



CLEANHORIZON

The Energy Storage Experts



Is the French market for battery storage set for exponential growth ?

31/10/2019 – Corentin Baschet





Clean Horizon was started in 2009 and is the world's sole consultancy specifically dedicated to energy storage.

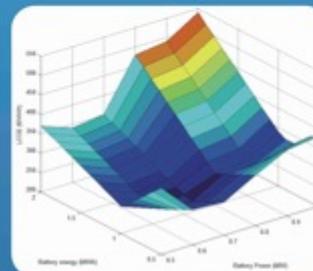
MARKET ANALYSIS

- Monthly analysis notes
- CHEAD storage project database



TECHNICAL CONSULTING

- Technical specifications
- Administration of RFP
- Selection of vendors
- Contract negotiation



Sizing visualization

Energy storage systems designed

241 MWh

as of September 2018

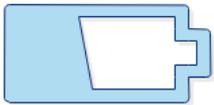
About 150 engagements in more than 20 countries



Agenda



1. Status of the market – existing and announced projects



2. The French islands – a recurring market for storage



3. Continental France – first commercial projects arising



4. Upcoming opportunities for storage





Over 85 MWh of storage are operational and more than 265 MWh have been announced

Most storage developments took place in the “Zones Non Interconnectées”

Volumes of announced and operational projects in each non-interconnected regions



Guadeloupe:

- 7 MWh operational
- 34 MWh announced



French Guyana:

- 8 MWh operational
- 42 MWh announced



Reunion island:

- 27 MWh operational
- 43 MWh announced



Martinique:

- 7.5 MWh operational
- 28 MWh announced



Mayotte:

- 2 MWh operational
- 20 MWh announced

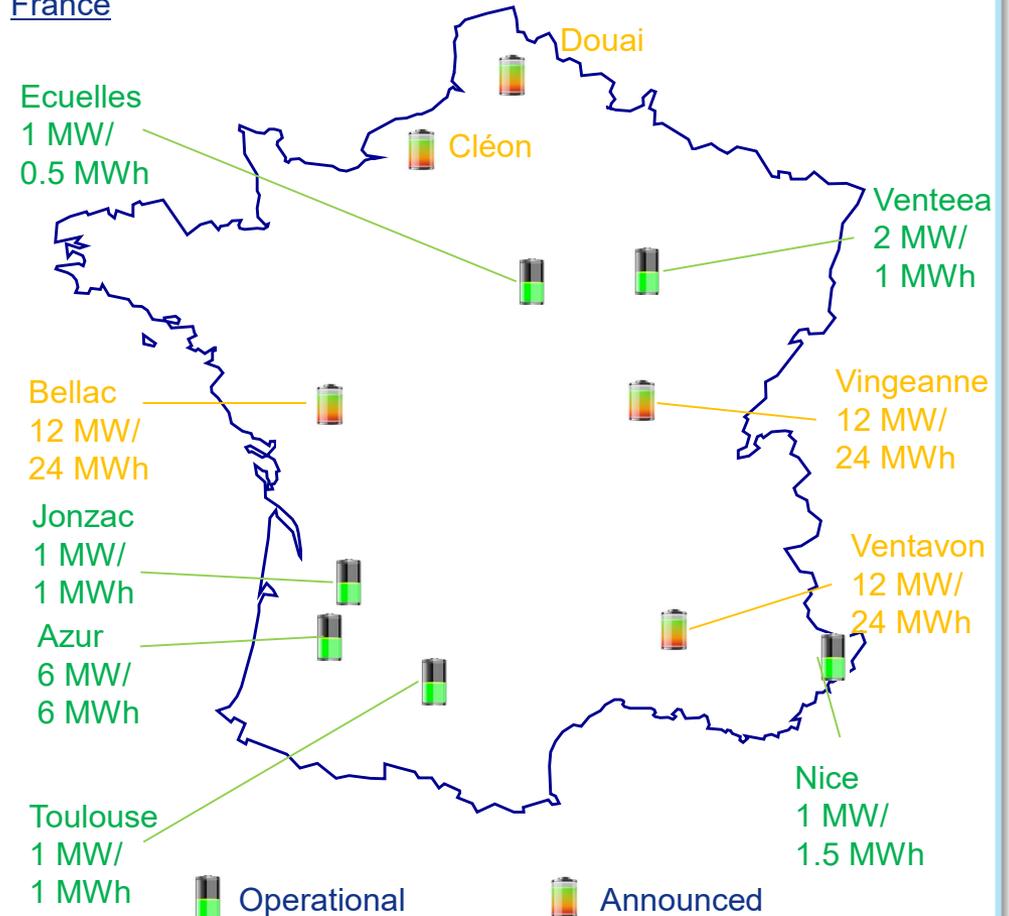


Corsica:

- 25 MWh operational
- 27 MWh announced

Developments in continental France remain limited to a few projects, but expand rapidly

Maps of the announced and operational projects in continental France

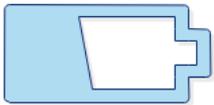




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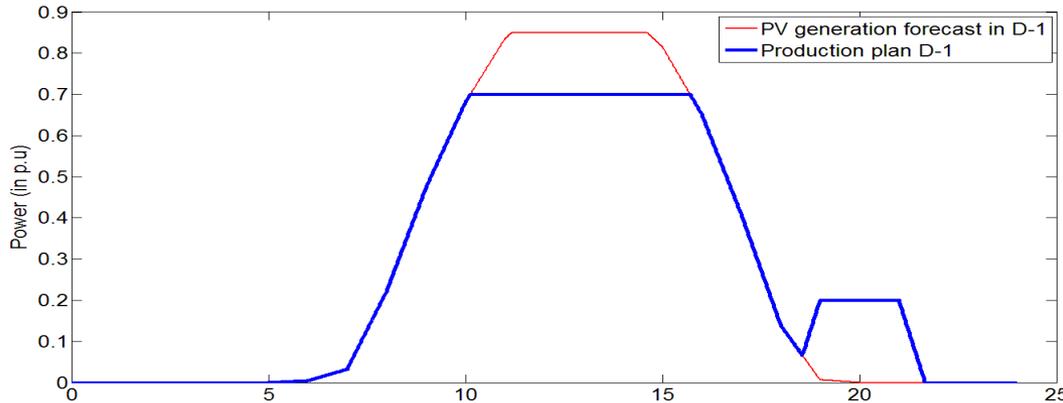




In the French islands, Storage is mainly used in conjunction with PV or wind to firm the output

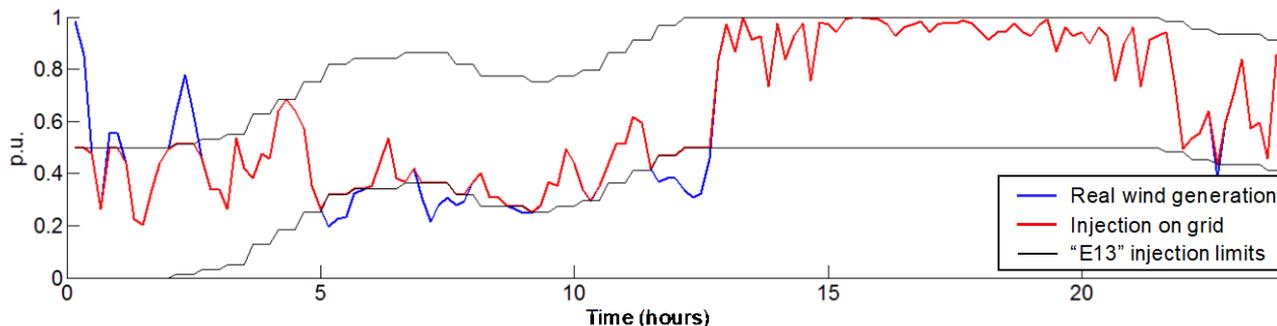
RFPs for PV plus storage are regularly issued

Illustration of the expected operation of PV plus storage installation in the French islands



