

RES4Africa Foundation Knowledge Platform

How IPPs can access electricity markets

EDP Renováveis

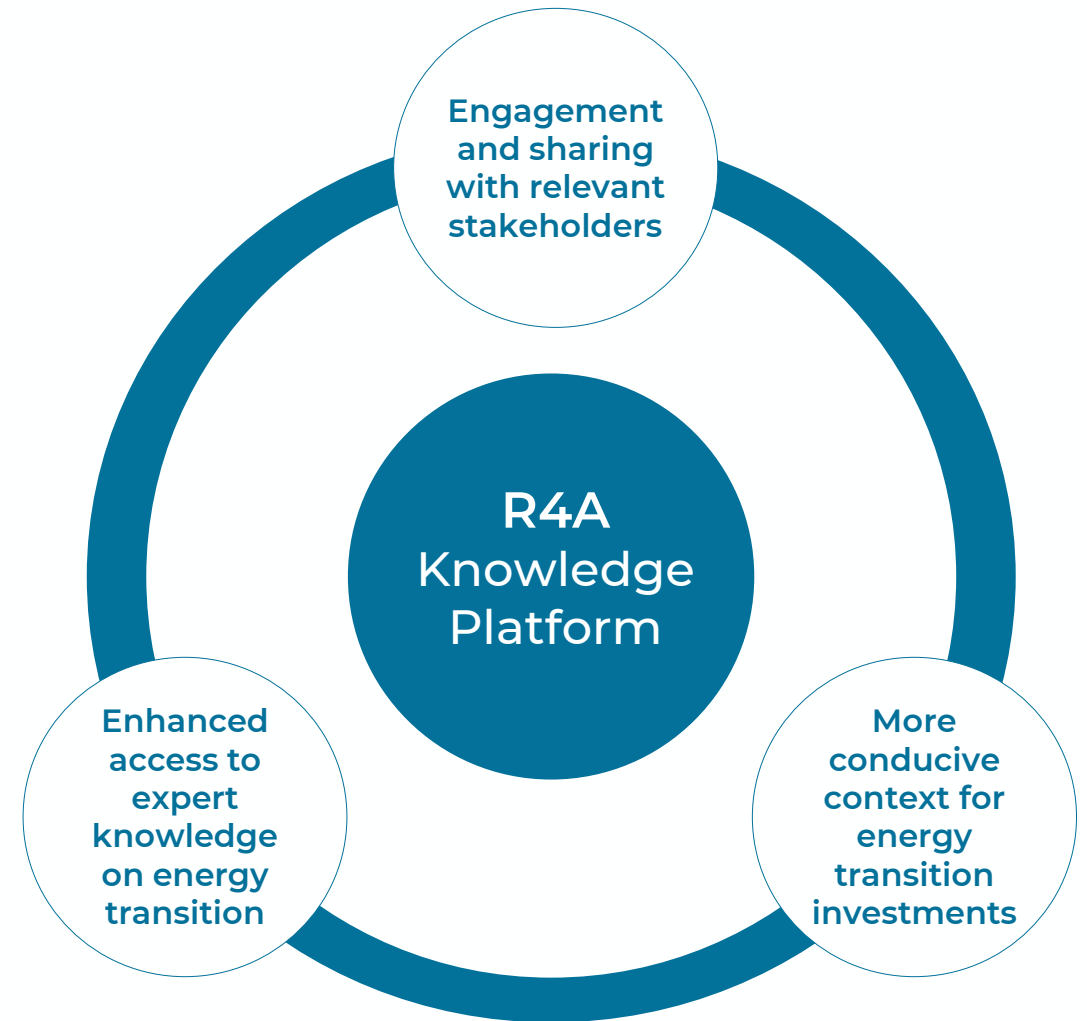


The RES4Africa Knowledge Platform offers a set of content-driven, technical-functional training

