



THE SHARING OF RISKS WITHIN A POWER PURCHASE AGREEMENT

BY

Elena NICULESCU

Bucharest University of Economic Studies, Bucharest, Romania



Article History

Received: 08/02/2024

Accepted: 13/02/2024

Published: 15/02/2024

Vol – 3 Issue – 2

PP: -75-84

Abstract

To comply with the climate neutrality goals, many companies buy or intend to buy green energy. In a situation like this, Renewable Power Purchase Agreements seem to be a very good solution for achieving this. Although PPAs can be attractive for both seller and buyer, the assumption of risks in this type of contracts was not very well analyzed.

The main goal of this research is to identify and analyse the risks that may occur when signing a PPA, on the one hand and to find the best solution for sharing them between the parties in the contract, on the other hand.

For this research the comparative analysis, survey based on questionnaires, Spearman's correlation matrix, and IBM SPSS Statistics for Window are used.

The results suggest that although there have been made some changes in the legal framework regarding these type of contracts, there is still place for improvement, the lack of confidence in the law being the main factor that leads to the hesitation to enter in such contractual relations non-legislation or insufficient legislation of the PPA representing one of the risks most often assumed by the parties.

The implications of the study are at the theoretical level: approaching a little-studied topic in the context of the development of some legal frameworks in order to promote green energy, clarification of some theoretical aspects regarding the assumption of contractual risks.

Index Terms: Force majeure, Green Energy, Power Purchase Agreement, Renewable Energy, Risk assessment

1. INTRODUCTION

Taking into consideration the Paris Agreement more world countries, including European Union want to become carbon neutral by 2050 [Hale et al., 2022; Council of European Union, 2020] as to limit the global warming below 1.5 C [IPCC et al., 2018, 2012]. This means the increase of the use of renewable energy which can make changes to the actual electricity system [IEA, 2021]. Among these changes there are listed the adaptation of the electricity network, as well as the creation of a balance between the demand and supply of energy, which is efficient from the point of view of costs [Denholm et. al, 2021].

In addition to this, The Energy Transition Commission is of opinion that all developed countries should reach by 2050 zero net carbon dioxide and all developing countries by 2060, by using innovative technologies to cut down emissions, clean electrification being one of the most important methods taken into account. This means that the total electricity use will

increase from 20% of final energy demand today to over 65% by 2050 and this electricity should be transmitted without carbon emissions [Iancu, 2022]. As a consequence to all this demand, it can be seen an increase of the use of renewable energy sources, what means an increase of the use of Power Purchase Agreements for all types of green energy [Bruck et al., 2018].

The Joint European Action for more affordable, secure and sustainable energy (REPowerEU) is a new plan developed by the European Commission with the purpose to create the needed measures to make the suppliers able to satisfy the consumers' requirements through the development of contracts, such as power purchase agreements or bilateral contracts, which represent contracts with a carbon-free electricity generator [European Commission, 2022].

The analysis starts with a first PPA definition. PPAs are bilateral contracts signed between a project developer (e.g. an RE generator) and an energy buyer, which sell and buy a



certain amount of electricity, for a certain number of years and a certain price [Gabielli et. al., 2022]. According to Vimpari (2022) in 2019 already 20 GW from renewable energy sources investments were developed based on PPAs signed between private companies.

The purpose of this article is to study and analyse the risks associated with the signing and performance of the Power Purchase Agreement in the transition process to a zero-carbon economy, risks that if are not taken into account can lead to an earlier termination of the contract.

This article has the following structure. The introduction presents Power Purchase Agreement Concept. In Section 2, PPA and its associated risks are defined with an analysis of the main scientific sources. Within Section 3, the research methodology is presented, which consists in a comparative analysis and a questionnaire. Section 4 presents the main research results and last, but not least the final section shows the main conclusion. Bibliographical references complete this article.

2. Power purchase agreement in the scientific literature

Power purchase agreements are bilateral contracts that are concluded between an electricity generator and a corporate off-taker in order to sell and to buy energy with a typical duration of 10 years or more [Gabielli et. al., 2022]

In general terms, the contractual risk represents a disadvantage that must be borne by the debtor of the impossible obligation and means those negative patrimonial consequences that manifest themselves by releasing the creditor from his correlative obligation, since the said obligation can no longer be executed, as long as neither the debtor's obligation it can no longer be executed for reasons beyond his control.

According to Costin et. al. (2007), the risk of the contract represents a harmful consequence arising from the termination of the contract due to impossibility of execution, in which the persons who bear the negative consequences are also determined, being an application of the debtors resperit rule. It is borne by the party whose performance can no longer be performed in case of force majeure and is marked by the impossibility of the contractor to ask the other party to perform its own obligations, as well as the obligation of the debtor of the impossible to perform obligation to bear all the expenses and the damages created by the impossibility of execution. The basis of *res pirit debtoris* has its root in the reciprocity and interdependence of the obligations generated by synalagmatic contracts.

In the specialized literature the risk is considered any damage brought to a person apart from any fault, damage considered under the liability of the contractor, and which gives rise to the obligation to identify and repara the prejudice [Hamangiu et. al, 2013].

