Medium Voltage Microgrid Islanding

Nice Smart Valley Project

NICE SMART VALLEY

4th Hybrid Power Systems Workshop
23rd May 2019

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Innovative Power Solutions

Agenda

- What is Interflex?
- What is Nice Smart Valley?
- SOCOMEC uses cases on the Isles of Lérins

Interflex project

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Main purpose

Europe expectations in terms of energy transitions =
50% of REN in the energy mix by 2030

3 years project

22.8 million €

Support the development of smart grid technologies at an industrial scale

The projects

6 demonstration projects

5 DSO

20 partners

Interactions

Flexibilities

Key topics

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Nice Smart Valley project

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What is Nice Smart Valley?

5 M€

6 Industrial Partners

ENEDIS L'ELECTRICITE EN RESEAU

GRDF GAZ RÉSEAU DISTRIBUTION FRANCE

ENGIE

EDF

GE

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What is Nice Smart Valley?

6 Experimentation Locations

3 Use Cases

Local flexibility mechanism operated by and for the DSO

Multiservice approach for centralized storage systems

Automatic islanding without any interruption of service

Why the Lérins Islands?

5 MV transformation posts to supply 56 customers

Why the Lérins Islands?

Only 1 submarine cable from Cannes to both islands

Why the Lérins Islands?

A new cable is costly and bringing gensets on site is long

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A new cable is costly and bringing gensets on site is long

SOCOMEC USE CASES

Explanations and results

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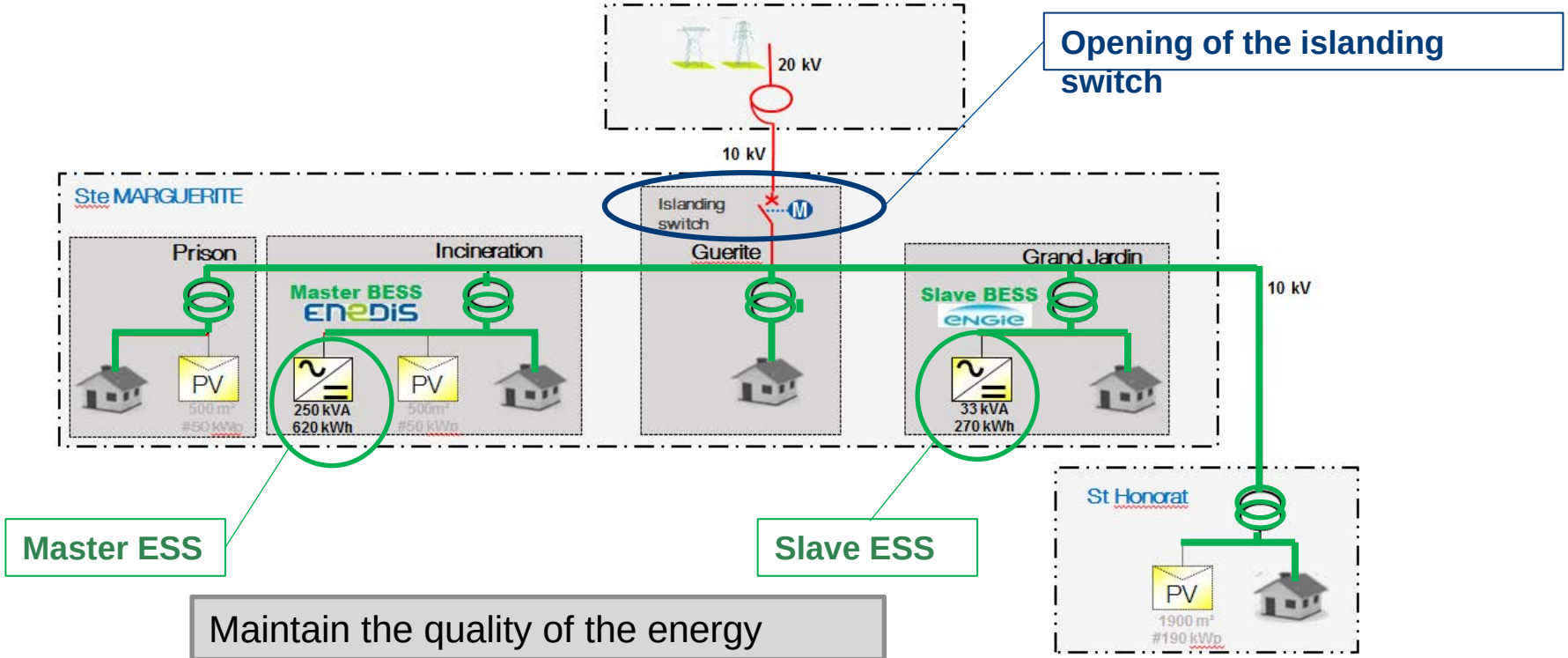
SOCOMEC Use Cases

