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APE

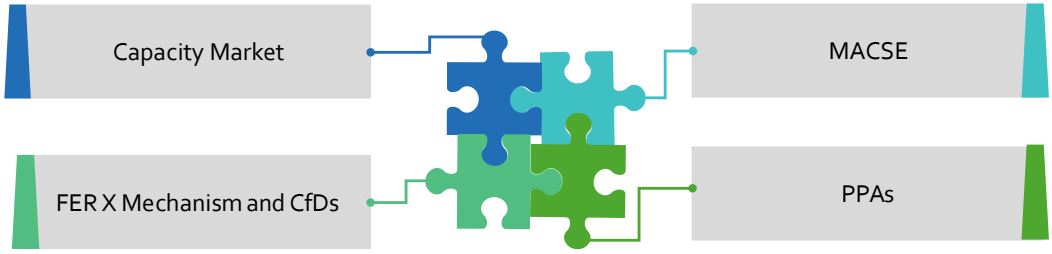
APPUNTI DI ENERGIA

MECHANISMS SUPPORTING THE ENERGY TRANSITION: CfD AND PPA

December 2025

Overview

In Italy, there are several tools available that, with distinct roles, contribute to the security of the electricity system during the transition to renewable sources:



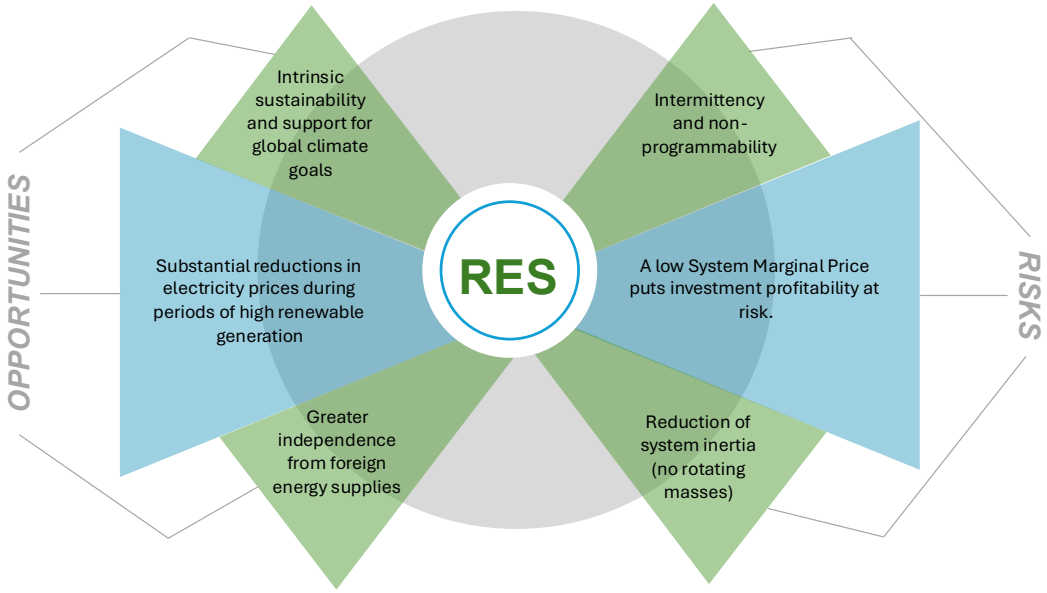
Capacity Market APE

MACSE APE

In this APE, we focus on the **FER X Mechanism** with **Contracts for Difference (CfD)**, which stabilize renewable plant revenues over time, and on **Power Purchase Agreements (PPA)**, long-term contracts between energy producers and buyers that make energy prices more predictable and encourage new investments.

Benefits and Risks of a Fully Renewable Energy System

A renewable-based energy system offers significant opportunities but also complex structural challenges. From the perspective of advantages, renewable sources ensure **intrinsic sustainability** based on naturally regenerated processes, eliminating the need to use fossil fuels. This translates into generally negligible variable production costs which, under competitive market conditions, can lead to **substantial reductions in electricity prices** during periods of high renewable generation. Moreover, these technologies have a **lower environmental impact** compared to fossil-fuel-based systems, with significantly reduced gas emissions throughout the entire life cycle of the plants, thus contributing to global climate goals. An additional benefit lies in **reducing dependence on foreign energy supplies**, strengthening national energy security, an aspect that has become particularly relevant following the energy crisis triggered by the Russia-Ukraine conflict.



