PPAs: A Comparative Study Towards the EU Green Deal

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EDITOR' S NOTE

The recent REPowerEU Plan of the European Commission considers Power Purchase Agreements (PPAs) a key driver to achieve the new 2030 target of 45% share of renewable energy. According to the European Commission, such target is essential to ensure the timely and effective achievement of carbon neutrality in 2050. However, the diffusion of PPAs is facing several challenges across EU Member States due to both market and legislative barriers which are intrinsic to the long term nature of PPAs. The volume investigates the legislative and market framework for PPAs in different EU Member States (Germany, Hungary, Italy, Portugal, Spain) to identify best practices for the diffusion of PPAs and to contribute to the EU debate on climate policies. The most relevant aspect of the book is its comparative and methodological value. The research, indeed, focuses on the potential market failures which, all other else being equal, may potentially affect the diffusion of PPAs in the countries subject to investigation. Identifying, in particular the regulatory and legislative solutions in place in each country to address market failures, such as: transaction costs, information asymmetry, externalities or monopoly power. The project is designed to be a useful tool for policy and decisionmakers on national and European level.

Renata Gravina

Fondazione Luigi Einaudi ETS

SECTION I

Introduction

CHAPTER 1

Chapter 1

Introduction

Simona Benedettini

The REPowerEU Plan, launched by the European Commission[1] (EC) in May 2022, defines the strategy of the European Union to transform Europe's energy system. The Plan identifies the actions according to which the European Union can tackle the climate crisis while, at the same time, puts an end to its dependence on Russian fossil fuels.

A cornerstone of the strategy is the acceleration of the roll-out of renewables, with respect to which the Commission has proposed to increase the 2030 target from 40% to 45%.[2] On March 2023, the European Parliament, the EU's executive Commission, and EU Member States have reached an agreement to set such target at a value of 42,5%.[3]

To this aim, Power Purchase Agreements (PPAs) are considered a key instrument to ensure the timely and effective decarbonisation target in 2030. As established in art. 2 of Directive (EU)

1 European Commission, 2022. Communication from the Commission to the European Parliament, the European Council, the Council, the European economic and social committee and the committee of the regions. REPowerEU: Joint European Action for more affordable, secure and sustainable energy. https://eur-lex.europa.eu/resource.html?uri=cellar:71767319-9f0a-11ec-83e1-01aa75ed71a1.0001.02/DOC_1&format=PDF

2 See footnote 1.

3 Euractiv, March 23, 2023. EU strikes deal on renewable energy law, agrees 42.5% target by 2030. https://www.euractiv.com/section/energy-environment/news/eu-strikes-deal-on-renewable-energy-law-agrees-42-5-target-by-2030/

2018/2001[4], (renewable) PPAs shall be intended as 'a contract under which a natural or legal person agrees to purchase renewable electricity directly from an electricity producer'. As outlined by the recent proposal of the European Commission to improve the design of the electricity market,[5] PPAs can protect against price volatility and can enhance both the stability and the predictability of energy costs, thereby contributing to the competitiveness of the EU economy in facing excessive volatile prices.

Despite such convincement, the diffusion of PPAs is facing several challenges across EU Member States due to regulatory, policy, and economic barriers, as well as awareness issues.[6]

This publication presents the findings of the research 'Power Purchase Agreements to achieve the net-zero target'. In particular, the research investigates the market failures at the basis of the limited diffusion of PPAs in Europe and addresses the legislative and regulatory solutions provided in different Member States to address such market failures. The following countries are under scrutiny: Hungary, Germany, Italy, Spain, and Portugal.

The REPowerEU Plan, launched by the European Commission (EC) in May 2022, defines the strategy of the European Union to transform Europe's energy system

4 Directive (EU) 2018/2001of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG

5 Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0148

6 DG ENER, 2019. Competitiveness of corporate sourcing of renewable energy. Annex C to part 2 of the study on the competitiveness of the renewable energy sector, Synopsis report: Online survey and interviews with EU stakeholders - Publications Office of the EU (europa.eu). https://op.europa.eu/en/publication-detail/-/publication/d0b1cbb0-c488-11e9-9d01-01aa75ed71a1/language-en/format-PDF/source-252625161

The aim of the research is to identify potential best practices and limitations in the approach of Member States to foster the diffusion of PPAs and support the rollout of renewables. Particularly, the findings of the research are expected to contribute to the EU debate on the definition of the policies supporting the decarbonisation of the energy sector.

The document is organised as follows. Section 2 provides an overview of PPAs, their salient features, their development across electricity markets at the EU level, and the main barriers to their diffusion. Section 3 discusses the state of the art of the EU legislative and regulatory framework on PPAs. Section 4 presents the methodological approach for the analysis. Sections 5 to 9 discuss the findings of the analysis for, respectively, Hungary, Germany, Italy, Spain, and Portugal. Section 10

summarises the results of the analysis and discusses some policy recommendations to promote the achievement of EU decarbonisation targets by means of PPAs.

An overview of Power Purchase Agreements

CHAPTER 2

Chapter 2

An overview of Power Purchase Agreements

Simona Benedettini

As outlined in Section 1, the EU Directive 2018/2001 defines (renewable) PPAs as a contract under which a natural or legal person agrees to purchase renewable electricity directly from an electricity producer. PPAs are long-term contracts which usually have a duration greater than three years and up to twenty or twenty-five years.

Given their nature of long-term contracts, PPAs provide several benefits to the parties involved in the agreement. For the off-takers, renewable PPAs essentially provide cost-competitive electricity for their activities, and they can be used as a hedging tool against electricity price-associated risks from the wholesale market. For renewable projects developers, PPAs provide an alternative and/or complementary source of stable income compared to public support schemes or merchant markets.

PPAs can be classified according to different dimensions: the location of the renewable energy project; the pattern of exchange of the electricity produced by the power plant financed by means of the PPA; the actors

involved in the power or financial exchange; the pricing structure.

On-site PPAs refer to renewable energy projects developed in proximity of the consumption site of the off-taker. The power plant is usually developed by a third-party which has the ownership of the asset as well as the responsibility to manage the facility production. The electricity produced is directly sold to the buyer. Off-site PPAs refer to renewable energy projects which are not necessarily built in the proximity of the consumption site of the off-taker. Off-site PPAs can be classified in:

- sleeved (or Physical) PPAs: the electricity producer sells the electricity to an intermediary (usually a licensed retailer) that handles the transfer of money and energy to, and from, a renewable energy project on behalf of the buyer. The intermediary takes the electricity directly from the power plant and 'sleeves' it to the off-taker for a given fee;
- virtual (or Financial) PPAs (VPPA): a virtual PPA entails a purely financial transaction. No electricity flows to the buyer from the renewable energy project. Differently, the electricity produced from the project flows directly into its local grid. Virtual PPAs generate guarantees of origins (GOs)[1] owned by the buyer – which can be employed to reduce its scope 2 emissions. Usually, a Virtual PPA establishes a fixed price for the electricity produced (the so-called 'strike-price'). Therefore, if the wholesale market price, i.e., the price the local grid pays the project developer for the power, exceeds the strike price, the VPPA buyer is paid the difference. If the market price is lower than the VPPA price, the buyer must make up the difference.

PPAs can also differ with respect to their pricing structure. To this purpose, the market practice highlights the occurrence of several pricing mechanisms. The most common formula is the fixed pricing structure according to which the buyer locks in a fixed electricity price (with no inflation indexation) for the duration of the PPA contract. Other pricing structures may entail the periodic update of the price. For example, the

1 A guarantee of origin is an electronic document which has the sole function of providing evidence to a final customer that a given share or quantity of energy was produced from renewable sources.

buyer locks in a starting electricity price that rises (or less commonly decreases) according to a contractual profile. The steps may be in nominal terms (without inflation) or in real terms with inflation indexation on top. Alternatively, there may be a simple fixed percentage increase per year. Other formulas allow the buyer to secure a discount to market (fixed percentage or amount) over the duration of the PPA. In exchange, the buyer provides the power producer with a floor price, guaranteeing a minimum price for plant production that provides bankability to the project. Nonetheless, this representation of possible pricing structures for PPAs is not exhaustive and, for more details, several studies are publicly available to provide a deeper understanding of the several existing renewable PPAs' pricing structure.[2]

PPAs can be signed by large industrial customers in the role of buyers (Corporate PPAs) as well as by SMEs or residential customers. However, corporate PPAs are the most common. Differently, SMEs and households appear experiencing difficulties in entering in PPAs.[3] In 2019, a survey has been conducted at the EU level, with a deep dive in the PPA market of ten Member States (see Figure 1).[4]

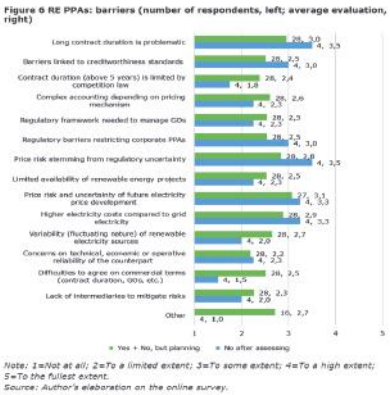

Figure 1: Barriers to the diffusion of PPAs. Source: DG ENER.[5]

2 A detailed representation of the pricing structure of PPAs can be found in: WBSCD, 2019. Pricing structure for corporate renewable PPAs. https://www.wbcsd.org/contentwbc/download/12227/182946/1

3 See note 5.

4 See note 6.

The analysis was aimed at identifying barriers to the diffusion of corporate PPAs, and its findings highlighted several regulatory, policy, and economic barriers, as well as awareness issues hampering the uptake of PPAs. In particular, SMEs appear to be concerned by the length of the contract, the reliability of the counterparty, and the possibility that the PPAs' price can be higher than the price of the grid electricity. Generally, respondents to the survey highlighted several legal obstacles, such as difficulties to signing contracts with more than one supplier, and barriers to the transfer of Guarantees of Origin to the off-taker. Policy barriers included support schemes that were incompatible or that competed with corporate PPAs, as well as a limited visibility on the evolution of support schemes. Economic barriers included creditworthiness of the off-takers, the risk that the PPA's price can differ with respect to the electricity market price during the execution of the contract, the variability of renewable electricity, and the associated costs for managing volume imbalances between the renewable project output and corporate demand. Furthermore, the transaction costs are perceived as still high and a lack of long-term hedging products to address imbalances or counterparty defaults was outlined.

Because of such barriers, PPAs in Europe have not achieved the same diffusion than in other regions of the World (Figure 2).

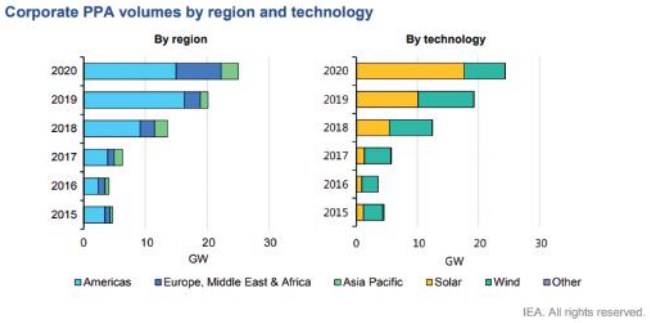

Figure 2: Corporate PPAs signed at the global level (GW). Source: IEA.[6]

5 See note 6.

6 IEA, 2021. Renewable Energy Market Update. https://iea.blob.core.windows.net/assets/18a6041d-bf13-4667-a4c2-8fc008974008/RenewableEnergyMarketUpdate-Outlookfor2021and2022.pdf

In spite of this, the market for corporate PPAs is growing (Figure 3), Spain representing the largest market for PPAs in the EU, followed by France and Germany (Figure 4).

However, since the European Union has set ambitious decarbonisation targets, for which distributed generation will play a relevant role as well, the current level of development of the PPA market appears to be inadequate. A greater volume of contracts, as well as a greater involvement of SMEs, is necessary to encourage the decarbonisation of the energy sectors effectively. The European Union is aware of such limitations that in fact, as it is discussed in Section 3, were recently addressed in several legislative and non-legislative sources representing the reference for the analysis presented in this publication.

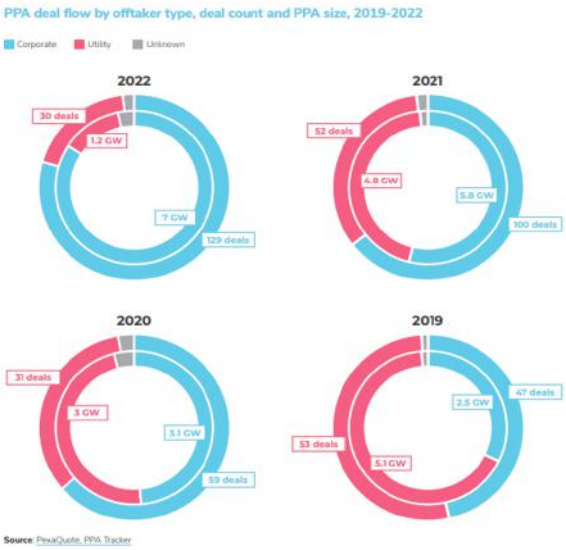

Figure 3: Corporate PPAs signed between 2019-2022. Source: PexaQuote.[7]

7 PexaQuote, 2023. European PPA Market Outlook 2023.
https://storage.pardot.com/891233/1675852816rjodUGY4/European_PPA_Market_Outlook_2023_V9.pdf

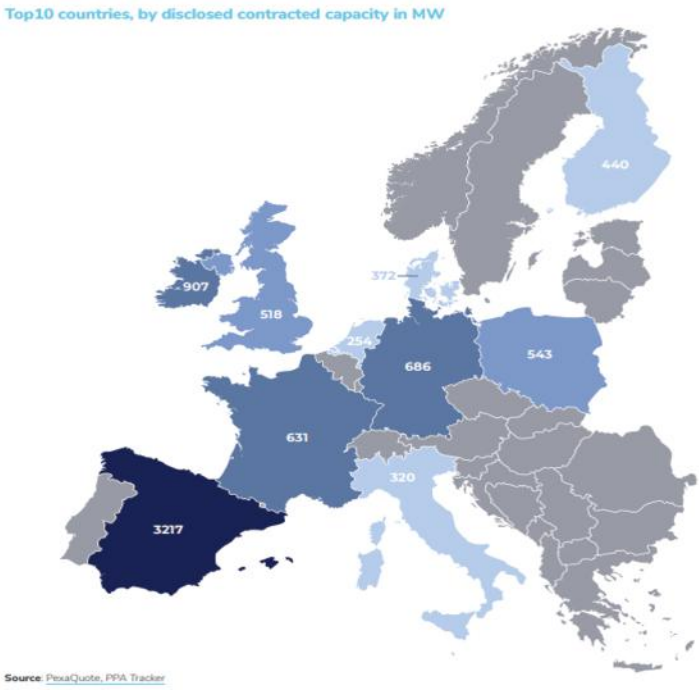

Figure 4: Corporate PPAs disclosed in Europe in 2022 (MW). Source: PexaQuote.[8]

8 See note 13.

The European framework on PPAs

CHAPTER 3

Chapter 3

The European framework on PPAs

Simona Benedettini

Only recently Power Purchase Agreements have been addressed at the EU level, with a growing interest as decarbonisation targets become more ambitious. Specifically, PPAs have been considered in the following legislative and non-legislative provisions:

- the EU Directive 2018/2001 on the promotion of the use of energy from renewable sources (the so-called renewable energy Directive or RED II) and the following European Commission proposal of amendments to RED II:[1]
- the EC Recommendation on speeding up permit-granting procedures for renewable energy projects and facilitating Power Purchase Agreements;[2]
- the EC Proposal for a regulation to improve the Union's electricity market design by amending Regulations (EU) 2019/943 and

1 See note 4.

2 European Commission, 2022. Commission Staff Working Document Guidance to Member States on good practices to speed up permit-granting procedures for renewable energy projects and on facilitating Power Purchase Agreements Accompanying the document Commission Recommendation on speeding up permit-granting procedures for renewable energy projects and facilitating Power Purchase Agreements. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=PI_COM:C(2022)3219

(EU) 2019/942, as well as Directives (EU) 2018/2001 and (EU) 2019/944.[3]

The EU Directive 2018/2001.

