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Power Purchase Agreement: Limits and Potential

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INTRODUCTION

PPAs are contracts between energy consumers, such as businesses and municipalities, and energy producers, typically renewable energy developers. In this agreement, the consumer agrees to purchase a specified amount of energy from the producer at a predetermined price for a specified period of time.
This type of contract offers several benefits, but also has its disadvantages. Power Purchase Agreements are used to promote the use of renewable energy sources and reduce the economic risks associated with investing in these projects. Power Purchase Agreements (PPAs) have become increasingly popular as a way for companies to reduce their carbon footprint, secure a stable source of clean energy, and save money on electricity costs.
It is examined the various types of PPAs, their advantages and disadvantages, and the legislation surrounding them.
The goal is to provide a comprehensive overview of PPAs and their role in promoting the use of renewable energy.

One of the key benefits of Power Purchase Agreement is reduced economic risk.
Energy consumers are able to secure a fixed price for their energy supply for a specified period of time, which helps to mitigate the impact of fluctuating energy prices on their business.
This can lead to significant cost savings over the life of the contract.
Additionally, PPAs often involve minimal initial costs, making them an attractive option for companies looking to reduce their carbon footprint without incurring significant upfront expenses.

Another benefit of PPAs is the ability to reach sustainability goals faster.
Many companies have set ambitious goals for reducing their carbon footprint and using renewable energy sources.
The Power Purchase Agreement can help these companies to reach their sustainability targets more quickly, as they provide a way to secure a stable source of clean energy without having to make large investments in renewable energy projects. This can also help companies to achieve greater economies of scale by pooling their energy requirements with other companies.

However, PPAs also have their disadvantages.

One of the biggest risks for energy producers is the risk of buyer insolvency. This can lead to significant financial losses for the producer, especially if the consumer is unable to pay for the energy it has agreed to purchase.
To mitigate this risk, companies can purchase credit insurance to ensure the solvency of the consumer. This type of insurance is often required for PPAs, and it is important for both parties to carefully consider the terms of the insurance policy before entering into the agreement.
In addition to the risk of buyer insolvency, there are also a number of regulatory and legal issues that must be considered when entering into a PPA.
This type of contract is relatively new, and the laws and regulations surrounding PPAs are still evolving. Companies must be aware of the regulations in their jurisdiction and ensure that their PPA is structured in a way that is compliant with these laws.

Finally, it is worth noting that PPAs are becoming increasingly popular in the United States, where they are being used by a growing number of businesses and municipalities.
The typical duration of a PPA is equal to the amount of time needed to repay the initial financing, but longer contracts can be structured if desired.
This can make it easier to repay the cost of installing the system, which can help to reduce the overall cost of energy and provide stability for both parties.

In conclusion, Power Purchase Agreements offer several benefits to both energy consumers and producers, including reduced economic risk, minimal initial costs, and the ability to reach sustainability goals more quickly.
However, there are also a number of risks and challenges associated with PPAs, including the risk of buyer insolvency, regulatory and legal issues, and the need for credit insurance.
Companies must carefully consider the terms of a PPA before entering into this type of agreement, taking into account their specific needs, goals, and regulatory requirements. By doing so, they can maximize the benefits and minimize the risks of this innovative type of contract.

Chapter 1

Power purchase agreement (PPA): what is it?

1. Introduction to PPA

The traditional electricity supply contract used in the United States is the power purchase agreement (PPA), and relates to the sale of electricity[1]. Power purchase agreement is a quite recently typology of agreement, and in Italy, these agreements are spreading more slowly than, for example, in the countries of northern Europe.

Power purchase agreement is a long-term agreement signed by two parties in order to provide electricity.

Usually, these two parties are identified by an electricity producer, who is the seller, and an electricity consumer or distributor, who is the buyer.

It's a bilateral agreement, responding to the freedom of form, for this reason it can take different form and it is considered as a *tailor-made* agreement.

PPA set all the terms and condition of the purchase agreement. Essentials elements are constituted by the prices, volume of electricity to be provided, the relation between production and consumption, penalties and termination clauses. It's clear that behind this agreement there is a great work of negotiation of the terms and conditions, based on the need to find a balance between the necessities of the power producer who generates electricity and the buyer who uses it.

The pivotal element that characterizes PPA is that the price is fix per kWh.

It is important to highlight that it's also possible that, instead of fixed prices, that limits the effects of energy price fluctuations, is possible to defines an indexed to the zonal price with or without the possibility of fixing, or else a variable element, perhaps with minimum and maximum values in accordance with electricity market trends, in alternative with the provision of margin sharing.

[1] Giacomo Graziosi, *Il contratto di Tolling,* 2002, p.511-538

This contract offers a great opportunity for the growth of renewable energies, for this reason their use has grown exponentially also in consequence of the environmental and energy policies carried out by Europe.

European law has started a work of encouragement of the use of renewable energy.

Renewable energy is a type of energy obtained from non-fossil sources, natural sources (wind, sun, ocean, plants), processed in a sustainable way.

An important act of European union that drives actions in this sense is the directive 2018/2001/EC [2].

European energy policies walk in the direction of reaching zero net greenhouse gas emission by 2050 and define tasks for reducing pollution and create a more sustainable model of production. In addition, the European green Deal promote a more efficient economic system that protects and conserve resources and incentive the use of natural resources. That policy would like to protect also the health of citizens from environmental-related risks.

If we consider a situation of market parity, PPAs are a great tool for the development of a project on renewable energy plant: the fact that PPAs are long-term agreement that set a fix price per Kwh is a guarantee for the bank and that means a facilitating bankability for the project proponent.

The scheme of PPAs incentives investments and protects the investor from the risk of price fluctuations. For these reasons, PPA is a great tool for all the projects having a big initial cost, PPA makes also possible to predict future revenues from the outset.

In the period of incentives for renewables energies PPAs are a perfect tool that reassure State for the return of investment, combining the needs of producers and consumers.

So, to resume, PPAs can mitigate the risk associated with market prices, they are used especially by large electricity consumers and in the case of significant investments that are planned for the construction or maintenance of renewable energy installations.

Therefore, alongside the definition of the essential elements of the contract, the parties will also establish a schedule for delivery of electricity, accounting, the beginning of project and accounting.

[2] Directive 2018/2001/EC of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources OJ L 328

Under this type of agreement, the buyer usually provides a number of services to the producer, in order to the management of forecasting production and imbalance, the transmission of market bids, the management of economic flows resulting from the purchase of energy and a guarantee of origin, a guarantee can prove the source of green energy.

It has previously been said that PPAs are long-term contracts. Therefore, it is useful here to define what is meant by long-term and whether short-term contracts can also be configured. The locutions long-term is intended to be a contract lasting between five and ten-twenty years, these are mostly used for the construction of new plants without incentives, so-called "market parity" plants. In the case of long-term PPA the parties have to include different clauses to manage the PPA, the buyer and the seller should define the management of PPA in these years, setting sales and risks by the introduction of the option to re-negotiate, end or extend the agreement.