For further details on how the System Marginal Price is determined, please refer to the APE on the Day-Ahead Market

However, this model entails significant economic and operational risks. From an economic standpoint, in a fully renewable system all power plants would submit bids close to zero, resulting in an equally **low System Marginal Price**. This would undermine market revenues and investment profitability, threatening the financial sustainability of the system itself. From an operational perspective, the intermittency and non-dispatchability of major renewable sources such as solar and wind **require the development of robust ancillary service markets** and adequate reserve

margins to ensure real-time balancing between supply and demand. Moreover, the massive penetration of inverter-based technologies, which lack rotating masses, leads to a **critical reduction in system inertia**, compromising grid stability and significantly increasing the costs of ancillary services needed to maintain system balance.

Solutions Proposed by the EU

To address these risks, the EU has approved a regulation to reform the electricity market (Reg. 2024/1747). The underlying idea is:

- **not to change the basic functioning of the market** (the price is set by the most expensive plant needed to meet demand) but
- to complement the market with stable **long-term instruments such as PPAs and CfDs**.

In detail:

Reg. 2024/1747

June 13, 2024 — **Regulation (EU) 2024/1747:** Reform of the EU electricity market structure, introducing PPAs and new tasks for ACER.

ACER Assessment

ACER Assessment: ACER reviews the need for voluntary PPA templates and recommends improving existing ones and supporting operators in building capacity. — October 15, 2024

COM(2025) 65 Report

March 3, 2025 — **Commission Report:** The Commission assesses how to streamline and simplify the procedure for applying the capacity mechanisms provided for by Regulation 2024/1747.

ACER Report

ACER Report: ACER analyzes the impacts of introducing CfDs even under normal market conditions and provides recommendations on national strategies for CfDs and the removal of structural barriers. — July 10, 2025

CfDs and PPAs compared

In light of the European regulatory framework, CfDs and PPAs coexist in Italy, each with distinct characteristics and purposes:

	Contract for Difference (CfD)	Power Purchase Agreement (PPA)
	Public investment support scheme	Private long-term bilateral contract for electricity supply
	Counterparty: public entity (e.g., GSE)	Counterparty: *utility*, *trader*, large consumer
	Fixed "strike" price, two-way (FER-X mechanism) or one-way settlement	Price and volume according to structure (*as-produced*, *baseload*, *shaped*, etc.)
	No physical delivery	Delivery can be physical or virtual
	Multi-year	Multi-year
	Support for new renewable capacity and reduction of systemic risk	For targeted price/volume hedging of specific portfolios or consumption sites

CfDs and FER X

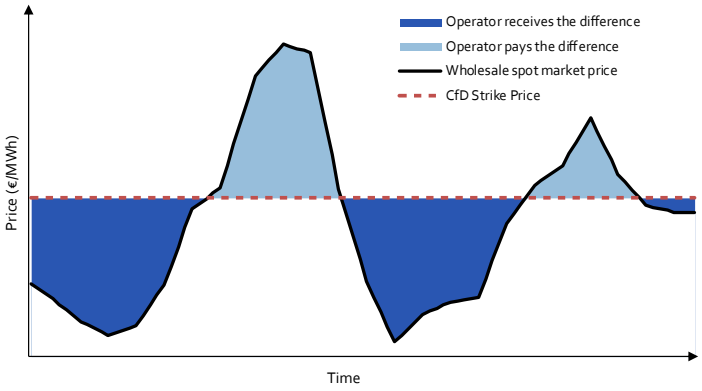
The functioning of CfDs is based on a purely monetary comparison between two values:

- **Strike Price**: a fixed price agreed upon contractually (often through auctions or calculated based on generation costs).
- **Reference Market Price**: the variable price of electricity (usually that of the day-ahead market).

CfDs protect producers and/or counterparties against fluctuations in energy prices, depending on the type:

	One-Way CfD (Producer Protection)	One-Way CfD (Counterparty Protection)	Two-Way CfD
Strike Price > Reference Market Price	The counterparty pays the difference to the producer	No payment	The counterparty pays the difference to the producer
Strike Price < Reference Market Price	No payment	The producer pays the difference to the counterparty	The producer pays the difference to the counterparty

The goal of **two-way CfDs** is to transfer part of the investment risk from the private sector to consumers, while ensuring benefits for both parties. For **producers**, the certainty of **stable long-term revenues** drastically reduces business risk. This facilitates access to credit and lowers financing costs, accelerating the development of new renewable plants. For **consumers**, the mechanism provides protection against energy price spikes. When market prices soar, producers return windfall profits to the State, resources that can be used to **ease electricity bills**.



