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**OFATE
DFBEW**

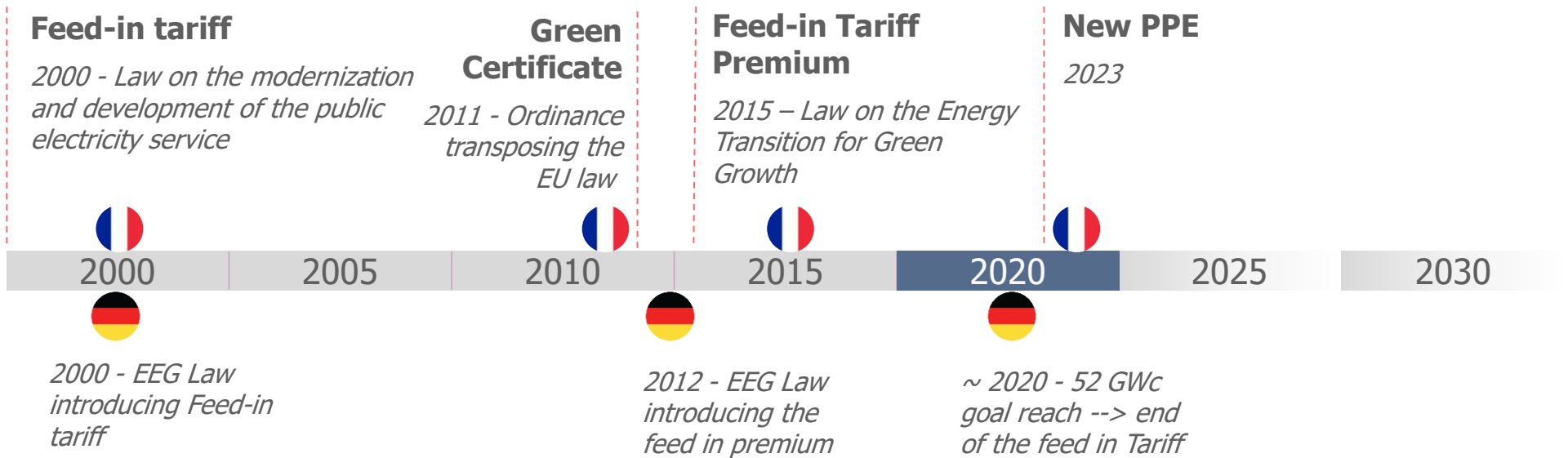
Options to continue operating ground PV plants at the end of their purchase contract





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Law evolution in the past decades



Total PV power connected to the grid by the end of 2019 (source : OFATE)

-  **9 904** MWp
-  **49 000** MWp (4th in the world)

Objectives of PV power connected to grid :

-  **PPE** **18 200** MWp (low option for 2023)
20 200 MWp (high option for 2023)
-  **EEG** **98 000** MWp for 2030 (in discussion)

Existing contracts aiming to encourage investment in renewables

Feed-in Tariff

Fixed electricity prices that are paid to renewable energy (RE) producers

- infra. <100kWc
- EDF (& local suppliers) are the only one obliged to buy from the producer

- + The producer does not sell electricity on the market
- + The producer does not have balancing responsibility
- + No price risk
- + The producer has priority dispatch

Feed-in Tariff Premium

Producers receive a premium on top of the market price of their electricity production

- Only infra.>500kWc
- Only as part of a call for tender

- + The producer has priority of dispatch

- The producer sells electricity on the market
- The producer has a balancing responsibility
- Price risk

Green certificate

Market based premium (Green certificate market price) over market price, based on output

Criteria defined by *Powernext* (state-mandated company)