The EU Directive 2018/2001 provides the first legal definition of **'renewables power purchase agreement', defined as 'a contract under which a natural or legal person agrees to purchase renewable electricity directly from an electricity producer'** (art. 2).

The same Directive recognises the existence of barriers to the diffusion of PPAs in Member States and the urgency to remove such barriers in order to promote the uptake of such long-term contracts for renewable energy projects. Art. 15.8 of the EU Directive 2018/2001 states that **'Member States shall assess the regulatory and administrative barriers to long-term renewables power purchase agreements, and shall remove unjustified barriers to, and facilitate the uptake of, such agreements'.** To this purpose (art. 15), the Directive establishes the obligation for Member States to describe interventions facilitating the uptake of PPAs in their integrated national energy and climate plans.

Among the possible measures to enable the development of PPAs, the Directive highlights the role of the guarantees of origins. According to the Directive, the latter can help mitigating

Only recently Power Purchase Agreements have been addressed at the EU level, with a growing interest as decarbonisation targets become more ambitious

3 See note 5.

the financial risk associated with PPAs. To this aim, the Directive is concerned that the value of guarantees of origins is addressed appropriately and that Member States allow the allocation of guarantees of origin also to subjects different than producers (art. 19.2): **'It shall be presumed that the market value of the guarantee of origin has been taken into account appropriately in any of the following cases: [...] (c) where the guarantees of origin are not issued directly to the producer but to a supplier or consumer who buys the energy from renewable sources either in a competitive setting or in a long-term renewables power purchase agreement.'**

The role of guarantees of origin in mitigating PPAs' financial risk is considered more exhaustively in the proposal of the European Commission to amend the RED II and published in 2021[4]. In particular, the proposal adds the possibility to transfer guarantees of origin also by means of PPAs: **'Member States shall ensure that those agreements are not subject to disproportionate or discriminatory procedures or charges, and that any associated guarantees of origin can be transferred to the buyer of the renewable energy under the renewable power purchase agreement'.**

EC Recommendation on facilitating Power Purchase Agreements.

Following the REPowerEU Plan, which led to a 2030 target of 42,5% with respect to the incidence of renewable energy sources on gross final energy consumption, the European Commission published recommendations concerning best practices to be implemented in order to promote the diffusion of PPAs across Member States.

In particular, the guidelines suggest interventions by Member States for

4 Proposal for a Directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021PC0557

the uptake of corporate PPAs as well as for long-term contracts for the procurement of renewable energy by small-medium enterprises. The guidelines are the following:

- announce an indicative volume of renewables deployment expected to be financed through PPAs. This provides visibility to renewable power project developers about the expected speed and avenues for project development;
- consider competitive tenders launching the opportunity for renewable power project developers to take 'holidays' from their public support schemes and sell their electricity through PPAs;
- allow the issuing of Guarantees of Origin in public support schemes, so that the revenue from the Guarantees of Origin reduces the need for public financing;
- establish a public platform to increase transparency on price, volume, types, and parties involved in signing renewable purchase agreements;
- flexible contracting for SMEs, including specific guidance for contract termination fees for small enterprises (Art. 12 of the Electricity Directive);
- enable multiple supply contracts, so that suppliers and buyers can contract directly with each other (Art. 4 of the Electricity directive);
- enable the development of on-site or near-site renewable projects that are developed under energy purchase agreements, especially if they are developed 'behind the meter' or through 'private wires';
- de-risk renewable energy purchase agreements via credit guarantees or insurances supported by public financial resources, in line with the state aid guidelines;
- encourage national promotional banks and institutions to offer debt products for large scale renewable energy projects – including offshore wind – in markets where contracting sufficient volumes of renewable purchase agreements ahead of financial investment decisions is difficult, given the size of the assets and the long time

needed for the construction;

- set out regulatory conditions to allow energy communities to sell excess energy through renewable purchase agreements;
- enable small business parks or industrial clusters to collectively purchase renewable energy through long-term purchase agreements.

Proposal of reform of the electricity market design.

The exceptional increase of electricity prices following the energy crisis encouraged Member States to submit to the European Commission possible proposals for the reform of the electricity markets. The objective of these requests for intervention was to make the trend in electricity prices less dependent on changes in natural gas prices.

The European Commission followed up on such requests with a proposal for interventions on the organisation of the European electricity markets published in March 2023 and subject to consultation with the stakeholders.[5] Following the consultation, the European Commission developed a proposal for a Regulation considering four fields of interventions with respect to the functioning of electricity markets:

- promotion of the dissemination of long-term contracts for the purchase and sale of electricity;
- promotion of the dissemination of storage systems and demand-side-response services for the supply of flexibility services to the electricity system;
- promotion of investments in electricity generation capacity from renewable sources;
- interventions to limit the sale prices of electricity to end customers.

5 European Commission. Have your say. Electricity market – Reform of the EU's electricity market design. https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13668-Electricity-market-reform-of-the-EUs-electricity-market-design/public-consultation_en.

With respect to long-term contracts, part of the focus of the EC proposal is on PPAs with the aim of providing secure and stable revenues for renewable and low carbon energy developers, and bring down risk and capital costs – at the meantime avoiding windfall profits in periods of high prices. With respect to PPAs, the EC proposal on the reform of the EU electricity market considers two main areas of interventions:

- reduction of the financial risk borne by PPAs' parties;
- standardisation of PPAs.

The proposal recognises that **'PPAs can protect against price volatility, but they are currently mostly available only to large energy consumers in very few Member States'.** Since one of the main barriers to the growth of the PPA's market is the credit risk that a consumer will not always be able to buy the electricity over the whole period, the EC proposal suggest that:

- Member States should ensure that instruments to reduce the financial risks associated to off-taker payment default are entailed in the framework of PPAs, including guarantee schemes at market prices. Such instruments should be accessible to companies that face entry barriers to the PPA market, and which are not in financial difficulty. For this purpose, Member States shall consider Union-level instruments. Member States shall determine what categories of customers are targeted by these instruments, applying non-discriminatory criteria;
- in designing support schemes for electricity from renewable sources, Member States shall allow the participation of projects which reserve part of the electricity for sale through a PPA or other market-based arrangements, and endeavour to make use of evaluation criteria to incentivise the access to the PPA market for customers that face entry barriers. In particular, such evaluation criteria may give preference to bidders presenting a signed PPA or a commitment to sign a PPA for part of the project's generation from one or several potential buyers facing entry barriers to the PPA market;
- putting an obligation on suppliers to hedge appropriately may also

boost demand for PPAs (which are a way of locking in future prices);

- adoption of a public support guarantee enabling the energy producer to receive a minimum price by the government, but nonetheless allowing the producer to earn the full market price even when this market price is very high;
- PPAs shall specify the bidding zone of delivery and the responsibility for securing cross-zonal transmission rights in case of a change of bidding zone in accordance with Article 14;
- PPAs shall specify the conditions under which customers and producers may exit from PPAs, such as any applicable exit fees and notice periods, in accordance with the EU competition law.

Summing up the different provisions on PPAs at the EU level, at least the following measures can be considered as best practices according to the EU:

Best practice	
Use of PPAs by energy communities	Set out regulatory conditions to allow energy communities to sell excess energy through renewable purchase agreements.
Transfer of GOs in combination with PPAs	Possibility to transfer Gos in combination with a PPA.
Transfer of Gos in combination with PPAs	Possibility to allocate Gos to parties different than renewable electricity producers, such as suppliers or final customers entering in a PPA.
State guarantee schemes on PPAs	De-risk renewable energy purchase agreements via credit guarantees or insurances supported by public financial resources, in line with the state aid guidelines.
Public support schemes combined with PPAs	Consider competitive tenders opening the opportunity for renewable power project developers to take 'holidays' from their public support schemes and sell their electricity through PPAs.
Public support schemes combined with PPAs	Allow the participation of projects to public support scheme which reserve part of the electricity for sale through a PPA or other market-based arrangements, and endeavour to make use of evaluation criteria to incentivise the access to the PPA market.
Quota obligations	Announcing an indicative volume of renewables deployment, which is expected to be financed through PPAs.
Quota obligations	Putting an obligation on suppliers to hedge appropriately may also boost demand for PPAs (which are a way of locking in future prices).
Use of PPAs for self-consumption	Enable the development of on-site or near-site renewable projects that are developed under energy purchase agreements.
Public platform	Establish public platform to increase transparency on the price, volume, types, and parties involved in signing renewable purchase agreements.
Flexible contracting	Flexible contracting for SMEs including specific guidance for contract termination fees for small enterprises.
Demand aggregation by means of PPAs	Enable small business parks or industrial clusters to collectively purchase renewable energy through long-term purchase agreements.
Standardization of PPAs	PPAs shall specify the bidding zone of delivery and the responsibility for securing cross-zonal transmission rights in case of a change of bidding zone, in accordance with Article 14.
Standardization of PPAs	PPAs shall specify the conditions under which customers and producers may exit from PPAs, such as any applicable exit fees and notice periods, in accordance with EU competition law.

The methodological approach

CHAPTER 4

Chapter 4

The methodological approach

Simona Benedettini

This research focuses on the potential market failures which, all other else being equal, may potentially affect the diffusion of PPAs in the countries subject to investigation: Germany, Hungary, Italy, Portugal, and Spain. In particular, the analysis aims at identifying the regulatory and legislative solutions in place in each country to address such market failures.

Market failures may arise because of the following factors:

- transaction costs. These are the costs borne by the parties of the contracts to enter into an agreement. Transaction costs can be classified as: searching costs, i.e., the costs associated with the process of matching demand and supply of a contract; and bargaining costs, i.e., the costs that the parties of a contract borne to come up with a beneficial agreement for both;
- information asymmetry. Information asymmetry occurs when one of the parties

of the contract benefits of a more accurate set of information, with respect to relevant issues for the execution of the contract, compared to the other party. In turn, information asymmetry may cause adverse selection and moral hazard. Adverse selection implies that the party with a more accurate set of information might participate selectively in transactions at the expense of the other party, and it may affect the contract price. Consider the following example: the demand side of a PPA has limited information about the technical characteristics of the renewable energy project for which the contract is signed. Therefore, the off-taker might risk to end up with a contract financing a renewable energy project with an under-expected performance, e.g., with respect to the volume of electricity produced. In turn, this might cause that the off-taker will receive an amount of electricity lower than the volume agreed in the contract, and that he will pay a higher price compared to the fair price according to the volume of electricity effectively delivered. Moral hazard is instead a situation where an economic actor has an incentive to increase its exposure to risk because it does not bear the full costs of that risk. For example, the producer does not have appropriate information on the creditworthiness of the off-taker. Therefore, following the signature of the agreement, the producer might be at risk that the off-taker will not pay in full for the

The analysis aims at identifying the regulatory and legislative solutions in place in each country to address such market failures

electricity produced and delivered under the contract;

- externalities. Externalities occur when a decision or an action of an economic agent cannot reflect the true costs or benefits of that given decision/action for a third party. Externality can be positive or negative. A negative or positive externality is an activity that imposes a cost/benefit on an unrelated third party, and may occur in production and in consumption activities. A positive production externality occurs when a firm's production increases the well-being of other parties, but the firm is not compensated by those others. A positive consumption externality occurs when an individual's consumption generates benefits to others, but the individual is uncompensated by such others. A negative production externality occurs when a firm's production causes a damage to the well-being of other parties, but the firm does compensate those others for this damage. A negative consumption externality occurs when an individual's consumption generates costs to others, but the individual does not compensate those others for such costs;
- monopoly power. Monopoly power occurs when in a market there is a single supplier of a service or a product, or when one firm has a dominant position in the market and, therefore, can act as a price maker, i.e., the firm can exert market power. In this hypothesis, monopoly power may determine, among other effects: higher and/or volatile prices for a given unit of production; restricting outputs to drive up prices; and productive and allocative inefficiency.
- Since the focus of the research is to address the regulatory and legislative solutions in place in each country to encourage the diffusion of PPAs, it is essential to provide a representation of the risks associated with different types of market failures (Table 1). Indeed, regulatory and legislative interventions operate an allocation of the risks of the contract among the parties of the transaction, by allocating such risks to the party that is best placed to manage them. In addition, in presence of market failures, such legislative and regulatory provisions may take the form of State intervention. In particular, the following risks are considered (Table 1).

Table 1: Main risks entailed by PPAs.

Risk	Description
Price risk	➢ Risk that significant differences between the PPA price and the market price of electricity may occur.
Demand risk	➢ Risk that the market does not provide a sufficient level of demand to stimulate producers to enter in a PPA.
Supply risk	➢ Risk that the market does not provide a sufficient level of supply to stimulate final customers to enter in a PPA.
Volume risk	➢ Risk that the intermittent nature of renewable electricity generation may cause significant differences between the expected and the actual electricity generation profile.
Party risk	➢ Risk that the off-taker does not pay the producer for the electricity produced and delivered under the PPA. ➢ Risk that the seller does not deliver to the off-taker the electricity committed under the PPA.

The above-mentioned risks are mostly the same that have emerged in the legislative and non-legislative work at the EU level on PPAs (see Section 3). Table 2 below presents a possible characterisation of the above-mentioned market failures with respect to PPAs, as well as an indication of the contract risk that they may give place to.

Table 2: Description of market failures which may represent an obstacle to the diffusion of PPAs.

Characteristics failure		
Transaction costs	▫ Searching and bargaining costs are high (or are perceived as such by the market).	▫ *Demand risk*: transaction costs are as high (or are perceived as such by the parties) as they prevent off-takers (especially small ones) to participate in PPAs. ▫ *Supply risk*: transaction costs are as high (or are perceived as such by the parties) as they prevent producers (especially small ones) to participate in PPAs.
Information asymmetry	▫ Information asymmetry concerning the creditworthiness of the parties of the contract; ▫ Information asymmetry concerning the technical characteristics of the renewable energy project.	▫ *Party risk*: information asymmetry may cause the off-taker or the producer to sign a PPA with a poor trustworthy counterparty (in terms of financial risk), so that during the execution of the contract one of the two parties turn out to be unable to fulfil its obligations. ▫ *Volume risk*: information asymmetry on the technical characteristics of the renewable energy project financed through the PPA may cause the off-taker to enter into a contract for a given expected level of electricity production that during the execution of the contract is not actually delivered due to, e.g., misleading or false information provided by the producer on the performances of the power plant. ▫ *Price risk*: information asymmetry may lead to a PPA's price higher than the price that would be justifiable in the light of the project costs and market fundamentals. This way, the PPA's price may differ significantly from the market price of electricity.
Externalities	▫ Negative consumption externality in the form, e.g., of a lower consumption of electricity from renewable energy sources by means of PPAs than what would be socially desirable. ▫ Negative production externality in the form, e.g., of a lower production of electricity from renewable energy sources by means of PPAs than what would be socially desirable.	▫ *Demand risk*: the market is not able to promote an adequate level of consumption from renewable energy sources, so that there is an adequate volume of demand to be met by means of PPAs. ▫ *Supply risk*: the market is not able to promote an adequate level of production from renewable energy sources, so that there is an adequate volume of supply to be financed by means of PPAs.
Monopoly power	▫ Monopoly power may take the form of a poorly competitive electricity market, such that the renewable electricity generation is concentrated among few players with respect to a given market zone or to the market as whole.	▫ *Price risk*: monopoly power may produce either a PPA at a higher price compared to the cost-reflective market price or it may cause, under certain conditions, high volatile market prices so that the PPA's and the market's price may differ frequently during the execution of the contract. ▫ *Supply risk*: opportunistic behaviours promoted by monopolistic market positions may cause an insufficient level of production from renewable energy sources available to stimulate the diffusion of PPAs.