A Feed-in tariff for wind plus storage exists, remunerating energy at 230 €/MWh

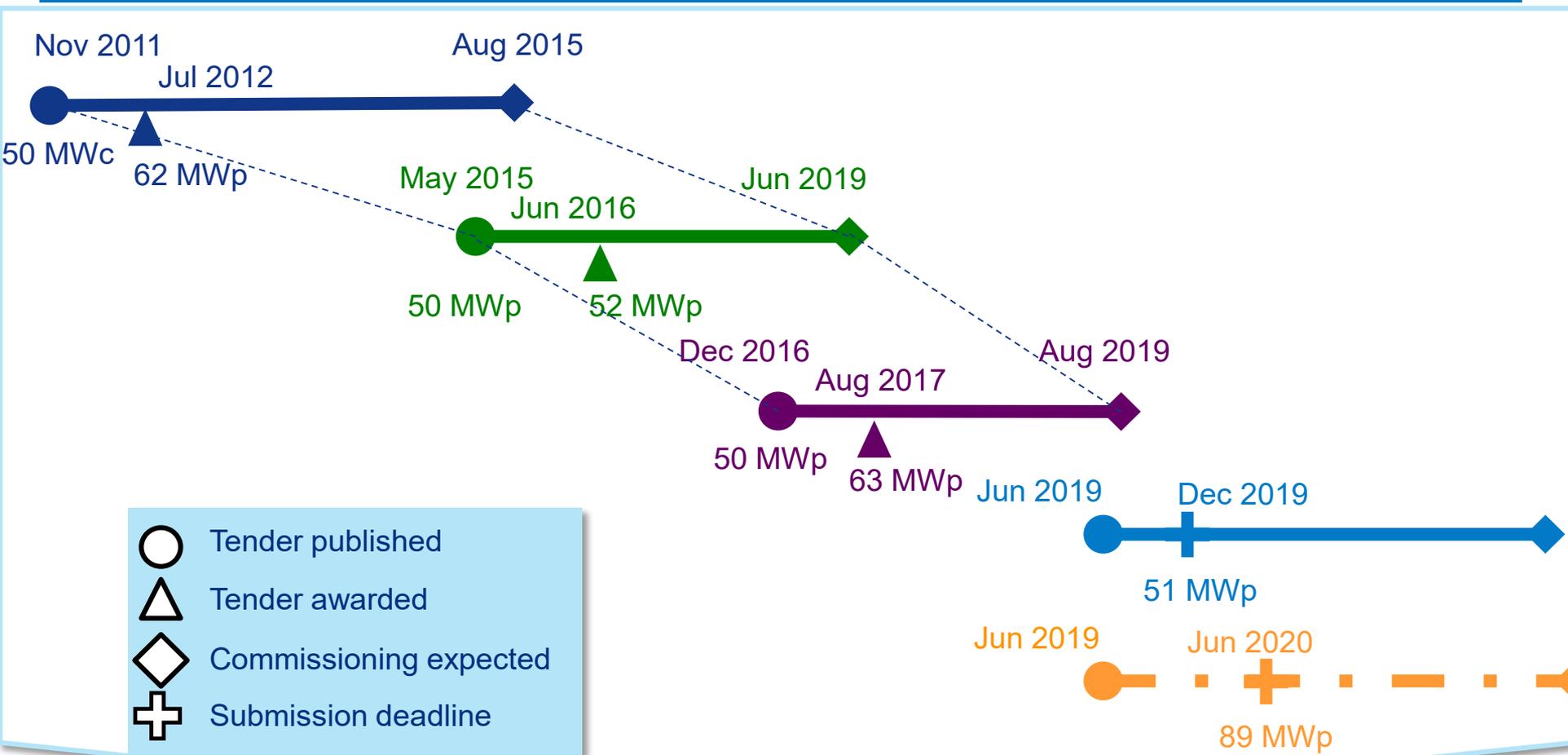
Illustration of the expected operation of an « E13 » wind plus storage installation



- Over 8 years of PV plus storage procurements, PPA prices have decreased from 400 €/MWh to well below 100 €/MWh.
- The wind tariff is in place since 2013 but will probably be suppressed soon by the regulator.



