template** documents (e.g. RFPs, term sheets)
- Strategies for **aggregated** deals
- Hedging** instruments
- Other

If your country has **multiple bidding zones**, is it possible to sign a PPA between assets in different zones?

- Yes
- No
- I don't know

What are your expectations, regarding the **PPA market outlook** in your country, within the next 5 years?

- Growth
- Decline
- Remain constant

PPA Insights

Transparency and interaction with other electricity markets

"Transparency" refers to access to information, including pricing and cost structure, contract terms, generation and delivery details, regulatory compliance and risks, as well as sustainability reporting.

Please rate the **importance** of PPA market **transparency**, for the conclusion of a PPA, on a scale of 1 (not important) to 5 (most important).

- 1
- 2
- 3
- 4
- 5

To what extent would you rate the lack of a **publicly available PPA price index** as a **barrier** for developing/signing a PPA, on a scale of 1 (not important) to 5 (most important)?

- 1
- 2
- 3
- 4
- 5

Please rate the impact of a growing PPA market on the **liquidity** of the following electricity **markets**, on a scale of 1 (least impact) to 5 (most impact).

	1	2	3	4	5
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Forward	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Day-Ahead	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Intraday	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Balancing	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Interaction of PPA markets with RES Support Schemes

RES Support Schemes (such as two-way CfDs) refer to state-backed policy mechanisms that promote renewable energy deployment by providing financial incentives.

How do you think that public RES support schemes **impact** the development of **PPA** markets, on a scale of 1 (negatively) - 5 (positively)

- 1
- 2
- 3
- 4
- 5

How would you rate the **attractiveness** of the following measure, on a scale of 1 (not attractive) - 5 (very attractive)?

Allowing **projects**, which reserve **part** of the electricity for sale through a renewable **PPA**, to **participate in support schemes** for electricity from RES

- 1
- 2
- 3
- 4
- 5

Standardization of PPAs and existence of market platforms for trading products

Do you currently have access to **standardized** PPA contracts?

Yes

No

Are there any **organized market platforms for PPAs**, that you are aware of?

- Yes, in my country
- Yes, in another country
- No

Please rate the importance of the following **barriers**, regarding the development and operation of a PPA **market platform**,

on a scale of 1 (least important) to 5 (most important):

	1	2	3	4	5
Limited market liquidity due to low participation from buyers or sellers	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of regulatory clarity surrounding PPA contracts and market rules	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of standardized contract templates and terms	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Guarantees of Origin (GOs) in PPA contracts

Are **GOs**, linked to **virtual** PPAs, considered a mechanism for decarbonizing products and reducing environmental impact?

- Yes
- No

Barriers to the development of PPA markets

Please rate the **importance** of the following **EU level** regulatory barriers for the **development of PPA markets**

on a scale of 1 (least important) to 5 (most important):

	1	2	3	4	5
EU Policy regarding the development of RES , specifically onshore wind and PV	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EU Policy regarding the development of offshore wind	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EU Policy regarding the development of nuclear energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EU Policy regarding the development of hydrogen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
EU Policy regarding sustainability goals of European industrial /commercial consumers	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Treatment of PPAs as derivatives (IFRS 9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Treatment of PPAs as leasing (IFRS 16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

Please rate the **importance** of the following **country level regulatory barriers** for the **development of PPA markets**,

on a scale of 1 (least important) to 5 (most important):

	1	2	3	4	5
Unclear grid access framework/rules for RES stations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Complex/unclear local licensing framework, for the development of RES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Unclear policy regarding the treatment of curtailments	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inability for consumers to procure energy through multiple suppliers	X	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental / social restrictions towards the development of RES in specific areas with rich RES potential	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complex market clearing and settlement framework due to electricity market rules	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For <u>physical</u> PPAs: Market structure restrictions on direct contracts between generators and off-takers, requiring intermediaries (e.g. utilities) to facilitate transactions	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the importance of the following **country level non-regulatory barriers** for the **development of PPA markets**,

on a scale of 1 (least important) to 5 (most important):

