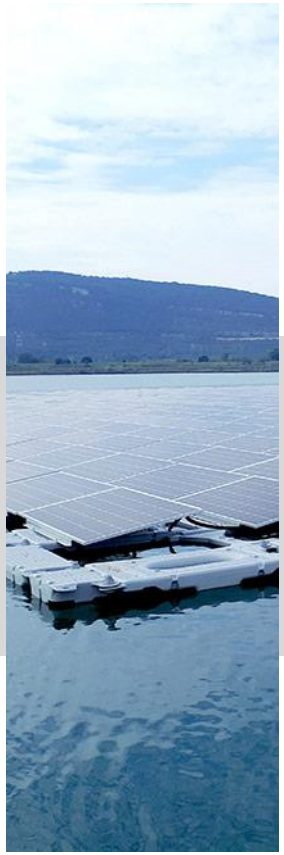
Akuo Storage in Islands

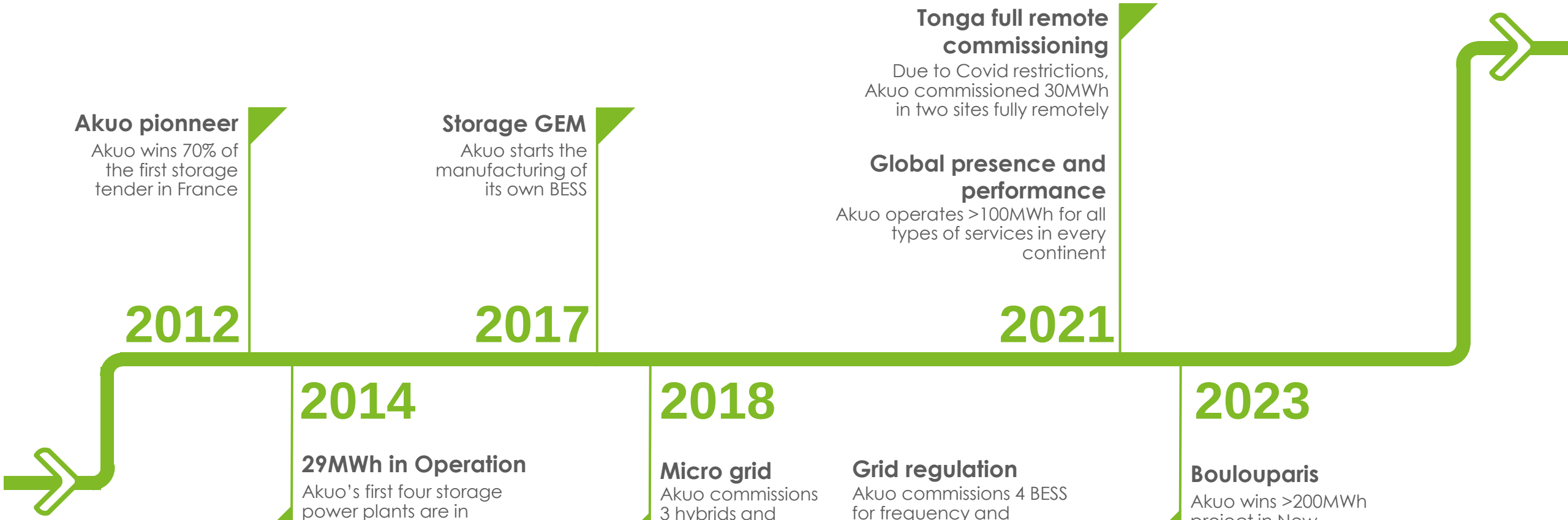
October - 2023

akuo
Entrepreneurs par nature

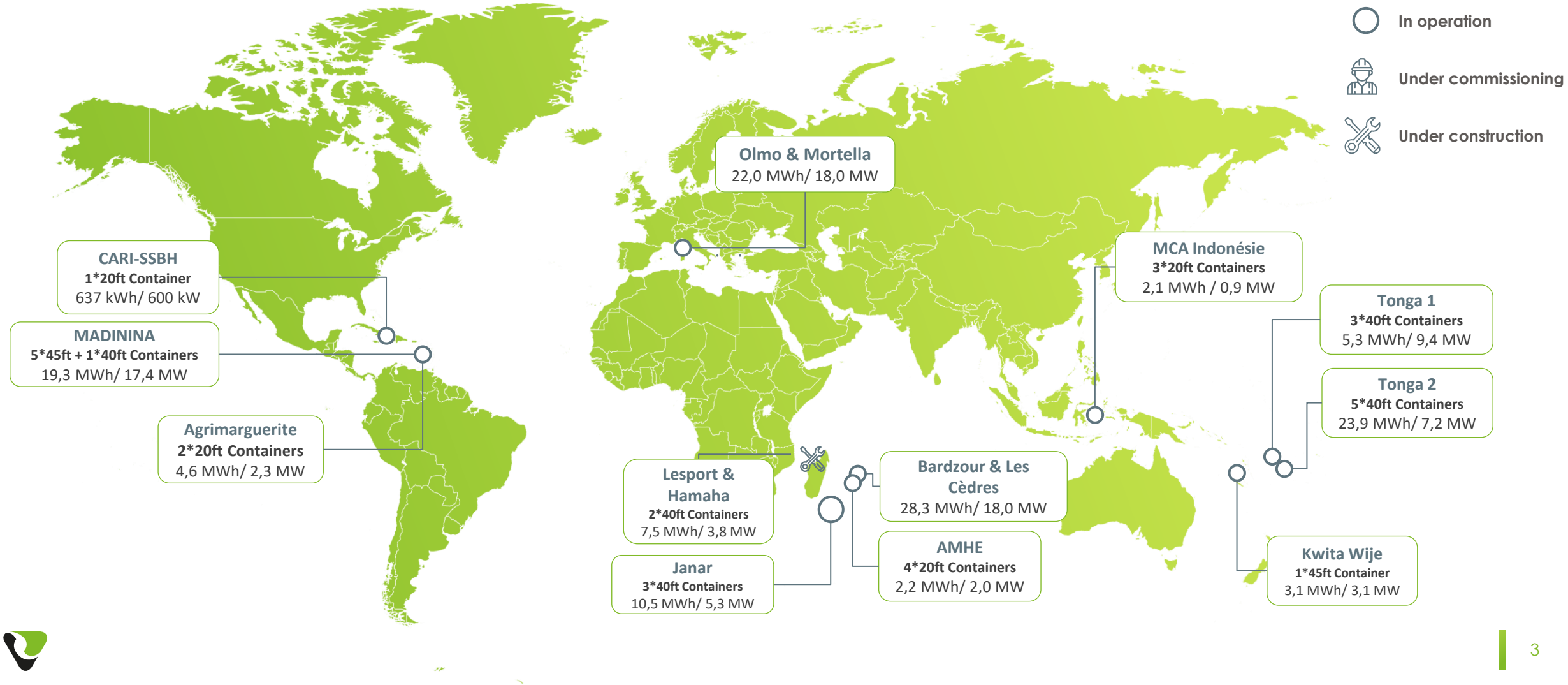
AKUO STORAGE PIONNEER AND LEADER

a presence at the heart of territories on all continents



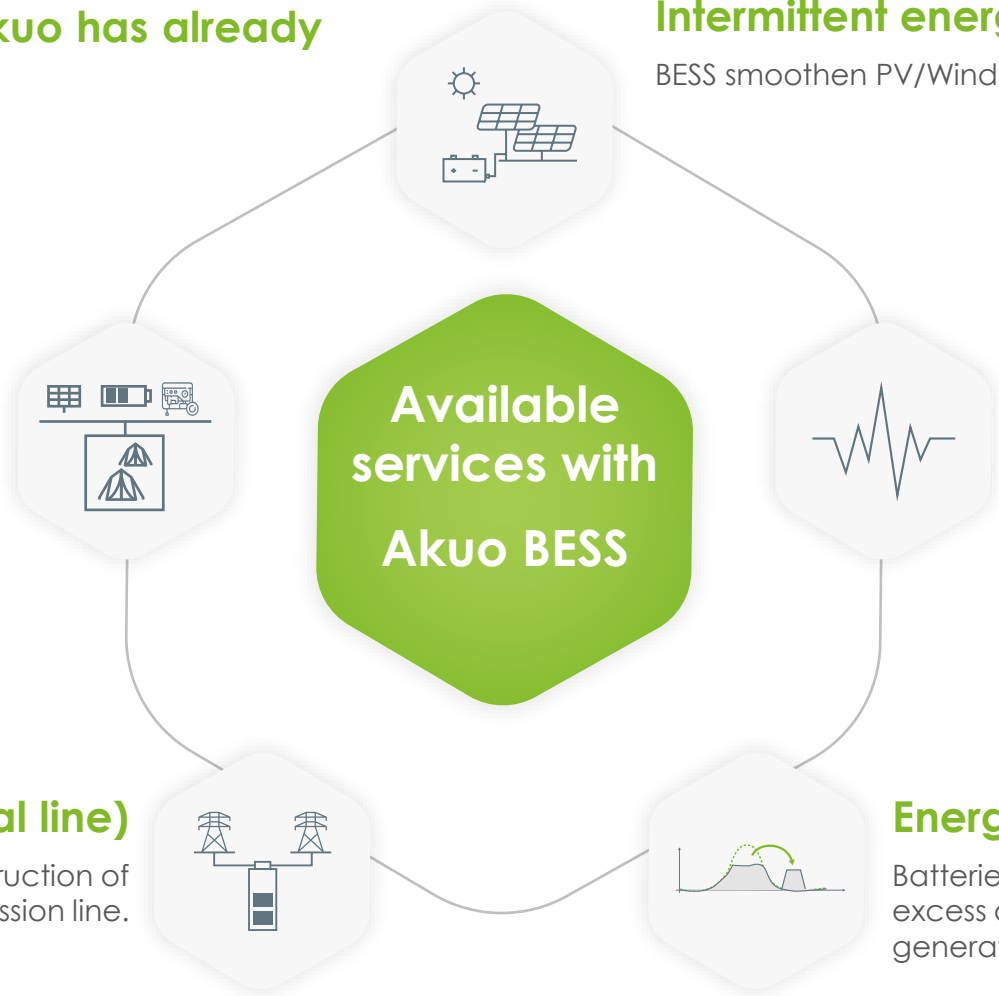
STORAGE ISLANDS PROJECTS

Akuo has currently 15 projects / 129 MWh in Operations or under construction in islands.



EXPERTISE IN ALL BESS SERVICES

A single Battery Energy Storage System (BESS) gives the opportunities to provide many services to the grid. Akuo has already implemented all of them.



Intermittent energy smoothing

BESS smoothen PV/Wind injection to the grid.

Grid forming

Batteries that replace gensets to form the grid and enable a higher RE penetration.

Frequency and voltage support

BESS automatically respond to grid frequency or voltage deviation in only few milliseconds.

Grid investment deferral (virtual line)

Batteries installation avoid the construction of new transmission line.

Energy shifting (arbitrage)

Batteries charge when generation is in excess or cheap and discharge when generation is missing or expensive.

TONGA

BESS TONGA 1

Kingdom of Tonga

7,2 MW / 5,3 MWh

Increases **grid flexibility and reliability**, renewables' penetration and provide frequency and voltage regulation.

Funded by ADB, Tonga's government, Tonga Power Limited, Australia's government and the Green Climate Fund

Commissioning 2021

BESS TONGA 2

Kingdom of Tonga

6 MW / 23.4 MWh

Smoothing out the electricity supply from RES ensuring the supply of generation matches the demand including at peak times

Funded by the ADB, Tonga's government , Tonga Power Limited, Australia's government and the Green Climate Fund

Commissioning 2021

In both cases, the batteries are owned and operated by the grid's operator **Tonga Power Limited** who will be trained by Akuo. Akuo's revenues come from the selling and installation of the product.