Three PV plus storage auctions have already been awarded in the French islands, two additional will take place in 2019 and 2020



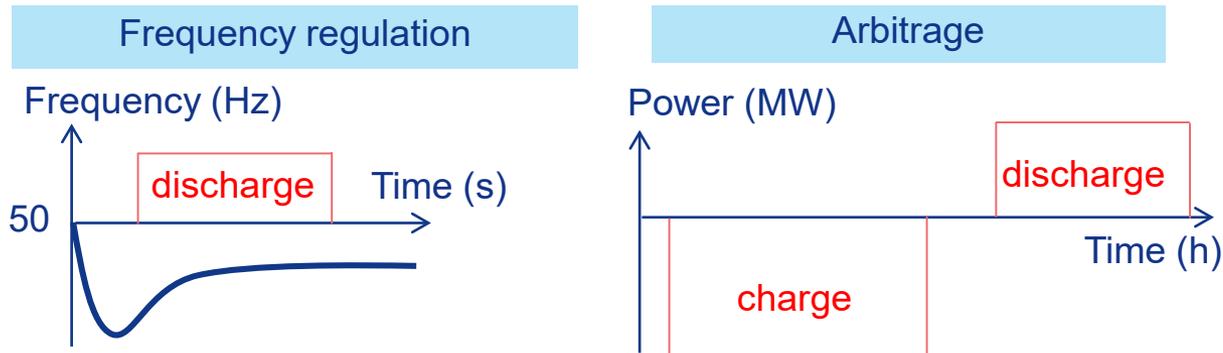
PV + storage tenders are set to be replicated in the French islands, latest auctions show island specific volumes



In the French islands, standalone energy storage systems are now tendered to provide two distinct services



The regulator opened a first bidding window in fall 2017 for 2 distinct services for storage in the islands

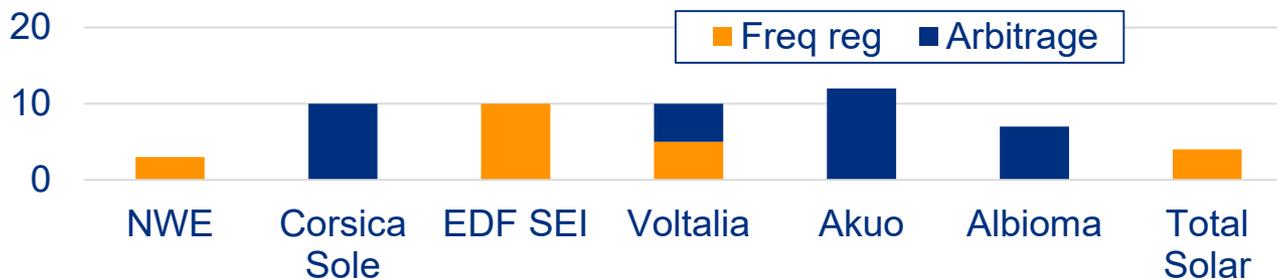


- 12 projects have been selected as part of the first bidding windows, representing a total of 61 MW and 66 MWh¹
- Bidding windows could be reopened in the future.
- The regulator will assess the revenues available for storage to determine the relevance of opening a new window.