The FER X Mechanism

FER X Decree

The FER X Mechanism is the new Italian scheme that applies CfDs to support renewables, introduced by the MASE decree of December 30, 2024, and in a transitional phase until December 31, 2025. The goal is to contribute to the 2030 target, which calls for 39.4% renewables in the energy mix. Eligible plants include photovoltaic solar, wind, hydroelectric, and facilities powered by gas from wastewater treatment processes: those **up to 1 MW enter the mechanism directly**, while **larger plants participate in competitive procedures** for capacity quotas differentiated by technology:

Technology	Capacity [GW]
Photovoltaic Solar Plants	10
Wind Power Plants	4
Hydroelectric Plants	0.63
Plants Powered by Gas from Wastewater Treatment Processes	0.02
Total	14.65

GSE (Italian Energy Services Operator)

Support is provided through **twenty-year two-way CfDs with GSE**. The contracts are **based on the actual energy injected into the grid**; negative market prices are treated as if they were zero.

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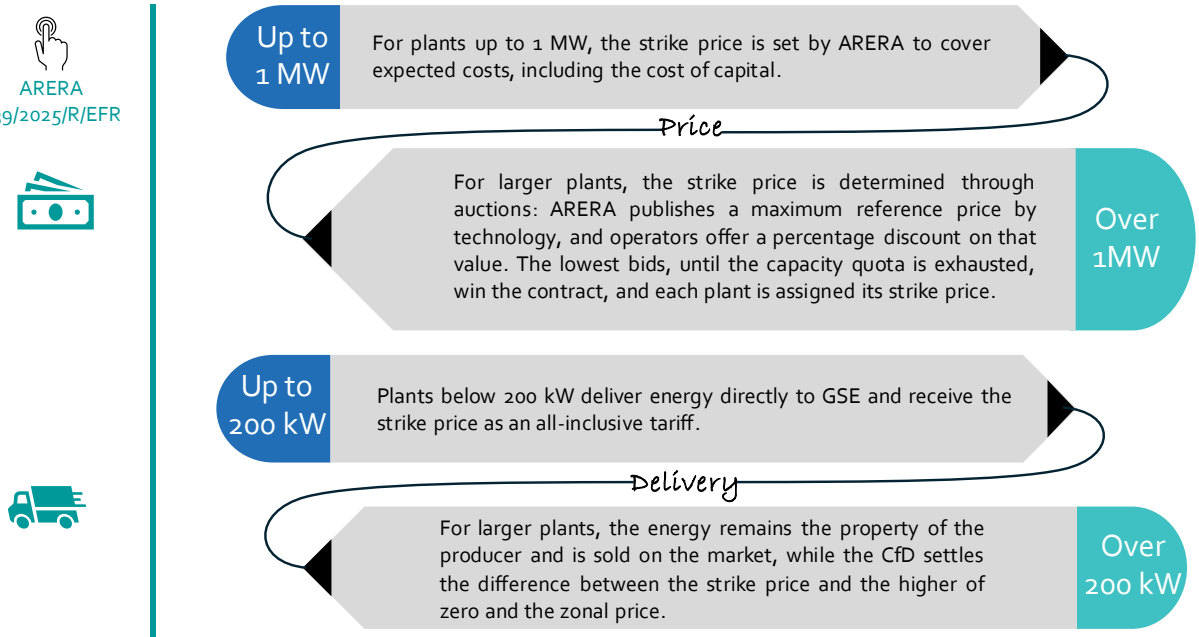


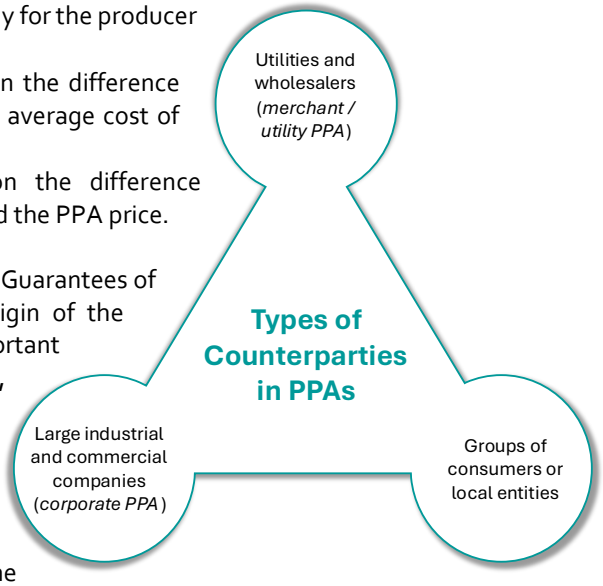
The first FER-X competitive procedure closed in September 2025 attracting significant interest, especially from photovoltaic and wind projects.