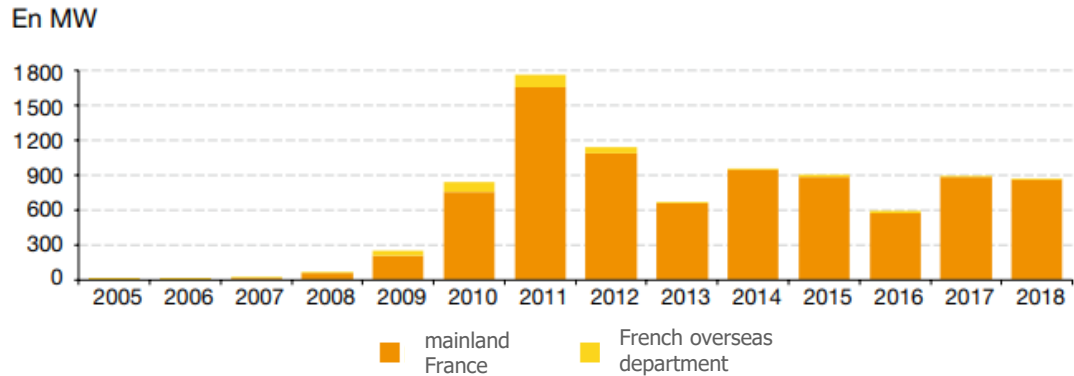
- + The producer has priority of dispatch

- The producer sells electricity on the market
- The producer has a balancing responsibility
- Price risk

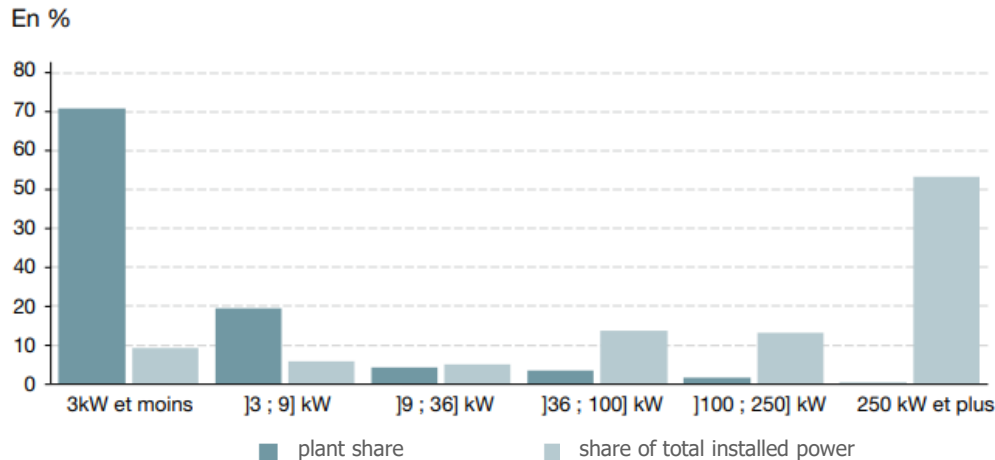
Anticipate the end of the purchase contracts for the first solar farms

Most of PV installations will have their contract expired from 2025

Evolution of the yearly installed solar power (MW) (source : SDES)



Breakdown of solar power plant in number and power by range of power at the end of 2018 (%) (source : SDES)