In the same sense are the claims of Costin (2004) regarding the obligation of the debtor of the impossible obligation to

bear the expenses he incurred by non-execution of the obligation and in general all the damages caused by the fortuitous impossibility of execution.

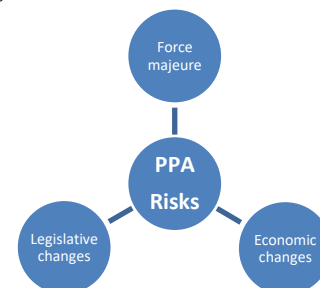
This is the reason why we should know how these risks should be coordinated and the way in which they should be shared between the parts, these aspects being very important to be taken into account when negotiating this type of contract, because - the more parties involved, the greater the risk that must be borne by them.

This is why in case that the party assumes a risk which is not in her obligation, then it expects to receive certain advantages in return. For example, in the case that the project company assumes the risk, then this part will expect to get an increase in its equity, while in the other case, the offtaker will expect to get a lower tariff. So, regardless of whether one party can gain any commercial gain by transferring the risk to the other party, it will still have to bear the risks of the contract in one form or another.

Taking into consideration the above-mentioned aspects it is very important to know how the risks are allocated in the contract, as long as PPA has to contain as many provisions outlined as clearly as possible, but also enough incentives to allow the parties to properly fulfill their obligations. As we already know, the producer typically has an obligation to construct, operate and maintain the project during the PPA, to deliver the required energy, while the buyer has the obligation to pay for the capacity, availability, and the delivered energy. Also, PPA will contain legal provisions regarding the solving of disputes, force majeure, and termination of the contract [United States Department of Commerce, 2019].

Among the risks that affect the PPA, we will analyse in this article: force majeure, legislative changes, and economic changes. It should be mentioned from the beginning that this analysis is done at the European level and an attempt was made to validate the hypotheses associated with the risks of actors from Romania.

Figure 1. Main risks that affect the PPA



At the same time, the absolute and invincible character is appreciated at the moment of the occurrence of the act, respectively at the time of the non-execution of the obligations [Viney, 2013], and once proven this prevents the contractual liability of the debtor. According to the provisions of art. 1634 of the Civil Code in the event that the obligation can no longer be executed as a result of force majeure occurring before the debtor is delayed, the debtor is released from the execution of the respective obligation.

However, the exoneration of the debtor is total, only when the damage is due to force majeure, otherwise the exoneration is only partial [Pop et. al., 2012]

Regarding the fate of the contract, once the total and definitive impossibility of executing the obligation exists, it will lead to its legal termination. Since we are talking about a synalagmatic contract, taking into account the contractual risk mechanism mentioned above, the creditor of the unenforceable obligation will also be released from his own obligations. Instead, to the extent that we are talking about a temporary impossibility of execution, the contract is maintained, but the obligations of the parties are suspended, as it results from the provisions of art 1557 C. civ.

In this regard, taking into consideration its effects, it is important that force majeure to be both provided in the PPA and very well detailed, this meaning to be defined in a very clear and precise way, including here natural events, but also other types of events, such as political ones.

Likewise, the discussions in a PPA must be held according to the affected party: the buyer or the seller (producer). If the situation affects the buyer, the PPA will usually establish the continuation of payments for the negotiated and transmitted energy, but in the event that the force majeure event affects the buyer and this leads to the delay of the COD date, the producer has the right to claim completion. The same it goes when the producer is affected by a local political force majeure – he can claim financial aid.

What is to be mentioned is that regardless the situation the impossibility of executing the obligation must not last longer than required by the force majeure event.

The term of change in law means the emergence of a new law, the modification of the existing law, and/or the changes in the analysis and interpretation of a law by a court, tribunal, or other authority which has the power to impose legal opinions.

The law applies in the time interval between the date of entry into force and the date of its termination and the applicable law is the one in force at the moment of signing the contract. The situation changes when, during the development of the contractual relations, a law appears that brings changes or makes it more onerous or more difficult to fulfill the obligations of the parties/one of the parties.

These legislative changes can affect the electricity producer in several ways, for example: they could affect the fulfillment of the obligation, they could affect his income, they could force the producer to bear a one-time capital cost or it could cause a continuous increase in the operating costs of the project company.

As part of the legislative changes are also included the changes in tax that may affect the producer by making the project uneconomical and these can be found in the form of change in tax rate, the creation of a new tax and class, or even the removal of certain tax benefits that can affect the production of energy but also the possibility of its supply. As for the consequences it is to be mentioned the increase or

decrease of production costs, maintenance costs, as well as the revenues considered by the producer.

3. Research Methodology

The main objective of this research is to find out the sharing of risks between the PPA parties, offering a deep understanding of this area and finding answers to an extremely controversial topic. The research methodology used in this paper consists in a comparative analysis, a survey based on questionnaire, Spearman's correlation matrix, and IBM SPSS Statistics for Window. This work has the main purpose of analysing and better understanding the way of assuming risks at the moment of signing the PPA, but also during the development of the contractual relations.