	1	2	3	4	5
Limited liquidity of forward markets for counter-hedging PPAs	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited tools for hedging volume and shape risk	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High degree of vertical integration , reducing the size of PPA markets	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of standardization for PPA contracts	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Absence of tools to mitigate off-takers' credit risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Too small electricity consumption of off-taker's (e.g. SMEs), compared to available RES projects	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of technical knowledge from financial institutions, regarding assessment of PPAs, especially for new technologies	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complex framework or demanding procedures for negotiating / signing a PPA (legal, technical, market, financial, tax etc)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Increased administrative costs for signing a PPA (from conceptualization to signature)	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased administrative costs for operating a PPA in terms of clearing, settlement or other market obligations	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Apart from the barriers listed above, please indicate any other barrier that may apply to your case:

Do you believe that a PPA can be easily **financially evaluated**?

- Yes
- No

PPA Categories

Demand Aggregation and Multi-Buyer PPAs

A "Multi-Buyer" or "Aggregated" PPA involves the pooling of multiple buyers, to collectively purchase energy as one party, under a single PPA agreement. Typically, smaller corporates with smaller consumption aggregate their demand to meet the off-take volume required for constructing new renewable energy projects.

Is it **possible** to enter multi-buyer PPAs in your country?

- Yes
- No

Please rate the **importance** of the following **barriers** regarding multi-buyer PPAs, on a scale of 1 (least important) to 5 (most important).

	1	2	3	4	5
Coordination and negotiations for alignment of multiple off-takers on uniform contract terms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Complexity of customized contract terms in separate bilateral agreements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Joint venture considerations, such as: Partner selection, governance, exit arrangements, conflict resolution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Individual credit and transaction risk of small off-takers and default risk allocation considerations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Difficulties in forming buyer partnerships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Unclear or non-existing relevant regulatory framework for demand aggregators	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate any additional possible reasons for **not** entering a multi-buyer PPA agreement

Hybrid PPAs

A "Hybrid PPA" includes the supply of electricity from a hybrid energy system, which combines different types of RES and storage solutions.

Please rate the **importance** of the following **barriers** regarding hybrid PPAs on a scale of 1 (least important) to 5 (most important).

	1	2	3	4	5
Economic challenges due to high storage technology costs	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited understanding / trust in the economic viability of Hybrid PPAs	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complexity of financial valuation of hybrid PPA	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited differentiation in available renewable energy sources types	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited available electricity storage capacity	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of regulatory framework for the development of electricity storage	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate any additional possible reasons for not entering a hybrid PPA agreement.

The challenge is that an aggregator needs to disaggregate the production and to allocate the individual profiles / shares to the respective off-taker and then to complement the PPA volume to full supply.

How **supportive** are current **policies** in your region for hybrid developments?

- Very supportive
- Not supportive
- Supportive but *

supportive but improvements are required in regulatory frameworks and grid integration as well as storage

Cross-border PPAs

In a "Cross-border PPA", the corporate buyer and renewable electricity generator are located in a different bidding zone / electricity market.

Please rate the following statement, on a scale of 1 (strongly disagree) to 5 (strongly agree):

The level of **market coupling** is important for me when assessing a cross-border PPA.

- 1
- 2
- 3
- 4
- 5

Is it **possible** to engage in a **physical** cross-border PPA?

- Yes
- No

How important is the **transferability** of **GOs** in a cross-border PPA, on a scale of 1 (not important) to 5 (most important)?

- 1
- 2
- 3
- 4
- 5

Please rate the importance of the following **barriers**, for developing a **cross border** PPA in your region, on a scale of 1 (least challenging) to 5 (most challenging):

	1	2	3	4	5
Lack of transmission rights with durations > 1 year	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Insufficient interconnection capacity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Limited offers for cross-border PPAs	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited instruments for hedging cross-border PPA risks (especially basis risk)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased complexity regarding the design, negotiation and implementation of cross-border PPAs	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Absence of a common , integrated framework regarding GOs	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regulatory complexity / lack of harmonization between countries or uncertainty in policies	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
High transaction costs and financing challenges	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please specify any other possible reasons for **not** signing cross-border PPAs:

1. PPAs in the context of offshore bidding zones are not feasible with the current regulation. Current transmission rights do not allow for proper hedging of long-term cross border projects.

