



CLEAN HORIZON

The Energy Storage Experts



South Africa Risk Mitigation auction: what's in it for energy storage?

October 15th 2020





ATA Webinar

South Africa 2 GW Risk Mitigation tender



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

MARKET ANALYSIS



Our experts track the development of energy storage markets and related regulations on all continents and leverage this knowledge to develop go-to-market strategies tailored to our customers' needs.

Update from the Field
Monthly analysis Notes

CHESS
Storage projects database

TECHNICAL CONSULTING



Relying on CRE-STORE, our dedicated energy storage modeling tool, we act as owner's engineer and lender's engineer for IPPs worldwide.

We also work for national utilities to help them quantify their energy storage master plan.

CRE-STORE
Storage simulation tool



As of July 2020, Clean Horizon has designed more than 1,730 MWh of storage projects



**Energy storage
systems designed**

1730 MWh*

**Projects designed
around the world**

60

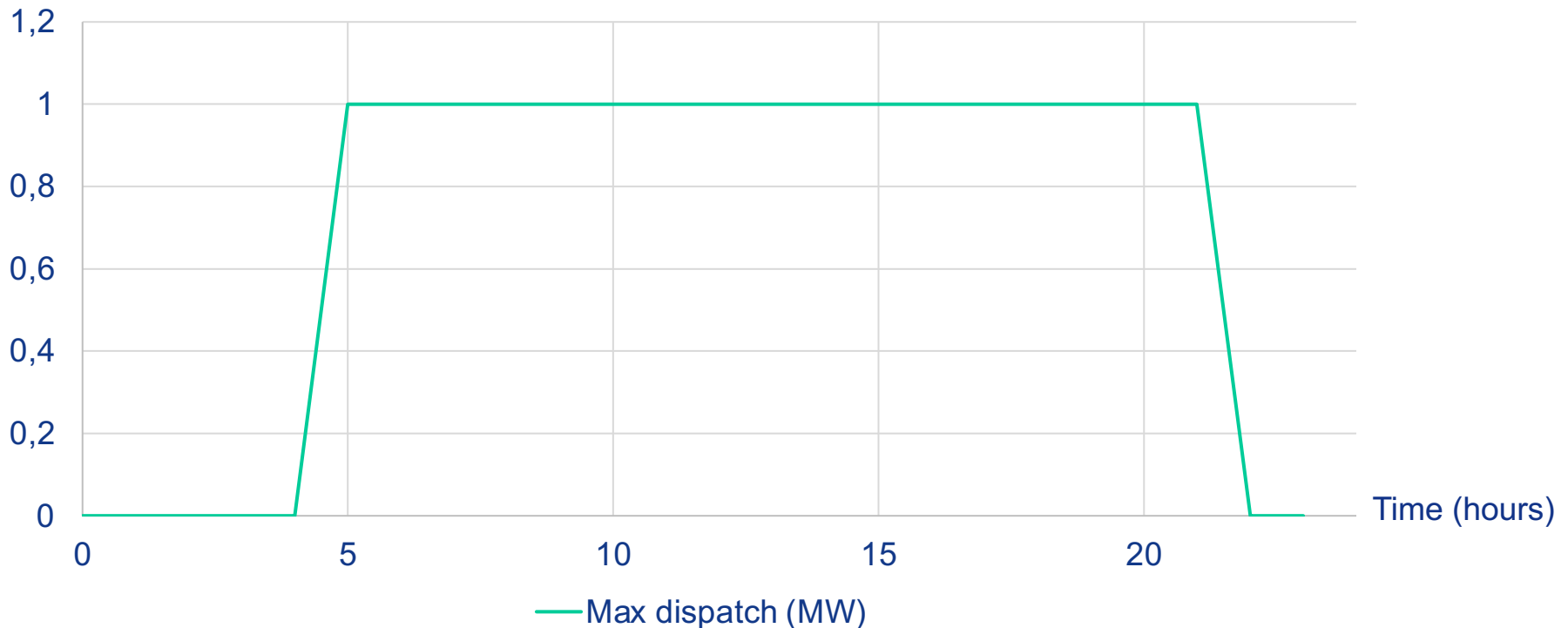
**49% of these MWh are built or in the process of being financed*



Technical requirements: several sites and technologies to meet one power dispatch instruction

Power output depending on the time of day (for a 1MW project)