The contractual changes, the legal consequences in case of impossibility of supplying the energy/paying the price, the utility of a third guarantor, major force were considered dependent variables while the attitude, the level of knowledge, and the experience were thought to be independent variables.

A research method is that of comparative analysis with the objective to treat and exemplify as best as possible the risks that can affect the validity of the contract because in the situation where such a risk could appear, it should not lead to the termination of the contract.

The formulation of questionnaires had the main purpose to find out the risks that may affect the PPAs in the transition to a zero-carbon economy, while the results are processed with IBM SPSS Statistics for Window. It has to be mentioned that the survey involved 232 respondents and it had the idea to determine the risks and to find out how this should be borne within the parties. Regarding the respondents, we emphasize that they fall into different categories representing different fields of activity, such as economic operators and industrial and small consumers. The confidentiality of the respondents is respected throughout the study. Personal data were not the subject of this study and the questions provided are not subjective in nature.

Furthermore, aspects such as attracting a guarantor in the contract, knowing how the risks are borne in case of majeure force, or the legal consequences in case of impossibility of supplying the energy/paying the price were taken into account when analyzing the results.

The profile of the consumers who answered the questionnaires is presented in Table 1.

Based on the research literature and the information presented above, the following hypotheses were developed and considered:

Hypothesis 1: *In the case of energy sellers, experience is directly correlated with the level of knowledge (considered independent variables) and influences the attitude towards the implementation of PPAs.*

Hypothesis 2: *In the case of energy sellers, the way the risks are associated is dependent on the understanding and knowledge of PPAs.*

Hypothesis 3: *The legal consequences must be analyzed depending on the party that assumes the risks, the buyer preferring the termination of the contract, and the seller preferring the application of penalties and the continuation of the contract in its current form.*

Hypothesis 4: *The risks born both with the conclusion of the PPA and in case of force majeure are in correlation.*

Hypothesis 5: *Risk-taking influences trust and attitude towards PPAs. The more equally the risks are shared, the more favorable the attitude becomes.*

In order to obtain the research results, the data were processed with IBM SPSS Statistics for Windows. The statistical analysis performed as a result of the processing of the questionnaire was based on the following stages: collection, processing, analysis, and interpretation of the survey results. Regarding the horizontal analysis, we show that the answers to each question have different units of measure (ordinal, nominal, scale) so that a horizontal analysis is not eloquent. The vertical analysis is aimed at statistical correlations in order to explore their presence and intensity between the variables included in the model. We wanted to find out the correlations between different factors which influence the risks and whether these factors were strongly correlated to other factors.

Spearman's rank correlation was used. The main variables used for the correlation analysis are the following: risk bearing in the PPA, attracting a guarantor in the PPA, risk bearing in case of force majeure or the legal consequences in case of impossibility of supplying the energy/paying the price, attitude, level of knowledge and experience.

4. Results and discussions

The analysis was carried out based on the questionnaire answered by 232 respondents, their profile being described according to the table below:

Table 1. Respondents' Profile

		Frequency	Percent
Part	Buyer	167	72.0
	Seller	60	25.9
	Other	5	2.2
Experience	Without experience	101	43.5
	0-1 year	50	21.6
	1-5 yers	34	14.7
	>5 years	47	20.3
The company operates in the energy field	no, but I deal with energy problems	42	18.1
	no, and	74	31.9

within the company I am responsible for other problems

	yes	116	50.0
Monthly energy consumption	0-50 MWh	98	42.2
	50-100 MWh	59	25.4
	100-500 MWh	64	27.6
	>500 MWh	11	4.7

From the analysis of the table, it can be seen that most of the respondents have the quality of buyer within the PPA with a percentage of 72%, while only 60 respondents have the quality of seller, with a total percentage of 25.9%.

In terms of experience, it can be seen that the majority of respondents are people who do not have experience in the field of energy, respectively of concluding PPAs, the percentage being a relatively high one of 43.5%, the difference up to 100% being divided as follows: category 0-1 years, 21.6%, category 1-5 years, 14.7% and category >5 years 20.3%, which means that only 47 respondents have more than 5 years of experience.

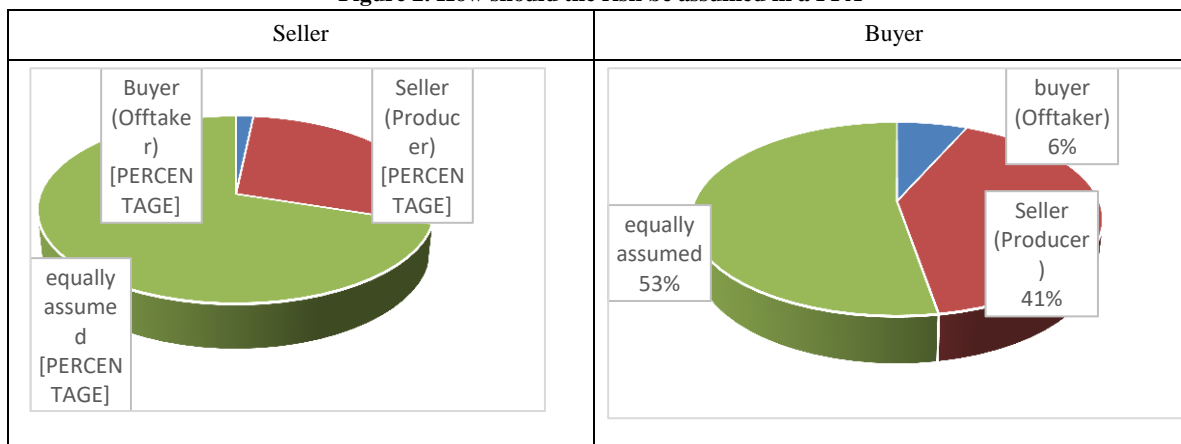
Regarding the aspects related to the field of activity of the companies represented by the respondents, it can be observed that half (50%) of the people who completed the questionnaire work in a company active in the field of energy, a percentage to which the specifics of the respondent's activity are added since 18.1% have the company's energy problems as their main job duties.