PPAs beyond RES

Nuclear PPAs

"Nuclear PPAs" refer to energy off-take agreements for electricity generated from a nuclear power plant.

Is it currently **possible** to sign a nuclear PPA in your country?

- Yes
- No

Please rate the following statement, on a scale of 1 (strongly disagree) to 5 (strongly agree):

Nuclear PPAs are essential tools to enhance the **competitiveness** of local and EU **industries**.

- 1
- 2
- 3
- 4
- 5

What are your expectations, regarding the **Nuclear PPA market** outlook in your country, within the next 5 years?

- Growth
- Decline
- Remain constant

Hydrogen PPAs

"Hydrogen PPAs" refer to the purchase of hydrogen, typically produced from renewable energy (green hydrogen).

Is it currently **possible** to sign a Hydrogen PPA in your country?

- Yes
- No

Please rate the following statement, on a scale of 1 (strongly disagree) to 5 (strongly agree):

Hydrogen PPAs are essential tools to enhance the **competitiveness** of local and EU **industries**.

- 1
- 2
- 3
- 4
- 5

What are your expectations, regarding the **Hydrogen PPA market** outlook in your country, within the next 5 years?

- Growth
- Decline
- Remain constant

Biofuel Purchase Agreements

"Biofuel Purchase Agreements" refer to the purchase of biofuels.

Is it currently **possible** to sign a PPA based on biofuels in your country?

- Yes

No

Please rate the following statement, on a scale of 1 (strongly disagree) to 5 (strongly agree):

Biofuels PPAs are essential tools to enhance the **competitiveness** of local and EU **industries**.

- 1
- 2
- 3
- 4
- 5

What are your expectations, regarding the **Biofuel PPA market** outlook in your country, within the next 5 years?

- Growth
- Decline
- Remain constant

Heat Purchase Agreements

"Heat Purchase Agreements" include the purchase of thermal energy (heat).

Is it currently **possible** to sign a Heat Purchase Agreement in your country?

- Yes
- No

Please rate the following statement, on a scale of 1 (strongly disagree) to 5 (strongly agree):

Heat purchase agreements are essential tools to enhance the **competitiveness** of local and EU **industries**.

- 1
- 2
- 3
- 4
- 5

What are your expectations, regarding the **Heat purchase agreements market** outlook in your country, within the next 5 years?

- Growth
- Decline
- Remain constant

Final Feedback on PPA Market Development

PPA market enhancement methods

The following section refers to all types of PPAs.

Please rate the **effectiveness** of the following measures, for **enhancing** the PPA markets in your country, on a scale of 1 (*not effective*) to 5 (*most effective*):

	1	2	3	4	5
Provision of connection term priority to RES projects with PPA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Allowing projects which reserve part of the electricity for sale through a renewable PPA to participate in support schemes for electricity from RES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	X	<input type="radio"/>
Development of voluntary PPA templates	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development of organized PPA market platforms	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design of credit risk guarantee schemes for off-takers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	X
Enabling consumer aggregation in the framework of PPAs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	X	<input type="radio"/>
Provision of tools for hedging PPA price/shaping risk	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Offering tax credits, subsidies or other financial incentives for both buyers and sellers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Introduction of long-term transmission rights with durations longer than one year in order to enable physical cross-border PPAs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Enhancement of transparency and clarity regarding PPA pricing , in order to ensure trust between the parties	X	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provision of training to help stakeholders effectively engage in PPA markets	<input type="radio"/>	X	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduction of the complexity of licensing process for projects with PPAs	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Apart from the practices listed above, please indicate any other measures that will enhance the PPA market according to your opinion:

PPA market developments

The following section refers to all types of PPAs.

Please rate the following possible **developments** of your **country's** PPA market, according to their **significance** to you, on a scale of 1 (least significant) to 5 (most significant):

	1	2	3	4	5
Movement of PPA markets towards more standardized products, that are agreed on market platforms or become tradable on liquid secondary markets, where both national and cross-border PPAs can be agreed and/or traded	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased diversification in the types of customers that have access to PPAs, including smaller companies and citizen organizations (directly or through aggregators and multi-buyer PPAs)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased diversification in the types of sources that participate in PPAs, including RES, nuclear, storage and other non-RES resources	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Contact

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