Awarded projects in the 2018-2019 “centralized storage” auctions

Battery storage capacity awarded in the 2018 - 2019 centralized auctions

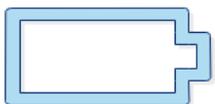
In MW



Note: 1. includes the Mayotte projects awarded in October 2019



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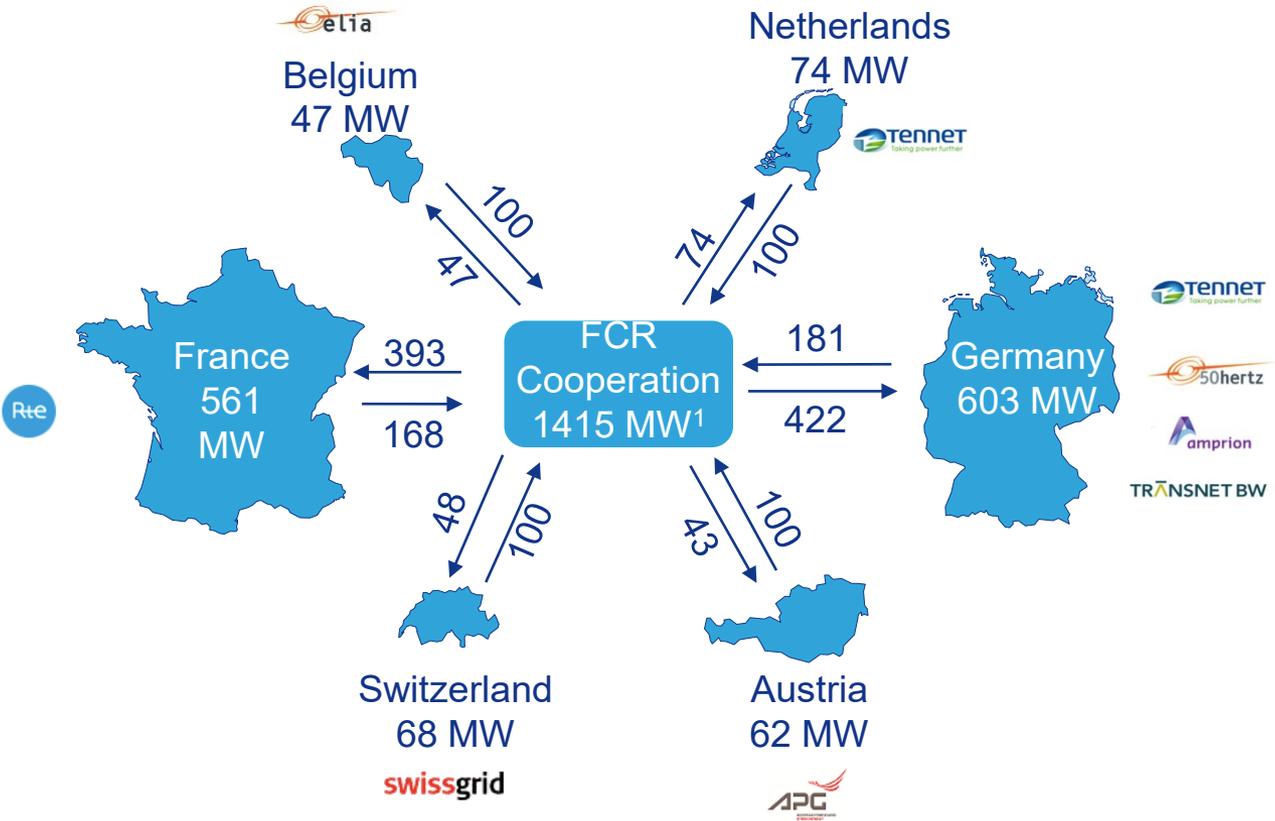




Commercial storage projects in France mostly capture revenues on the Frequency Containment Reserve market

In Western Europe, frequency control (denominated Frequency Containment Reserve) is procured jointly by 6 countries on a common platform

FCR cooperation information: export / import limits (MW), TSOs, and minimum requirements for FCR¹



- On this platform, conventional generators and storage compete indistinctly
- The uptake of storage was fast: almost 400 MW of storage has been deployed to capture value on this market, and more is coming.
- France has joined the platform in 2017 and opened its FCR rules to storage over the course of 2018.