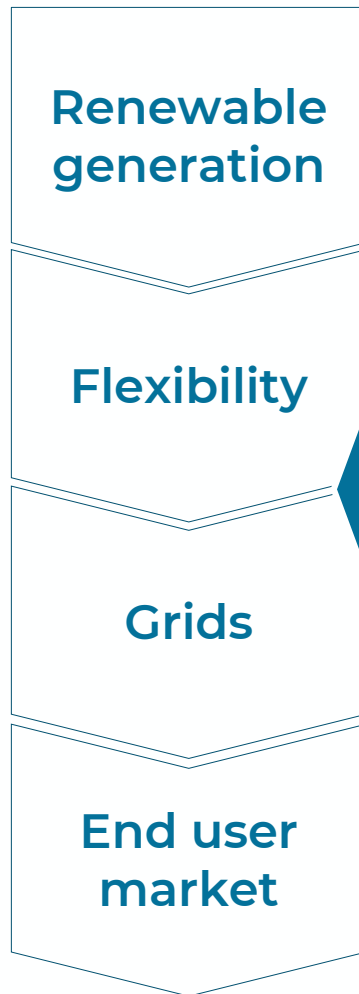
The aim of the **RES4Africa Knowledge Platform** is to establish a public platform of technical training content, usable by third parties in accordance with the Foundation's core principles of a think tank and open hub for knowledge sharing.

The purpose of the Platform is to **offer a set of technical-functional content**, organized in sharp modules covering renewable energy and more in general the key topics part of the energy transition.

The modules will be also delivered to on-request **professionals of the energy sector** (e.g., Energy Ministries, Regulatory Authority, vertically integrated incumbents, Associations, other relevant parties).



The Platform covers all the key areas of energy transition, with a comprehensive perspective across the value chain



The Platform covers the following thematic areas:

Technologies: a comprehensive understanding of different technological options and features / potential is a pre-requisite for a successful planning and implementation of fully functioning energy systems

Policies and regulations: must go hand in hand with measures ensuring that industrial and other economic capabilities are aligned with sustainable development and climate priorities

Access to market: Successful deployment of RES and flexibility technologies depends on how effectively MWh produced can be sold on the market and to what extent risk is properly hedged

Permitting: one of the key hurdles that developers face, especially for utility-scale RES projects. Key common issues can be identified, and proper management principles can be set up

Financing: bankability is one of the highest impact factors to ensure that utility-scale RES projects are successfully deployed. Compliance with requirements from international funding entities is fundamental

Operation: considering the level of maturity reached by RES technologies, a significant share of the value that can be extracted by RES projects stems from an advanced asset management approach

Sustainability: is progressively becoming a top priority for investors and energy industry stakeholders in assessing investment opportunities. A more comprehensive evaluation approach must be adopted

IPPs seek to enter and strengthen their position in the market

The Platform covers the following thematic areas:

Technologies

Policies and regulations

Access to market

Permitting

Financing

Operation

Sustainability



How IPPs can access electricity markets

What is the context: the Renewable Energy (RES) industry needs an appropriate regulatory framework in order to successfully increase RES investments and achieve the targets set by the government

Why is this relevant: Therefore, governments need to ensure that the right conditions for investments are met, and in particular:

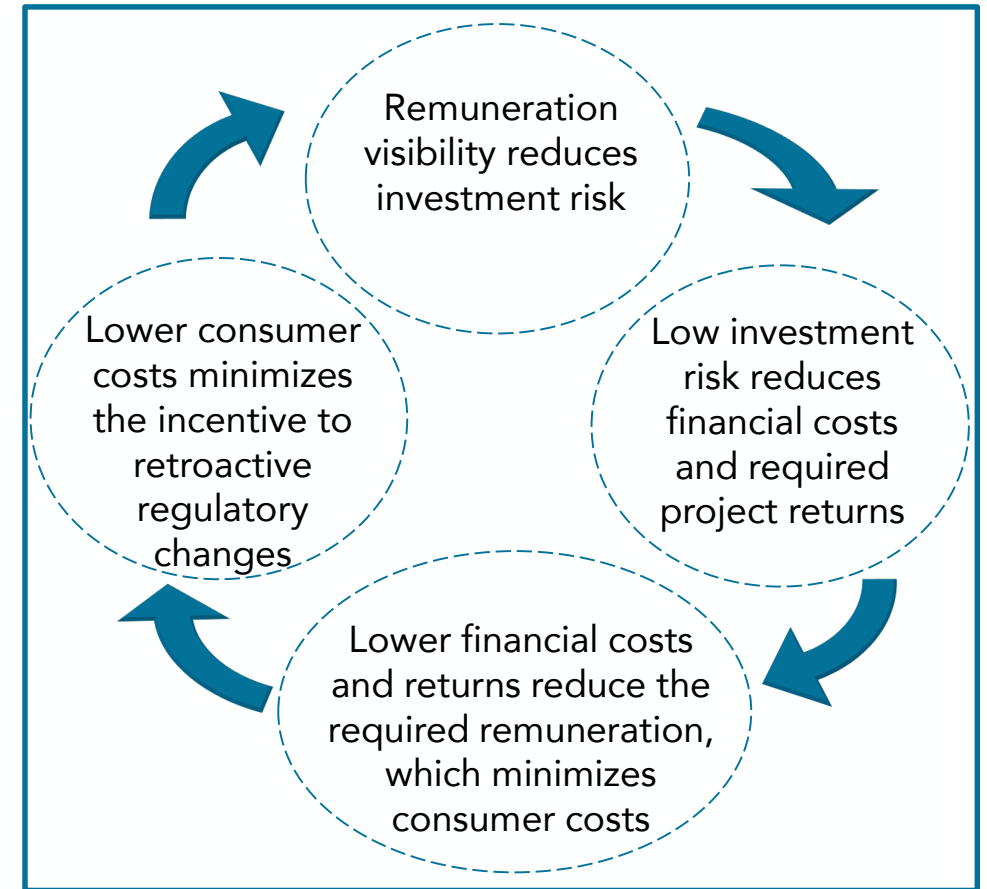
- **Legal certainty and clear regulatory frameworks:** the regulatory framework stability must be guaranteed, and retroactive changes have to be avoided
 - The Energy Strategy and RES targets have to be clearly announced
 - In early stages, clear regulatory frameworks and targets **encourage the development of an industrial and manufacturing base** in the country
 - In addition, delivering RES targets requires **fast and simple permitting rules**
- **Appropriate route to market:** as RES projects are long-term investments, operators need to have **appropriate mechanisms to sell the energy produced**
 - The International experience shows that routes to markets **providing long-term visibility on future revenues** are the ones that more incentivize RES investments

Renewable energy projects need long-term visibility on future revenues (long-term contracting)