In MW



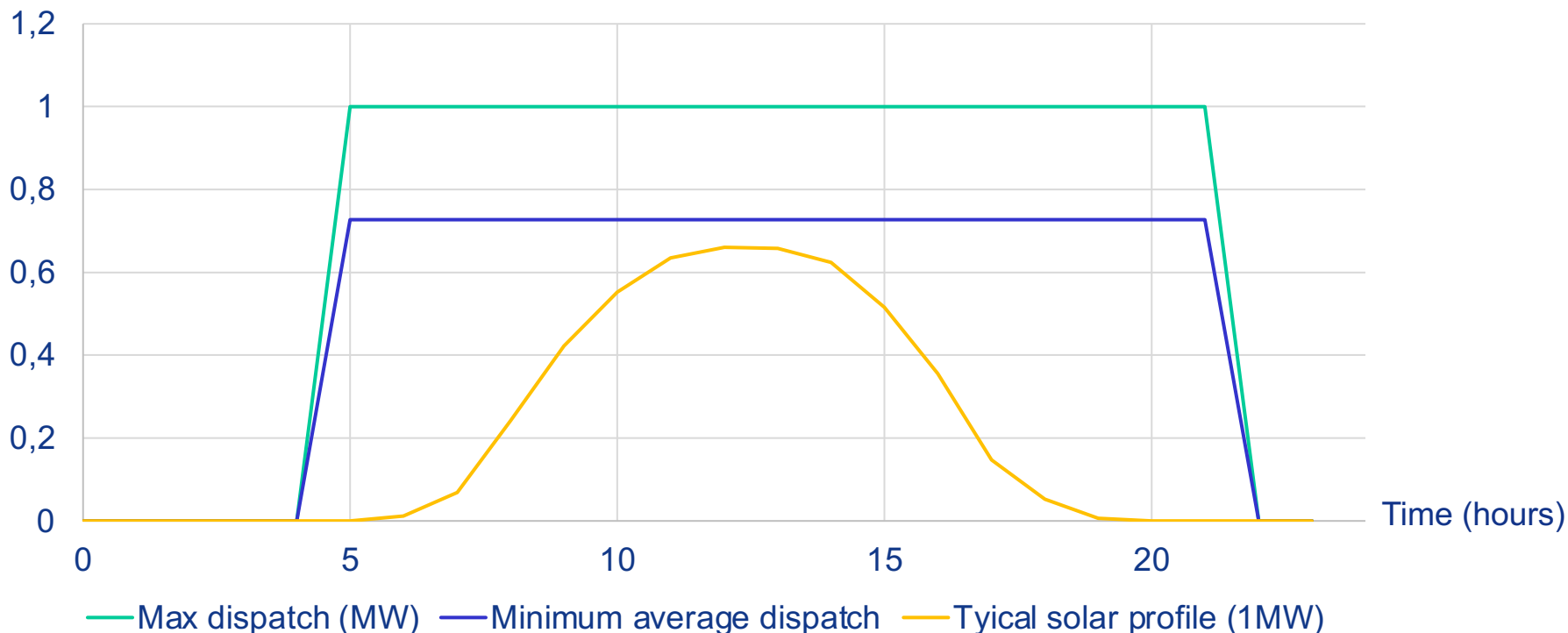
- Capacity must be dispatchable between 5:00 and 21:30
- Minimum contracted capacity must be between 50 MW and 450 MW
- A project can consist of several sites and multiple technologies
- Storage cannot charge from the grid



This auction is designed for gas, but renewables and storage have a role to play

Power output depending on the time of day (for a 1MW project)

In MW



- The auction is designed for gas plus renewables
- PV plus storage would need to be largely oversized to match the dispatch requirements with one full equivalent cycle per day on the battery
- Wind plus PV plus storage can probably be competitive with 2 full equivalent cycles/day
- Geographic diversity of sites is an advantage
- Competition: is there 2 GW of gas capacity in South Africa that can participate in this auction?