INDONESIA

Rural electrification of 3 villages through Millenium Challenge Account (MCA) call for tenders

Merabu, Long Beliu et Teluk Sumbang

2 MWp of SolarGEMs®

2.1 MWh of storage GEM®

Cyclone-proof

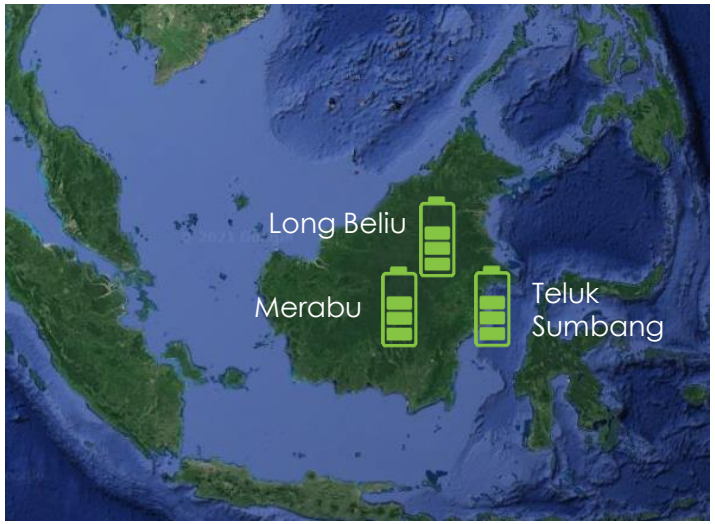
Storage **supports the grid** and manage the generation of solar electricity

480 households

A mini-grid between the three villages was created to supply the villagers with clean energy. The 3 mini-grids are operated by a local board owned by the villagers.

Implementation of a special training to promote socio-professional integration of women into the labor market. Also, Akuo trained the villagers so that they have the necessary skills to maintain and operate a mini-grid and run an electricity board.

Grant awarded in 2016 by MCA Indonesia
Commissioning in March 2018



ST VINCENT

Partnership with MASDAR for construction of a hybrid power plant at the Caribbean

Union Island

480 kWp of ground mounted PV
600 kWh of Storage GEM®
6 diesel generators

EPC, off-grid: power plant managed by the local utility
Akuo system forms the entire Island grid

MAURITIUS

Ancillary service for Mauritian grid

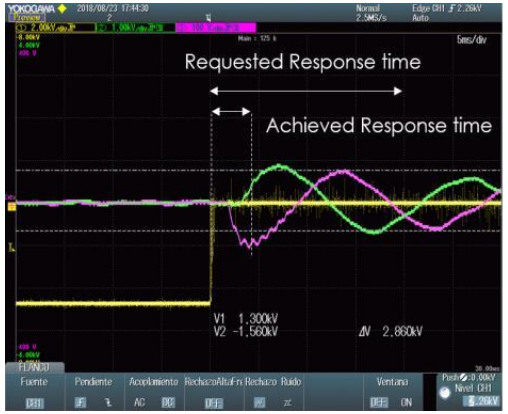
Amaury & Henrietta, Mauritius

2 MWh / 4MW of storage (Storage GEM®)

Storage able to provide frequency regulation for CEB's grid

Commissioning **July 2018**

Batteries are owned and operated by the CED grid's operator who was trained by AKUO. AKUO's revenues come from the sale and installation of GEM®'s



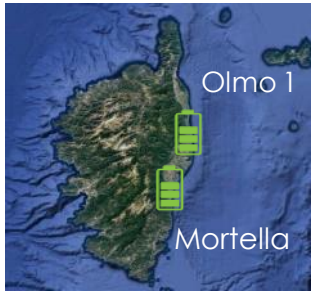
Response Time
< 5 ms

Global record

GOING GLOBAL - MORE THAN 129Wh OF STORAGE CAPACITY

Reunion Island
39 MWh

Corsica
22 MWh



New Caledonia
3 MWh

Guadeloupe
5 MWh

Mayotte
8 MWh

Hybrid system : solar plant + storage

Already repowered

- Renewable energy is injected into the grid
- Stability regardless weather conditions
- Ability to commit the day before on a smoothed and curtailed power profile specified by grid utility

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GOING GLOBAL - MORE THAN 129Wh OF STORAGE CAPACITY