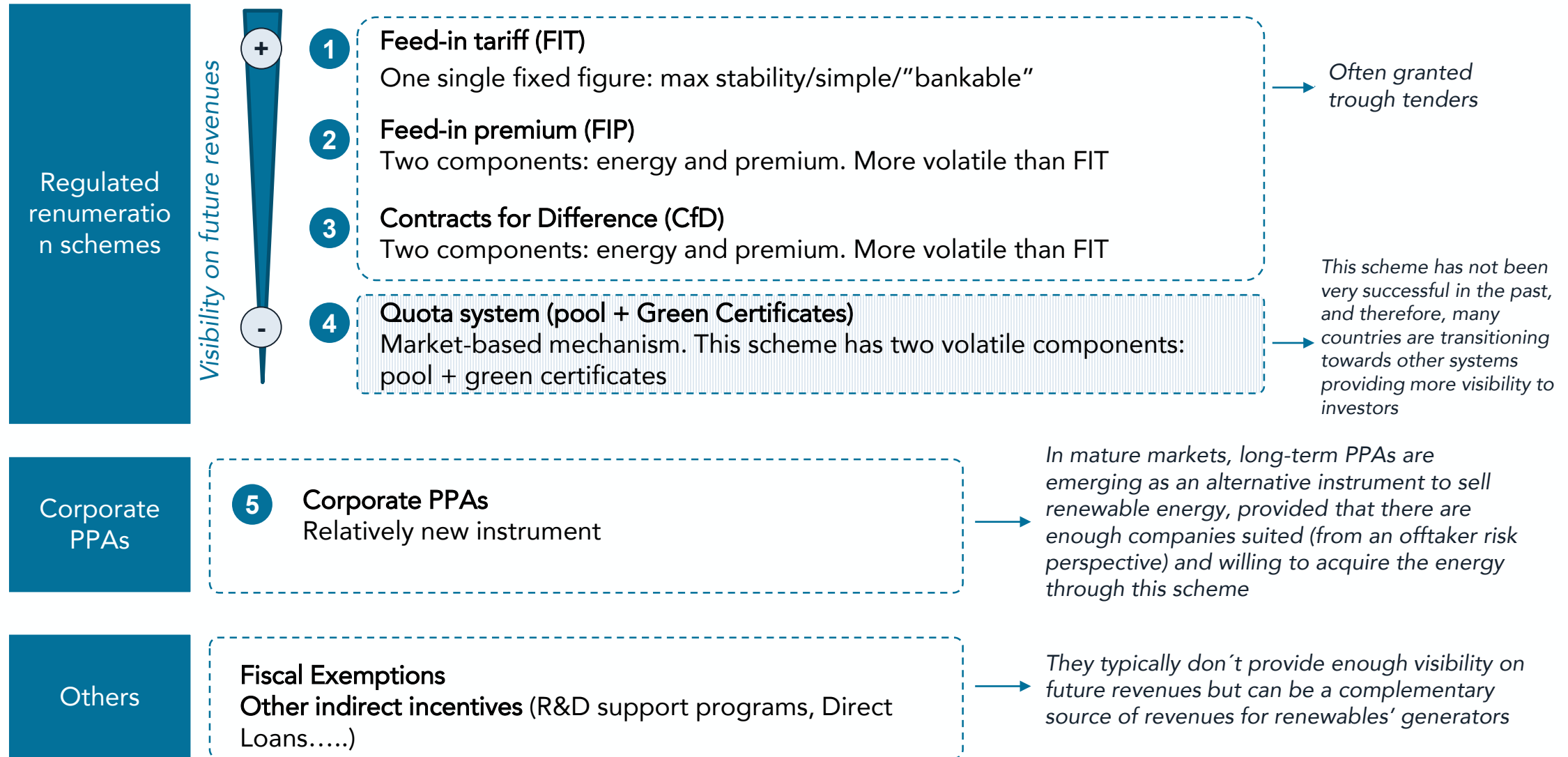
Spot markets are not an efficient way to boost renewables' investments...

....As renewable projects need visibility on their remuneration

- **Spot markets are not efficient way to remunerate renewable energy (RES) projects:**
 - Wholesale markets put pressure on variable costs, mainly fuels
 - However, this does not have any effect in the case of RES as variable costs are very low and RES do not use fuels
 - Since RES cannot react significantly to spot market signals, spot markets do not induce significant efficiencies in RES
- Moreover, some countries, in which the electricity market is still not fully liberalized, still don't have an operating spot market
 - In these markets, **other schemes are needed** to promote investments in renewable energies
- RES need **price visibility** which is needed to incentivize new investments:
 - Main cost component of RES is the initial capital investment
 - Hence, providing visibility on the remuneration decreases the investment risk which, in presence of competition (if remuneration is provided through tenders) will make participants bid lower prices
 - This is why, fixed-price remuneration schemes are the most efficient way to remunerate renewables