Of course, such market failures can occur simultaneously with respect to a given transaction. Similarly, they can also be influenced one with the other. For example, among other cases, transaction costs may increase information asymmetry or negative externalities on the production side. Similarly, the price risk may exacerbate the party risk. For the sake of simplicity, the research will address the above-mentioned barriers independently one from the other.

- For each country under scrutiny, an in-depth analysis of the legislative, regulatory, and market framework concerning PPAs is performed to investigate the following issues:
- whether PPAs benefit from an ad hoc legislative and regulatory framework or, differently, whether PPAs have yet to be addressed by specific legislative and regulatory provisions. In case a country lacks an appropriate legislative or regulatory framework to promote the diffusion of PPAs, the analysis will focus on market practices. However, in the light of the European Commission recommendations for the promotion of PPAs, the lack of a legislative or regulatory framework for PPAs is considered itself a barrier to the promotion of PPAs in that country. Differently, the adoption of legislative or regulatory provisions on PPAs is considered a signal of a more mature debate and awareness about such long-term contracts;
- if a legislative and regulatory framework is in place for PPAs, the analysis will focus on the existence of measures aimed at mitigating those risks associated with PPAs hindering the diffusion of such long-term contracts. To this purpose, and in light of the assessment conducted in Section 3, the analysis considers the existence of the following measures as a best practice (see Table 3).

Table 3: Identification of best practices.

Policy option	Market failure	Risk
Public platform	Transaction costs	Demand risk Supply risk
State guarantee scheme (State-owned fund)	Information asymmetry	Party risk
State guarantee scheme (Buyer of last resort)	Information asymmetry	Party risk Price risk Volume risk
State guarantee scheme (Seller of last resort)	Information asymmetry	Party risk Price risk Volume risk
State guarantee scheme (Price floor)	Information asymmetry	Party risk Price risk Volume risk
State guarantee scheme (Price cap)	Information asymmetry	Party risk Price risk Volume risk
Standardization of PPAs' elements	Transaction costs	Demand risk Supply risk
Quota obligations	Monopoly power Externalities	Demand risk Price risk Demand risk Supply risk
Public support schemes combined with PPAs	Externality	Supply risk
Transfer of GOs in combination with PPAs	Externalities Transaction costs	Demand risk Supply risk
Use of PPAs by energy communities	Externalities Transaction costs	Supply risk
Demand aggregation by means of PPAs	Externalities Transaction costs	Demand risk
Flexible contracting	Externalities Transaction costs	Demand risk

Public platforms.

Digital platforms may facilitate matchmaking between actors involved in PPAs by reducing transaction costs. The public ownership of such platforms might be a plus since it is perceived by market players as a source of reliability and objectivity of the information provided. However, along with public platforms, privately-owned platforms for the promotion of PPAs have been developed over the years as well. Such platforms may have different characteristics:

- disseminate information and advice on PPAs characteristics, PPAs' transactions, and PPAs' parties. This is the case, for example, of European platforms such as Pexapark;[1]
- promote matchmaking between supply and demand of PPAs by means of networking and training activities, as well as dissemination of information on PPAs' parties' characteristics and other relevant dimensions for PPAs. This is, e.g., the case of Canada[2] and Australia[3];
- organise the purchase and offer of renewable electricity by means of PPAs. This is the case, e.g., of Italy and the DNV GL Instatrust platform[4].

State guarantee schemes on PPAs.

State guarantees on the sellers' income and/or buyers' payments are aimed at mitigating the party risk (also referred as 'financial risk'). The scheme may be adopted according to different characteristics:

- the scheme may establish a State-owned fund to guarantee the revenues of the seller in the hypothesis of non-payment by the off-taker. The State-owned entity would step into the buyers' position in the PPA. Such type of mechanism has been adopted in Norway[5] and

1 See: https://pexapark.com/

2 Business Renewable Centre Canada Marketplace. Available at: https://businessrenewables.ca/

3 Business Renewable Centre Australia Marketplace. Available at: https://businessrenewables.org.au/brc-a-marketplace/

4 See: https://www.dnv.com/news/dnv-gl-opens-instatrust-147268

Spain[6]. The buyer might pay a premium for the activation of the guarantee. In addition, eligibility conditions to benefit of the guarantee may be established. To avoid moral hazard, the mechanism may cover only part of the missing payments of the off-taker and might apply according to specific ranges of difference between the PPA and the market price;

- legislation on PPAs may establish a State-owned entity acting as last-resort buyer to mitigate the risk of default of the buyer. The establishment of a State-owned entity aims at guaranteeing an off-take agreement to sellers in the hypothesis the buyers are defaulted or are unable to secure a PPA under normal market conditions. In this circumstance, the State-owned entity would step into the buyer's position in the PPA. As for any other State guarantee on PPAs, the buyer might pay a premium for the activation of the mechanism, and eligibility conditions may be established in order to access the mechanism. To avoid moral hazard issues, the mechanism may be designed to cover only part of the residual volumes and might imply the payment of a discounted price to the seller. A similar mechanism has been adopted in France[7] and Great Britain[8];
- the legislation may adopt, in compliance with state aid guidelines, the introduction of a price floor price or a price cap to ensure a minimum payment to producers and a maximum payment for buyers. This has been, e.g., the case of Italy, that has introduced a temporary form of regulation of PPAs' prices for specific customers' categories (see Section 7).

Standardisation of PPAs' elements.

To mitigate transaction costs and the risks listed below, a country

5 See https://www.eksfin.no/en/news/about-eksfin/did-you-know-that-the-norwegian-government-can-guarantee-for-long-term-power-purchase-agreements-in-norway/

6 See https://www.mincotur.gob.es/es-es/GabinetePrensa/NotasPrensa/2020/Paginas/200626Np-Fergei.aspx

7 See: LOI no 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte.

8 See: 2015 No. 1412 – The Power Purchase Agreement Scheme (Amendment) Regulation 2015.

legislation may provide for a minimum standardisation of PPAs. This is usually the case in countries adopting platforms to promote matchmaking between demand and supply. Standardisation may refer to contract schemes or to minimum information to be provided in the contract. California,[9] Italy, and Great Britain[10] are examples of countries where standardisation mechanisms are adopted.

Quota obligations.

Such measures are mostly aimed at reducing demand and volume risks, and may be characterised in different ways:

- the adoption of an obligation for retailers to provide final customers with a fixed amount of electricity produced by renewable sources and by means of PPAs. This is the case, e.g., of California;[11]
- the adoption of an obligation for some customer categories, e.g., industrial customers to buy a given amount of electricity from renewable sources;[12]
- the adoption of an obligation on producers to develop energy projects whose electricity production must be sold by means of PPAs.

Public support schemes combined with PPAs.

The measure mostly concerns the coordination and combination of PPAs with support schemes for renewable energy projects. In particular, the latter are considered a tool to promote the diffusion of PPAs. To this aim, the European Commission (Section 3) considers the following best practices:

9 See https://charleslawpllc.com/our_expertise/eei-master-agreements-for-the-purchase-and-sale-of-power/

10 Standard contract scheme is available only for the Off-taker of last resort scheme. See https://www.ofgem.gov.uk/environmental-and-social-schemes/offtaker-last-resort-olr

11 See https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard

12 See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0557.

- competitive tenders opening the opportunity for renewable power project developers to take 'holidays' from their public support schemes and sell their electricity through PPAs; or
- consider the opening to public support schemes only for projects reserving part of the electricity for sale through a PPA or other market-based arrangements; or
- in tenders' assessment criteria, consider the inclusion of the reservation of part of the electricity produced by an energy project for supply by means of a PPA.

Transfer of GOs in combination with PPAs.

According to the European Commission (Section 3) the possibility to transfer (and to price) GOs in combination with PPAs may be a mechanism which can promote the diffusion of such long-term contracts. In particular, such measure would enable the mitigation of the supply and demand risk, and its effectiveness would even increase if Member States' legislations also allow different parties than the producers (e.g., suppliers or final customers) to annul or transfer GOs.

Use of PPAs by energy communities.

The diffusion of PPAs can be promoted also by allowing energy communities to supply to the market the electricity produced but not self-consumed by means of PPAs. Such measure would allow mitigating supply risk.

Demand aggregation by means of PPAs.

The diffusion of PPAs can be promoted also by allowing the aggregation of demand (households, SMEs, or industrial clusters) and removing barriers for such configurations to enter into PPAs for the collective

purchase of renewable electricity. Such measure would allow mitigating demand and party risks.

Flexible contracting.

Flexible contracting essentially refers to the transparency of the conditions and clauses set in a contract. Among these, the European Commission (Section 3) highlights the importance for SMEs to adopt specific guidance such as, e.g., with respect to contract termination fees.

According to the methodological approach described in this section, for each country under scrutiny the following issues will be addressed in the next sections:

- the legislative and regulatory framework for PPAs;
- the potential for PPAs in Italy;
- main findings and takeaways.

SECTION II

Chapter 5

The legislative and regulatory framework for PPAs in Germany

Chapter 6

The legislative and regulatory framework for PPAs in Hungary

Chapter 7

The legislative and regulatory framework for PPAs in Italy

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The legislative and regulatory framework for PPAs in Germany

CHAPTER 5

Chapter 5

The legislative and regulatory framework for PPAs in Germany

Gero Shaeck

Directive (EU) 2018/2001 states that EU Member States should have implemented national legislation in order to comply with its requirements until 2021. In the coalition agreement signed in December 2021 between SPD, Greens, and FDP, the parties currently forming the German government agreed to strengthen long-term PPAs besides other instruments.[1] In a working paper published in 2023 by the German Ministry for Economic Affairs and Climate Action (Bundesministerium für Wirtschaft und Klimaschutz', BMWK) that discusses measures regarding the competitiveness of German and European energy-intensive industry, the PPAs, together with contracts for difference (CFDs), are highlighted as an important measure to provide the industry with cheap and clean energy.[2] The

1 Coalition Agreement between SPD, Bündnis 90/Die Grünen and FDP https://www.bundesregierung.de/resource/blob/974430/1990812/1f422c60505b6a88f8f3b3b5b8720bd4/2021-12-10-koav2021-data.pdf

2 BMWK. (2023). 'Wettbewerbsfähige Strompreise für die energieintensiven Unternehmen in Deutschland und Europa sicherstellen. Arbeitspapier des BMWK zum Industriestrompreis für das Treffen Bündnis Zukunft der Industrie'

Ministry lists the following measures currently considered to promote PPAs:

- ✓ State securities for companies to lower risk premiums of PPAs;
- ✓ liability-releases for banks providing credits for PPAs;
- ✓ enabling companies to enter a PPA without lowering their credit rating;
- ✓ easing the access to PPAs for medium-sized companies.

This shows that PPAs have finally arrived on German policymakers agenda and are perceived as an instrument not only to provide the industry with cheap electricity, but also to promote the expansion of renewable energy generation. However, as of the date of writing this publication, Germany has not have passed laws to regulate or promote PPAs yet, but despite this, multiple hundred PPAs have been disclosed in Germany each year since 2019. In the this chapter, the German regulatory framework regarding renewable energy – and how it caused the recent increase in PPAs popularity – will be analysed.

The promotion of renewable energies in Germany finds its legal basis in the German Renewable Energy Sources Act

5.1 The current legislative framework to promote renewable energy in Germany.

The promotion of renewable energies in Germany finds its legal basis in the German Renewable Energy Sources Act (‘Erneuerbare-

Energien-Gesetz', EEG) that has been in place since the year 2000 and was amended several times since then. The EEG expanded the 1991 Electricity Feeding Act, which was the world's first law to promote the feed-in of renewable.[3]

There are two main policies in the EEG to promote the feed-in of renewable energy. One is a fixed feed-in tariff ('Einspeisevergütung') paid when plant operators feed their produced power into the grid. The other is a market premium that operators receive when they sell their produced power on the electricity market. Feed-in tariffs have been part of the EEG since the law entered into force in 2000, while market premiums have been added to the law in 2012. Both the feed-in tariff and the market premium are paid for the duration of maximum 20 years. This rule has been in place since the EEG entered into force in 2000 and has never been changed since.

In its initial form, feed-in tariffs where as high as 50,6 cents per kilowatt hour for photovoltaic systems. In the 2023 amendment of the EEG fixed prices for energy are specified, depending on the system's installed capacity, on the mode of production, and on the share of produced power that is fed into the national grid. Prices for energy produced by photovoltaic systems range from 13 cents to 6,2 cents per kilowatt hour. The feed-in tariff is calculated as those prices minus 0,4 cents per kilowatt hour.

Over time, the focus of the EEG has been switched from feed-in tariffs to the market premium. Currently, owners of power plants with an installed capacity up to 100 kilowatts can choose between fixed feed-in tariffs and a market premium. Plants with a capacity above 100 kilowatts are only entitled to receive the market premium. For small power plants up to 1 megawatt installed capacity, the market premium is currently calculated by subtracting the energy's market price from the prices specified in the EEG. Since 2014, the market premium for power plants with an installed

3 F. Lüdeke-Freund and O. Opel. (2014). 'Die Energiewende als transdisziplinäre Herausforderung', in H. Heinrichs and G. Michelsen (eds.), Nachhaltigkeitswissenschaften (Springer Spektrum),pp. 429–54.

capacity bigger than 1 megawatt is determined via a competitive tender. The Federal Network Agency ('Bundesnetzagentur') publishes invitations to tender with a fixed capacity volume for different technologies. Bidders can offer to build and operate a new power plant and submit a market premium as their bid. The lowest offers get accepted until the combined capacity of the approved power plants has reached the tender volume.

The shift from fixed premiums to competitive tendering makes sense from an economic perspective. The idea of fixed premiums was to help renewable energies enter the market at the time it was dominated by fossil energy sources. In 2014, renewable energy production technologies where already well-established in the market, and innovation caused production prices to decrease. The shift towards competitive tenders ensured that only cost-effective power plants prevail in the market. Moreover, it incentivises innovation to reduce overall cost even further.

A survey amongst German energy market's actors shows that guarantees of origin are seen as one of the biggest advantages of PPAs, on par with price security

5.1.1 Use cases for PPAs in Germany.

Since the EEG offers attractive subsidies to power plant operators, PPAs only played a minor role in Germany for a long time. This effect got enhanced even further by PPAs not being addressed by the EEG or other German regulation. Under the German law, PPAs are treated as regular contracts and do not receive any monetary or institutional promotion.