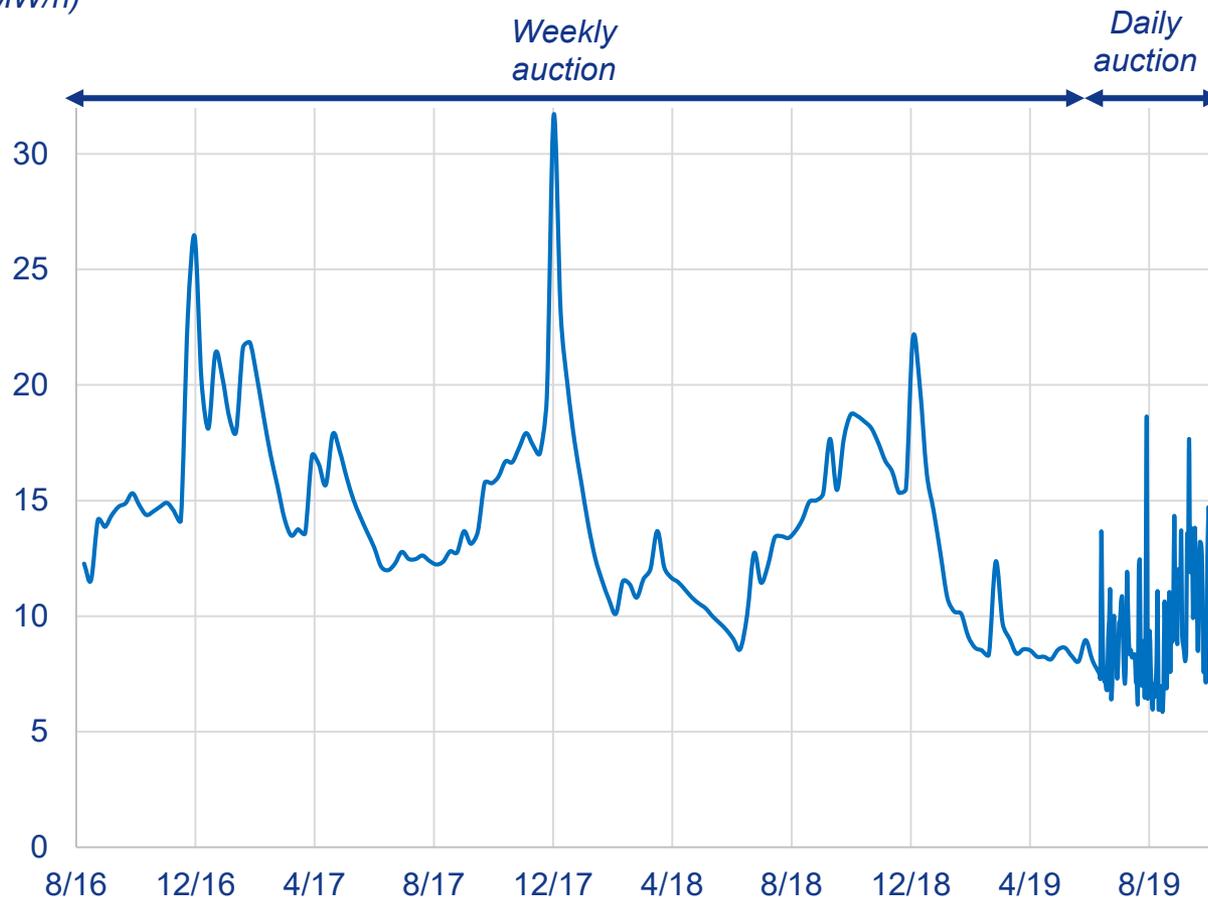
1. Procurement targets vary slightly every week based on TSOs requirements and past years' production



Revenues on this market are decreasing, but can be combined with other sources of income

Revenues available on the FCR market have reduced from 18€/MW/h to 10€/MW/h

Evolution of the FCR prices over the last 3 years (coupled market)
(€/MW/h)



- After several years of sharp decline (-40% in 3 years), the FCR prices seem to be stabilizing slightly at around 9 - 10€/MW/h.
- These levels of revenues and the downward trend are not attractive to investors.
- **However, other revenues are accessible in France, such as the capacity mechanism, which offers up to 20 k€/MW/year of additional revenues.**