On the other hand, the configuration of short/medium-term PPAs is not excluded, of course this typology is less used, but it's possible to find PPAs of one-to-five years.

2. How does PPA works ?

The previous paragraph analyzed what are power purchase contracts and which are their main characteristics.

In this paragraph will be analyzed the operation and various types of contracts.

Usually, PPA is necessary when there is a renewable project that must be built, in this case parties have to determinate the structure.

PPA can be *virtual* or *physical*, *on site* or *off site*.

A Power Purchase Agreement is "on-site" when the generating plant is installed on the consumer's business site. So, the plant is still owned by the producer, who sells the power on-site, to the business that needs it.

With an on-site PPA, there are no charges such as grid fees for the electricity generated by the plant, as this is not supplied through the public grid, the advantage of these contract is the

tailored plant sizing as this is based on the consumer's energy profile. Another advantage is represented by the directly reduction of the company's consumption.

In a PPA “off-site”, instead, the plant is not located at the business site, because perhaps it lacks adequate space, or logistical or environmental constraints emerge.

Simply, the consumer purchases clean energy from the producer, who supplies it to the consumer through the public net.

The advantage of these PPAs is the flexibility, as the plant operator is not forced to build close to the end user, he can choose a location with favorable conditions for the installation of its plant. The price of electricity supply is negotiated in the PPA, so all participants enjoy the benefits of long-term price security, and the grid operator continues to receive the charges and fees due.

The customer usually receives the green certificates generated by the electricity production.

The distinction between physical and virtual PPA it’s refers to the moment of buying. In the physical PPA the buyer purchase energy at the counter point, so energy will be received thought the physical delivery of energy in the net. A virtual or financial PPA provides the purchase in the form of energy credits. Virtual PPAs have flexible contract structures and makes possible that buyers meet part of their sustainability targets with a relatively small number of contracts, in this way buyers reach their renewable energy portion quickly and efficiently.

It means that the production plant doesn’t delivery electricity to the consumer because the PPA “contains” as basis of exchange another agreement that is compensated in order to the price. The payment arrangement make price safe. The security of the price permits to reducing risks and augment profits.

In addition, there is another typology of PPA, the *sleeved* PPA. In this agreement an intermediary utility company manage the transfer of money and energy at the place and for the interest of buyer. The presence of the intermediate characterizes this type of agreement. The intermediate is accountable of needs of energy’s supply.

These different typologies of agreement allow the parties to negotiate and tailor the contract to their necessities.

3. Benefits and risks of PPA

The paragraphs above explain the different typologies of PPA and when these are used, so, now, it's important to underline the advantages and the disadvantages of these contracts.

The first benefit that emerge by the previous paragraph is that using PPAs allows to reduce the economics risks, linked to the fixed price.

Another benefit is represented by the minimal or not existents initial costs, for this reason is usually used or renewable energy plants without an incentive system, PPAs turn as a very attractive instrument because they offer the investor the conditions of financial stability needed to proceed with the investment.

This aspect encourages the use of PPAs, especially in a system that would promote renewables energies and offer to the promoter of the project the possibility to have tax credits and incentive to realize it. For this reason, PPAs are used in particular by large electricity consumers and in the case of major investments planned for the construction or maintenance of renewable energy plants.

So, the benefit for the company is constituted by saving on electricity, with no initial costs, and by reaching their sustainability targets faster; the benefit for the producer is the possibility to earn money from the sale of energy, after he has recouped his investment costs.

On the other side the main disadvantage is that the productor is exposed to the risk of buyer insolvency, but it's easy to contain the risk by providing insurance of the credit, with the aim of to ensure the entity's reliability and solvency of buyer.

Usually, these insurances are atypical, because PPAs are atypical, so it's necessary to define clauses with precision.

It clear that PPAs give different opportunities to increase the use of renewables energies and to contain the phenomenon of inflation but also appear that this recently typology of contract must be deeply defined.

For all the reasons explained, PPAs are very used in USA and usually the duration of the agreement is equal to the amount needed to repay the initial financing. With a longer contract, it becomes easier to repay the initial cost of installing the system, thus reducing the price of energy and giving a stability to the parties.

Having discussed the scheme, potential and limitations of PPAs, will then be analyzed the legislation and uses of these contracts.

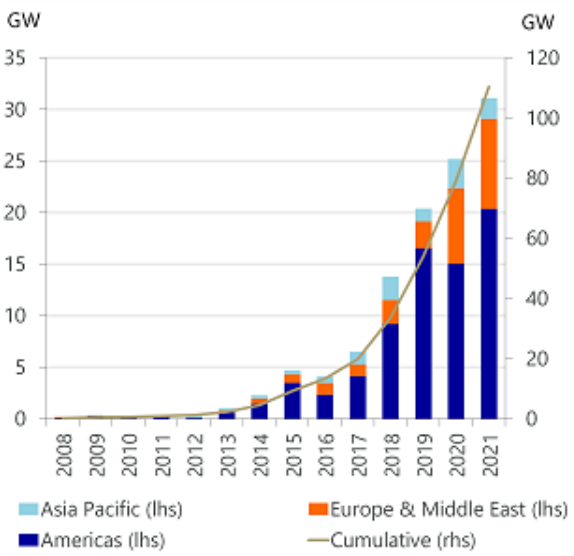
Chapter 2

Regulation of PPA

1. International Context

In the European tables, energy transition is a great point of interest.
Europe starts to focus on clean energy and to the needed to reduce emission and pass to renewable energies.
In the horizon of a polluted world, the only way to get out this situation it's to pay more attention on climate changes and on the consequences link to the humans' activities.
When, in the international context, different governments started to speak about renewable energy and to move to them, governments had to invest on them with incentives and financial aid to enterprises.
Then, international private market has begun to invest on renewables energies due to the competitivity of this sector and the public investments rapidly decrease to leave the opportunity of growing to the private market.
In this context PPAs have gradually grown in all different countries, because of the benefits of this typology of agreement that permits a constant flow of money to fuel project realization and the evolution of project finance.
A lot of consultant societies start to work on PPA and the use of these agreement increase in the last years.
In the following graphic[3] it's possible to see the increase of volume of the annual contracted corporate PPA by region.

[3] BloombergNEF, 2022



United States is the first country to have invested on PPAs, then, all around world, countries start to use these agreements.

In the following paragraph it's possible to find a focus on the use of PPAs in the different countries.

a. Australia

Energy market in Australia has a complex regulation. Law regime is very open to the market and the legislation is very uniform on the territory. Each country had approved national law in the energy sector, i.e. South Australia had approved, in 1996, the National Electricity Act[4] and the National Electricity Regulations to manage power grids as one market.

Australia also introduced the Australian Energy Market Commission (AEMC) to issue regulation on energy market. This commission was created to work for Australia's future productivity and living standards by contributing to a decarbonizing, affordable and reliable energy system for all consumers[5].