Despite that, in recent years PPAs became more and more popular in Germany.

There are multiple reasons for the recent increase in popularity of PPAs in Germany. One relevant factor is the maximum subsidy period of 20 years defined in the EEG. As the EEG has surpassed the age of 20, the oldest power plants have already fallen out of the subsidy period – with more to come in the following years. Without fixed feed-in tariffs and market premiums, the income risk for operators of power plants who sell on the power exchange market, increases as prices fluctuate. PPAs can offer income security to those operators by allowing them to sell their power for a set price over a long time. The first PPAs that have been concluded in Germany in 2018 were concluded for power plants that had reached 20 years of age, thus losing their eligibility for subsidies.

Another factor that makes PPAs especially attractive to companies are guarantees of origin. To prevent double funding, the EEG prohibits issuing guarantees of origin for power that was funded with EEG subsidies. As a consequence, most guarantees of origin that are sold in Germany come from Norwegian hydro power plants.[4] More and more companies set their own goals to become carbon neutral in the future, being in need of guarantees of origin, as they represent an important tool on their way to carbon neutrality. PPAs with power plant operators that do not receive EEG subsidies, therefore, not only provide a reliable source of energy, but also of guarantees of origin. A survey amongst German energy market's actors shows that guarantees of origin are seen as one of the biggest advantages of PPAs, on par with price security.[5]

Under the current EEG, a photovoltaic plant that is submitted to a competitive tender for a market premium must not exceed an installed capacity of 20 MW. This upper limit was introduced to ensure the access of multiple stakeholders to the competitive tender. However, as experts have criticised, despite the increase of total tender capacities, the limit of

4 E. Hauser, S. Heib, J. Hildebrand, I. Rau, A. Weber, J. Welling, J. Güldenberg, et al. (2019), Marktanalyse Ökostrom II. (Umweltbundesamt). https://www.umweltbundesamt.de/publikationen/marktanalyse-oekostrom-ii.

5 Deutsche Energie-Agentur (ed.) (2021), 'Marktmonitor Green PPAs 2021'.

20 MW remained.[6] Therefore, this limitation currently excludes big photovoltaic power plants that can profit from economies of scale, and that are therefore important to sustain cost-efficient renewable energy production from EEG subsidies. Luckily, this questionable regulation does not prevent companies from planning and building high-capacity photovoltaic power plants. Instead, it can be observed that in recent years, starting in 2019, plant operators invest in high-capacity photovoltaic power plants, mitigating investment risks by entering long-term PPAs with big German companies. This trend has led to contracts for power from newly build photovoltaic plants making up a significant share of the German PPA market.

It is remarkable that in Germany the responsibility of the recent success of the PPAs is not to be awarded to their active promotion (which is currently non-existent), but rather to the existing flaws in the current legal framework in the promotion of renewable energies.

Besides power plants failing to meet the criteria to receive subsidies from the EEG, there also exist power plant operators who willingly choose not to collect those subsidies. A special case is the one of the newly built off-shore wind power plants. Starting from 2017, invitations for tender for off-shore wind power plants were responded with bids asking for a market premium of 0 cents.[7] This shows that the bidders expect those power plants to be profitable on their own, without the need of any subsidy. As those plant operators receive no subsidies, this implies that there is no obligation to sell their generated power on the electricity market. Several off-shore power plant operators saw this as an opportunity and contracted PPAs with big German companies. Ørsted for example contracted multiple long term PPAs for different off-shore wind power plants in Germany that are currently under construction. This shows that the risk mitigation, that is currently mainly provided by State funded market premiums, can also be achieved without subsidies

6 BSW Solar (2022), 'Stellungnahme Des BSW-Bundesverband Solarwirtschaft e.V. Zum Referentenentwurf Des EEG 2023 in Der Fassung Vom 04.03.2022'.

7 Bundesnetzagentur (2017), 'WindSeeG - 1. Ausschreibung Für Bestehende Projekte Nach § 26 WindSeeG. Ergebnisse Der 1. Ausschreibung Vom 01.04.2017 Bekanntgabe Der Zuschläge', BK6-17–001.

on a free market. Another group can potentially utilise PPAs profits from a rather flexible aspect of the regulation regarding EEG market premiums. Plant operators can choose to leave and re-enter the subsidy programme on a monthly basis. This allows them to stop selling their power on the electricity market, contact a short- or mid-term PPA, and proceed to sell on the electricity market afterwards. When prices on the German futures market for electricity exceeded EEG market premiums, many plant operators saw an opportunity, stopped selling on the electricity market, and contracted short- and mid-term PPAs.[8]

5.2 Discussion of the findings.

The analysis of the legislative framework shows that Germany currently does not have any specific regulation regarding PPAs. As PPAs are considered a key instrument to achieve decarbonisation targets by the EU, the question arises why Germany does neither regulate, nor promote them. One reason for this can be seen in the current state of German renewable energy regulation. The EEG has a long history in Germany and has become very detailed and complex over time; the current model, focusing on market premiums awarded via public tenders, is in practice since almost 10 years now. Of the 509 TWh electricity that were produced in Germany in 2022, 46,3% came from renewable energy sources, mainly wind (24,1%) and photovoltaic (10,6%), resulting in a 4% increase in the share of renewables compared to the prior year.[9] This shows that the current regulation is still capable of promoting the expansion of renewable power plants in Germany. As Germany has a well working regulatory framework, a re-design of the framework is on one hand elaborate and slow and, at the same, on the other hand it is perceived as not urgently needed from the regulator's perspective.

While Germany has been on a good path in the past, its goals for the future, as stated in §1 EEG, are even more ambiguous. For 2030, the defined target is a German gross electricity consumption of the 80% of

8 Deutsche Energie-Agentur (ed.) (2023), 'PPA-Markt Deutschland: Marktüberblick'.

9 Statistisches Bundesamt (2023), 'Stromerzeugung 2022: Ein Drittel Aus Kohle, Ein Viertel Aus Windkraft'. Pressemitteilung Nr. 090 vom 9. März 2023. https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/03/PD23_090_43312.html.

renewables. While the current regulatory framework has proven effective, it might not be enough to reach such an elevated target. To achieve those goals, it is mandatory not to lose any important players on the way. As the analysis shows, multiple potential energy providers – mainly operators of old plants and operators that want to build power plants above an installed capacity of 20 MW – are neglected by the current regulation. Taking a glance at the PPA market in Germany, one can notice how many of those operators are able to stay in the market, or enter it, utilising PPAs without further regulation needed. However, as a comparison with other European countries shows, the German PPA market is relatively small, especially considering Germany's size, its economic power, and its lead role in renewable energy production. A survey of market actors in the German electricity market highlights how the legal framework and the uncertainty about the regulation are seen as the biggest entry barriers into the PPA market by over half of the respondents.[10] This result suggests that while the PPA market has developed a lot in the last 5 years, insufficient regulation still limits its full potential. If Germany wants to keep its lead role, it crucial both to implement the RED II proposals regarding PPAs and to learn from those regulations that already represent a best practice in other European countries. Considering the short time left until 2030, the legislator must not postpone its action. Otherwise, as the implementation of a

If Germany wants to keep its lead role, it crucial both to implement the RED II proposals regarding PPAs and to learn from those regulations that already represent a best practice in other European countries

10 Deutsche Energie-Agentur (ed.) (2021), 'Marktmonitor Green PPAs 2021'.

regulation, the adaptation to it, and the building of new power plants all take time on their own, regulation might come too late to achieve the 2030 goal.

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The legislative and regulatory framework for PPAs in Hungary

CHAPTER 6

Chapter 6

The legislative and regulatory framework for PPAs in Hungary

Tamás Babicz

In 2007, by adopting the Electricity Act, the Hungarian power market become fully liberalised and market-driven. Starting from 2016, a boom in Hungarian PV installation occurred, which led to the currently oversupplied system on DSO level. Robust decarbonisation targets are still the main driver for solar power plant commission in the country. In this paper we take a deeper look for a better understanding of the current main barriers to establish PPAs in Hungary, that may be listed as the current legislative system (especially the government-provided subsidies), the market liquidity, the energy producers' income tax, and power balance management. Investors' concerns of the Hungarian legislation and government-driven short-term policies also take up a great amount of banking and financing of such expensive projects. In this analysis we recommend a more efficient legislation for PPA production and a market-friendly taxation in regard to the development of the solar and especially wind projects.

6.1. Overview of the electricity market.

6.1.1. Installed capacity and Electricity Generation by source (2022 or 2021).

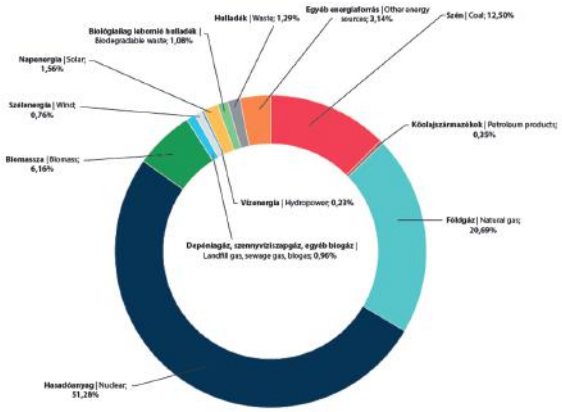
In 2021 the Hungarian Electricity Sector reached a new record of energy consumption at 6,940 MW. Total Gross Electricity Consumption experienced a 4,7% increase in 2021 compared to the 2020 baseline, which also includes the estimated electricity generated by Small-Scale Household Power Plants (HMKE). Gross Domestic Electricity Production increased as well, while the import-export balance rose, resulting in a 73,9% share of domestic production in total consumption in 2021.1

Solar Power Plants continue to record intensive growth. The combined capacity of solar panels installed in Hungary (including HMKEs) has reached 2.954 MW, an increase of 39% compared to the previous year. This means that solar power now accounts for 17,7% of the Total Installed Capacity of the Hungarian Electricity Market and, therefore, together with other renewable sources, Green Energy now represents 25,3%. The share of electricity generated from renewable energy sources in Total Gross Electricity Consumption reached 13,66% in 2021.

In 2007, by adopting the Electricity Act, the Hungarian power market become fully liberalised and market-driven

1 Hungarian Central Statistic Office (STADAT), 'Gross electricity production [gigawatt hours]'
STADAT, 2021. https://www.ksh.hu/stadat_files/ene/en/ene0009.html

Figure 1: Ratio of energy sources used for electricity generation, 2021.Source: MEKH.2



Contrary to renewable power plants, there have been no major developments in conventional power plants or technologies.3

As detailed in Section 1.3, the government is keen to diversify the source of energy incoming to the country, as well make the Hungarian energy mix more resilient to the great market fundamentals. The States of Eastern Europe were more exposed to the Russo-Ukrainian conflict then their Western counterparts, which paves the way forward for more sustainable energy usage (heating and cooling moratorium in governmental and municipality buildings, utility management in a more energy efficient way, etc.), increasing domestic energy production and education of energy users of the industrial and household segments.

In light of what highlighted so far, the Hungarian electricity system is slowly diverging from the conventional electricity production, while looking the way forward for renewables with a strong support for photovoltaic and biomass, and a lesser (but gradually growing) one to wind and geothermal.

2 National Regulatory Authority of Hungary (MEKH) 'Data of the Hungarian electricity system' 2021. Pp 46. https://mekh.hu/download/1/72/31000/MEKH_statisztikai_kiadvany_villamos_energia_A4_web_V%c3%89GLEGES.pdf

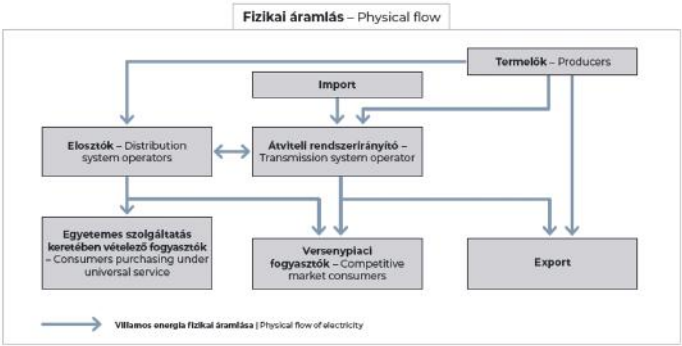
3 See note 2. Pp 7.

6.1.2. Market structure (main actors for each segment of activity, market shares).

On 25 June 2007, the Hungarian Parliament adopted the Electricity Act,4 following which the Hungarian electricity sector is fully unbundled and liberalised. The Electricity Act regulates the sector, also the largest Hungarian energy company, a 100% state owned MVM Group5, mother company of Hungarian TSO (MAVIR) and electricity market operator (HUPX Group)6. The two companies are responsible for maintaining the physical and financial flow of the country's electricity market (see Figure 2 & 3 below). MVM Group through its subsidiary MVM NEXT provides the country's universal (household) sector with natural gas and the electricity.7 Since 2022, MVM NEXT is the only universal service provider in Hungary.8

Based on 2021 data, the Hungarian electricity market balanced on the domestic production (see Figure 1) and a strong import portfolio.9

Figure 2: Physical flow, 2021.Source: MEKH.10



4 2007. évi LXXXVI. törvény a villamos enerigáról. Pub. L. No. 86, 2/7//2007, Magyar Közlöny (2007). https://net.jogtar.hu/jogszabaly?docid=a0700086.tv

5 MVM Group (2021) 'Our activities'. https://mvm.hu/en/Tevekenysegunk/TevekenysegiTerueletek

6 HUPX Hungarian Power Exchange (2023) 'About us'. https://hupx.hu/en/about-us/company-info

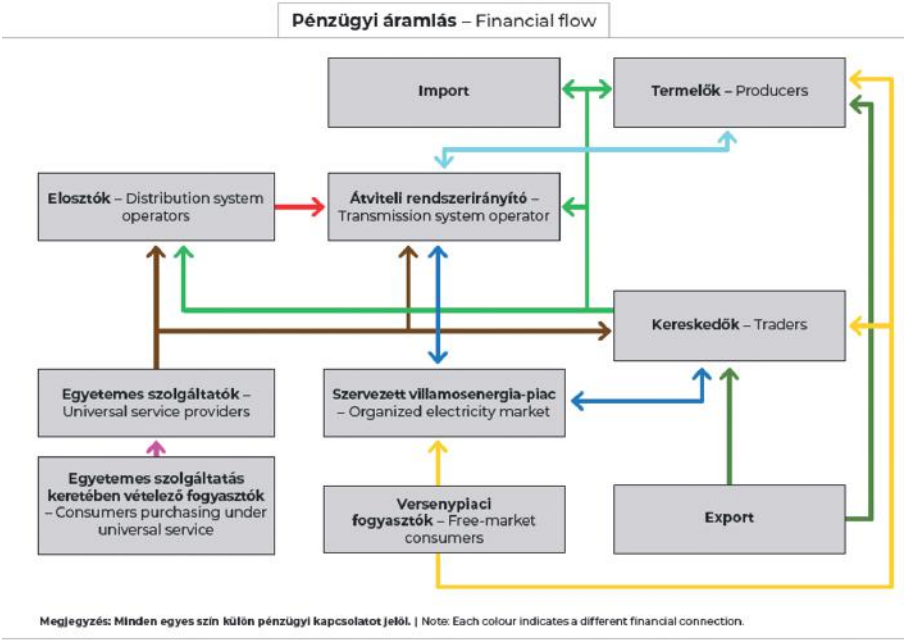
7 MVM NEXT (2023) 'Tájékoztatás'. https://www.mvmnext.hu/aram/pages/aloldal.jsp?id=10362279