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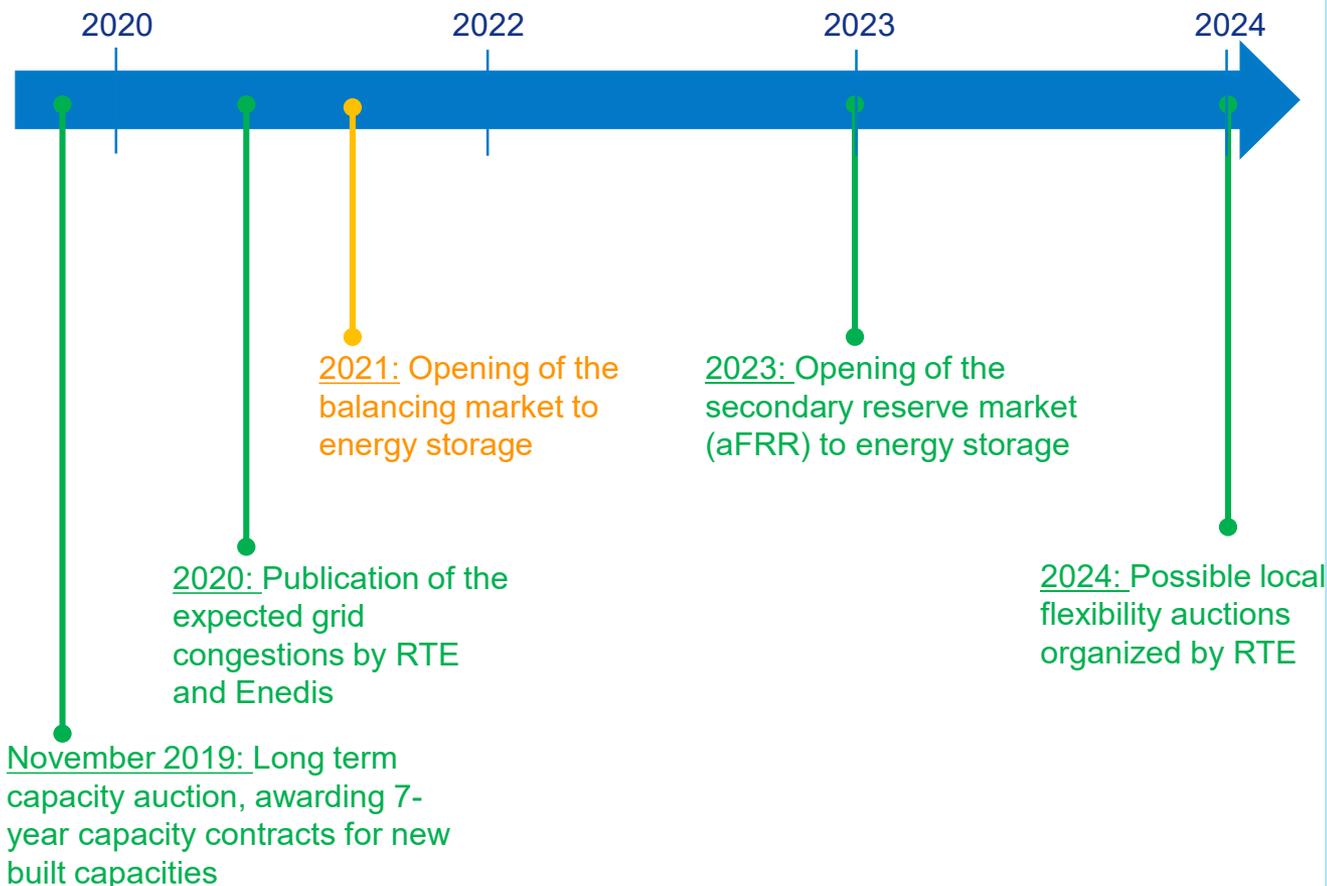
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Over the next years, several opportunities will arise for storage

Expected timeline of the French market developments



Legend:

High potential value for storage

Low potential value for storage

- The long term capacity auction is a rare opportunity to access long term revenue contracts with a storage asset.
- The possibility to provide flexibility to grid operators could increase the value of adequately sited projects.
- Additional regulatory measures are also expected, which should facilitate the development of commercial projects in France.



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Thanks for your attention!



Corentin Baschet
Head of market analysis
Clean Horizon

+33 7 81 34 15 30

corentin.baschet@cleanhorizon.com