Martinique
19 MWh

Full services

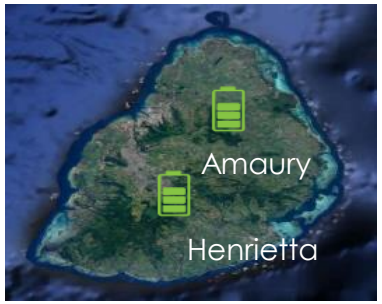
- Standalone storage
- Managed by the TSO for a maximized benefit
- Akuo commits on the availability

Tonga
29 MWh

Full services

- Standalone storage
- One dedicated to quick and automatic frequency and voltage regulation
- One dedicated to arbitrage managed by the TSO

Mauritius
2 MWh



Primary response

- Standalone storage
- Control of the grid frequency and voltage through the Central Electricity Board
- Record time response

Union Island
1 MWh

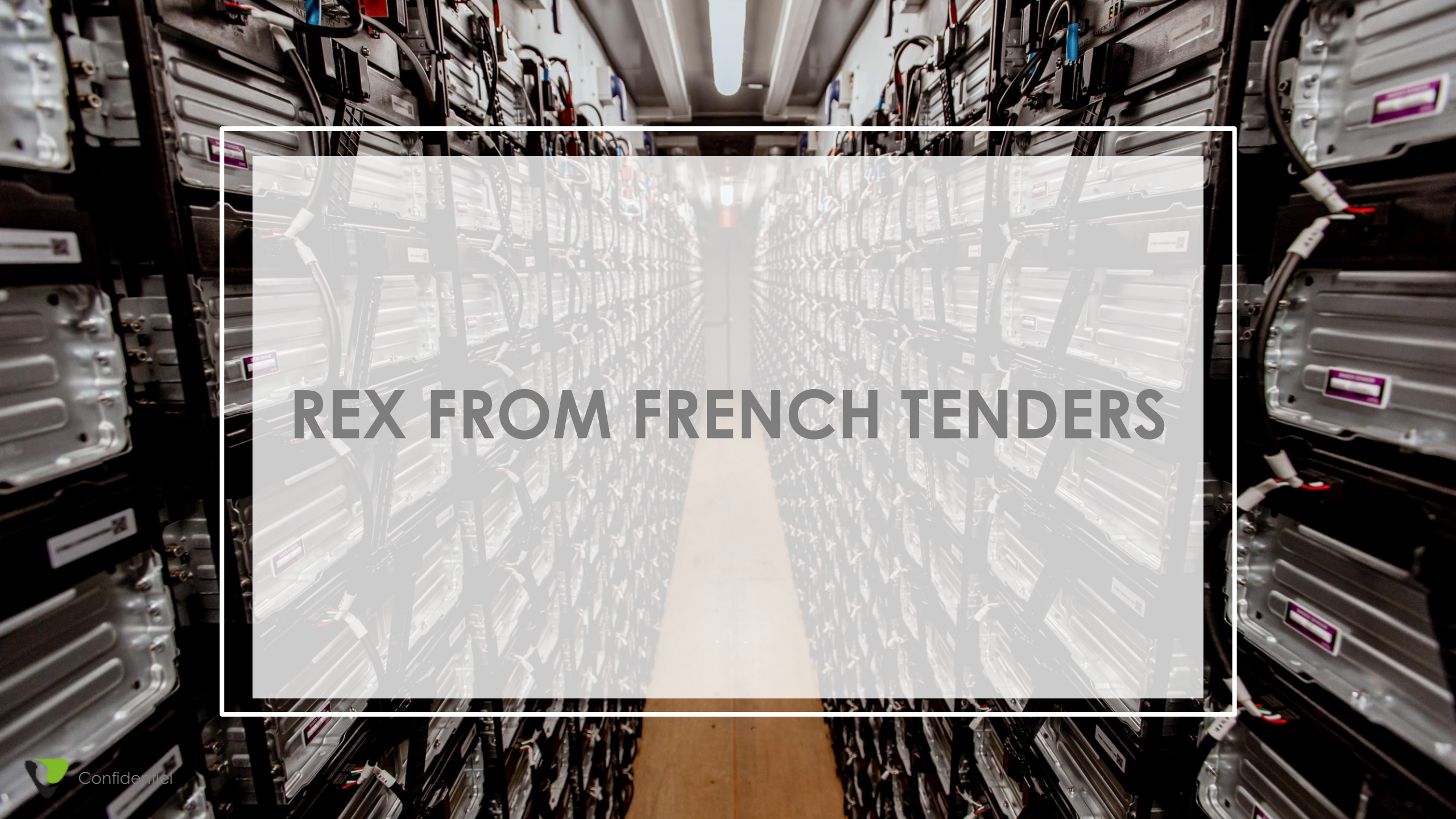
Off grid hybridization

- PV + storage plant
- Full hybridization with existing genset
- EMS controls the whole island