[4] An Act to make provision for the operation of a national electricity market, to regulate the electricity supply industry and to make provision for safety and technical standards for electrical installations.
[5] https://www.aemc.gov.au

Energy market offer the possibility to private agents to participate in the trade of electricity supply. So, the common market is open and not subject to government regulation.

Energy market regulation law is limited to the access to electricity grids, market operations, safety of the grids, resolution of controversies.
Australian Energy Regulator (AER) has the task to applicate law, in particular regulates the energy market and the energy networks at wholesale and retail levels, under national energy legislation and rules. Its functions mostly relate to energy markets in eastern and southern Australia[6]. The Australian Energy Market Operator (AEMO)[7] has the responsibility of managing electricity market. It is therefore also involved in managing the rapid changes facing the energy landscape.
Regarding this topic in the Australian landscape, it should be noted that North Australia has a different regime for the sector.

b. China

China has a great market of PPAs, for this reason law framework has an advanced structure made by national laws, ministerial regulations, local laws, internal laws of the public electricity companies and of the grid public companies.
China market is very controlled and public sector manage the stipulation of PPAs.
Most use of PPA and renewable energy is made by multinational companies, that are mostly interested to be competitive in international market.
China's policy encourages a lot use of renewable energy, the high-level of china's technologies classifies companies as best equipped with renewable energy.
This technology level permits companies to have incentives like business income tax, free conversion, priority loans from the Bank of China.

[6] https://www.energy.gov.au
[7] AEMO was established by the Council of Australian Governments (COAG) on 1 July 2009 to manage the National Electricity Market (NEM) in the eastern and south-eastern states and Australian gas markets.

China's companies see the profits and the advantages of PPA in the tariff structures, the time of the agreement and the requisite levels of the plant's available capacity during periods when required to be available for scheduling.

PPA must respond to PPA laws, electricity law and subsidiary regulation, electric power supply and user regulations, contract law and grid regulations.

All these laws make possible to have a uniform system, clear and defined for the companies and users who wants to stipulate an agreement.

c. USA

United States are pioneers of the use of PPA. The economic system has always favored the economic initiative. The energy policy act of 2005[8] makes energy industry deregulated and this aspect facilitates the trade of energy market, this has meant that PPAs are very used for sell energy. Since the early 2000s, there has been a big increase in corporate power purchase agreements (PPAs) in the United States, with these types of contracts dominating b to b energy arrangements in 2018, where more than 45% of the renewable energy traded was thanks to PPAs[9].

Use of PPA in local districts has aid to produce clean energy and to fix a trust relationship with inhabitants. District of Columbia, i.e., has developed different PPA to guarantee clean energy.

Federal system of USA creates and facilitates the use of this instrument.

The two typologies of PPAs most used are virtual and physical.

A very used PPA in USA is the solar PPA, an agreement used to sell solar energy.

Freedom within companies can stipulate agreements and regulate energy market is a point of favor for the use of PPA. The growth of PPA use in USA has encouraged the use in other countries in chain. If USA needs energy and Spain has energy, Spain is more encouraged to stipulate a PPA. The main difficult is linked to the law and regulation questions.

[8] The Energy Policy Act of 2005 is a federal law signed by President George W. Bush that was passed by the United States Congress on July 29, 2005, and signed into law on August 8, 2005. The Act changed US energy policy, it provides tax incentives and loan guarantees for energy production of various types.

[9] https://www.pangea-si.com/intelligence/understanding-power-purchase-agreements-latin-america-and-us/

If we consider that, it appears clear that a good asset of regulation increases the use of this type of agreement. Law and administration simplicity invite companies to use PPA.

The independent authority of Texas, the Electric Reliability Council of Texas, regulates energy market in Texas and with a simple law asset has made Texas a captivating country in the energy procurement landscape.

Companies also need to confront with the regional transmission organization that supervises wholesale electricity in thirteen states in the Northeastern United States and that gives certificates of the origin of clean energy.

USA has enacted the introduction of two measures that should benefit the energy market, the Build Back Better, that envisages the introduction of targets to incentivize national supply chains that are there to ensure the energy transition, and the Inflation Reduction Act, that guarantee an investment of USD 60 billion to create clean energy jobs.

Since the second industrial revolution, companies which are involved in the supply and distribution of electricity, have started to grow, given the growth of services and of infrastructures, automatic systems and telecommunications.

Law reforms has included de-regulation of economic system in order to give the opportunity to the market to grow and to develop.

USA has the possibility to regulate the energy purchase in detail. In this way, the concurrency is growing, and the costs become lower.

One of the key features of the USA market is that it invests in innovation.

Federal Energy Regulatory Commission (FERC)[10] is the independent authority that regulates the transmission of natural gas, petrol and electricity in the USA, it regulates also energy project, so it communicates with companies who want to realize projects.

Companies have the possibility to have fiscal benefits from incentives when they want to sign a PPA.

[10] The Federal Power Commission (FPC) was established by Congress in 1920 to allow cabinet members to coordinate federal hydropower development. In 1935, the FPC was transformed into an independent regulatory agency. In 1977, when Congress passed the Department of Energy Organization Act, the FPC was renamed the Federal Energy Regulatory Commission (FERC).

2. European Context

Europe has a high potential to increase renewables energies market.
From 2009 Europe started to legislate in order to promote renewable energy. European Parliament with the directive 2001/77/EC and 2003/30/EC and then 2009/28/EC, promotes the use of energy from renewable sources. European work in this way has continued until now with a particular focus on energies policies.

For this reason, Europe highly recommend and sustain the spread of agreements having the capacity to give strength to the renewable system.

Europe 2020 strategy promoted the reduction of gas emission, the improvement of renewables energies sites and the augmentation of competitiveness in this sector, in order to promote an inclusive growth of the use of renewable energy.
Renewable energy directive of 2018 demands that the 32% of final consumption of energy has to consist of renewable energy.
Actually, the majority of PPA activities is made by north countries. Norway, Sweden and Finland have the primacy for the use in Europe.
European territory will offer the opportunity to highly increase the use of PPA. Germany, Spain, France and Ireland have the availability of large plots of land, useful for the realization of renewable energy projects and sites financed by PPAs.
It's important that Europe valorizes this great potential by a uniform legislation, also because companies are well prepared to welcome change in this direction.
For the moment European Union hasn't a uniform legislation or a general common law framework, this situation creates a fragmentation. Fragmentation means that some countries have laws that allow to stipulate different typologies of PPAs, like UK and Netherlands that regulate the stipulation of virtual and financial PPA, some haven't this regulation.
As consequence it's difficult to build a solid terrain to promote the growth of PPA stipulation.
Germany and France allow PPA "on-site" in which a company partners with a generator to make renewable electricity on its own land to power operations. On the other side, sleeved, physical or

direct PPAs, in which energy is produced, 'sorted' through the grid and an equivalent amount is consumed by the corporate off-taker, are few and far in number.

A uniform framework is necessary to promote and insure companies, investment, low costs and interaction between European countries.