Correlating the aspects indicated in points 2 and 3 in the table presented above, we can see that although 68.1% of the respondents are active in the energy field, nevertheless the level of experience is low, which proves that the PPA market in Romania is poorly developed and did not present a particular interest for economic operators, respectively the average and industrial consumers of the country.

Last but not least, the analysis of the respondents' profile must also be correlated with the monthly energy consumption, where it can be seen that compared to the companies represented by the respondents, it appears that they are small and medium industrial consumers, having a monthly consumption of less than 500 MWh and adding up a total percentage of 95.3%.

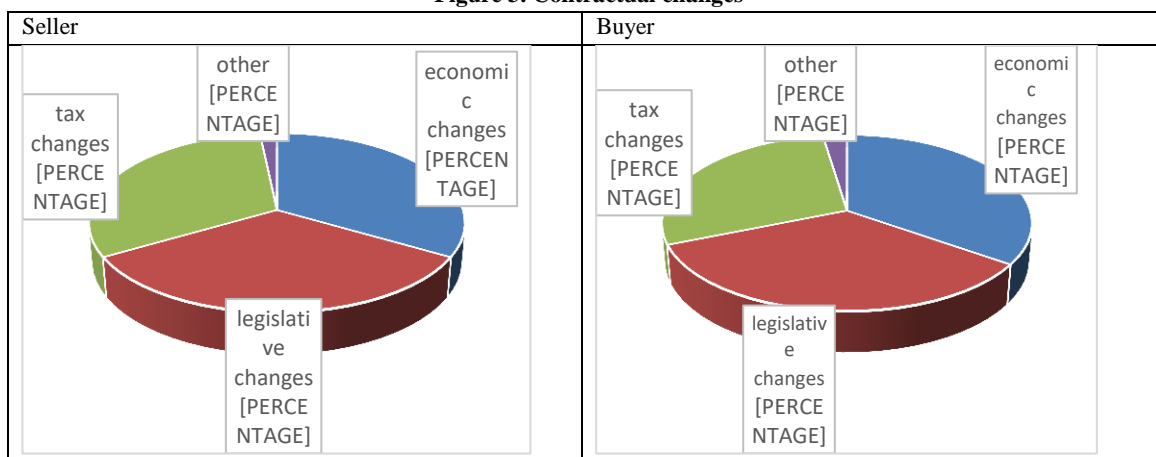
At the same time, it should be mentioned that the results of the questionnaire were analyzed from two perspectives: the perspective of the buyer and the perspective of the seller, and presented in the graphic illustrations in Figures 2-6.

Figure 2. How should the risk be assumed in a PPA



Although we can observe, from the analysis of the perspectives of the two parties (seller and buyer) that places 1 and 3 in their preferences are the same (we are talking here about the equal assumption of risks in the contract - place 1, respectively that the assumption of risks must be done only by the buyer - 3rd place), the difference consists only in the percentages allocated to them, an aspect that attracted our attention is given by the large number of respondents who are part of the category of the seller and who appreciate that the latter, as a producer, should be the one who bears the risks in the contract.

Figure 3. Contractual changes



The changes made to the contract are relevant from both points of view. Surprisingly or not, both the buyer and the seller consider that the changes made to the law are the most important changes that can affect the form of the contract, the percentage being a very tight one of 33% for the seller and 34% for the buyer. Fiscal and economic changes keep the same positions in the visions of the two contractual parties, respectively the 2nd and 3rd places, the percentages being some as tight as in the case of legislative changes.

An aspect that must be mentioned is given by the percentage of 2% of the respondents who filled in the column "others", a percentage which, although small, proves that there are other external causes that can intervene and affect the form of the PPA, among these causes external counting, political causes. In this sense, we can observe that these aspects prove the fact that the changes brought to the law are the most important in changing the contractual form, these legislative changes being of a great possibility to bring changes to the substance of the contract, especially in terms of the possibility of fulfilling the obligations incumbent on the parties, in this case regarding the possibility of supplying the energy and paying the price.