Indonesia
2 MWh

Off grid micro grids

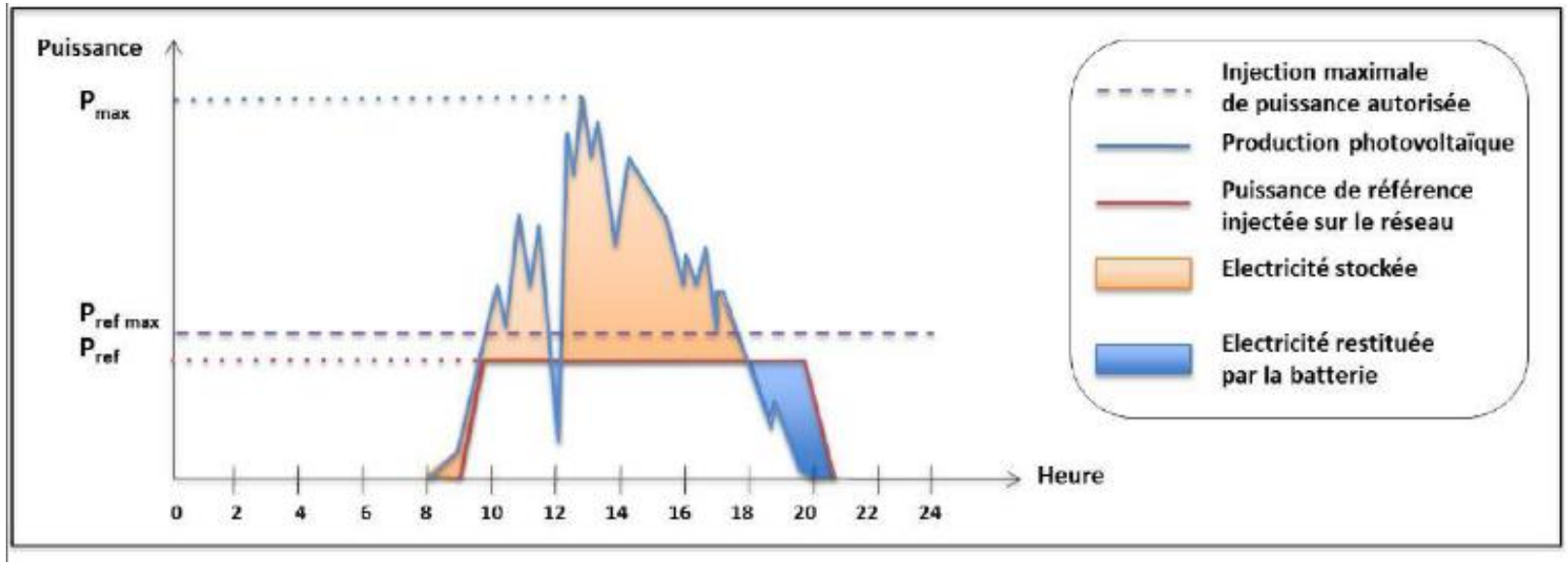
- Rural electrification of 3 villages thanks to Akuo's GEM solutions.
- Off-grid context
- Conveys clean energy to isolated populations



REX FROM FRENCH TENDERS

AO CRE ZNI – First tender

First tender asked for a plateau during the entire day.