A good ecosystem is made by the balance between the concurrency and the cost effectiveness.

In Europe the great volume of PPA stipulation it's recent and is due to the increase of interest for renewable energy.

Each country is obliged to have a certified system for guarantee the origin of renewable energy.

UK has renewable energy obligation certificates (ROCs) and guarantees of origin for renewable energy (REGO).

We can mention states like UK, France, and Germany, for example.

UK has renewable energy obligation certificates (ROCs)[11] and guarantees of origin for renewable energy (REGO)[12]. France and Germany also have guarantees of origin.

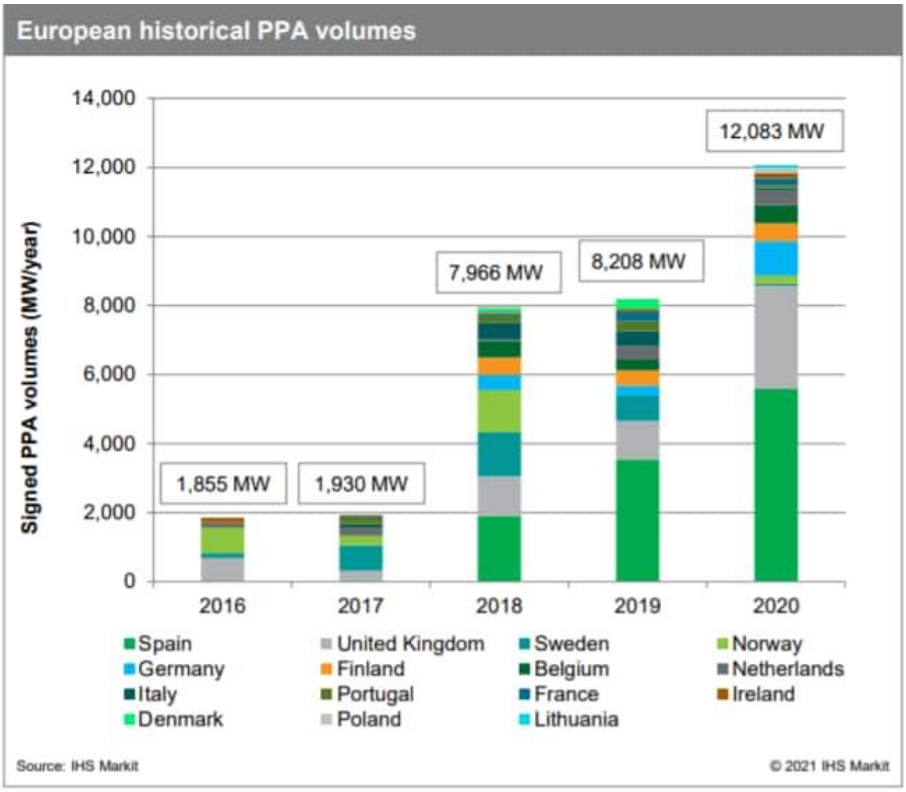
The system provides the existence of electronic registers for the acquired certificates and then it links to the productors of renewable energy.

Spain, on the other hand, has dominated the market recently, ranking as the first country in Europe for the stipulation of PPA. The growth of Spain is the consequence of the necessity to finance photovoltaic projects.

The spread of PPA is link to the sustainability policy that all the companies start to adopt and for the benefits of costs.

[11] ROCs are certificates issued to operators of accredited renewable generating stations for the renewable electricity they generate.

[12] The Renewable Energy Guarantees of Origin (REGO) scheme provides transparency to consumers about the proportion of electricity that suppliers source from renewable generation. All EU Member States are required to have such a scheme.



In this diagram[13] is possible to see how the PPA market is increased, and which are the countries where the use is mostly realized.

Countries as France, Italy and Est Europe use of PPA is not raised yet.

Lots of international organizations try to incentive the use of PPA, the World Business Council for Sustainable Development (WBCSD) published a report to help companies increase renewable electricity supply in Europe using cross-border power purchase agreements (PPAs). In a PPA, a company buys renewable electricity generated outside its electricity market through a corporate renewable PPA. This means, as we know, that renewable electricity can be generated in the country, in Europe, that it can produces in the most efficiently way, providing greater flexibility for companies who buy and sell renewable electricity.

Increase the interaction between European countries is the best way to increase the use of this contractual typology, in order to favorize the development of companies and countries.

The values of the use of PPAs is not only an economic value but also a social and environmental value. Power purchase agreement gives the opportunity to use and create clean energy. In fact,

[13] IHS markit

choose projects with the most favorable conditions in relation on the location and use a multi-technology approach across multiple geographic areas provides efficiency and economic benefits. So, next step after the increase of PPA in the countries, it's to increase cross-border PPAs, they have the potential to substantially increase the use of renewable electricity in Europe.
Europe has an incredible potential and the general use of PPA could give the opportunity to Europe to develop this potential and create a favorable environmental[14].

3. Regulation in Italy

Energetic transition passes toward agreements. Renewable energy market uses a lot the tool of PPA because of the benefits link to this agreement: constant flow of economic income, low and often fixed costs, possibility to finance and realize projects, fixing all the phases of the project: design, the authorization, financing, installation and maintenance of a renewable energy plant, then selling the energy generated to the corporate customer or off taker at a pre-determined price.
Economic incomes are determinate, and the furniture is sure.
This tool allows to reach the energy goal fixed by government of Europe.
The diffusion of this agreement is not so advanced yet.
In the last period the parliament creates a platform, the Energy Market Operator, to increase the use of PPAs, but for the moment the procedure is slow and public bodies discourages this typology of agreement; for this reason, the electricity prices are low and Italian insurance doesn't cover all the time of agreement, in Italy, the duration of contracts is between 5-10 years, the insurance reaching 5/6 years at best.

PPAs are most widely used abroad, especially in the United States, and have also taken hold, albeit somewhat late (except for some experiences in the Nordic countries), in Europe.

[14] https://ppp.worldbank.org/public-private-partnership/sector/energy/energy-power-agreements/power-purchase-agreements

In these countries, the duration of the contract is at least 10-15 years (long term PPA), because the investor wants to cover with the PPA the period needed to repay the initial financing. With a longer contract, it becomes easier to amortize the initial expenses for the installation of the system, thus reducing the price of energy.

As it's possible to see, Italy needs other time to increase of the use of PPA. First of all, Italy has not implemented PPA law.

The reference for that is the legislative Decree No 199 of 8 November 2021[15], transposing Directive 2018/2001/EU on the promotion of the use of energy from renewable sources.

The decree aims to speed up the process of sustainable growth of Italy, bringing provisions about energy from renewable sources, in line with European objectives of decarbonization of the energy system by 2030 and complete decarbonization by 2050[16].

Government has not yet approved the draft of ministerial decree on long term negotiation of renewable energy.

Only in the last year Italian Government starts to work on laws.