There are different ways to remunerate Renewable Energy Projects



Types of remuneration schemes for RES

Fixed-price-based remuneration

Description

Fixed feed-in tariff

- A fixed (or inflation indexed) tariff is paid per MWh produced

Feed-in premium

- Developer receives the price of the energy price plus a premium
- Premium might be indexed, capped, and/or floored
- Operators are typically responsible for balancing its production

Contract for difference

- A fixed (or inflation indexed) tariff is paid per MWh produced and the producer typically receives the difference between this price ("strike price") and the average market price
- Operators are responsible for balancing its production

Assessment

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Easy and low cost: easy to implement and supervise ▪ Reduces regulatory and market risk for investors and loan risk for financial companies ▪ Stable frameworks encourage the development of manufacturing in the country ▪ Effective in promoting different technologies 	<p>Risk over/under support</p> <ul style="list-style-type: none"> ▪ Can be easily corrected with market monitoring ▪ Need to adjust the tariffs when targets are achieved and/or costs vary

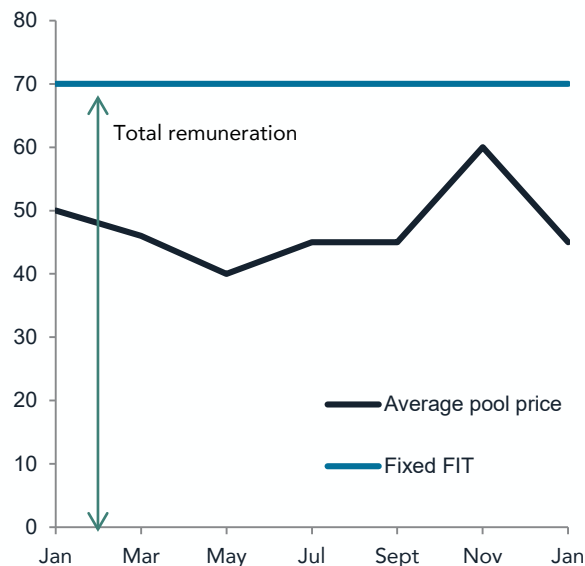
While FIT is typically the starting point for countries with a less developed market, CfD is mostly used in mature markets, being often awarded through competitive auctions