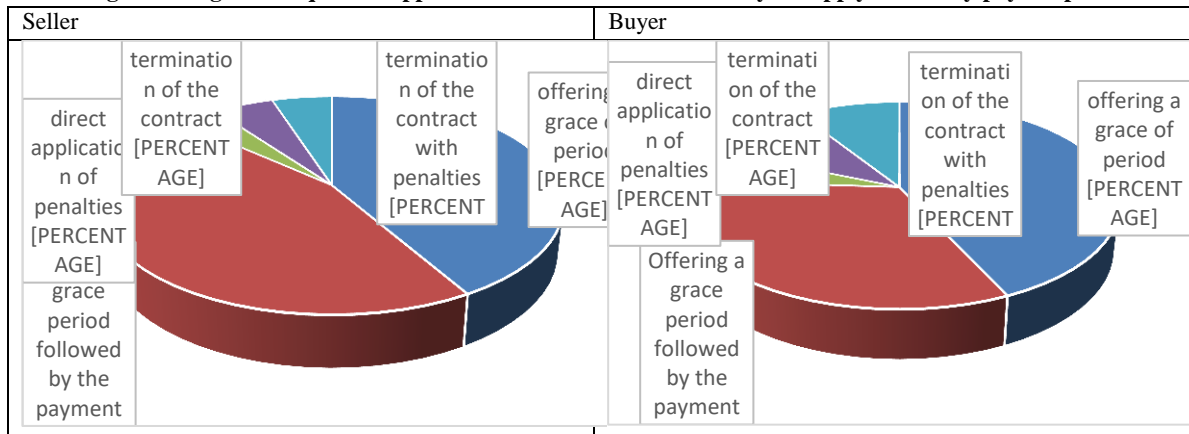
This situation clearly raises a question mark regarding the predictability and safety of the law, as long as the legislative changes occupy the main place in the opinions of the respondents regarding the risks brought to the nature and substance of the PPA. In this sense, the principle of legal security appears in the foreground and although it is not expressly regulated by the constitutional norms, it represents a fundamental principle of the rule of law. [Popescu et. al., 2008] At the same time, despite the fact that it brings the courts to the attention, in reality, it also concerns the legislative activity, because, through the modality in which normative acts are regulated, correlated and systematized, the unity of their interpretation emerges [Predescu, Safta, 2021].

As it was also stated in the specialized literature, after the entry into force of a normative act, in the creation of which all the rules of legislative technique were taken into account, there is the possibility that during its existence certain legislative events intervene, such as the modification, completing, repealing, republishing, suspending or others similar to them, which have as a consequence its modification.

In such situations, the legislator is the one who intervenes, as long as he is the only one able to ensure the clarity and coherence of the regulation, as well as its integration into the

legal system, with the aim of eliminating possible differences in interpretation.

Figure 4. Legal consequences applicable in the event of an inability to supply electricity/pay the price



Regarding the legal consequences that should be applied in case of non-payment of the price/non-supply of the contracted energy quantity, we can observe a different vision between the two categories: sellers and buyers. Thus, if the sellers consider in percentage 45% that the most appropriate legal consequence would be the offering of a grace period immediately followed by the payment of late penalties, the buyers are much more indulgent and prefer only offering a grace period for the non-supply of energy, which implies a greater probability that the respective contract will remain in force between the two co-contractors. Practically, we observe an inversion of the preferences of sellers and buyers, on the 1st and 2nd places being the options of offering a grace period followed by penalties, respectively offering only a grace period, with the mention that the two are in reverse order in depending on the recipient.

terminate it but with the application of damages in the event of non-compliance with the obligation to pay the price or to not supply the energy. Thus, we are talking about a percentage of 5% in the case of the seller who considers that the termination of the contract/termination of the contract with damages should be applied, while the buyer in a slightly higher percentage believes that the termination of the contract should be applied (10%), respectively termination of the contract with damages (9%).

In this context, we can observe that although the buyers seem to be more indulgent with the sellers in case of non-compliance with the energy supply obligation, nevertheless the buyers would apply the most severe consequences (legal sanctions) to the extent that the co-contractor or not - would fulfill the obligations, in which case the termination of the contract would intervene, respectively the termination of the contract with interest damages.

Another aspect that must be presented is given by the possibility of the parties to terminate the contract or to