The absence of uniform and clear legislation in this regard does not help the spread of PPAs.

The panorama of PPAs in Italy is still confused and not strictly regulated.

This aspect impacts also because long-term contracts for the sale of energy are still uncommon, few parties willing to enter into agreements longer than three years.

Italy have not yet established a suitable policy and regulatory framework for green energy. The European Union previously provided incentives for the development of wind and solar power plants, but these incentives are set to expire soon. It will be crucial for these countries to comply with EU regulations on reducing emissions and to establish long-term agreements to continue and expand the use of renewable energy sources.

Furthermore, there is currently a lack of a clear medium- to long-term energy pricing signal. On the other hand, it's worth mentioning that despite these challenges, this type of agreement has been steadily increasing in recent years[17].

[15] Attuazione della Direttiva (UE) 2018/2001 del Parlamento europeo e del Consiglio dell'11 dicembre 2018, sulla promozione dell'uso dell'energia da fonti rinnovabili.

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

[17] https://www.rinnovabili.it/energia/ppa-aziendali-rinnovabili/

Taking all of this into consideration, it makes sense that with specific regulations it's obvious that parties will have more trust about the stipulation, also because this market is very attractive for investors.

Italy has greats opportunities to get grow this sector, but to fully develop this sector it is necessary that there be more attention from the legislator on the subject, so that there can be more precise legislation on PPA.

Chapter 3

Power purchase agreement in Italy

1. Use in Italy

In this paragraph, we will take a detailed look at the Italian legislative context for Power Purchase Agreements (PPAs) and how it coordinates with European legislation.

The main legislation that governs PPAs in Italy is the Legislative Decree 28/2011 and subsequent amendments.

The Decree establishes the legal framework for the production and sale of electricity from renewable energy sources, including the use of PPAs.

In terms of coordination with European legislation, Italy is subject to the Renewable Energy Directive (RED II)[18] which sets a target for the EU to increase the share of renewable energy in its overall consumption to at least 32% by 2030. Italy has set a target of 32% of renewable energy in its overall consumption by 2030[19].

The national target is in line with the EU directive.

Additionally, Italy is part of the EU Emissions Trading System (EU ETS), a market-based mechanism aimed at reducing greenhouse gas emissions. This system applies to power stations and other large industrial facilities, and companies must surrender an allowance for each tonne of CO2 they emit.

The recent Legislative Decree 8 November 2021, No. 199, which implements the European Directive 2018/2001 (RED II) identifies a series of important measures aimed at accelerating the ecological transition process in Italy and promoting the achievement of the 2030 goals set at the EU level.

[18] Direttiva (UE) 2018/2001.
[19] https://temi.camera.it/leg18/temi/tl18_fonti_rinnovabili.html

The decree aims to accelerate the sustainable growth path of Italy, providing provisions on renewable energy, in line with the EU's decarbonization goals for 2030, and complete decarbonization by 2050[20].

The decree defines the tools, mechanisms, incentives, and institutional, financial, and legal framework necessary to achieve the objectives of increasing the share of renewable energy by 2030, in implementing Directive (EU) 2018/2001 and in compliance with the criteria set by the law 22 April 2021, No. 53[21].

Article 28 of the Decree particularly concerns Power Purchase Agreements and provides for the definition of tendering instruments for the supply of renewable energy to the Public Administration, through schemes for the sale and purchase of long-term electricity.

It also provides for the creation of a platform to promote the meeting between the parties interested in the conclusion of contracts, the definition of one or more tendering instruments for the supply through schemes for the sale and purchase of long-term electricity by Consip[22], the establishment of a certification system for the renewable origin of the energy sold under the agreements and the possibility of these agreements to be considered as eligible investments under the National Recovery and Resilience Plan.

In conclusion, the Italian legislative context for PPAs supports the growth of renewable energy and aligns with the EU's efforts to increase the use of clean energy, reduce greenhouse gas emissions and comply with the state aid rules.

In recent years, Power Purchase Agreements (PPAs) have become increasingly popular in Italy's renewable energy market.

Hereafter, I will present some of the most significant PPAs that have been signed in Italy, highlighting the capacity of power and the parties involved in each agreement, which for the remarkable amount of energy involved producers and traders.

Starting in 2019, the Italian wind energy sector began exploring the possibilities of PPAs. In May of that year, it was announced that DXT Commodities, Duferdofin Nucor, and Fera had created the first corporate PPA for wind energy in Italy[23].

[20] https://www.mase.gov.it/pagina/piano-la-transizione-ecologica
[21] https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2021-04-22;53
[22] joint-stock company, 100% owned by the Ministry of Economy and Finance, which operates exclusively at the service of the Public Administration, intervening with tools and methodologies for the digitization of public procurement.

[23] https://www.roedl.it/it/temi/legal-newsletter/7-2021/power-purchase-agreement

This PPA will cover a quantity of around 200 million kWh of electricity, which Fera is already producing in northern Italy, and will be purchased through a PPA for a period of 7 years by DXT Commodities.

Another example of a PPA in Italy is the agreement signed by Octopus with Shell Energy Europe Ltd.

The five-year fixed price PPA will include 'Guarantees of Origin', a label providing information on electricity from renewable sources to customers on their energy source. The PPA will cover six of the ten projects currently under construction (70.5MW) once they have been completed in early 2019.

Edison and Chiron Energy also signed a long-term PPA to support the development of photovoltaic plants in northern Italy. The plants will enter operation in the first half of 2023 and produce around 45 GWh per year.

Axpo Italia and Canadian Solar Inc. announced the signing of two long-term PPAs for a duration of 10 years for the purchase of energy produced by two photovoltaic plants under construction with a total capacity of 84 MWp. The construction of these plants by Canadian Solar will take place before 2023.

MYTILINEOS S.A. and Statkraft signed a Power Purchase Agreement (PPA) for the sale of energy generated by four photovoltaic plants in Italy. These plants, located in Emilia-Romagna, Lazio, and Campania, have a total power of 63 MW and the operations will start in stages starting from 2023, and will be completed by the first quarter of 2024.

In February 2022, Greencells announced the acquisition of five photovoltaic projects with a total capacity of 233 MWp in southern Sardinia. According to the CEO of Greencells, "Italy has a highly developed attractive PPA market as well as an adequate electricity price level and, like Germany, opted for a rapid coal phase-out – optimal conditions for solar power plants."

This PPA, with a total capacity of 233 MWp and located in the south of Sardinia, showcases the growing interest in the Italian PPA market for solar energy projects. With a highly developed market, a suitable electricity price level, and a commitment to phasing out coal, Italy is becoming an increasingly attractive option for companies looking to invest in renewable energy through PPAs.

To provide an overall picture, in terms of gross energy generation power, and to give value to the power results achieved thanks to the PPA examples mentioned before, I report the total Gross Installed Power in Italy as of December 31, 2021, and then proceed to see what the energy needs, production, and consumption were in 2021 in Italy.