Types of remuneration schemes for RES

Fixed-price-based remuneration

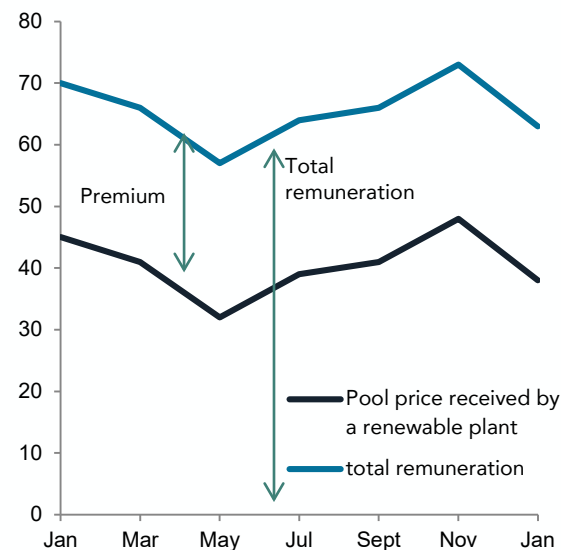
SYSTEM DESCRIPTION

Fixed FIT



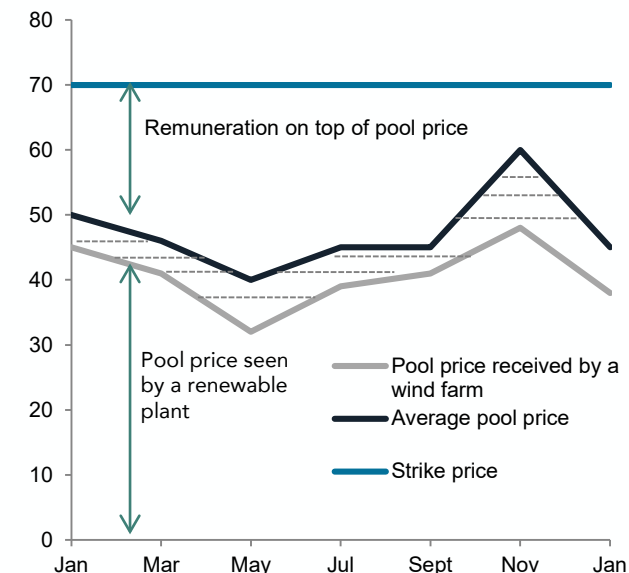
- Remuneration is fixed and insulated from electricity prices

Feed-in premium



- Remuneration consists of a premium to be paid on top of electricity price (~ to a Green Certificate scheme with the advantage of removing the uncertainty on the GC's price)
- If power prices are high, generators increase their overall remuneration

Contract-for-difference



- RES generator receives the pool price plus a premium calculated as the difference between the strike price and the average pool price
 - In case of wind energy, wind generators usually receive a pool price lower than the average pool price ⁽¹⁾
 - Therefore, the striped area can be lost

(1) Wind projects typically see a lower pool price than the average pool price as wind farms usually produce more at night (when pool prices are lower). In addition, in countries with high wind generation, at times of high wind generation, pool prices tend to decrease

Types of remuneration for RES

Quota systems (Green Certificates)

Background

- Green Certificates were a common remuneration system last decade (specially in Europe)
 - However, this system does not provide enough visibility on future remuneration and has not been enough to achieve the targeted RES volumes (at least, in most of the countries)
 - Therefore, an important number of countries have abandoned this system and replace it by Contracts-for-Difference

Demand

- Electricity suppliers are obliged a supply of % of their energy with renewables sources (quotas)
 - To prove their compliance, suppliers need to redeem a quota of GCs each year (therefore, they are the purchasers of GC in the market)
- If electricity suppliers are unable to meet their quota, they will need to pay a penalty , which acts as a de facto cap on the GC price
- Demand (quotas) is fixed by the government, who creates an artificial demand for GCs
 - This "regulated demand" is extremely inelastic (once the obligation is fulfilled, demand is zero, regardless of the price)

Supply

- Renewable energy generators are issued a number of GCs per MWh generated
- In some markets, different technologies are granted a different number of GCs/MWh (banding)
- GCs may have unlimited validity or predefined expiration date

Balance

- If demand is larger than supply (GCs deficit): prices would go up to infinite or typically to a penalty price defined by the regulator which is the buyer's opportunity cost
- If supply is larger than demand: prices should go down to zero or converge to a floor price, if defined
- The only factor that can affect this situation is the expectation of a change in supply-demand balance or, if infinite banking and borrowing of GCs is permitted

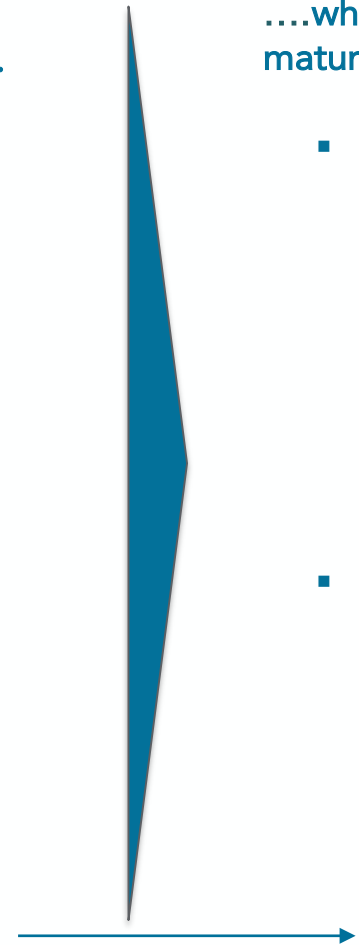
Remuneration schemes can be administratively granted or awarded via competitive mechanisms

Administratively-granted remuneration schemes are particularly appropriate in less mature renewables markets...