Figure 5. The utility of a third guarantor

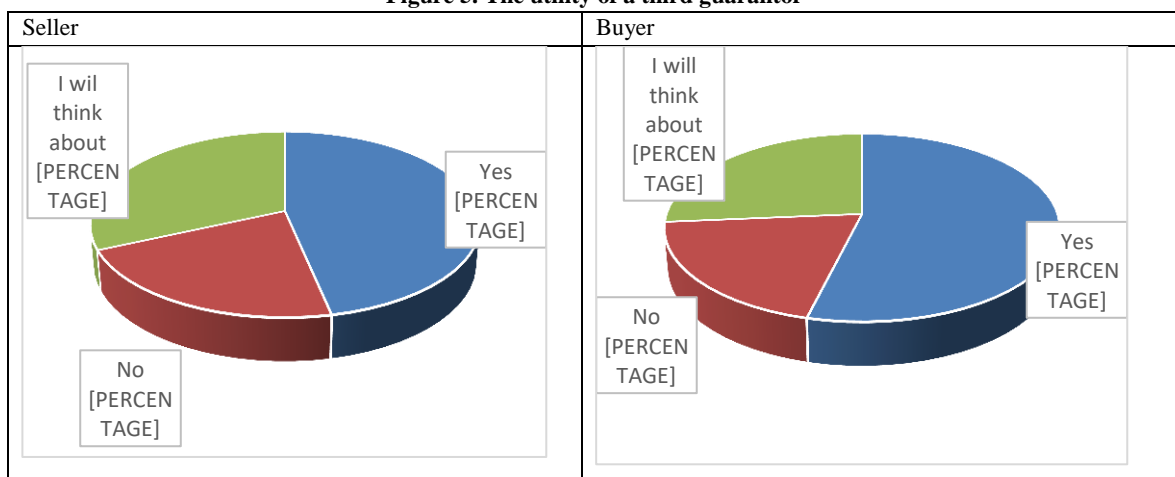


Figure 5 shows the opinions of the respondents as sellers or buyers in a PPA regarding the usefulness of the existence of a third-party guarantor in the contract. Analyzing these results carefully, we can observe some similarity between the preferences of the two categories, where with a slight

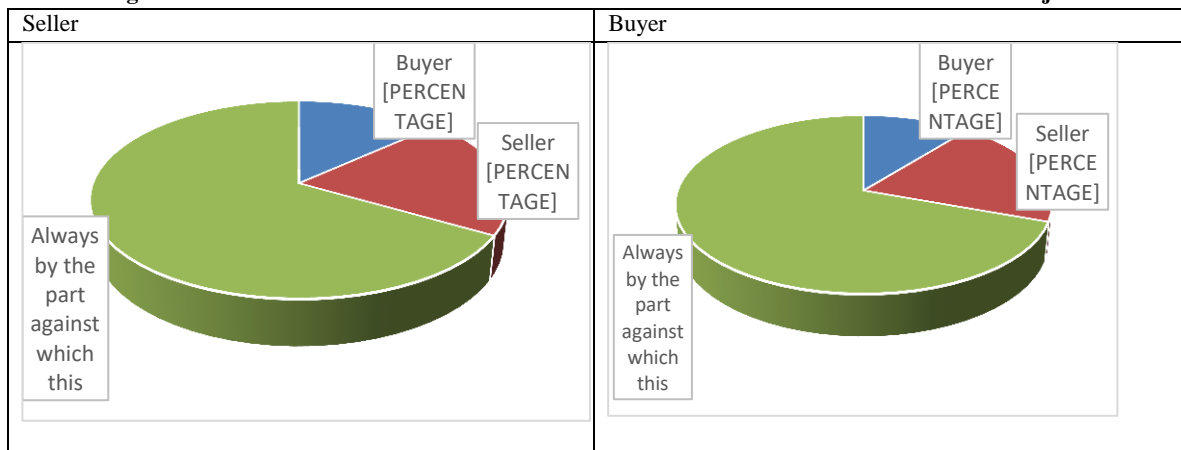
difference in percentages, we can note the following: on the first place is the agreement for the introduction of a third-party guarantor in the contract, the most respondents from both categories (seller – 46%, buyer – 54%) considering that such a person who obliges himself together with the debtor to fulfill the latter's obligation in case the main debtor fails to

fulfill it is welcome. Moreover, we can observe that the buyers are the ones who, in a slightly higher percentage, are the ones who would appreciate more the usefulness of a guarantor, an aspect that leads us to the idea that among the buyers there is a slightly higher probability of not being able to pay all/partially the price for the electricity it buys from the producer.

Regarding the option to think more about the possibility of introducing a third-party guarantor in the contract, although the percentages are not very different, we are talking about a

percentage of 32% in the case of sellers, respectively of a percentage of 26% in the case of buyers, we can notice that the sellers are the ones who are more hesitant to admit a new person into the contract, which could mean that their experience in developing contractual relationships within a PPA is a positive one, in which both parties have exactly respected their established obligations by contract, without the need for the intervention of a third person who, by virtue of his capacity, can help to continue the contract.

Figure 6. How should the risk be assumed in case of the intervention of an event of force majeure



The last figure, respectively Figure no. 6 presents the results regarding the assumption of risks by the parties in the event of force majeure. Practically, in this situation it can be emphasized that most respondents both from the category of sellers (67%) and from the category of buyers (69%) agree that the risk should be assumed by the party to which it appears, on the 2nd places and 3 with a much smaller percentage for the seller (20% for both categories), respectively the buyer (13% according to the opinion of the sellers and 11% according to the opinion of the respondents who are part of the category of buyers).

Correlating all these above-detailed aspects, it can be observed the importance and obligativity of them to be taken into account and analyzed when the parties wish to enter into a PPA.

Table 2. Correlation matrix (Spearman's rho correlation).