Characteristics

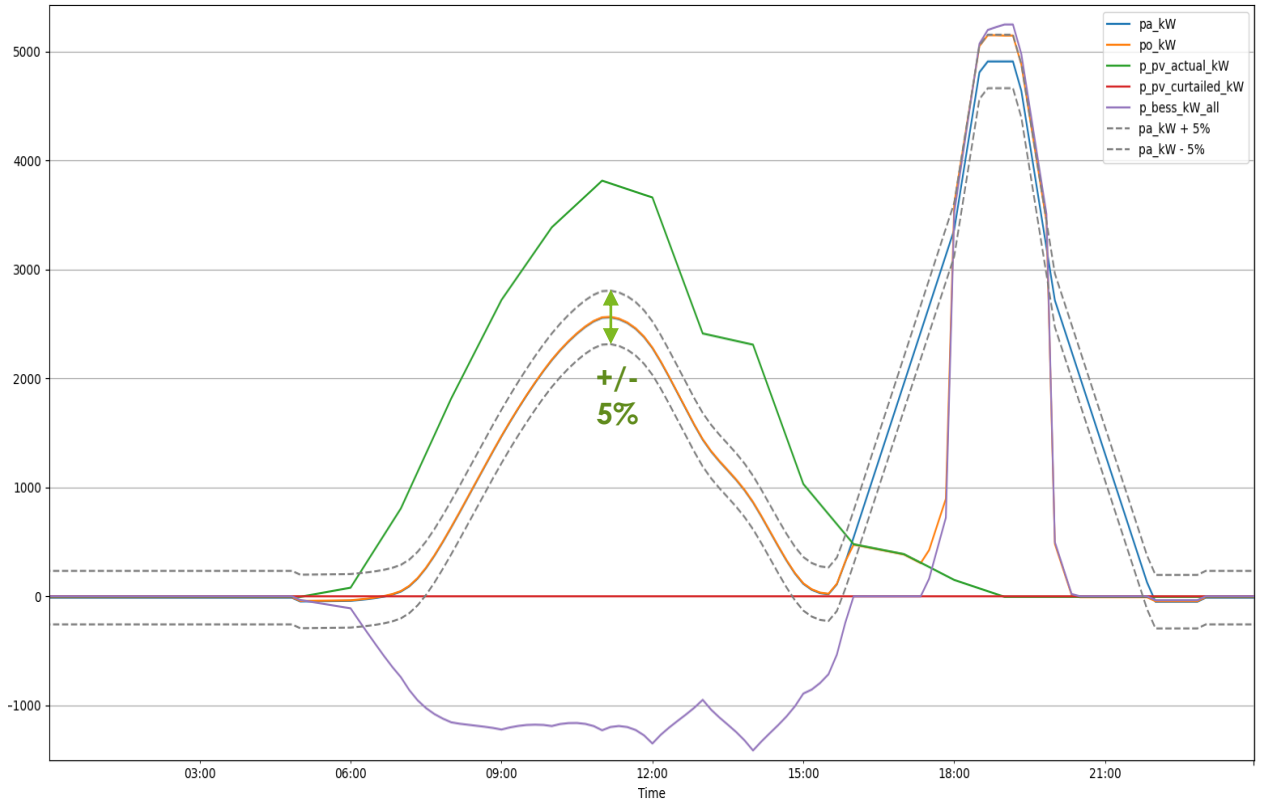
- Max PV injection at 30% of the PV power installed
- Simple forecast (T1, Pref, T2)
- Day ahead forecast and possible reforecast during the day
- Max & min ramp rate on the morning and evening

Key take aways

- High amount of curtailment
- No production shift to the peak demand period on the evening
- Over quality: flat injection is very challenging for a limited benefit to the grid

AO CRE ZNI – Second tender

Second tender asks for a daily forecast and a maximum injection between 6pm and 8pm.