The gross power of energy generation, as of December 31, 2021, was 119.8 GW, with an increase of 0.6% compared to the previous year. In 2021, the renewable energy generation park

continued to grow with a general increase of 2.5% and a power of 58 GW, representing 48.4% of the total installed in our country.

On the other hand, the thermal power generation park recorded a slight decline, going from 62.7 GW in 2020 to 61.9 GW.

In numerical terms, there was a transition from 948,979 renewable plants in 2020 to 1,029,479 in 2021 (the photovoltaic sector alone recorded an increase of 80,245 plants).

Several sectors recorded increases compared to the previous year: photovoltaics with +4.4% reached 22.6 GW, followed by wind with +3.5% and 11.3 GW, while for renewable hydropower there was a slight increase of 0.3% reaching 19.2 GW; bioenergy (4.1 GW) and geothermal (0.8 GW) remained substantially stable. In terms of power, we can appreciate the trend of increasing sustainability at the expense of the use of fossil fuels.

Although in terms of annual production, most of the energy is due to the latter.

The demand for electricity in 2021 was 319.9 TWh, recording an increase of 6.2% compared to the previous year.

The electricity energy requirement was met by 86.6% by domestic production intended for consumption, for a value of 277.1 TWh (+3.0%), and the remaining quota (13.4%) by net imports from abroad for an amount of 42.8 TWh, an increase of 32.9% compared to 2020.

The gross domestic production was 289.1 TWh in 2021, recording a +3.0% increase compared to 2020.

In detail, domestic production was covered by 59.0% by non-renewable thermal power production (an increase of 5.5% compared to 2020), 16.4% by hydroelectric production (-4.1% compared to 2020), and the remaining 24.6% by wind, geothermal, photovoltaic and bioenergy sources (wind +11.5%, photovoltaic +0.4%, geothermal -1.9% and bioenergy -2.9% compared to 2020). With a focus on thermal power production, given the prevalence it holds in covering the requirement, we observe how cogeneration plants, which represented 53.7% of the total thermal power in 2021, with an electric power production of 101.6 TWh produced, in a cogeneration setting, 57.7 TWh of thermal power, with a corresponding use of the heat of 81.8%.

Electric energy consumption in Italy in 2021 was 300.9 TWh, with an increase of 6.0% compared to 2020.

From the observation of individual macro-sectors: an increase of 8.2% was recorded for industry, an increase of 6.4% both for services and agriculture, while the residential sector recorded an increase of 4.8%[24].

[24] https://www.terna.it/it/sistema-elettrico/statistiche/pubblicazioni-statistiche#:~:text=Produzione%20annuale%20lorda%202021%3A%20%2B3,%2C0%25%20rispetto%20al%202020

In conclusion, the Italian legislative context for Power Purchase Agreements (PPAs) aligns with European efforts to increase the use of clean energy and reduce greenhouse gas emissions. Italy has set a target of 32% of renewable energy in its overall consumption by 2030, which is in line with the European Union's Renewable Energy Directive II's target of 32%.

The recent Legislative Decree 8 November 2021, No. 199 provides a framework for the promotion and use of PPAs in Italy, both for private and public entities, as a key instrument for promoting the growth of renewable energy and supporting the implementation of the National Recovery and Resilience Plan. As seen from the agreements and the figures mentioned, Italy is making progress toward its renewable energy targets and is on track to meet the EU's goals for 2030.

2. Critical aspects

In this discussion, it is imperative to provide a comprehensive overview of the inherent risks associated with renewable energy power plants and the impact they have on corporate power purchase agreements (PPAs). By taking a closer look at the various risk factors and potential mitigation strategies, it is possible to gain a better understanding of the challenges and opportunities present in this industry.

This overview aims to reach a conclusion on the topic of risk in the renewable energy sector.

Power Purchase Agreements (PPAs) have emerged as a crucial instrument in financing the shift toward a sustainable energy future and providing mutual benefits to both parties involved. By entering into a PPA, buyers can enjoy economic advantages, streamlined financial planning, and the opportunity to greatly decrease their carbon footprint.

In addition, for renewable energy projects, PPAs serve as a reliable source of revenue that can facilitate project financing.

However, it must be noted that the renewable energy sector poses a complex risk profile and no PPA can completely mitigate all potential risks.

The allocation of these risks is a crucial aspect of PPA contracts. There are several methods for managing residual risks, the rapid growth of the corporate PPA market presents a favorable

environment for the development of novel insurance and risk mitigation products, further driving the transition towards renewable energy.

Now that Renewable Energy Plants are becoming increasingly realized at grid parity, meaning without incentives, due to the lowering of technological and realization costs, Power Purchase Agreements (PPAs) are a very interesting tool because they offer the investor the necessary financial stability conditions to proceed with the investment.

In this context, PPAs are attractive for new renewable energy plants with a high initial investment cost and low operating and maintenance costs, as the fuel cost (such as wind and photovoltaic) is zero.

They are less suitable for other types of plants that have to bear the costs of procuring the energy source (bioenergy or hydroelectric plants).

The construction of a new large plant requires that future energy sales revenues be known in advance, or obtaining initial funding will be difficult.

This is where the PPA allows predicting future revenues from the start, making them key elements in a specific contract.

In theory, it is possible to think of PPAs agreed upon for plants (fully amortized) that have finished the incentivizing life.

The remaining useful life and maintenance work that must be performed on the plant should not be underestimated.

For the energy producer, the benefits of the PPA are primarily managerial: the buyer takes care of managing relationships with Energy Market Managers (EMMs), Energy Services (GSE), and the high-voltage transmission network (Terna). Depending on the contract solutions chosen, the producer will not be exposed to the risk of paying balancing fees.

It must also be remembered that the PPA allows (among other contract options) the sale of energy at a fixed cost.

In this way, the producer can count on limited exposure to energy price variability and the buyer deals with predictable prices that are identified in advance in the contract.

Analyzing the benefits of PPAs, one cannot fail to mention the risks. Although PPAs are extremely advantageous contracts, they also involve risks.

One of the main risks, that will be outlined, regard the producer's side. The main risk is the buyer's insolvency it is possible that the latter does not make the expected payment. Surely thanks to the guarantees this danger is minimized, but it is never eliminated.

The non-standard nature of the Power Purchase Agreement implies greater caution in the management of relations between the parties.

Complex and long-term in nature, PPAs often require extensive time and consultations before they are finalized. As they are long-term contracts, both parties are committed to long-term conditions, which can lead to disadvantages if prices change negatively for one party. Additionally, renewable energy production, particularly wind and photovoltaic, can fluctuate greatly. If the agreed electricity volumes are not available at the specified delivery time, the plant operator must be able to compensate for them financially or physically or outsource them to a third party, such as an energy trader.

As mentioned, another disadvantage of this type of contract is the risk of insolvency for the producer towards the buyer, as payment is made on a consumption basis. This can be remedied by financial guarantees, either typical contract guarantees or the ones offered by the game's consultation document, which acts as a central counterpart to eliminate the risk of insolvency.