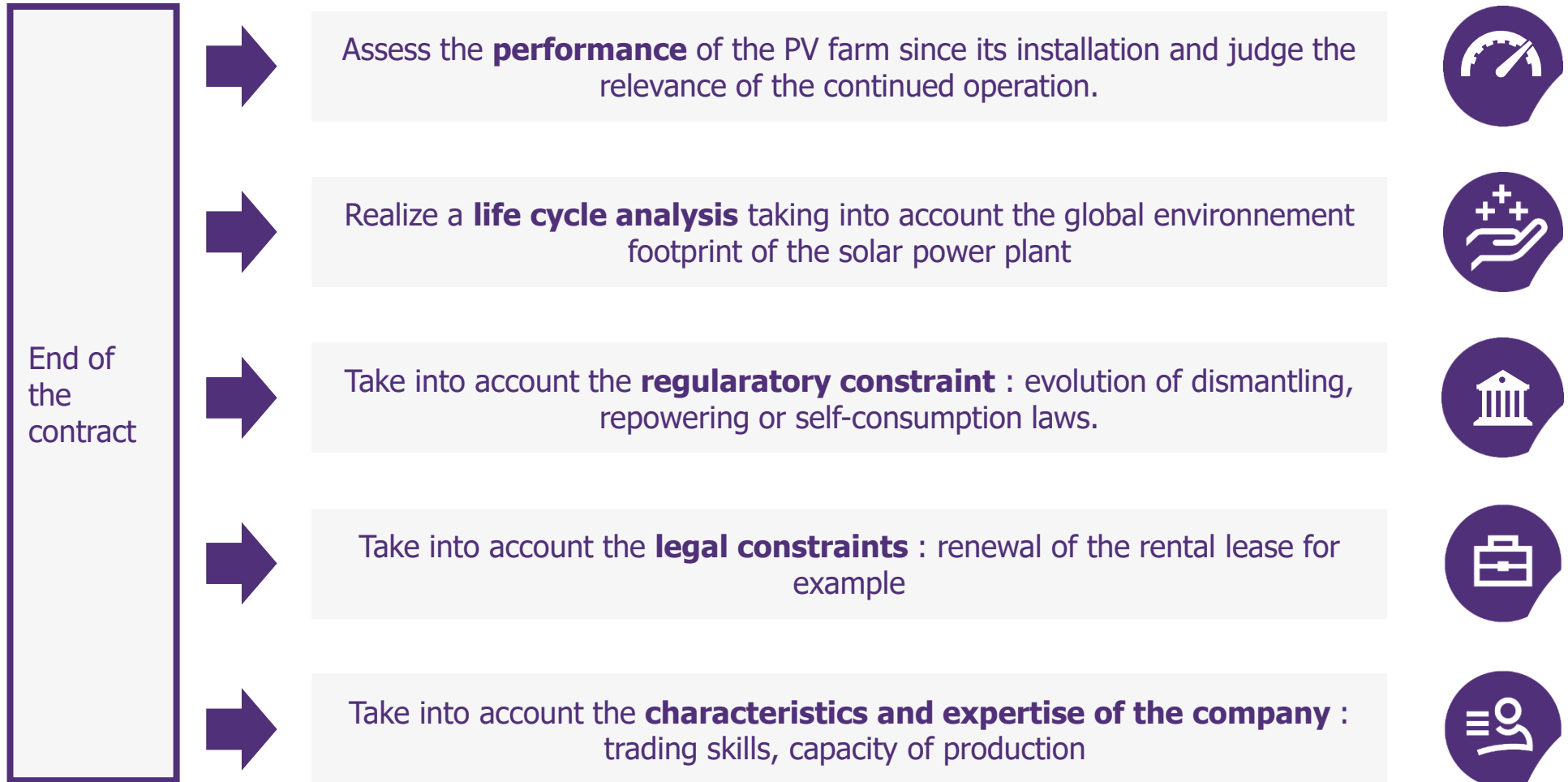
In France ground solar power plants have a power that ranges between 500kWp and 300MWp (Cestas)

Ranking of the largest ground PV producers dec. 2018 (Source : Cabinet Finergreen)