8 Evelin Szőke (2022) 'MVM becomes the only universal provider for Hungary's gas and electricity market'.CEENERGY NEWS, https://ceenergynews.com/electricity/mvm-becomes-the-only-universal-provider-for-hungarys-gas-and-electricity-market/#:~:text=MVM%20becomes%20the%20only%20universal%20provider%20for%20Hungary's%20gas%20and%20electricity%20market,-By%20Evelin%20Sz%C5%91ke

9 See note 2. Pp 68.

10 See note 2. Pp.11.

Figure 3: Financial flow, 2021.Source: MEKH.11



The biggest actors on domestic electricity production are Western European companies and MVM Group, which is the key player in the Hungarian energy sector.12

The main market marker electricity (or integrated energy) trading companies in Hungary are also Western European companies, MVM Group being the key players as well.13

6.1.3. Decarbonisation targets for the electricity sector.

In 2020, Hungary adopted a law requiring the reduction of carbon-

11 See note 2. Pp.11

12 See note 2. Pp. 12.

13 MEKH (2023) 'List of companies with electricity trading lincences.' https://mekh.hu/villamosenergia-ipari-engedelyesek-listaja

emissions of at least 40% by the year 2030 (in comparison with 1990 levels), and becoming carbon neutral by 2050, in line with EU's Fit for 55.14 Moreover, by 2030 the Hungarian gross energy composition renewables should reach at least 21%. Like in Europe, in Hungary seven sectors account for all greenhouse-gas emissions: power, industry, transportation, buildings, agriculture, waste, and land use and forestry, from which electricity and heating takes up 24,9%.15

In order to reach the 2030 objective of the 40% carbon neutrality, the Ministry of Innovation and Technology introduced a system for energy efficiency. The energy efficiency obligation system (EKR),16 enforced on 1st January 2021, imposes significant energy efficiency obligations and onerous sanctions on the affected license holders. EKR has already been successfully applied in 16 Member States in Europe, thus the system is proved to be a great tool to increase energy efficiency. The obliges17 need to introduce projects and implement measures that result in proven energy savings on the end user's side. For example, a certified energy efficiency investment carried out by the end user, replacing an old, inefficiently functioning machine line with a more modern one, renovating buildings, and so on, accounts as proven energy saving. Obliges have to achieve adequate annual energy savings18 among their supplied end users.19

On 1st December 2022, in response to the global – and the increasing European – energy crisis, the Hungarian Government established a new, dedicated Ministry of Energy to tackle such challenges. On the following May 2023, the Ministry of Energy issued a roundtable discussion with market participants to renew the National Energy and Climate Plan

14 2020. évi XLIV. törvény a klímavédelemr l. Pub. L. No. 137, 9/6/2020, Magyar Közlöny https://net.jogtar.hu/jogszabaly?docid=a2000044.tv

15 Mohammed, S., Gill. A. R., Alsafadi, K., Hijazi, O., Yadav. K.K., Hasan, M.A., Khan, A. H., Islam, S., M.S. Cabral-Pinto, M. & Harsanyi, E., (2021) 'An overview of greenhouse gases emissions in Hungary'. Journal of Cleaner Production, Volume 314, pp. 2, https://www.sciencedirect.com/science/article/pii/S0959652621020837

16 2015. évi LVII. törvény az energiahatékonyságról, Pub. L. No. 70, 22/5/2015, Magyar Közlöny. https://net.jogtar.hu/jogszabaly?docid=a1500057.tv

17 Energy trading companies and transportation fuel retail sellers.1

18 Numbers differ from 0,05 to 0,5 percent.

19 MEKH (2023) 'Energiahatékonysági kötelezettségi rendszer'. https://www.enhat.mekh.hu/ekr

(NEKT)20 fostering a greener, more sustainable, diversified, and climate-oriented plan. The Ministry's State Secretariat expects to have the final drafting on July 2023, in order to present it for more detailed discussion.21

Moreover, the Regional Centre for Energy Policy Research (REKK) has issued the Hungarian Energy and Climate Strategy,22 which gives a greater outlook for the Hungarian decarbonisation measures. As an independent think-thank in Hungary, REKK provides a holistic and in-depth understanding overview in energy-related topics, supported with massive and precise database. As it results from the document, it is clear that to cope with the challenges to become carbon neutral by 2050, participants should heavily ramp up the process post-2030.

The position of the Hungarian Government is clear, the country needs to achieve the decarbonisation goals of 2030 and 2050. To tackle the related challenges, the following measures should be taken:

- replace the capacity of Paks Nuclear Power Plant;
- restructure the lignite-fired Mátra Power Plant;
- significantly increase energy produced by photovoltaics;
- support the production and consumption of geothermal and biogas/biomethane, as well as the clean hydrogen industry;
- make new regulatory measures to increase the flexibility of the power system;

20 See note 14.

21 Ministry of Energy (2023). 'MÁJUSBAN KEZDŐDHET MEG A NEMZETI ENERGIA- ÉS KLÍMATERV FELÜLVIZSGÁLATA'. 12 April, https://kormany.hu/hirek/majusban-kezdodhet-meg-a-nemzeti-energia-es-klimaterv-felulvizsgalata

22 Regionális Energiagazdasági Kutatóközpont (2022). 'Hungarian Energy and Climate Strategy' 19 February, https://rekk.hu/downloads/events/Energy__Climate_Strategy_Summary_EN.pdf

- introduce green district heating programs;
- support e-mobility projects;
- promote local, household renewable energy projects.

In order to solve the climate tasks, the government would make the largest polluters pay for a fair and just energy transition in the country. The estimated cost of such a transition is EUR 150 billion, i.e., 2-2,5% of the annual GDP up to 2050.23

The position of the Hungarian Government is clear, the country needs to achieve the decarbonisation goals of 2030 and 2050

6.2. Main barriers to the diffusion of PPAs.

6.2.1 State of the art on the debate, legislative, and regulatory framework of PPAs.

In its nature, the Hungarian electricity market is fully liberalised and very competitive. Energy consumption is steadily growing in the country, as household as well as industrial (mainly machinery, e.g., vehicle production) demand curve always points upwards,24 not to mention that final investment decisions have been made for several new electric vehicle battery factories in the country. As mentioned at Subsection 1.1, the domestic production is not able to keep with such pace (but it has never been intended to, either), therefore the import makes a robust leg of the balance sheets. However, decarbonisation targets, diversification, scale of green energy purchase, and reduction of

23 See note 22.

24 Hungarian Central Statistic Office (STADAT), 'Final energy consumption [petajoules]'. 2021. https://www.ksh.hu/stadat_files/ene/en/ene0006.html

financial exposure represent key points for energy off-takers and energy trading companies. Fostering PPA contracts through State-provided guarantees (with main focus on green energy production) has already reached the governmental level.25

Hungary already has a renewable energy off-take system – at the moment, two simultaneously. One is the so-called KÁT (Mandatory Off-Take System)26 the other one is the METÁR (Renewable Energy Support Scheme).27 One of the main differences between the two schemes is that while KÁT has been introduced to help small scale developers, METÁR is originally intended for their complementary peers.

The renewable electricity produced by the participants of KÁT system is taken over by the system operator MAVIR (responsible for the KÁT balancing group), for a period of 20-25 years and at a pre-determined fixed tariff (following inflation by 1% point lower).28 The relatively high and fixed tariff, along with take-and-pay off-take, provides producers with a stable predictable cash flow. Furthermore, the support tenor provides a significant safety buffer for both investors and bank financiers. The operation of KÁT system is rather simple, as it does not require special expertise on behalf of credits to assess business models.

In 2017, the new operational support system 'METÁR' was introduced for renewables-based electricity generation, meanwhile KÁT remains operative. In contrast, the METÁR scheme is much closer to a market-based energy production, which is less predictable and involves more business uncertainties. The most important difference is that METÁR is an auction-based support system in which investors apply for price support – the investor has to determine a so-called offer price (usually HUPX minus 10-15%), which implies a long-term and guaranteed price for it.

25 See note 20.

26 389/2007. (XII. 23.) Korm. rendelet a megújuló energiaforrásból vagy hulladékból nyert energiával termelt villamos energia, valamint a kapcsoltan termelt villamos energia kötelező átvételéről és átvételi áráról. Pub. L. No. 138/1, 23/12/2007, Magyar Közlöny, https://net.jogtar.hu/jogszabaly?docid=a0700389.kor

27 299/2017. (X. 17.) Korm. rendelet a megújuló energiaforrásból termelt villamos energia kötelez átvételi és prémium típusú támogatásáról. Pub. L. No. 168, 17/10/2017, Magyar Közlöny, https://net.jogtar.hu/jogszabaly?docid=a1700299.kor

28 MEKH, (2023). 'Kötelező átvételi rendszer'. 4/6/2022, https://www.mekh.hu/kotelezo-atveteli-rendszer-villamos-energia

Only applicants with a lower need for incentive will receive the incentive, thus creating a competitive situation between potential producers. However, the primary virtue of the system is that it creates a competition between investors or producers, which, in effect, reduces the lifecycle production costs of electricity. As a result, the system can be much more financially self-sustaining and less dependent on some sort of central budgetary support. The ultimate benefits of such competition are booked by industrial consumers by way of the reduced cost of subsidies (in METÁR such consumers pay for premia subsidy received by renewable energy producers). The incorporation of market signals into the support scheme is also very beneficial, in the sense that through market forces the reduction of technology costs due to the advancement of technologies can spiral into the domestic market.29

While the goal of KÁT was clearly to promote the spread of renewable energy with the help of an easily transparent support system, METÁR, that is based on price competition, already noticeably supported efficiency and economically feasible projects. This led to a result: partly due to competition, and partly thanks to the solar power plant equipment price reduction, the METÁR price has gradually halved the previous KÁT price.30

However, the tender announcements for METÁR changes from year to year: for example, in the large category the maximum size was raised from 20 MW to 50 MW, and then it was again limited to 20 MW the following year. This is also a significant risk factor for developers: it is not possible to calculate whether it is worth focusing on 50 MW developments with better economies of scale, or whether it is worth thinking about projects below 20 MW.

Based on the current price conditions, only those companies with particularly good financing and relatively low capital costs and yield

29 Central Bank of Hungary (2021). 'Financing the Hungarian Renewable Energy Sector, Challenges and Opportunities'. Central Bank of Hungary Sustainable Finance Department Pp. 7. https://mnb.hu/letoltes/20210121-financing-the-hungarian-renewable-energy-sector.pdf

30 Lengyel, A. & Balogh, G. (2022). 'METÁR vagy cPPA? Válaszút előtt a hazai napenergia-termelők'. 23/03/2022, https://www.linkedin.com/pulse/met%25C3%25A1r-vagy-cppa-v%25C3%25A1lasz%25C3%25BAt-el%25C5%2591tt-hazai-andr%25C3%25A1s-lengyel/?trackingId=yMO2WxLqRja79UyROX93yw%3D%3D

expectation can perform well in the METÁR tender, because this is actually the only way to be competitive in the METÁR tender.

In line with what explained above, the Hungarian legislature system does not hold any obstacle for market participants to sign PPAs; however, the government – or the legislative bodies – have yet to adopt a specific regulatory framework. The main reason is that no matter how great the need for stable and long-time green agreements in the sector is, the current the European energy crisis sets more acute challenges for the lawmakers – a crisis that is even deeper for the Russian linked natural gas and the nuclear-sourced Hungarian energy mix.

6.2.2 Identification of the main barriers to the development of PPAs.

Due to the unique properties of electricity (mainly storage difficulties), trading is also unusual. The most massive volume changes hands in the Day-Ahead Market (DAM), where a physically delivered product can be bought or sold for a given hour of a given day, and a blind auction is organised for each hour. The liquidity of electricity exchanges, like other exchanges, requires a sufficiently large number of traders to submit a reasonably large number of bids.31

Income tax of energy suppliers (commonly known as Robin Hood tax) is payable by energy suppliers and public utility suppliers, including the Hungarian establishments of foreign companies.32

On 4 June 2022, a new government Decree33 has been enacted by the Hungarian government, introducing sector-specific taxes to companies viewed by the government as generating 'extra profits' in the current adverse economic situation. The government's pivotal priority is to use the increased public revenues to finance the current, as well as the expected future substantial costs of public services provided at limited

31 Biskas, P. N., Chatzigiannis, D. I., Bakirtzis, A. G. (2013). 'Market coupling feasibility between a power pool and a power exchange', Electric Power Systems Research, 104, pp. 116–128. https://doi.org/10.1016/j.epsr.2013.06.015

32 2008. évi LXVII. törvény a távhőszolgáltatás versenyképesebbé tételéről. Pub. L. No. 52, 15/11/2008, Magyar Közlöny, https://net.jogtar.hu/jogszabaly?docid=a0800067.tv

33 197/2022. (VI. 4.) Korm. rendelet az extraprofit adókról. Pub. L. No. 93, 4/6/2022, Magyar Közlöny, https://net.jogtar.hu/jogszabaly?docid=a2200197.kor

utility prices set by law (in Hungarian: rezsicsökkentés) and military developments.34 The Decree lists many sectors of the Hungarian economy, one of them being the extra profit tax levied on electricity generators, which are (or were entitled to) the KÁT or METÁR (also METÁR-premium) renewable support systems, but then exited these systems. However, volatile energy prices are trading lower since the summer period of 2022, or at least trading sided in the past few months, but only hovering around 100 EUR/MWh.35

Overall, it will be very difficult or almost impossible for KÁT and METÁR producers to take advantage of high market prices in the future. At the same time, it is clear that the government is not counting on the abolition of the Robin Hood tax, which been a painful issue for the energy sector for a long time. However, the spread of consumer-centred corporate PPAs and on-site power generation projects may gain ground.36

The Decree (see note 34) issued the tax rate at 65% (on the excess turnover), however the newly issued tax liability is retroactive from 1st January 2022. It is worth noting that this 'extra profit' tax comes in addition to the already existing taxes applicable to this sector, primarily the 31% Robin Hood Tax and 9% corporate income tax on profits, and the (up to) 2% local business tax that applies on an adjusted turnover.37

Besides, due to decarbonisation efforts, built-in weather-dependent renewable capacity is increasing in Europe, leading to increased supply-side uncertainty – and thus increasing price spikes.38 Such price spikes should theoretically be handled by the average person, the energy trading company – assuming the PPA is not on-site (see Section 3.1). There are several ways to develop a product suiting for both party's

34 Kenyeres, L. & Lukonits, A. (2022). 'Hungarian Energy Market, Details published of windfall taxes and tax increases affecting the energy sector'. Client Alert, Pp 2. https://www.wolftheiss.com/app/uploads/2022/06/22_06_10_CA_Hungarian-Energy-Market-Details-published-of-windfall-taxes_ENG.pdf

35 HUPX, (2023). 'Historical data'. 15/05/2023, https://hupx.hu/en/market-data/dam/historical-data

36 See note 20.

37 Kálmán, E., Hermann, Zs., & Deák, P. (2022) 'Hungary introduces 65% extra profit tax on renewable projects leaving KÁT/METÁR support systems'. CMS Law-Now, 16 June, https://cms-lawnow.com/en/ealerts/2022/06/hungary-introduces-65-extra-profit-tax-on-renewable-projects-leaving-kat-metar-support-systems

38 Bajai, M. Vig, A. & Hortay, O. (2022). 'Electricity Market Liquidity and Price Spikes: Evidence from Hungary'. Periodica Polytechnica Social and Management Sciences, 15 Juuly, 30(1), pp. 49–56. https://pp.bme.hu/so/article/download/16857/9245/112968

needs, but it is easily understandable that market uncertainty (significantly volatile prices) combined with the producer's side uncertainty (in case agreements are signed as taken as produced) drives energy traders to price in the exposure. Now, without an in-depth knowledge of the pricing logic of the market participants (e.g., relying on huge portfolio effect), these green products of PPAs will fall behind their rivalling products in the market. In short, the price paid by the end user (off-taker) will be significantly higher than in case of other green sourced electricity (GoO, PoS, or other state subsidised) products on the market.