Despite the efforts of the legislator to facilitate the growth of Power Purchase Agreements (PPAs) through the GSE energy market management platform and the previously listed benefits, PPAs are only slowly growing in Italy. The market has been maturing in recent years and only recently has there been an increase in PPA announcements, most of which are corporate PPAs.

Still, on the subject of negative aspects of PPAs, the problems reported by stakeholders include slow authorization procedures and opposition from public entities, low electricity prices, lack of long-term hedging tools through international financial or insurance instruments (in Italy, contracts have a duration of 5-10 years with a maximum hedge of 5-6 years), leading to only virtual PPAs, and the near impossibility for the public sector to obtain energy through PPAs.

The renewable energy market is facing challenges with PPAs and the deserted auctions of FER 1[25] are evidence of this. The results of the fifth procedure published by GSE on May 27, 2021, show an allocation of only 297.7 MW out of a total incentivize power of 2,461 MW, with the auction for large wind and photovoltaic plants once again disappointing, with incentives awarded to only 73.7 MW out of 1,581.5 MW[26]. The trend of the procedures is negative and shows decreasing participation in the auction and registry tenders.

With regards to the European countries discussed in the preceding chapter, it is important to highlight the favorable commonality for the proliferation of Power Purchase Agreements (PPAs): the availability of supply-side of the market.

[25] D.M. July 4, 2019.
[26] https://www.roedl.it/it/temi/legal-newsletter/7-2021/power-purchase-agreement

In simpler terms, for any agreement to be concluded, the demand and supply must converge, and these countries have a presence of large-scale renewable energy facilities, except Italy.

In essence, these countries established large energy facilities before Italy, and this represents the commonality that has defined the spread of PPAs.

In Italy, however, there remains a scarcity of supply, with the market being dormant after the cessation of incentives, resulting in authorized utility-scale projects amounting to less than 1 GW capacity. Moreover, the country faces the challenge of slow and complicated authorization processes, further amplifying its lag behind other European nations in PPA matters.

The strengths of PPAs are primarily centered around the bankability they offer due to the optimal risk allocation over the long term.

Through PPAs, each risk is transferred to the entity best equipped to manage it. However, several limitations must be considered:

1) The slow and complex Italian authorization processes, which have so far resulted in a shortage of approved projects, the obsolescence of Guidelines, and the existence of a veto power in the hands of various entities involved in the authorization process, represent a major hindrance.

2) The second limitation is related to auctions, particularly the long waiting periods that characterized the formation of DM FER and subsequent auction outcomes. In particular, for the wind sector, many operators have adopted a wait-and-see approach before negotiating a PPA.

3) The uncertainty generated by the definition and consolidation of market architecture at the European level also constitutes a challenge. For instance, the potential for negative prices, or the transition to nodal prices, creates uncertainty even though regulatory risks are lower in PPAs as there are no incentives.

4) The final limitation is specific to Italy, relating to the legal and regulatory environment (that should be implemented) that impacts contract negotiations.

To mitigate the outstanding risk, several options are available, including aggregation, which reduces risk through the bundling of several projects or buyers. Additionally, new forms of PPAs, such as the proxy-generation PPA, are being developed to facilitate better risk management.

This type of PPA bases settlement on renewable energy inputs rather than the energy generated, allowing off-takers to hedge other risks through insurance and commodity markets.

The commodity markets, such as energy exchanges, also provide opportunities for buyers and sellers to manage PPA risk through futures trading.

Insurance is also an emerging area for risk-hedging products specifically tailored to corporate PPAs, often developed from risk-mitigation products initially designed for other industries and adapted for the renewable energy sector.

To summarize, despite the growing demand for corporate PPAs and the increasing adoption of renewable energy, the PPA hedging market is still in its early stages.

This lack of coverage and diversity in hedging solutions presents a challenge for the industry, as it hinders the growth of the corporate PPA market and the widespread adoption of green energy. Therefore, there is a need for greater innovation in the insurance sector. However, the corporate PPA community cannot solely rely on the insurance industry to drive this change. It is crucial to actively engage with insurers and collaborate to spur innovation and increase the availability of PPA hedging solutions.

The potential for growth and the inherent risks associated with corporate PPAs make this sector a suitable area for insurers, hence, there is confidence that the number and variety of PPA hedging options will grow shortly.

3. Future of PPA in Italy

The European and national goals are clear, the trend towards decarbonization. To date, many environmental values have already been improved globally, in Europe and nationally. The use of coal will decrease in the coming year and the share of fossil fuels in the global energy mix in the Declared Policies Scenario drops from around 80% to just over 60% by 2050[27].

The Italy and Sustainable Development Goals with the 2022 report from the Italian Alliance for Sustainable Development analyzes the progress of our country in implementing the 17 Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda. Improvements are seen in energy (Goal 7) and climate.

In particular, the energy goal is one of the few to have supported an improvement compared to the pre-pandemic situation, this highlights a constant growth in the development of renewable energies.

[27] World Energy Outlook

The specific targets for the 2021-2030 period resulting from the EU Council, Commission, and Parliament process are as follows:

By 2030, about 210 TWh of green energy should be produced, a value more than doubled compared to the 2017 level (103 TWh). Some plants may cease production due to obsolescence. According to RSE studies, the new goal will require investments of 50.7 billion euros in new renewable capacity and 42.4 billion euros in the network.

The EU has recognized the need (Renewable Directive 2001/2018) to develop technologies that require price stabilization by promoting measures that remove administrative barriers to the signing of Corporate PPA.

In the preceding chapter, reforms were enacted to drive the growth of renewable energy. The trend is clearly inclined towards simplification and ease of access to these sources, such as reduced distances for wind and photovoltaic plants.

With regard to the future of PPAs, attention must be paid to legislative changes related to renewable energy.

A significant simplification of the bureaucratic process and acceleration of timelines to speed up and drive the development of new green plants, from photovoltaics to wind energy, are expected.

There is also the strengthening of the Pnrr-Pniec Commission and more streamlined procedures even for offshore renewable electricity production plants and green and renewable hydrogen production plants[28]. These are the priority objectives of the "energy" package of measures contained in the draft decree. Among the measures, the reduction of distances (from 7 to 3 kilometers) for the construction of wind and photovoltaic plants from protected assets is planned, and it also states that, in the absence of regional legislation identifying suitable areas, those areas where plants are already installed and not already protected are to be considered as such[29].

It is evident that there is a trend toward simplification and streamlining of administrative procedures in order to increase the use and production of renewable energy. Given the inclination of the legislator to facilitate the development of renewable energy and environmental goals, it is easy to conclude that the use of Power Purchase Agreements (PPAs) will increase over time. Furthermore, from a contractual perspective, the PPA certainly represents a facilitator.

In the future, in order to achieve the set goals, changes and improvements are necessary.