1. ENGIE
2. EDF Renouvelable
3. tenergie
4. TOTAL
5. Caisse des dépôts



Some criterias to determine which option to choose



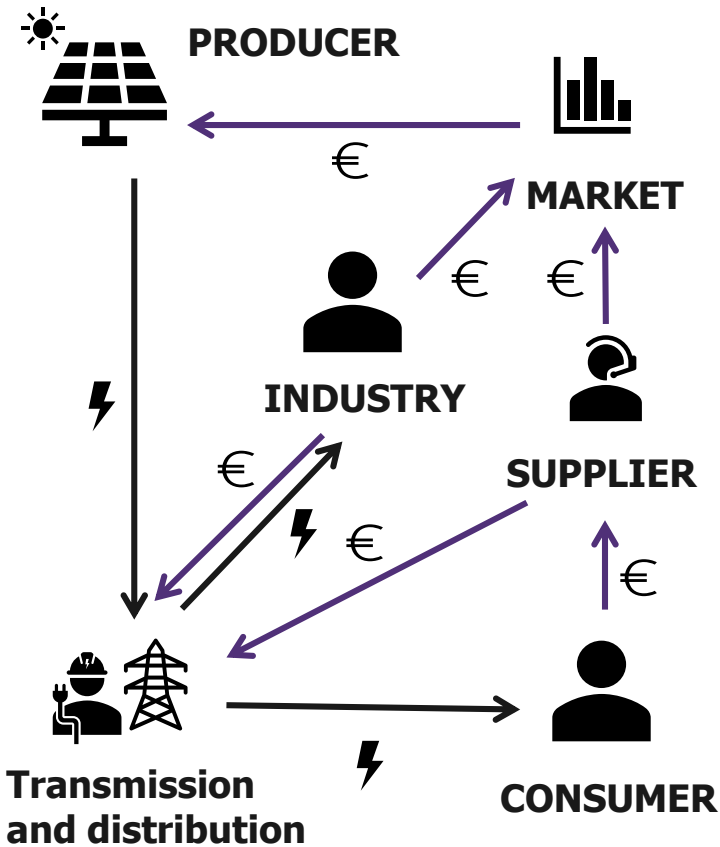
Wholesale market



Definition:

The wholesale market is where electricity is traded (bought and sold) before being delivered to end consumers (individuals, households or businesses) via the grid.

Market Organisation



HISTORIC / STAKEHOLDER

Big players in the electricity market already have the expertise and skills to trade on the market.



Europe major marketplaces are

epexspot (Germany, France, Swiss and Austria)

nordpool spot (Northern Europe, UK, Estonia)

IMPACT ON THE EnR DEVELOPPEMENT

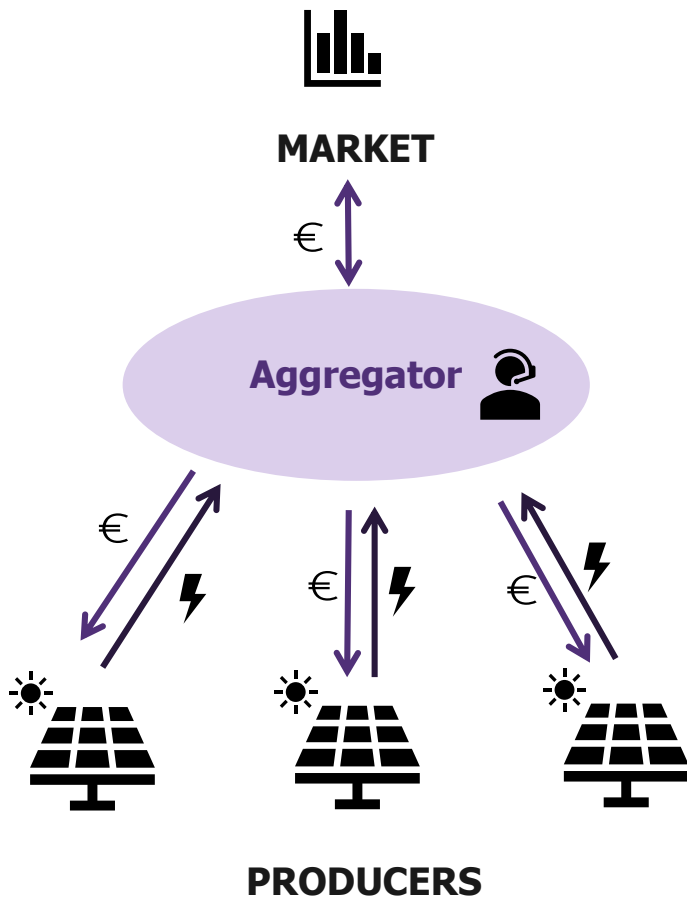
The direct access is difficult for producers with small capacities.