Storage has in any case a role to play in this auction with or without thermal power plants

Meeting dispatch instruction without gas

The power plants will receive each day a power dispatch instruction and an ancillary service dispatch instruction for the next day

- Wind and solar generation are erratic
- Forecasts can reduce the uncertainty on generation
- Storage can ensure the match between renewables and dispatch constraint

Meeting ancillary requirements constraints

- **Instantaneous Reserve** if larger than 50 MVA:
Ability to amend capacity of at least 3% of project capacity with a 10 second response and maintaining performance for 10 minutes
- **Regulating Reserve** if larger than 50 MVA:
Ability to amend capacity by at least 10% contracted capacity at a rate of at least 1.67% capacity/minute and maintain this output for an hour
- Reactive power and voltage control if larger than 100 MVA



An optimised bid for this auction will minimise the evaluation price while satisfying the technical constraints

Data collection: renewables generation profiles, development costs, capital costs, operational costs, minimum and maximum installed capacity, gas costs

Minimise the evaluation price while ensuring that the technical requirements are met, computing the penalties due to reduced availability

Results of the optimization:

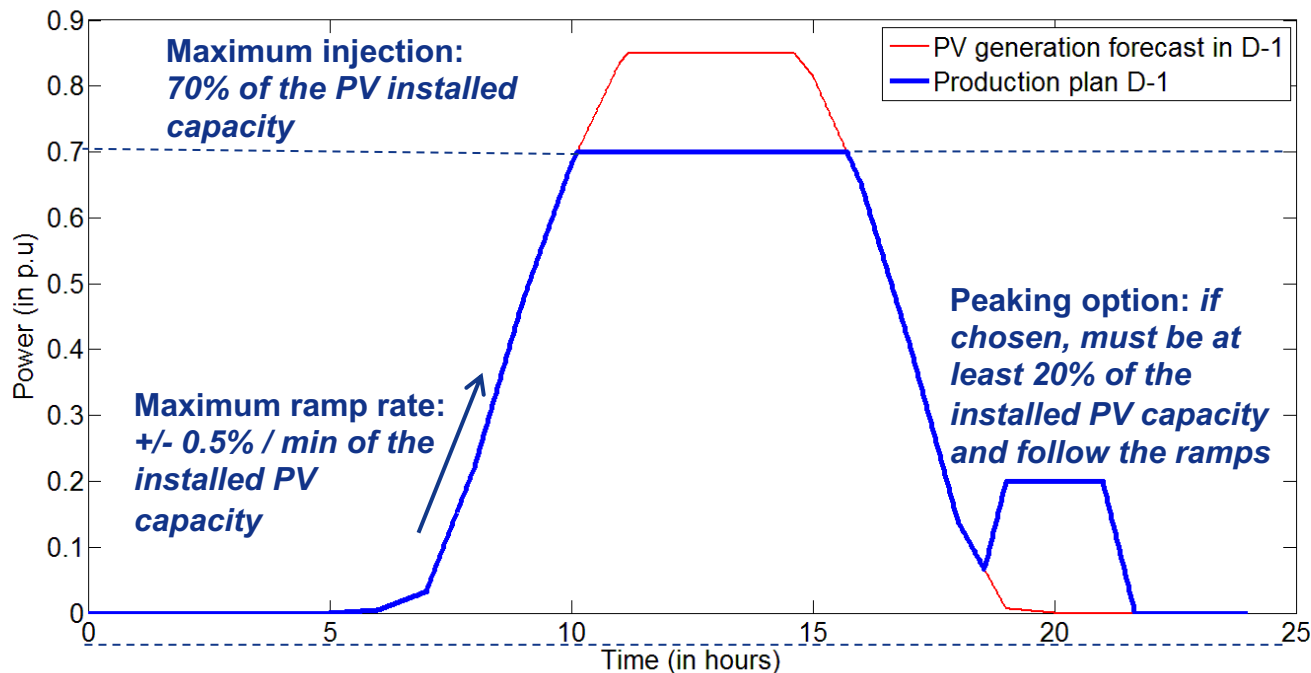
- Capacity of renewables to be deployed on each site
- Energy storage system to install and location (important due to no import constraint)
- Gas capacity to be installed
- Parameters to bid: tariffs component



In the French islands 280 MWh of storage are being deployed to make PV more dispatchable (first projects installed in 2018)

The French islands PV plus storage projects are a good illustration of storage enabling dispatch

Requirements of the French PV plus storage tender



- Storage can make renewables fit in a dispatch instruction
- The French islands have projects operating since 2018



Guadeloupe:

- 7 MWh operational
- 34 MWh announced



Reunion island:

- 27 MWh operational
- 43 MWh announced



Mayotte:

- 2 MWh operational
- 20 MWh announced



French Guyana:

- 8 MWh operational
- 42 MWh announced



Martinique:

- 7.5 MWh operational
- 28 MWh announced



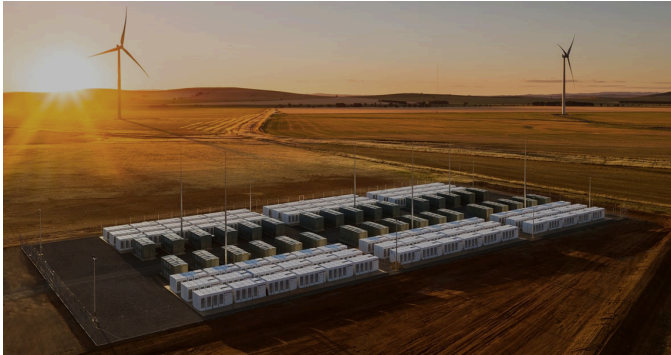
Corsica:

- 25 MWh operational
- 27 MWh announced



The Neoen and Tesla 100 MW / 129 MWh project in South Australia has been operating since December 2017

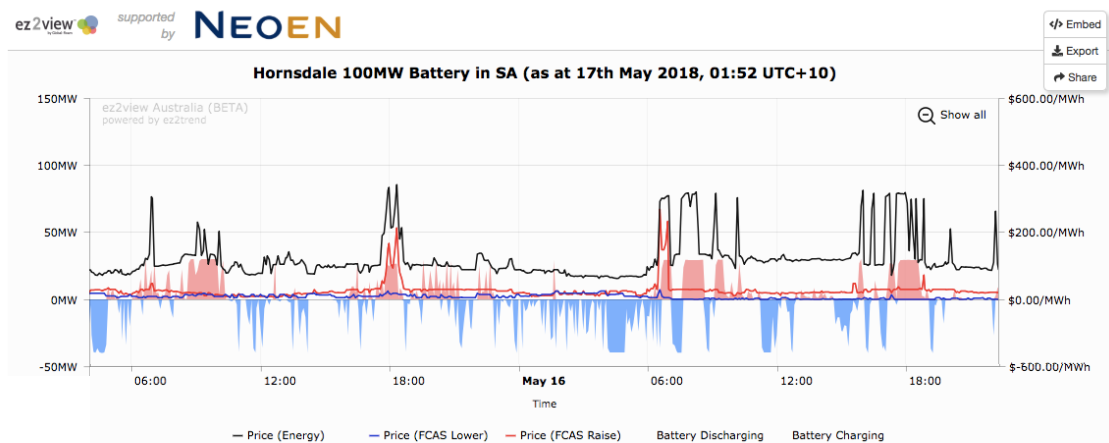
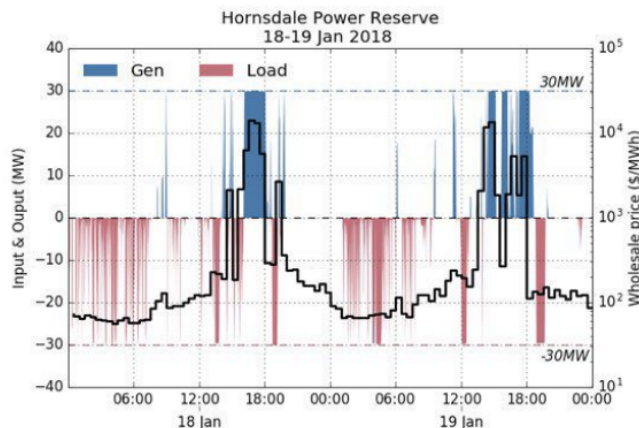
In South Australia, Tesla and Neoen installed a 100 MW / 129 MWh storage system mainly to provide frequency regulation to the grid (battery cost = 56 million euros)



The contract between Neoen and the state is not public but it seems from the battery behaviour that:

- 70 MW / approximately 39 MWh is dedicated to provide frequency regulation (market called FACS, contract with SA government – generated 9million euros in 2017)
- 30 MW / approximately 90 MWh is used to do arbitrage on the wholesale market

The battery also does some arbitrage on the energy markets with the remaining capacity: in January, the battery system earned over 1 million AUD in two days



Sources: Neoen document de base à l'appui d'une opération financière, Autorité des marchés financiers <https://reneweconomy.com.au/tesla-big-battery-moves-from-show-boating-to-money-making-93955/>

<https://hornsdalespowerreserve.com.au>



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Thank you for your attention

Your questions are welcome!

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