PPAs

Renewable PPAs are long-term bilateral contracts between an energy producer and a buyer, at a price agreed in advance. Their main purpose is to **stabilize revenues and costs** against fluctuations in energy prices: by fixing a price for the entire duration of the contract, both producer and buyer are partially protected from market volatility. Like CfDs, this stability makes it easier to finance new renewable plants, as investors can present **predictable cash flows** to banks.

The value of a PPA is calculated differently for the producer and the buyer:

- For the **producer**: it depends on the difference between the PPA price and the average cost of energy production;
- for the **buyer**: it depends on the difference between the wholesale price and the PPA price.



Guarantees of Origin

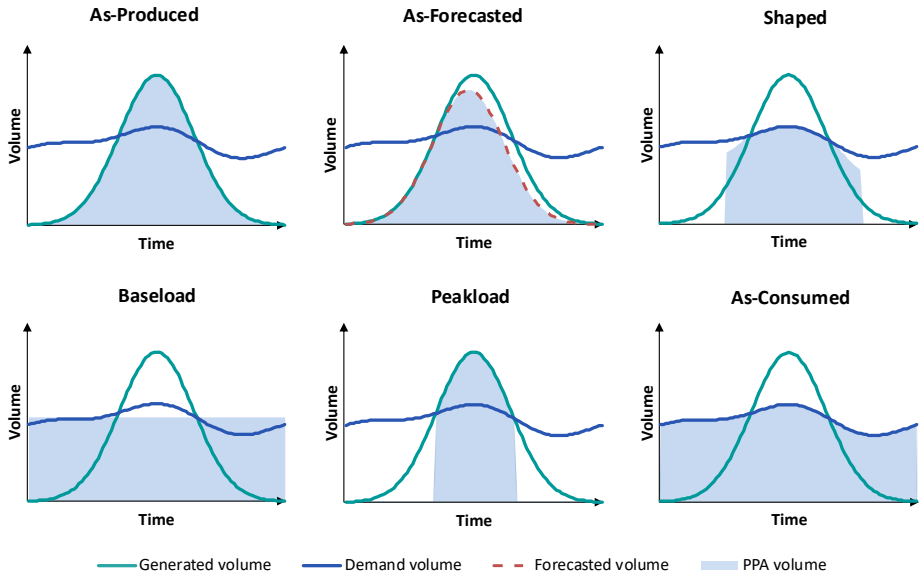
In *corporate PPAs*, companies can obtain Guarantees of Origin, which certify the renewable origin of the purchased energy, an increasingly important element for decarbonization targets, sustainability reporting, and corporate image toward customers and investors.

Different PPAs allocate risk in different ways through contract design. On the **price** side, there are fixed-price formulas or variants with a ***floor*** (minimum price to protect the producer), ***cap*** (maximum price to protect the buyer), or ***collar***, which combines both and activates a mechanism similar to a CfD when the market price moves outside the defined range.

Critical Issues	Possible Solutions
The production from non -dispatchable plants (PV, wind) depends on weather conditions and may not match the buyer's consumption profile, creating imbalances to be managed on the market.	Combine multiple technologies (e.g., wind and photovoltaic) or add storage systems to make energy more dispatchable.
	Entrust a third party with imbalance management through *sleeved PPAs*, where an intermediary supplier buys energy from the producer, resells it to the consumer, and covers surpluses and deficits for a fee.
Negotiating a PPA requires technical, legal, and market expertise often unavailable to small producers and small consumers.	Promote community PPAs, where several small players aggregate as sellers or buyers to increase their bargaining power.

On the **delivery** side, in Italy the most common PPAs are of the "**as-produced**" type, where the buyer purchases all the energy actually generated by the contracted plant, and the "**baseload**" type, where a fixed continuous quantity is supplied. For the two products, different prices are observed: as-produced PPAs follow actual generation, which is often concentrated in hours when market prices are lower, while baseload PPAs require converting a variable output into a flat delivery profile, with additional hedging and balancing costs reflected in a price premium.

There are also PPAs with more sophisticated schemes, such as "**peakload**", "**as-forecasted**", or "**shaped**", where volumes follow forecasts or agreed load profiles:



In all cases, the combination of **price and delivery profile** determines how **risks and benefits are shared between the producer and the buyer**.

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