Aggregator

Definition:

The aggregator plays the role of an intermediary between the electricity producer and electricity market or a direct consumer.

Market Organisation



HISTORIC / STAKEHOLDER

Start-ups and small aggregators are being acquired by bigger electricity firms in order for them to gain expertise and suggest customized offers for both customers and producers



Is a start-up created by EDF Group in 2017 in order to help electricity producers who create renewable energy and businesses who can adapt their patterns of consumption to make use of it.



Founded in 2009, Next Kraftwerke connect power-producing assets from renewable sources such as biogas, wind, and solar with commercial and industrial power consumers and power-storage systems.

IMPACT ON THE EnR DEVELOPPEMENT

Enable energy producers to have access to electricity market **without hiring electricity traders** and **dealing with complex market mechanisms**

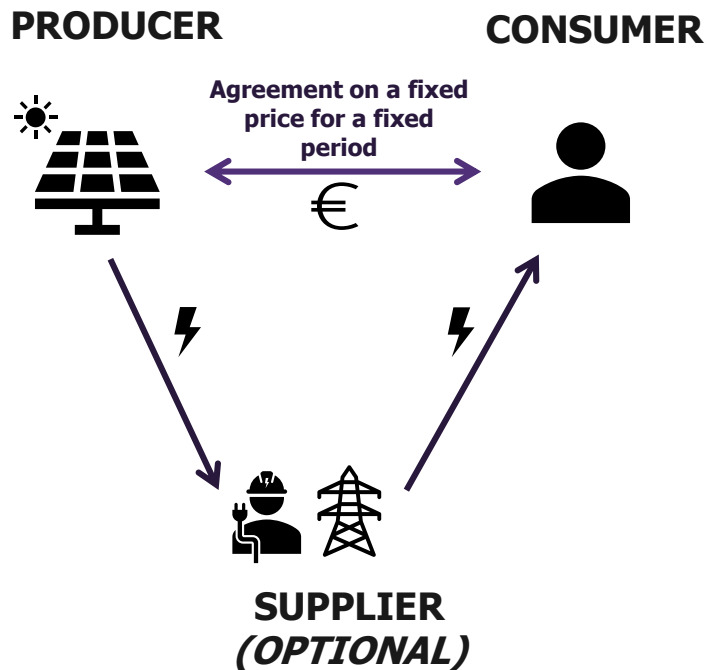
Power Purchase Agreement (PPA)

DEFINITION

Purchase agreement between a consumer & renewables operator (and in option, a supplier) with a fixed tariff over 10 to 20 years. The contract is permitted by the article L. 314-18 à L. 314-27 (Energy Code)



MARKET ORGANISATION



HISTORIC / STAKEHOLDER

- **Massive rise of the practice in the past few years** following the price drop of photovoltaic infrastructures
- Established concept in the US **just emerging in Europe and France**
- Producers are mainly **electricity-intensive industrials** like **ENGIE** (18MW PPA) or **SNCF** (143MW PPA).



IMPACT ON THE EnR DEVELOPPEMENT

- Extension of a contract at the end of the purchase obligation by only covering operating and maintenance costs
- Potential increase in the number of PPA in the future
- *Accessible to producers whose infrastructure does not meet the feed in tariff or CRE's tender criteria*

Synthesis : different options depending on the specificities of the installation

Challenges around the extension of operating lifetime of ground PV solar farms :

- Economical and financial challenge : a technico-economic study must be done
- Environmental challenge : increase the lifetime of the facilities by continuing to operate them
- Legal, legislative and regulatory challenges : check all the necessary prerequisite to secure further operation

Wholesale market



Aggregator



Power Purchase Agreement (PPA)



PARIS

LONDRES

NEW YORK

HONG KONG

SINGAPOUR *

DUBAI *

SAO PAULO *

LUXEMBOURG

MADRID *

MILAN *

BRUXELLES

GENEVE

CASABLANCA

ISTANBUL *

LYON

MARSEILLE

NANTES

* Partenariats



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