Balance group management and scheduling represent further obstacles for energy traders concerning PPAs.

The balance group represents one of the major technical foundations of the electricity trading activity within the Hungarian electricity system. 'Balance group', made of one or more members, means a system of settlement organised to determine (according to the principle of adequate effect) and settle accounts concerning the use of balancing energy, to carry out the related functions, and to govern the related liabilities.39 In line with this, balance groups are created to predict the aggregated energy consumption of the members during a given period of time, as well as to optimise energy usage and settle accounts regarding any under- and over-consumption by the members.40

The goal of scheduling is ensuring that the domestic electricity system remains as balanced as possible despite the weather-dependent production of renewable power plants (mainly solar in Hungary). For that energy traders offer various types of solutions to same-day (intra-day) and next-day (day-ahead) planning and scheduling towards the system operator.

PPAs, as they rely on hardly forecastable scheduling, face both challenges gravely. This means that an energy trader – or, for on-site

39 See note 4.

40 Bányi, G. (2023). 'Balance Group Management'. 25/04/2023, https://partner.mvm.hu/en/Nagykereskedelem/Merlegkor-menedzsment

PPAs, the end user – should price in the volatility of the production, in case it seeks to reach a favourable price for which it should take off the energy from the producer as taken-as-produced. It is worth mentioning another obstacle: in case the end user or the PPA provider leaves the balancing group of the trading company, this situation can further worsen the portfolio management tasks of the trader company, resulting again in additional price items appearing on the sheets.

The diffusion of PPAs, securing a green, long term, domestic – or even on-site – produced energy source, is of outmost interest of Hungary. However, at the end of the day, investors will decide 'by the numbers', being said that, as of 2023, investing in PPA construction has its barriers on the financial side, namely, margin calls and financing the projects by financial institutes or banks.

Energy traders – or final off-takers and end users of the product – have to make margin calls to clearing houses and/or other authorities, determined by the State. Margining is a form of security deposit to guarantee future deliveries in case of default. These deposits have risen sharply in line with prices, leaving several companies badly exposed to bankruptcy as they are unable to find cash fast enough.41 Wholesale and exchange-based commodity markets such as gas, power, coal, and oil require down-payments from utilities to cover open liabilities, which rise when there are unusually wide price fluctuations. Selling future output ahead necessitates paying buyers a safety deposit or margin in case the producer cannot deliver. Once the supply is received, the producer gets their money back.

While electricity prices were trading extremely high in 2022 – not concerning the price of GOs – energy traders have found themselves in a grave situation, margining finance locked a great amount of their liquid assets, which in conventional times would have been used for executing other spot or derivate trades. For this reason, energy traders tend to

41 Eckert, V. & Buli, N. (2022). 'Explainer: How margin calls came to threaten Europe's energy firms'. 16 September, https://www.reuters.com/business/energy/how-margin-calls-came-threaten-europes-energy-firms-2022-09-16/

secure PPA deals with customers who are willing to pay the cost for margining; in other words, another formula is priced in the equation.

Projects financing may occur by two distinct methods: i) developers may finance the project from their own assets, funds; or ii) include a financial institution. This paper has already discussed the reason why developers tend to dodge the opportunity to finance such projects on their own. Concerning the involvement of a bank, however, several obstacles should to be tackled. First, a bank will only finance a project if it can be secured by financial and/or other sector specific guarantees. These financial institutions will look for their return on investment (ROI) to be safe, this meaning that when evaluating a project, banks tend to use a more conservative approach on ROI, hence a project with, e.g., a 10-year return expectation, should have at least 15-years. For that period of time, it is hardly possibly to secure PPAs. As a solution, developers try to sign back-to-back agreements with users, for even a 15-year period. All this, in combination with market uncertainty, makes PPA prices uncompetitive, even compared to other GO-based green products.

Last, but not least, it is also worth mentioning the rising development costs. In the post-Covid era of Europe, not just energy prices have risen, but the prices of raw materials and industrial scale resources have skyrocketed. As the implementation process takes time due to banking, acquiring the necessary administrative documentation, signing agreement with developing and operator companies, etc., developers face shrinking margins in the PPA sector, as materials to build a green energy production unit is increasing day by day.

Measures to promote the diffusion of PPAs.

6.3.1 Identification of the legislative proposals, and/or solutions in PPAs' practice or under investigation in each country, in order to promote the diffusion of PPAs and remove barriers to their development.

As of 2023, the Hungarian legislative system lacks behind its European Union counterparts. For a better understanding, it is essential to take a

deeper insight into the current state of renewable contracts and understand the consumer's behaviour and their needs.

In 2021, the stock market price of electricity rose significantly (more than 200%) and it still currently exceeds the price level available on the METÁR tender. In addition, price volatility also increased, as it was further enhanced by the war in Ukraine. In this market environment, for more and more actors (factories, industrial real estate developers and managers) there has been an increase in the role of renewable energy (mainly solar and wind) as a predictable energy source cheaper than the current market price, based on strictly financial aspects.42

The 'green' commitment of consumers increased noticeably in the past decade as well. The domestic industry is largely based on vehicle production, including not only large car manufacturers (Audi, Mercedes, Opel, Suzuki – the so-called OEM companies), but also their direct and indirect suppliers (the so-called Tier 1-2-3 companies). The OEMs are under great pressure from end consumers to make production more sustainable and 'green', a pressure that is further passed on to their suppliers and, therefore, a very significant segment of the domestic industry will be forced to change its operation and energy consumption. In addition, many companies – even those not in the vehicle industry – pay attention to making their production processes more sustainable 'on their own initiative', expecting the domestic production unit to reduce the carbon footprint of production and use renewable energy sources.

So far, companies have typically solved the procurement of renewable energy by purchasing renewable GOs. The suspicion of 'greenwashing' is definitely reduced if at least a part of the electricity procurement is done by more direct means – either by generating electricity from a renewable power plant (mainly solar) an own site or in its immediate vicinity, or by entering into a direct contract with a producer that is physically further away (corporate PPA – which can be physical PPA or virtual PPA).43

42 See note 30.

43 See note 30.

With the current price levels and the legislative background (see Section 2.2), PPAs can provide a more favourable return on investment rate than the METÁR system. On the industrial consumer's side, this ended up in resulting in new opportunities for renewable energy developers. Although, in principle, in the case of on-site production, industrial consumers can choose to develop and own the renewable energy production unit themselves, in many cases they do not want to bear the burden of related professional tasks, including securing financing. In the case of off-site production, this is an even more complex task, so there is a very low probability that the management of a factory will start an independent renewable power production unit development project.

If a renewable energy developer intends to target large industrial consumers, completely new tasks arise. These are, above all, the following:

- development of sales and bidding capabilities – sales channels and processes must be developed, from finding potential large consumers to managing the bidding process until concluding a contract;
- developing the ability to cooperate – operating a solar power plant in a foreign area, coordinating outages, maintaining contact with the recipient of electricity, and continuously managing partner risk mean new tasks;
- development of a PPA contractual structure – in the KÁT and METÁR systems, the contractual legal framework was given, but now it is the responsibility of the renewable energy production unit developers to enhance a contractual framework that ensures bank financing, a clear delimitation of tasks between the parties, and the appropriate management of emerging risks.44

However, with the lack of a platform to execute PPA deals or the void of trackable data, it is hard to estimate the churn rate of PPA deals in place in Hungary as of 2023. Undoubtedly, on-site PPA deals have been agreed

44 See note 30.

behind-the-meter, referring to a system where the energy producer directly sells the product to the customer, while there is no direct – or indirect – connection the to the grid operator.

Generally, lawmakers have two major possibilities to introduce a new legislature: the first is reacting to the needs of the components of the administered area (in the case of fostering PPAs, social demand for greening the economy, needs of utilities to be more sustainable, industrial requirement for green production, hence development of such product that can please the mankind of the XXI century, etc.); the second is driving the events shaping the public opinion or having the ability – through governmental and public research and feasibility studies – to forecast/foresee major events concerning the country and subsequently step up with the legislation process.

EFET's (European Federation of Energy Traders) contractual framework already gives an easily accessible legal background for energy traders.45 Hungarian legislation is already compliant with EFET, hence signing PPAs in the country is an off-the-shelf product at the moment.

Based on the market structure explained above, the industrial and social demand for green, stable, and domestic produced long term energy contracts can be highlighted. It is expected that the lawmaker will react in the near future to promote the diffusion of longer-term renewable energy contracts in Hungary. Nevertheless, is it unsure whether such law-making provisions will actually regulate PPAs.

6.4 Discussion of best practices.

6.4.1 Identification of best practices, and why among the measures discussed .

As discussed in Section 2.1, the Hungarian legislative system does not

45 EFET 2022. EFET Insight into Forward Trading in Wholesale Electricity Markets. https://efet.org/files/documents/20220216%20EFET_Insight_01_forward_trading.pdf

currently hold any direct obstacle for the diffusion of PPAs in the country. However, some indirect challenges are observable along with other non-legislative challenges.

The Hungarian lawmakers have complied with the legislative framework provided by the European Union (See 3 – The European framework on PPAs Section),46 and thus its application is fully compatible. However, as discussed in Section 2.2, the Hungarian legislative system is generally not considered as stable among developers; moreover, legal security is an acute topic among financiers, and retroactive legislation makes investors think twice before signing longer term agreements. To that aspect, the country needs to build its legal environment in order to promote the diffusion of PPAs as a more investor/developer friendly one. Specifically, the burden of the so-called Robin Hood tax makes the surrounding countries a more favourable investment location for developers, hence creating a more competitive habitat for Hungarian projects.

In the 2010s (and since then) Hungary has experienced a boom in PV installations (both household and on an industrial scale), and such developments are more than welcome to the country's exposed energy mix. Unfortunately, neither the TSO nor the DSOs47 have yet upgraded the systems to fit for not easily forecastable renewable production – due to the lack of funding – which resulted in higher balancing costs for network users. In order to reduce costs of scheduling and group management, heavy investments need to be placed throughout the entire country. This is a task requiring great governmental commitment and robust investment from private DSO owners.

Corresponding to infrastructure upgrade, network connection procedure makes up an additional technical topic for producers.

Hungary is undoubtedly a solar superpower in the region; however, in order to balance a renewable portfolio, one needs to have a similar size

46 See Italian perspective.

47 Majority of them are state owned through subsidies.

installed capacity of complementary resources. Wind power, apart from a few owned by Spanish energy giant Iberdrola, makes a significantly less part of the energy mix (see figure 1), hence being unable to contribute to balance the portfolio. The country has great unexploited capabilities in wind but, however, current legislature is hostile to that. Promoting wind energy – along with already mentioned geothermal and bio potentials (see Section 1.1 and 1.3) – would straighten the curve of solar energy production and ease the effect of solar based energy production spikes. Investors' demand for wind – as well as off-takers' – is already in the country.

The Hungarian legislative system does not currently hold any direct obstacle for the diffusion of PPAs in the country

For producers and off-takers, a sustainable way to secure PPAs in the near future would require different pricing methods for the renewable and green electricity products. This implies that parties should enter into two different agreements (or one framework agreement with several confirmations). To handle a PPA from an off-taker's side is more competitive than having a base-load agreement in place (same quantity of energy delivery in each period, preferable 5-15 minutes, or at least MWh/h, as such products are tradable on HUPX) and a volatile, taken-as-produced one with general green certificates (GOs), for shorter periods of time (quarterly, monthly, or even day-ahead products).

PPAs make a great opportunity to 'greener' the Hungarian energy mix; however, as discussed in the documents for a financially stable system, much has still to be done both on the governmental and the industrial (off-taker's)

side. Flexibility and adaptation are the key, and whoever stays firm will miss out the opportunity.

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The legislative and regulatory framework for PPAs in Italy

CHAPTER 7

Chapter 7

The legislative and regulatory framework for PPAs in Italy

Simona Benedettini

7.1 Best practices.

The Italian legislative framework on PPAs is set by the Legislative Decree 199/2021,[1] which has transposed the EU Directive 2018/2021 on the promotion of the use of energy from renewable sources. Additional provisions on the long-term contracting of renewable electricity have been adopted by means of Decrees approved by the Ministry of Energy.

In particular, the Italian legislative framework entails the following areas of intervention for the promotion of PPAs:

- adoption of a public platform for the matchmaking of demand and supply of PPAs;
- requirement of minimum information to be included in PPAs negotiated on the public

1 See: https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2021-11-08;199

platform;

- negotiation of PPAs with a state-owned counterparty;
- use of PPAs in energy communities.

7.1.1 The public platform for the matchmaking of demand and supply of PPAs.

The public platform has been introduced by article 28 of the Legislative Decree 199/2021 with the aim of promoting the match between the parties potentially interested in the stipulation of long-term contracts for the sale and purchase of electricity produced from renewable sources.

The platform is organised and managed by the Gestore dei Mercati Energetici (GME), the state-owned entity responsible for the operation of electricity and gas exchanges in Italy. GME is fully owned by the Gestore dei Servizi Energetici (GSE), an entity fully participated by the Ministry of Finance and responsible for managing public support schemes for renewable sources and energy efficiency interventions.

The parties interested in searching for a counterparty to sign a PPA can post an announcement on the public platform. To this aim, such parties shall submit an application to GME for admission to the public platform. The players admitted to the platform shall then pay to GME an access fee and a fixed annual fee.

The platform involves two different sections for publication:

- an announcements section, in which operators (both buyers and sellers) interested in proposing or seeking long-term contracts for the sale and purchase of electricity from renewable sources can publish, in anonymous and non-binding form, their announcements, respectively of sale or purchase, while the operators interested in these announcements can view them and express their interest;
- contract registration section, in which the seller operators fulfil the obligation to register the concluded long-term contracts for the sale of electricity from renewable sources.

Operators are allowed to modify or cancel their announcements published on the platform.

Following an expression of interest in an announcement (from a buyer or a seller), the GME informs the proposing operator (a buyer or a seller) about the occurred expression of interest. If the operator proposing a given advertisement agrees to get in touch with the operator who has expressed interest, the GME sends a notification to the latter. The same procedure applies if the operator proposing a given announcement refuses to get in touch with the operator who has expressed interest.

At present, the PPA public platform has only the aim of allowing the publication of buyers' and sellers' announcements concerning potential long-term contracts for the purchase/supply of renewable electricity. In the future, the Legislative Decree 199/2021 intends to upgrade the use of the platform also for the direct negotiation of PPAs.