- Administratively-granted remuneration schemes (mainly, feed-in tariffs) may play a **crucial role to jumpstart** rapid renewable energy market growth
- FITs are seen as necessary to promote renewable energy sources in the early stages of their development, **as they can ensure that renewable generation is economically feasible**
 - This scheme can send the right signals to the whole renewable sector, promoting a **strong national-based industry and solid supply-chains**
 - Besides, it **minimizes investors' risks** as future revenues are known beforehand, removing the "price-discovery" feature inherent to competitive tenders
- Administratively-granted FITs have **encouraged important renewable deployment**
 - Virtually all of today's largest RES markets implemented this scheme at early stages
 - Some examples include Germany, China, Spain, Brazil, South Africa or Japan

....while competitive mechanisms are common in most mature markets

- Administratively-based feed-in tariffs have progressively been replaced by **competitive support systems** in most mature RES markets
 - Auctions are a **cost-efficient** way of promoting RES due to the fact that they foster competition between different players and technologies, while they are effective in **preventing uncontrolled surge of new installations**
- In Europe, for example, the **regulation requires** that any support for new renewable facilities must be granted **through tenders**



All these leading RES markets have transitioned to competitive support systems

Today, most of the mature renewable's markets grant support through tenders

1 2 3

Tenders are becoming a very popular instrument tool to allocate RES as many benefits may arise from this scheme....

- An increasingly number of countries are choosing **tenders as an instrument to allocate renewable capacity**, becoming a very popular policy tool in recent years
- Tenders have important advantages for **governments**:
 - They **allow to control renewables' volume deployment** (in particular to avoid uncontrolled surge of new facilities)
 - When well designed, the price competition inherent to the tender scheme increases **cost efficiency** and allows price discovery, avoiding potential windfall profits and underpayments (which is one of the disadvantages of administratively-granted FITs)
 - Tenders also help to **minimize sudden or retroactive regulatory changes** because achieved prices tend to be low, and therefore, there are less incentives to introduce retroactive measures
- **From the RES operator** perspective, tenders have the advantage to award **long-term contracts providing the needed visibility on future revenues**
- The introduction of competition and the revenues stabilization mechanism for generators, eventually lead to **lower cost for consumers**

....However, tenders need to be properly designed in order to achieve the desired RES deployment

- Tenders have to be designed **according to the economic reality** of the country, the **energy market situation** and **policy goals**
 - No one design fits all tender schemes
- **Visibility on future auctions** is positive as the continuity in the implementation of auction rounds (as opposes to a "stop-and go" implementation), increases **long-term planning certainty**
- The auction's winner selection criteria may be **"price-only"** (contracts are awarded to most competitive projects) or **"multi criteria"** (if other criteria as considered as for example the inclusion of an industry plan, job creation, technical capabilities, sustainability goals, etc.)
- Auction can also be **technology-neutral** or **technology-specific**
 - In **technology neutral auctions**, RES technologies compete against each other to determine those projects with **overall lowest generation costs**
 - On the other side, **auctions defined by technology** have important advantages: they can help governments to control the technology mix they wish (in particular supporting less mature technologies), provide visibility to the industry and the whole supply chain (so they can grow according to the targets) and promote different technologies with different capabilities and costs

Since the main cost of RES is related to the initial investment, it makes sense to put pressure on the initial cost (ex-ante competition) through tenders

Auctions are usually more efficient when designed and conducted by a central regulator