		Correlations						
		atitudine	asumarea riscurii	riscurile in caz de forte majora	nivelul cunostintelor	consecintele juridice in caz de imposibilitate plata / furnizare	experienta	
Spearman's rho	Attitude	Correlation Coefficient	1	.415**	.504**	.348**	0.162	0.135
		Sig. (2-tailed)	.	<.001	<.001	0.006	0.216	0.305
		N	60	60	60	60	60	60
	Risk assumption	Correlation Coefficient	.415**	1	.598**	-.029	0.02	-.001
		Sig. (2-tailed)	<.001	.	<.001	0.825	0.88	0.939
		N	60	60	60	60	60	60

Risk assumption in case of force majeure	Correlation Coefficient	.504**	.598**	1	-0.006	0.127	0.14
	Sig. (2-tailed)	<.001	<.001	.	0.961	0.335	0.286
	N	60	60	60	60	60	60
Level of knowledge	Correlation Coefficient	.348**	-0.029	-0.006	1	0.196	.305*
	Sig. (2-tailed)	0.006	0.825	0.961	.	0.134	0.018
	N	60	60	60	60	60	60
Legal consequences applicable in the event of an inability to supply electricity/pay the price	Correlation Coefficient	0.162	0.02	0.127	0.196	1	-0.024
	Sig. (2-tailed)	0.216	0.88	0.335	0.134	.	0.858
	N	60	60	60	60	60	60
Experience	Correlation Coefficient	0.135	-0.01	0.14	.305*	-0.024	1
	Sig. (2-tailed)	0.305	0.939	0.286	0.018	0.858	.
	N	60	60	60	60	60	60

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

When analyzing the correlations in SPSS, applying the Spearman method, we noticed that the first three hypotheses are false, there is no clear correlation between the level of knowledge, experience, and attitude towards PPAs (correlation coefficient 0.348), as well as between knowledge and risk-taking (correlation coefficient 0.029 in the case of concluding contracts, respectively 0.006 in the case of force majeure).

Also, the legal consequences are not correlated either with the part of the contract (see also Figure 4) or with the way in which the risks are divided in the realization of the PPA (correlation coefficient 0.02 in the case of the conclusion of the contracts, respectively 0.127 in the case of force majeure).

However, it is observed that there is a relatively strong correlation between the attitude towards the PPA and the assumption of risks, which confirms Hypothesis 5, both in the implementation of the PPAs (0.415) and in case of force majeure (0.504), the 2 confirming- should be correlated according to Hypothesis 4, so that as the attitude becomes positive in favor of PPAs, the risks must be shared equally or directed towards the seller. This is demonstrated by comparing the percentage of responses associated with the sharing of risks from the point of view of both the seller and the buyer, according to Figure 2, in which both parties to the

contract consider it beneficial to assume the risk equally or strictly by the seller.

Table 3. Qualitative results from seller's and buyer's point of view

	Seller	Buyer
The assumption of risks in a PPA	++	+
Contractual changes	+	++
Legal consequences applicable in the event of an inability to supply electricity/pay the price	It depends on the legal consequences +	It depends on the legal consequences ++
The utility of a third guarantor	+	++
The assumption of	Always by the part against	Always by the part against

risks in a PPA in case of force majeure	which this cause arises	which this cause arises
---	-------------------------	-------------------------

5. Conclusions

This study has investigated the risks assumed by the parties when signing a PPA.

The Spearman correlation matrix revealed that there is no correlation between the level of knowledge, experience, and attitude towards PPAs, as well as between knowledge and risk-taking.

Thus it can be understood that the risks are not perceived correctly regardless of the level of knowledge of the respondents whose opinions are very divided.

Another conclusion that can be drawn is that the assumption of risks also depends on other factors, such as for example the geo-political context at the time of the conclusion of the PPA.

Also, the legal consequences are not correlated either with the part of the contract or with the way in which the risks are divided in the implementation of the PPA. It can be seen that the opinions are divided among the respondents in terms of bearing the legal consequences in case of non-fulfillment of the contractual obligations. Thus, if the sellers consider in percentage 45% that the most appropriate legal consequence would be the offering of a grace period immediately followed by the payment of late penalties, the buyers are much more indulgent and prefer only offering a grace period for the non-supply of energy, which implies a greater probability that the respective contract will remain in force between the two co-contractors.

Moreover, the termination of the contract is seen differently by the respondents as long as a percentage of 5% in the case of the sellers who considers that the termination of the contract/termination of the contract with damages should be applied, while the buyer in a slightly higher percentage believes that the termination of the contract should be applied (10%), respectively termination of the contract with damages (9%).

In this context, even if there is no direct correlation between the bearing of legal consequences, the contractual part, and the sharing of risks in the PPA, it can still be observed that the tendency of buyers is to terminate the contract in case of non-supply of electricity by the seller, unlike sellers who in a smaller percentage would choose such a legal sanction.

We can observe that although the buyers seem to be more indulgent with the sellers in case of non-compliance with the energy supply obligation, nevertheless the buyers would apply the most severe consequences (legal sanctions) to the extent that the co-contractor or not - would fulfill the obligations, in which case the termination of the contract would intervene, respectively the termination of the contract with interest damages.

At the same time, the study highlighted that despite the fact that approximately 2/3 of the respondents carry out their activity in the field of energy, nevertheless, the level of experience is quite low, which proves the urgency of taking safe and quick measures so that the PPA market in Romania can develop efficiently by attracting as many consumers and economic operators as possible in such a contract.