7.1.2 The standardisation of PPAs signed on the public platform.

The legislator also introduced requirements for PPAs concluded by means of the public platform concerning minimum information to be provided by the operators. In particular, both purchase and sale announcements must contain at least the following minimum information:

- duration of the contract object of the announcement (at least 3 years);
- production profile (baseload; peak-load; pay as produced; other);
- capacity of the power plant object of the announcement (at least 5 MW);
- total volume of electricity production covered by the announcement (expressed in MWh);
- type of renewable source covered by the contract;
- for each plant covered by the announcement, the relative status (e.g., authorisation obtained, in operation, etc) and, for the plants not yet in operation, the expected date of entry into operation;

- expiry date of the announcement.

If a buyer and a seller agree to sign a PPA by means of the public platform, the seller has the obligation to register such contract in the contract registration section of the platform. The seller shall indicate at least the following minimum information:

- counterparty of the contract;
- duration of the contract;
- production profile (baseload; peak load; pay as produced; other);
- price agreed;
- total quantity of the contract (expressed in MWh);
- type of renewable source of each plant covered by the contract;
- total electricity production expected (MWh);
- capacity (MW) of the power plant object of the contract;
- geographical location of each plant covered by the contract

7.1.3 Negotiation of PPAs with a State-owned counterparty.

To support industrial customers and SMEs during the energy crisis, the Government approved a temporary measure involving the adoption of a price cap on PPAs.[2] In particular, the Government assigned to the GSE the responsibility to sell by means of the PPA platform managed by the GME a fixed amount of electricity (about 16 TWh) at a fixed price (€ 210/MWh) for certain categories of customers: industrial and SMEs. Customers which could benefitted from the measure were selected by means of the first arrived first served principle.

2 See the Decree of September 16th, 2022 of the Ministry for Enviroment and Energy Security: https://www.mase.gov.it/sites/default/files/Archivio_Energia/Archivio_Normativa/dm_EE_release_314_16-09-2022.pdf

7.1.4 Use of PPAs in energy communities.

The Legislative Decree 199/2021 also allows energy communities to stipulate PPAs for the supply of the electricity self-produced and not consumed. Energy communities can also participate to the public platform operated by GME.

7.2 Discussion of the findings.

The Italian legislative framework for PPAs appears to be quite mature since it entails some of the best practices among those proposed by the European Commission, such as the public platform for the negotiation of PPAs, contract standardisation, and PPAs in energy communities. In addition, the debate on PPAs has originated in Italy well before the recommendations of the European Commission.

However, the potential for PPAs in Italy is quite unexplored, if one considers the goal set in the Italian National and Climate Plan which, on a preliminary basis, expects PPAs to contribute at least an additional 0.5 TWh each year of renewable energy[3] to a RES-E target of 55% set in the same Plan.

In addition, in the light of the new target concerning RES penetration agreed by the EU Parliament (42,5% in 2030) we should expect a greater contribution of PPAs in fostering renewable electricity generation in Italy. The Italian electricity market has a significant potential for the development of PPAs. In 2022, total electricity production in Italy amounted at 276 TWh of which 47 TWh (17%) from photovoltaic and wind generation, and 28 TWh from hydroelectric power plants (10%). In total, electricity generation from renewable sources represented about 27% of total electricity production.

The last development plan of Terna[4], the Italian electricity transmission

3 Italian Energy and Climate National Plan. https://energy.ec.europa.eu/system/files/2020-02/it_final_necp_main_en_0.pdf

4 See https://www.terna.it/it/sistema-elettrico/rete/piano-sviluppo-rete

system operators, states that in 2030, Italy shall achieve a target of 65% of RES-E (which is equivalent to 70 GW of additional capacity installed) to comply with the new decarbonisation targets set at the EU level. According to Terna, on January 2023, the demand for connection to the transmission grid by renewable electricity generation plants amounted to 340 GW (of which 37% from solar and 54% from wind sources). A value which is equal to 5 times the target set for 2030.

At the same time, the increasing electricity prices as well as their increasing volatility due to the energy crisis, call for the adoption of market tools which may help to mitigate price risks (for both consumers and producers) and foster the development of renewable electricity generation by ensuring a stable revenue flow for project developers.

Another factor which may encourage the diffusion of PPAs in Italy is the increasing attention of the legislator to the development of energy communities. The latter, indeed, are receiving strong support in Italy and PPAs may be a useful solution to sell the electricity produced and not consumed by the Community.

However, except for the temporary measure concerning the purchase of renewable electricity from GSE (section 7.3), there are not interventions in place to address both price risk and counterparty risk (on the seller's side). To this aim, the recent energy crisis and the uncertain evolution of the macroeconomic scenario suggest the opportunity for Italy to investigate the potential benefits – in terms of diffusion of PPAs – to adopt public schemes to address both price and party risks. Such measure should be implemented consistently with the framework of the EU State aid guidelines.

The legislative and regulatory framework for PPAs in Portugal

CHAPTER 8

Chapter 8

The legislative and regulatory framework for PPAs in Portugal

Ricardo Silvestre

8.1 Demand and supply of PPAs in Portugal.

The Paris Agreement[1] calls for investments in clean renewable energy to become a priority, both for governments and the private sector. Countries with high solar radiation, strong wind currents, and vast seacoasts are natural recipients for the implementation of renewable energy projects to provide a clean source of electrification for industry and communities. Specific countries, like Portugal, became attractive spots, particularly in the European Union (EU), due to the need of energy independence.[2] The potential for these projects, namely in the central-south region of the country, from Lisbon down to the Algarve, has been well-known for some time. In 2016,

1 United Nations (2015) 'Paris Agreement', United Nations, 12 December, https://unfccc.int/sites/default/files/english_paris_agreement.pdf.https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

2 R. Silvestre (2022), 'The Importance of Iberian Energy to the Future of European Union and Central and Eastern Europe', 4Liberty.eu, 17, 128-145. https://4liberty.eu/wp-content/files/09-RICARDO_SILVESTRE__THE_IMPORTANCE_OF_IBERIAN_ENERGY_TO_THE_FUTURE_OF_EUROPEAN_UNION.pdf.

data from annual average values of global horizontal irradiation showed that region as the most suitable for the implementation of medium to large scale solar plants[3] - and this has been observed repeatedly.[4] Aware of the potential, the Portuguese government presented the National Energy and Climate Plan in 2019,[5] approved by the Resolution of the Council of Ministers nº 53/2020, of 10 July[6]. This law Decree updates the national goals of renewable energy in final energy consumption. The Portuguese government wills to have, in 2030, a quota of the utilisation of energy from renewable sources of 49% or above in the final total consumption. The targets set for that progression are, in 2024, a consumption equal or above 34%; in 2026 equal or above 40%; and in 2028 of 44%. Regarding the sector of transportation, the aim is to have 29% of this kind of energy in final consumption, and with land transport of 75% by 2025, and 100% by 2030. These goals also tie into the ambition for the country to reach carbon neutrality by 2050. This path is presented in the Roadmap for Carbon Neutrality 2050,[7] with a special focus

Specific countries, like Portugal, became attractive spots, particularly in the European Union (EU), due to the need of energy independence.

3 A. Cavaco, H. Silva, P. Canhoto, and S. Neves (2016), 'Annual Average Value of Solar Radiation and its Variability in Portugal', Workshop on Earth Sciences 2016. Abstract book, https://www.researchgate.net/publication/311680456_Annual_Average_Value_of_Solar_Radiation_and_its_Variability_in_Portugal.

4 International Energy Agency (2022), 'Portugal Country Report', IEA, https://www.iea-shc.org/countries/portugal/report.

5 European Union (2019), 'National Energy and Climate Plan 2021-2030', European Union, December, https://energy.ec.europa.eu/system/files/2020-06/pt_final_necp_main_en_0.pdf.

6 República Portuguesa (2020), 'Resolução do Conselho de Ministros n.º 53/2020. Aprova o Plano Nacional Energia e Clima 2030 (PNEC 2030)', Diário da República, 133, 2-158. https://files.dre.pt/1s/2020/07/13300/0000200158.pdf.

7 República Portuguesa (2019), 'Roadmap for carbon neutrality 2050 (RNC2050). Long-term strategy for carbon neutrality of the Portuguese economy by 2050', Ministério Transição Energética, 6 June, https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3d%3dBAAAAB%2bLCAAAAAAABACzMDexBAC4h9DRBAAAAA

on renewable energy and the incorporation in different sectors. Portugal already reached the 4th best rate of incorporation of renewable energy in the electric sector of the EU,[8] and there is the objective to generate +15GW of renewable energy in 10 years.[9]

Then, starting in early 2017, the growth of additional private investment to create the conditions for selling and buying of energy in the liberalised market occurred. In March of the same year, an energy consortium started to build the largest unsubsidised photovoltaic plant in Europe of that time,[10] with the capacity to generate 221MW and power 150.000 homes per year. At the time, the transition to a fully private funding was explained to be '(...) due to the increasing in the competitiveness of solar energy generation (...) ability to optimise the cost of delivery across the value chain (...) the projects favourable location in Southern Portugal, which boasts one of the highest solar radiations in Europe'.[11] Then, in the span of three years, three other major developments were introduced. In 2018, two of the investors in Solara4 were also involved in creating the project of Ourika, also in the south of Portugal, a 46MW solar plant capable of generating energy for 23.000 homes, characterised by having a power purchase agreement (PPA) with a 20-year fixed price deal.[12] Then, in late 2018, it was the turn of the former state energy company Portugal Energies (EDP in Portuguese) to sign an 18-year contract for energy supply with the Indian group, Sakthi, being the biggest ever at the time.[13] This PPA aimed to assure stability of energy supply and a price reduction, being that the electric energy produced would come from renewable sources. In 2019 it was the turn of the power plant at Vale de

%3d%3d.

8 J. Sousa (2022), 'Portugal mantém-se como o quarto país europeu com maior incorporação de renováveis na eletricidade', Eco.Sapo, 12 Setember, https://eco.sapo.pt/2022/09/12/portugal-mantem-se-como-o-quarto-pais-europeu-com-maior-incorporacao-de-renovaveis-na-eletricidade/.

9 V. Silva (2020), 'Governo quer o dobro do solar e chegar a 15 GW de renováveis até 2030', Eco.Sapo, 21 May, https://eco.sapo.pt/2020/05/21/governo-quer-o-dobro-do-solar-e-chegar-a-15-gw-de-renovaveis-ate-2030/.

10 A. Pressley (2023), 'WElink powers ahead with Europe's largest unsubsidised solar project', Intelligent CIO, 1 November, https://www.intelligentcio.com/eu/2017/11/01/welink-powers-ahead-with-europes-largest-unsubsidised-solar-project/.

11 A. Pressley (2023).

12 Allianz (2018), 'Allianz acquires first subsidy free solar project in Iberia', Allianz, 25 October, https://www.allianz.com/en/press/news/financials/stakes_investments/181025_allianz-acquires-first-subsidy-free-solar-project-in-iberia.html.

13 J. Sousa (2018), 'EDP celebra com a Sakthi o maior contrato comercial de sempre em Portugal', Jornal Económico, 17 December, https://jornaleconomico.pt/noticias/edp-celebra-com-a-sakthi-o-maior-contrato-comercial-de-sempre-em-portugal-390112.

Moura to start functioning, a fifty-five hectares project with a total capacity of generating 28,8MW and capable of producing 55GW/h from renewables, enough to sustain 10.000 homes.[14] This power plant was also a part of a 10-year contract PPA with a price guarantee, and ready to serve the Iberian market. From the perspective of the consumer, these PPAs allow a guarantee of electricity supply for the agreed period, and offers stability and predictability of energy prices. From the perspective of the seller, these long-term contracts are a source of stable revenue, which is important for the planning of investment and operations, aided by the crescent optimisation of electricity production from renewable sources. Apart from the market stability, all the projects presented above were introduced to reduce carbon dioxide emissions, therefore helping to reach the decarbonisation targets set by the Portuguese government and the EU.

This liberalisation of the energy market was one of the many positive aspects of the ascension of Portugal to the EU. That meant the reversion from the traditional State control of almost all public services to the creation of a private consortium now managing energy services, the company EDP. Due to this restructuring, which happened by law in 1991, all the contracts that existed before the privatisation, known as Contracts for the Acquisition of Energy (CAE in Portuguese) – most of them long-term – had to be reformulated to accommodate a new model of bilateral contracts based in market forces. This change was put in force by a 2013 regulation, the Law-Decree nº 35/2013[15] (now replaced by the Law-Decree nº 15/2022 of 14 January).[16] This new structure of the market and market players was also extensive to renewable energy, with the creation of the company EDP Renewables.

14 Agência Lusa (2019), 'Central fotovoltaica de Évora entra em funcionamento na sexta-feira', Diário de Notícias, 13 June, https://www.dn.pt/lusa/central-fotovoltaica-de-evora-entra-em-funcionamento-na-sexta-feira-11006756.html.

15 República Portuguesa (2013), 'Decreto-Lei n.º 35/2013, de 28 de fevereiro', Diário da República, 42, 1154-1165. https://files.dre.pt/1s/2013/02/04200/0115401165.pdf.

16 República Portuguesa (2022), 'Decreto-Lei n.º 15/2022, de 14 de janeiro', Diário da República, 10, 3-185. https://diariodarepublica.pt/dr/en/detail/decree-law/15-2022-177634016.

8.2 Best practices.

However, when making a comparison with different Member States, it is important to highlight that due to its recent past of regulatory tendencies and in its still mostly State rules-based system, there are many hurdles in Portuguese legislation terms. These are included in a massive omnibus bill regulating the commercial relations in the electric sector.[17] Still, some best practices are currently in place and help the promotion of PPAs:

- the guarantees of PPAs in Portugal to include the freedom of price negotiations for service rendered from the electric energy producer to the seller and consumer, and what are the costs of the energy purchase, that can vary depending on the market conditions, or the level of commitment from both parts;
- contracts are remitted to the Portuguese Commercial Relations Rulebook (RRC in Portuguese), that establishes the functioning of commercial relations between the market's agents and the commercial conditions for the connection to the public energy network;[18]
- there are definitions on how to access to the mode of wholesale market, with a need for registration of market agents and participants;
- there is also a definition of wholesale market contracts for long term, as it pertains to operators and agents, and the setting of rules for the organised market – understood as the ones that have a formalised structure for the buy and sell of energy;
- the needs for compliance of the technical rules that are part of the Manual for Procedures of the Global Management of the National Electric System[19] determined by the administrative independent ESRE, the Energy Services Regulation Entity;

17 República Portuguesa (2020a), 'Entidade Reguladora dos Serviços Energético. Regulamento n.º 1129/2020', Diário da República, 252, 69-233. https://files.dre.pt/2s/2020/12/252000000/0006900233.pdf.

18 República Portuguesa (2020a).

19 Entidade Reguladora Serviços Energéticos (2020), 'Manual de Procedimentos da Gestão Global do Sistema', ERSE, May, https://www.erse.pt/ebooks/regulamentos-manuais-guias/eletricidade/manual-de-procedimentos-da-gestao-global-do-sistema-eletrico-maio-2020/.

- the needs to communicate to the operator of the energy transport network – the privately owned National Energy Network (or REN in Portuguese), which is the Global Manager of the National Electric System (GGS, in Portuguese) – the terms of a PPA contract, including its duration;
- settlements of processes are exclusive responsibility of the two parts, but the verification and valorisation of deviations, to calculate the amounts that must be paid or received by the parties involved in the agreement, is done by REN;
- in case there are aggregators of energy production, it is necessary to state what are the electric production units in the eventuality of a switch the source of energy, and if any of the aggregate ones can become a consumer installation.