[28] In particular, for example, there is the possibility of an exemption from the *VIA* (*valutazione di impatto ambientale*).
[29] https://www.ilsole24ore.com/art/pnrr-nuovo-decreto-taglio-netto-burocrazia-lanciare-l-energia-green-AE4xVRaC

In terms of PPAs, the National Energy and Climate Plan (PNIEC)[30] foresees a "study phase", in which the measures to be implemented will be deepened, including:

• Defining the possible types of PPAs and their minimum elements for the conclusion of contracts, examining the needs of the different parties involved (large consumers, traders, aggregators, producers, financiers);

• Identification of any barriers to be removed, of a normative or regulatory nature, an implementation phase through legislative measures. In fact, there is an "initial push" through pilot projects within the framework of the National Action Plan on Green Purchases of the Public Administration and procurement procedures for energy supplies through tenders carried out by Consip.

• Qualification of production plant projects favoring the aggregation of potential demand, in particular from small and medium-sized enterprises and consortia/purchasing groups representing final customers;

• Promotion of the aggregation of energy production supply also with different technologies;

• Inclusion of balancing costs in the energy price;

• Possibility of substitution by third traders in case of failure or non-performance of counterpart;

• Mitigation of the risk of production volume through the combination of different sources (wind, photovoltaic).

Furthermore, from the conclusion of PPAs, a contribution of renewable energy equal to at least 0.5 TWh additional is expected.

As the demand for renewable energy continues to increase, companies are increasingly investing in Power Purchase Agreements (PPAs) for a variety of reasons.

One of the most significant is the increased accountability of companies to their customers, stakeholders, and investors to take action on environmental issues.

Companies are also striving to close the gap between their goals and the reality of achieving renewable energy targets as the deadlines for these objectives approach.

While larger organizations have historically entered into these agreements, smaller companies are likely to adopt PPAs as pressure grows on businesses to transition to renewable energy. Additionally, the global market for renewable energy PPAs are expanding, with corporate

[30] Integrated National Energy and Climate Plan for 2021-2030.

renewable energy goals increasingly driving procurement efforts beyond the United States, which has historically been the most successful market.

We can expect to see a growing number of companies entering into PPAs in markets such as Europe, Australia, and new geographies.

Virtual Power Purchase Agreements (VPPAs) should also be noted for their potential in the future. A VPPA is a long-term bilateral agreement for renewable energy that does not involve the physical delivery of energy from the seller to the customer, who does not need to change their energy supplier.

The contract does not include dispatching costs, but it does offer the advantage of issuing renewable energy certificates[31].

The flexibility of VPPAs makes them even more attractive to large corporations and presents significant growth potential in the future.

PPAs are evolving in a way that makes it easier for corporations to participate in the renewable energy market. As the market matures and corporate demand continues to grow, it is important to consider how PPA structures and options will evolve to meet these demands.

It is undeniable that in the future there will be an increase in the use of Power Purchase Agreements (PPAs), both in Italy and around the world. At the same time, the obstacles that PPAs, and more generally the use and market of renewable energy, encounter in Italy have been analyzed.

As examined, Italy and Europe have ample room for increasing the use of PPAs, but more precise legislative regulation and greater information towards private individuals is required.

In order to increase the use of these agreements, it would be advisable to promote the use of PPAs among private individuals, removing the obstacles that are present today.

The future is oriented towards a green economy, where renewable energy dominates.

This change is already evident on several fronts, and with regard to the analysis of PPAs, it has been evident that despite the political and regulatory situation in recent years, this type of agreement has grown progressively.

In the future, PPAs, as well as other instruments that incentivize a green economy, will be central, attention towards environmental protection shows no signs of stopping and inevitably, all tools capable of safeguarding the environment will develop and increase.

[31] Energy Attribute Certificates (EACs).

CONCLUSION

In this study, the potential of Power Purchase Agreements (PPA) has been highlighted. PPAs are atypical contracts, not yet fully established in Italy.

The analysis aimed to bring out the strengths and weaknesses of PPAs. The weaknesses were analyzed, and improvements were suggested from a legal and organizational standpoint.
The study of such contracts was not limited to Italy, but also to other countries in the European Union and, more generally, to the rest of the world. In America, the use and well-structured nature of PPAs have been emphasized. In America, the atypical nature of the Power Purchase Agreement is favored because of a flexible legal system based on constantly evolving jurisprudence.

Given the responsibility, goals, and imminent deadlines for the climate in recent decades and the increasing need for a secure and independent energy supply, PPAs are a key element in adapting our consumption to the undeniable and unchangeable climate change and expanding an independent reality in energy production.
Recently, not only in Italy, the problem of fluctuating costs of gas and other fossil fuels has made the energy expenses of many families uncertain.
In fact, relying on other countries is not always the most convenient and least risky alternative, and recent historical events have widely demonstrated this. The war in Ukraine has highlighted this concept, as Russian gas was no longer available, and prices rose and fluctuated in an attempt to find other solutions.

One of the advantages of the Power Purchase Agreement is precisely related to this aspect.
The Power Purchase Agreements would certainly solve this problem, as they not only draw from green sources but also stabilize the price. This is why PPAs are now more than ever a focus tool in solving the problem.

These contracts are necessary to achieve the volumes of clean energy outlined in the European goals in this country.
One of the main contributors to the slow spread of the Power Purchase Agreements is the limited growth of plants dedicated to creating renewable energy, and in this, a draft decree, such as the one mentioned in the last chapter, on more flexible concessions for the construction of new plants, can be helpful.

Energy is a primary and necessary good, not having this good on the market determines its non-trade and the need to import it from other countries.
For producers, it will not be difficult to sell the green energy created, especially with figures such as traders who characterize Sleeved PPAs, willing to buy energy for others. For producers, it will not be a problem to repay the plant since the energy will be sold.
In the course of this study, I gave some examples of PPAs, where large capacities of electricity were seen to be traded among large producers and distributors.
A doubt arises, can only large companies use the Power Purchase Agreements? The answer is no, PPAs are useful at all levels.

Unless you are a quoted producer who can issue bonds to finance your project, the PPA constitutes the only means of financing for most energy projects. This is especially true for small and medium-sized enterprises, which have limited access to traditional bank financing.

In conclusion, the study also emphasized the necessity of PPAs to achieve the volumes of clean energy outlined in the European goals and the limited growth of plants dedicated to creating renewable energy as one of the main contributors to the slow spread of PPAs. PPAs are useful at all levels and are the only means of financing for most energy projects, especially for small and medium-sized enterprises. Power Purchase Agreements can help companies reduce long-term energy costs and improve their environmental sustainability, as well as promote the development of renewable energy sources and contribute to the energy transition towards a more sustainable future.
Additionally, Power Purchase Agreements can also offer benefits for renewable energy developers, as they provide a stable source of revenue and a guaranteed purchase of the produced energy. This helps to fund new projects and promote the development of sustainable energy sources.
Ultimately, Power Purchase Agreements are an important opportunity for companies and organizations to contribute to the fight against climate change and promote the development of renewable energy sources, without compromising their operations and finances.

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