1 2 3

Advantages of a central regulator

From a risk perspective

- The **risk of a private off-taker is typically higher than the one of the electricity tariff system**, and therefore, it's more efficient to have the electricity tariff system doing long-term contracts

From a quantity perspective

- A central regulator **may aggregate all the demand for renewables**
 - When using centrally set auctions, appropriate volume control may be implemented through careful design
 - If no central regulator designs the auctions, there would be doubts that the number of corporates willing and suited (from an off-taker risk perspective) for long-term corporate PPAs would be enough as to deliver all the needed RES' volumes

From a target perspective

- Under the right conditions, **central procurement can be effective to achieve policy goals and renewable targets**
 - When using administratively set auctions, appropriate cost and volume control may be implemented through careful design
 - If no central procurement exists, targets' achievement will depend on the individual behavior of single companies which may lead to significant under-delivery
 - Without a central regulator, the generation mix of new addition would just be the result of the market

From the consumers' perspective

- Auctions conducted by a central regulator are an **efficient mechanism to secure investors' revenue stabilization, which reduces investors' risk premiums and, as a consequence, decreases consumers' tariffs**

Corporate PPAs are emerging as an additional alternative to sell Renewable energy

What are CPPAs

- A Corporate Power Purchase Agreement (CPPA) **is a long-term contract** under which a business agrees to purchase electricity directly from a RES generator
- CPPAs can be **structured in different ways**
 - In Physical CPPAs the producer sells a defined amount of power to the corporate offtaker
 - In Financial CPPAs, no renewable power is physically delivered
 - Instead, the agreement functions with a derivative contract structure where the offtaker and generator agree a defined 'strike price' for power generated by the RES facility.
 - Each party will then enter into separate agreements to sell/acquire (as applicable) electricity at the spot price.
 - The agreement then works as a financial hedge ⁽¹⁾

Advantages of CPPAs

- For companies wishing to sign CPPAs
 - CPPAs provide an **opportunity to commit using RES**, reducing their carbon footprint, improving sustainability and **providing greater energy security and price certainty**
- For Renewable operators:
 - CPPAs can provide developers with long-term **revenue stabilization** which allows them to obtain financing and reduce the risk of the investment

Global relevance of CPPAs

- The **global volume of existing CPPAs is still low** as CPPAs are only well-established in a limited number of countries: US, UK and Scandinavian markets
 - In other markets (such as Spain, Netherland, Japan, Chile or Australia, among others) CPPA are playing an increasingly role although they still represent a small share of energy contracts
 - **In Africa, CPPAs are still in early days** as many challenges remain: lack of renewable projects and offtakers wishing to sign CPPAs, regulatory challenges, not full market liberalization (and high degree of vertical integration), and lack of grid limiting the appetite for off-site PPAs, among others

The CPPA market is still in early stages and has only reached a mature stage in some consolidated renewable markets

(1) If the spot price in a settlement period exceeds the PPA defined strike price, the generator pays the excess amount to the offtaker for power generated in that period; if the market price for power is less than the strike price in a settlement period, the offtaker shall pay the shortfall amount to the generator for power generated in that period.

Key messages

- A **favorable investment environment** is needed in order to successfully increase renewable energy investments:
 - Stable regulatory frameworks
 - No retroactive changes
 - Simple permitting rules
- Renewables also need **revenues stabilization mechanisms providing long-term visibility**
 - Spot markets are not an efficient way to remunerate renewable energy projects
- International experience shows that **fixed-price remuneration schemes** are adequate to incentivize RES' investments
 - Remuneration from Green Certificate systems are volatile and may deter RES investments
- Fixed-price remuneration schemes may be allocated **through tenders**
 - Tenders can help to reach RES targets at the lower cost for consumers, provided they are appropriately designed
- **Corporate PPAs** may be an **alternative route to market** for renewables
 - However, they have only reached a significant volume in some mature renewables markets

RES4
AFRICA
FOUNDATION