8.3 Discussion of the findings and recommendations.

In October 2018, a 'somewhat splashy' announcement was made in Portugal: the first investment in a solar farm without public subsidies was presented to the Portuguese media. This is particularly noteworthy in a society that, in only 50 years of democracy after the end of the dictatorship and normal governance by elected leaders, is used to be State-subsidy dependent in almost every field. Even with the liberalisation of several markets, from energy to water, from investments to funds, from goods to services, Portugal still has a massive dependence on State budget funds that, in fact, have been ruinous to the country fiscal and economic functioning, leading to the need of bailouts. The most dramatic, due to the crippling government's budget deficit,[20] was the Economic Adjustment Programme of 2011-2014[21] that contained 'structural reforms to boost potential growth, create jobs, and improve competitiveness' and 'reducing the scope of the public enterprise

20 R. Reis (2013), 'The Portuguese Slump and Crash and the Euro Crisis', Bookings, https://www.brookings.edu/bpea-articles/the-portuguese-slump-and-crash-and-the-euro-crisis/.

21 European Commission (2023), 'Financial assistance to Portugal', European Commission, https://economy-finance.ec.europa.eu/eu-financial-assistance/euro-area-countries/financial-assistance-portugal_en.

sector'.[22] That has been achieved, partially, by the liberalisation of the energy market and the creation of conditions for market players operate, naturally, overviewed by independent organisations that serve as regulatory agencies and that enforce Portuguese laws and EU Directives. The absence of governmental intervention, in a broader sense, incited the European Commission to propose, in a package of reforms to the Portuguese electric market in March 2023, the creation of a State mechanism to cover financial risks for those small and medium enterprises willing to enter in PPAs, but that are currently unable to access them.[23] At the same time, because of the regulatory nature of the State (as previously mentioned) there is a high level of standardisation needs, as well as of information sharing with the regulatory agencies: on one hand, this presents more hurdles for private investors but, on the other hand, it helps keep the market functioning properly. For example, this mechanism is also applied to the need of having guarantees of origin that, once achieved, can be included in PPAs contractual procedures.[24] This can be also applied in relation to the need for aggregated status, which is subject to a thorough procedure, and then needs to be communicated to regulatory agencies if they become part of a PPA.[25]

Currently, in Portugal, more work can be done, procedures can be better defined, smarter regulations can be produced, and more incentives to create clean energy in a scale that can then lead to the development of PPAs can be given. Some are worth pointing out, including a simplification of PPAs, since long-term contracts are complex and may contain variable terms and conditions capable of making their operation difficult. To make them more accessible and easier to understand, a simplification of said contracts would represent a positive measure, without imposing undue burdens to the agreeing parts. Equally, PPAs should have more flexible options of purchase and selling of energy,

22 Organisation for Economic Co-operation and Development (2013), 'Portugal. Reforming the State to Promote Growth', OCDE, May, https://www.oecd.org/portugal/Portugal%20-%20Reforming%20the%20State%20to%20Promote%20Growth.pdf.

23 A. Oliveira (2023), 'Reforma do mercado elétrico "positiva" mas implementação pode ser difícil', Eco.Sapo, 17 March, https://eco.sapo.pt/2023/03/17/reforma-do-mercado-eletrico-positiva-mas-implementacao-pode-ser-dificil.

24 Entidade Reguladora Serviços Energéticos (2022), 'Regulação da Energia. Legislação Essencial', ERSE, 22 February, https://www.erse.pt/media/25bb4f3s/legisla%C3%A7%C3%A3o_energia_final_22fev2022.pdf.

25 República Portuguesa. (2020a).

which will allow for agreeing parts to revise the contract to their needs. It is understandable that ESRE (the Energy Services Regulation Entity, presented above) would be resistant to such an option due to the need to overview those changes, but the conditions could be created for that to be streamlined. This also ties-in to the need to create mechanisms that allow a better access to market information. In that way, agreeing parts can have a clearer and more detailed information on prices, terms, volumes, and other contract conditions. This could surely improve trust and transparency in the relationship between buyers and sellers (and make ERSE work easier).

Another solution often presented is the creation of a secondary market for long-term energy sales contracts that can improve their operation, allowing the parties to negotiate, transfer, or resell their contracts. Again, there is the question to have a regulatory operation on those secondary markets, but once more, those are structures that could be put in place. A modernised system for the resolutions of disputes and performance measurement is warranted, in a way to speed-up decision from regulators or judicial institutions. This ties-up to another recommendation of having independent performance measurement, which ensures measurement accuracy and avoids conflicts between parties, in order to mitigate price risk. Regarding the supply risk, there is a need to ameliorate and expand the Portuguese energy grid. The investment in the production of clean energy from renewable sources, aiming to promote competition and reducing prices, is highly dependent on the modernisation of the energy grid. Luckily, the Portuguese government is planning major expansions of electricity infrastructure to support the integration of renewables and to increase interconnections with Spain. The government is also taking steps to increase the flexibility of the electricity system, including the deployment of smart grids and pilot projects for dynamic tariffs, and demand response market participation. These are measures that can be also found in the Recovery and Resilience Plan (RRP), part of the Next Generation EU fund.[26] This will

26 R. Silvestre (2022a), 'The Portuguese Plan for Recovery and Resilience: Contribution for a comparative analysis between EU Member States on effects on governmental institutions and policies', in G. Bovenzi and O. Łabendowicz (eds.), NextGenerationEU: Taking Stock (Brussels: European Liberal Forum), p. 105.

also allow to bridge a structural gap between supply and demand where, if able to produce enough clean energy to be a market player for PPAs, renewable energy communities (also included in the RRP) could enter the gross market; neither they would be dependent from the government facilitating permits for operation and trading, via public auctions, for the 'allocation of reserve injection capacity at points of connection to the Public Service Electric Grid for solar photovoltaic energy, produced in an electro producer centre'.[27]

Naturally, there are always more ways to improve the liberalisation of the markets, and to increase the incentives for private market players to have a bigger role and participation on energy production and commercialisation, particularly the one that results from renewable sources – in which Portugal has a very favourable geographical position. Still, some very concrete and positive steps were already taken, and others can be introduced for Portugal to be a positive example for the rest of the EU on how to use power purchase agreements to achieve the 2030 target of a 45% share of renewable energy, as determined by the European Commission.

27 República Portuguesa (2019a), 'Despacho 5532-B/2019, de 6 de Junho', Diário da República, 109, 17428(2). https://files.diariodarepublica.pt/2s/2019/06/109000001/0000200002.pdf.

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The legislative and regulatory framework for PPAs in Spain

CHAPTER 9

Chapter 9

The legislative and regulatory framework for PPAs in Spain

William Wang

Since 2019, Spain has pioneered the Power Purchase Agreement (PPA) in the EU. This chapter introduces and analyses the legislative and regulatory framework of the Spanish PPAs. Spain has relaxed the regulations and the financial barriers of small-scale producers and on-site PPAs, expanded the PPA contracts limit, and provided funding to incentivise consumers to adopt and use more PPAs. However, the simplified legislative frameworks should not only be a temporary policy for the post-pandemic recovery but become a long-run strategy to facilitate the PPAs. Thus, the current PPA contracts' legal limits should be further relaxed, and unnecessary State subsidies should be eliminated to make the market price signals work. Besides, it is also recommendable that Spain adopts private insurance firms as institutions to compensate for energy price fluctuations, which might be a more efficient alternative to the state insurance mechanisms.

9.1 General practices.

Since 2019, Spain is one of the pioneers in adopting PPAs. The Spanish legislative framework on PPAs is set by a series of Royal Decrees (RD) and laws, including RD 244/2019,[1] RDL 36/2020,[2] RDL 24/2020,[3] and RD 1106/2020.[4] The mentioned Law-Decrees have transposed the EU Directive 2018/2021 on the promotion of the use of renewable energy. Additional provisions on the long-term contracting of renewable electricity have been adopted by Decrees approved by the Ministry for Ecological Transition.

In particular, the Spanish legislative framework entails the following areas for the promotion of PPAs:

- relax the regulatory process of small-scale producers and on-site PPAs (RD 244/2019);
- eliminate some financial barriers for on-site PPA generations (RD 244/2019);
- expand the PPA contracts by public procurement regulations to 10 years (RDL 36/2020);
- provide funding to increase electro-intensive consumers to adopt PPA and use more renewable energy (RDL 24/ 2020 and RD 1106/2020).

Spain has relaxed the regulations and the financial barriers of small-scale producers and on-site PPAs, expanded the PPA contracts limit, and provided funding to incentivise consumers to adopt and use more PPAs

1 See Real Decreto 244/2019 (2019).
2 See Real Decreto-Ley 36/2020 (2020).
3 See Real Decreto-Ley 24/2020 (2020).
4 See Real Decreto 1106/2020 (2020).

9.1.1 Relax the regulatory process of small-scale producers and on-site PPAs.

The RD 244/2019 started the process of Spain's regulatory reduction of small-scale energy producers and on-site PPAs. The law aims to encourage self-consumption to be carried out with renewable distributed generation, establishing that self-consumed energy of renewable origin, whether co-generation or waste, will be exempt from all types of charges and tolls.

The Decree also simplified the definition of on-site (self-consumption) energy users into two modalities. The first is self-consummation without surpluses, which can no longer discharge energy to the grid. The second is self-consumption with surpluses, in which discharges can be made to distribution and transportation networks.

This regulatory framework involves three different sections:

- energy price compensation. The new regulations enable the development of compensation mechanisms between the energy deficit and the surplus of on-site energy consumers with surpluses for installations up to 100 kW. Besides, it also applies to the produced but not consumed energy in installations up to 100 kW in 1 month;
- streamline the administrative process: 1) on-site facilities without surpluses (for which the associated consumer has already access and connection permits for consumption) are exempted from needing access and connection permits for the generation facilities; 2) the energy distributors can modify the contract for small and on-site consumers only with the latter's consent, without the necessity of a previous permission from the government administrations; 3) based on the setting of the law, instead of manually approving or disapproving the energy installation, the Spanish State will register the installation information only for statistical purposes to evaluate the energy production and consumption conditions;
- allow the implementation of dynamic partition coefficients and shared self-consumption. The energy generated in a shared system can be shared among on-site users without over-installing energy

installations.

The RD 244/2019 has provided a clear and simplified definition of on-site energy users. Based on the new Decree, the Spanish State will no longer manually approve or disapprove energy installation for on-site users, streamlining the administrative process. It also provides a flexible and compatible plan for on-site users to share their energy without over-installing. Besides, the previously mentioned price compensation institutions will offer incentives for using renewable energy in Spain.

9.1.2 Eliminate some financial barriers for on-site PPA generations.

RD 244/2019 also eliminated some financial barriers for on-site PPA generations, including taxes and tolls. Significantly, it benefits the Corporate PPAs as the energy charges are reduced, eliminating costs for the Corporate PPAs.

9.1.3 Expand the PPA contracts by public procurement regulations to 10 years.

The Article 53 of Title I of RDL 36/2020 expanded the term limit on power supply contracts by public procurement regulations to ten years, instead of the previous four-year limit. Besides, the Law-Decree also raises the importance of simplifying administrative processes for a more efficient energy transition. However, the RDL 36/2020 does not support the possibility of renewal or extension when the contract has researched the ten-year limit.

9.1.4 Provide funding to increase electro-intensive consumers to adopt more PPA.

Followed by the remuneration criteria for management guidelines established by the EU, the RDL 24/2020 created the new reserve fund FERGEI ('el Fondo Español de Reserva para Garantias de Entidades Electrointensivas' in Spanish), to encourage the use and installation of renewable energy and reduce uncertainty. Continuing the framework of RDL 24/2020, Chapters I and II of Title II of the RD 1106/2020 further applied the framework to electro-intensive consumers:

- the electro-intensive consumers are firms that consume more than 1

GWh per year in two of the previous three years and consume at least 50% of their energy during off-peak hours;

- the mentioned industrial electricity consumers must contract at least 10% of their annual power demand via renewable energy Cooperative PPAs with a minimum term of five years as quota obligations and GOs transfer in combination with PPAs;
- on behalf of the Spanish State, the FERGEI will assume some financial risks for the energy generators and suppliers if the electro-intensive consumers cannot pay the fee;
- FERGEI is planned to have an annual budget of € 200 million in minimum or € 600 million for the first three years of implementation;
- under Cooperative PPAs, the Spanish government will guarantee payments to suppliers in case the off-takers cannot pay. A State insurance mechanism will cover credit risk (de facto or legal insolvency) regarding non-payment by any PPA electro-intensive consumer in the mid-run and long run.

9.2 Discussion of the findings.

As explained, following the EU Directive 2018/2001, the RD 244/2019 provides a more flexible contracting for SMEs, self-consumption, and demand aggregation by PPAs means. Besides, it established an initial legislative framework for public support schemes combined with PPAs and standardisation of PPAs.

Although the RDL 36/2020 expanded the term limit on power supply contracts by public procurement regulations up to ten years, there are still several doubts that the Law-Decree will stand. First, as it mainly emphasises the post-pandemic recovery from 2021 to 2026, we should consider whether the above-simplified rules would continue to be effective after this period; second, the current framework does not allow the abovementioned supply contracts to be renewed after the ten-year limit, proving an inflexible setting for public administrations and suppliers; third, the simplified contract framework is limited to appointed

production activities based on the recovery plan, while if this more efficient contract indication could be applied to other energy production activities still remain questioned.

The RDL 24/2020 further implemented the quota obligations and GOs transfer in combination with PPAs. Besides, due to RDL 24/2020 and RD 1106/2020, paying particular attention to FERGEI's insurance or guarantee operations is also necessary. The insurance mechanism is managed by the Managing Agent (Agente Gestor). As a state guarantee scheme on PPAs, the insurance is based on a net of indirect taxes, cancellations, and refunds resulting from increasing or deducting remuneration up to 5% of the premiums received. The Electro-intensive Market Risk Commission (la Comisión de Riesgos del Mercado Electrointensivo), who approved the FERGEI, will be responsible for the annual verification of the performance of the Managing Agent. The insurance mechanism provides a particular pricing structure to reducer the uncertainty (such as the credit risks of unpaid consumers) of the suppliers of PPAs. However, as the insurance funding is based on the State insurance firm, the Spanish Export Credit Insurance Company (CESCE), whether it can work like a purely private insurance firm or rather also create regulatory, policy, and economic barriers is still unclear. In this regard, instead of the State insurance mechanisms, adopting private insurance firms as institutions to compensate for energy price fluctuations might be an adequate alternative.

Moreover, following the above PPA legislative frameworks, the RDL 17/2021[5] further eliminates barriers regularly and provides temporary energy subsidies due to the growing energy prices. The RDL 17/2021 provides a public platform for a more transparent and market-based pricing structure. However, whether the deregulation policy will stand after the end of the energy crisis is still unknown, and the side effects of energy subsidies should also be under observation after the policy implementation. Finally, the mechanism of confronting the increasing energy prices partly caused by previous State regulatory policy should be enforced.[6]

5 See Real Decreto-Ley 17/2021 (2021).

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6 For previous studies on the regulatory problems of Spain's energy transition, see Wang et al. (2022) and Martínez-Zorita & Fernández Ordóñez, (2023). For more on the EU free market-based energy transition approach, see Wang et al. (2021).

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