Session I – Hosting Country Situation

The economics of distributed energy storage from kW to MW scale

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Small scale vs mid scale ES
a simple economic consideration

- Simplified condition of profitability for a storage associated with residential PV :
  - **LCOS ≤ $P_{retail} - P_{whol}$**

- LCOS : intrinsic cost of storage for which the storage Net Present Value equals zero.
- P_{retail} (resp. P_{whol}) : levelized price of electricity on the retail market (resp. on the wholesale market). Market conditions are supposed reached (i.e. the excess electricity is sold on the wholesale market). Only energy revenues are considered here.

- Simplified condition of profitability for a storage operating on the wholesale market (wind or PV park, B2B customer…) :
  - **LCOS ≤ $P_{wholp} - P_{wholop}$**

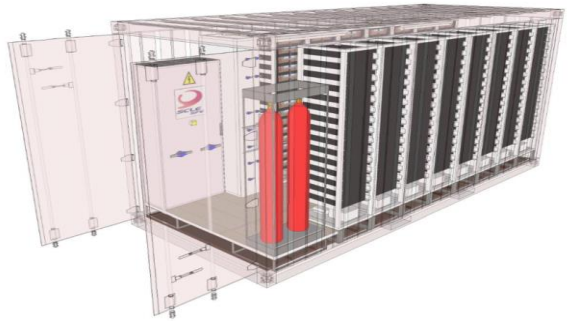
- P_{wholp} (resp. P_{wholop}) : levelized price of electricity on the wholesale market during peak hours (resp. during offpeak hours). Only energy revenues are considered here.

- In Europe, ($P_{retail} - P_{whol}$) is in the range of **100 – 250 €/MWh** (the lowest in France, the highest in Germany) and ($P_{wholp} - P_{wholop}$) in the range of **30 €/MWh** : it is therefore clear that the profitability is easier to reach for a small scale storage associated with residential PV than for a mid scale one (except in specific situations like islands where business models are different, see next slide).
- However, the LCOS of Lithium-ion batteries is now in the range of **350 - 400 €/MWh** : cost reduction is therefore necessary even for the residential PV application.

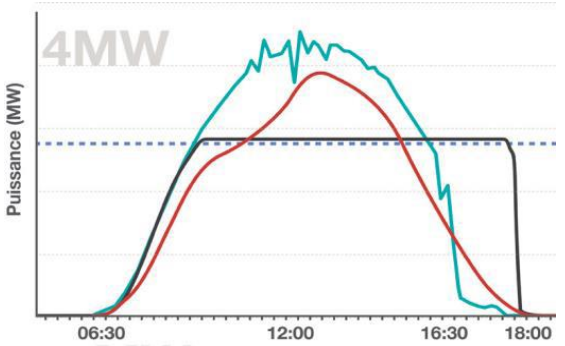
Mid scale ES developed by Cofely Ineo

- Cofely Ineo (GDF SUEZ Group) has developed an original mid scale ES (**GRID Pow'ER**) consisting in :

- **- BATT'NR :** a 20 feet container of batteries, using Lithium-ion technology with an energy capacity of around 700 kWh, and easy to adapt to any new technology.
- **BATTGRID :** a 20 feet container of 1.2 MW capacity, including the power conversion system needed to interface the batteries with a high voltage application.
- **Profil'ER :** an Energy Management System, allowing, for example, a PV plant + storage to follow a trapezoidal profile, as required by the French Regulatory Authority in its tender for islands.



- Red curve : Day ahead PV forecast / Blue curve : Real PV production.
- Black curve : Production injected in the network ; the trapezoidal profile is defined on day ahead, and may be adjusted intraday.



- **GRID Pow'ER is currently being implemented on a PV park in Corsica (4.4 MWp PV and 4.3 MWh / 2.4 MW storage).** With such a business model, the market price (or feed-in tariff) must be high enough to make the PV plant + storage profitable.

Key messages

- Small and mid scale energy storage are potentially very efficient tools to meet the flexibility challenges of the energy transition in Europe.

- **Cost reduction is however necessary** (through learning curve but also through disruptive technologies).

- **Small scale storage with residential PV is approaching profitability on some markets**. Its development will most probably be quicker than anticipated today, as it occurred for PV itself.

- Profitability is more distant for applications of mid scale storage, except in islands or other non interconnected areas. Development of batteries in the residential sector, in islands, and for electric vehicles should allow to prepare such applications.

Thank you for your attention

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