Characteristics

- Max PV injection at 100% of the PV power installed
- Accurate forecast (1min injection profile)
- Day ahead forecast and 3 Intra day reforecasts
- PV smoothing at 0.5%Pmax/min
- Additionnal tarif for peak injection

Key take aways

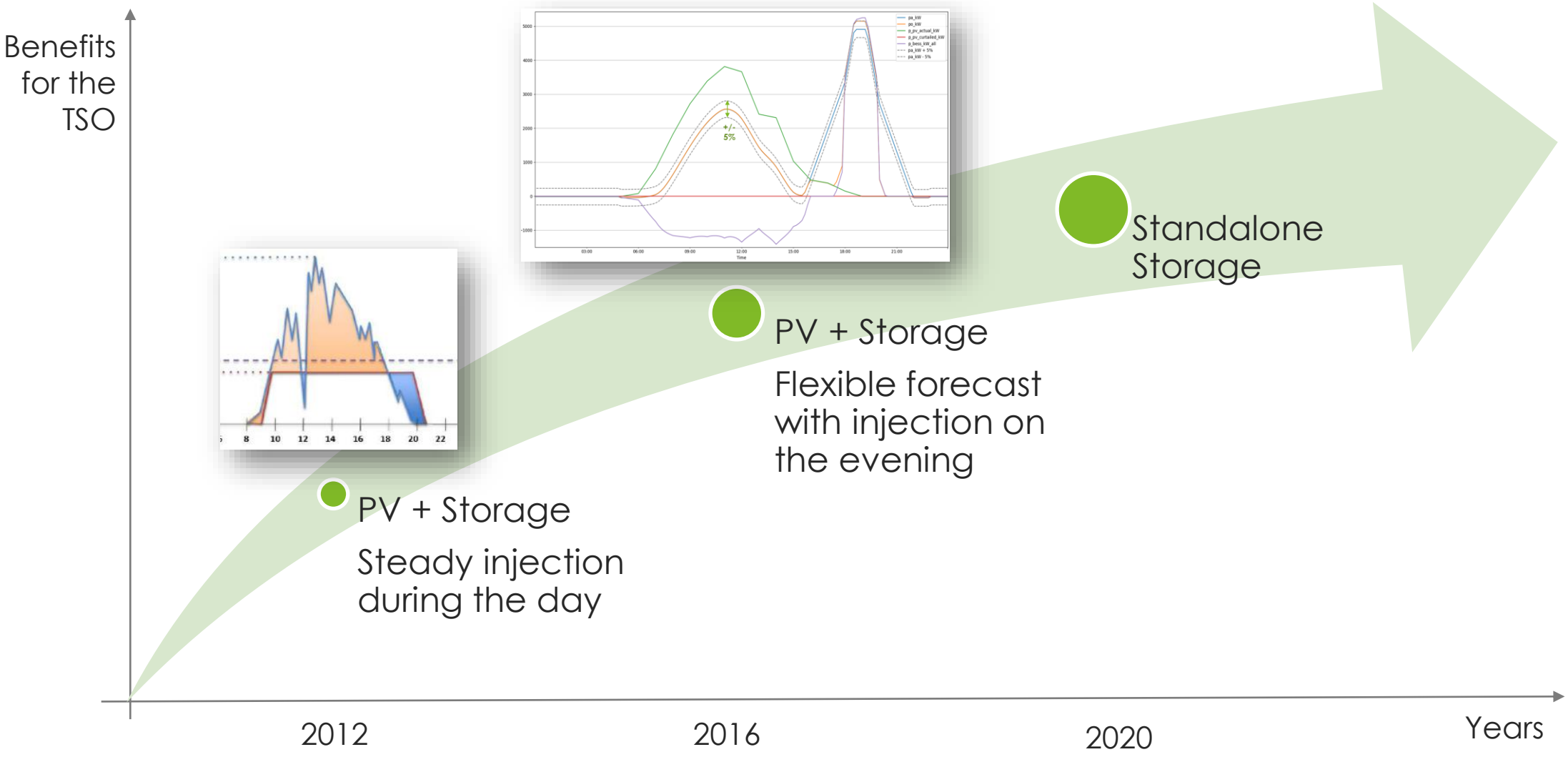
- Storage use based on one PV plant only and not the grid constraints
- Limited services stacking
- 20y specifications not supposed to change

AO CRE ZNI – Last tender

Last tenders asked for :
solar only +
energy storage only, dispatchable by the TSO for a maximum use.

- Sizing done on the grid constraints
- Storage dispatched manually by the TSO for arbitrage
- Automatic activation for frequency and voltage regulation
- Remuneration based on the availability and the performance of the storage plant

REX from AO CRE ZNI tenders



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