The need to take these measures is more relevant as the legislative changes prove to be more often taken into account by the respondents when they refer to the risks that appear when concluding PPAs.

Although certain steps forward have been made, in Romania there can still be seen a deficient way of regulation and drafting of the legal provisions. In this regard, we have to mention that the Romanian Government through The Government Emergency Ordinance no. 143/2021 provided some legal certainty to PPAs and created more favorable conditions for solar generators under net metering, which removed, after a period of 10 years, the ban on the use of the PPA that exists in Law no. 123/2012 of electricity and natural gas.

Despite the fact that in the middle of 2020, through The Government Emergency Ordinance no. 74/2020, the Government introduced an exception to this prohibition, an exception that applied only to new electricity production capacities and which allowed producers to enter into bilateral contracts outside the centralized market in compliance competition rules and negotiated prices, we can currently talk about a clearer regulation in the Romanian legal system of these contracts, a regulation which, although not sufficient, creates some security able to attract investors to the energy market in Romania.

6. References

1. Annexes to the Communication from Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, and the Committee of the Regions – Repower Plan, 2022, Brussels.
2. Bruck, M., Sandborn, P., Goudarzi, N., 2018. A Levelized Cost of Energy (LCOE) model for wind farms that include Power Purchase Agreements (PPAs). *Renewable Energy*, 122, 131–139.
3. Cas., s. com., dec. nr. 414/2000, în PR nr. 2/2001, nr. 54, p. 74.
4. Costin M.N., Costin M.C., 2004, *Dicționar de drept civil*, vol. III, Ed. Lumina Lex, București, p. 370.
5. Costin, M.N., Costin, C.M., 2007, *Dicționar de drept civil de la A la Z*, ed. a II-a, Ed. Hamangiu, București, p. 879.
6. Council of European Union, 2020, Long-term low greenhouse gas emission development strategy of the European Union and its Member

- states. Available at <https://unfccc.int/documents/210328>.
7. Denholm, P., Arent, D.J., Baldwin, S.F., Bilello, D.E., Brinkman, G.L., Cochran, J.M., Cole, W.J., Frew, B., Gevorgian, V., Heeter, J., 2021, The challenges of achieving a 100% renewable electricity system in the United States, *Joule* 5, 1331-1352.
 8. Gabrielli P., Aboutalebi R., Sansavini G., 2022, Mitigating financial risk of corporate power purchase agreements via portfolio optimization, *Energy Economics*, 109.
 9. Gabrielli, P., Hilsheimer, P., Sansavini, G., 2022, Storage power purchase agreements to enable the deployment of energy storage in Europe, *iScience*, p. 1-18.
 10. Hale, T., Smith, S.M., Black, R., Cullen, K., Fay, B., Lang, J., Mahmood, S., 2022, Assessing the rapidly emerging landscape of net-zero targets. *Clim.Pol.*22, 18-29.
 11. Hamangiu C., Rosetti-Bălănescu I., Băicoianu Al., 2013, *Tratat de drept civil roman*, vol. II, p. 543.
 12. Iancu, L., 2022, A zero carbon Fashion, but at what cost? *Energy Industry Review*, 3.
 13. IEA, 2021, *Net Zero by 2050 – a roadmap for the global energy sector*. Tech. rap. (IEA). Available at <https://iea.org/reports/net-zero-by-2050>.
 14. IPCC, 2018, Summary for policymakers *Global Warming of 1.5 C. An IPCC Special Report on the impacts of global warming of 1.5 C above preindustrial levels and related greenhouse gas emission pathways*. In the context of strengthening the global response to the threat of climate change. IPCC, V. Masson-Delmotte, P. Zhai, H-O Pärtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Pean and R. Pidcock, et. Al., eds., (Geneva, Switzerland: World Meteorological Organisation), p. 24
 15. Paziuc, C., 2019, *Răspunderea contractuală. O analiză juridică și economică*, Ed. Universul Juridic, București, p. 328 sqq.
 16. Pop, L., Popa, I.-F., Vidu, S. I., 2012, *Tratat elementar de drept civil. Obligațiile*, Ed. Universul Juridic, București, p. 441;
 17. Popescu S., Ciora C., Șandăreanu V., 2008, *Practical aspects of technique and legislative evidence*, Monitorul Oficial Publishing House.
 18. Predescu I., Safta M., 2021, *Principiul securitatii juridice, fundament al statului de drept Repere jurisprudentiale*, p. 12, publicat pe site-ul www.ccr.ro, accessed at 25 October 2022.
 19. Taghizadeh-Hesary F, Yoshino N, Rasoulinezhad E., Rimaud C., 2021 *Power purchase agreements with incremental tariffs in local currency: An innovative green finance tool*, *Global Finance Journal* 50, 100666
 20. United States Department of Commerce, 2019, *Understanding Power Purchase Agreement*, Second Edition, p. 44, 118.
 21. Vimpari, J., 2020. *Financing energy transition with real estate wealth*. *Energies*, 13., 103390.
 22. Viney, G., Jourdain, P., Carval, S., 2013, *Traite de droit civil. Les conditions de la responsabilite*, ed. 4, Ed. LGDJ, Paris, p. 331.