- **Medium Voltage Islanding**
- **Grid Protection Plan**
- **Anticipated Islanding**
- **Wireless Communication Between Two Storage Systems**
- **Operating Modes**

Medium voltage islanding

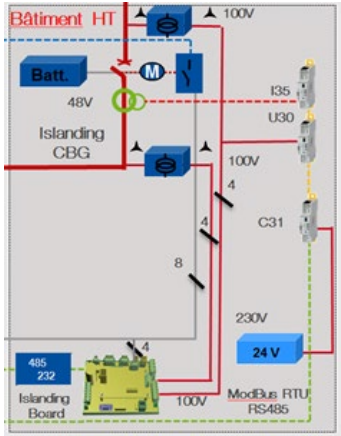
General drawing



Maintain the quality of the energy supply

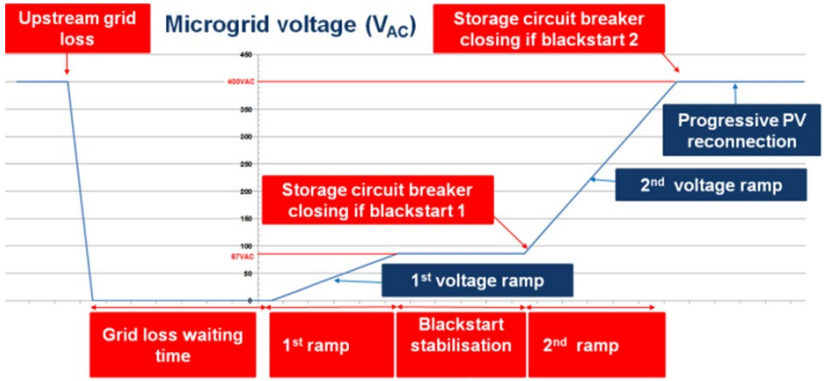
Medium voltage islanding
Specific equipment needs

- Islanding switch upstream and downstream voltage measurements
- Current measurement adaptation for accuracy reasons

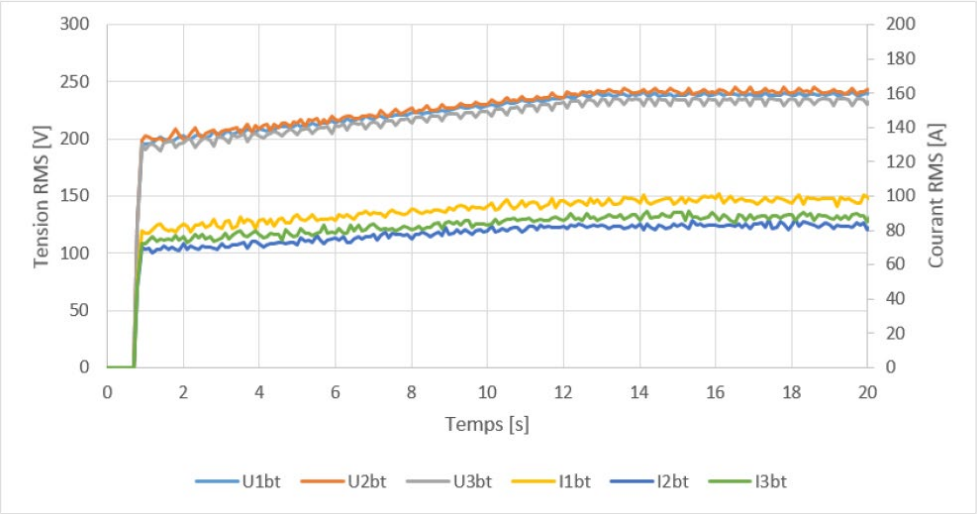


Medium voltage islanding
Blackstart process

- Grid failure => automatic opening of the islanding switch
- Master ESS starts => soft voltage ramp-up
- Nominal voltage reached => Slave BESS and PV production are reconnected



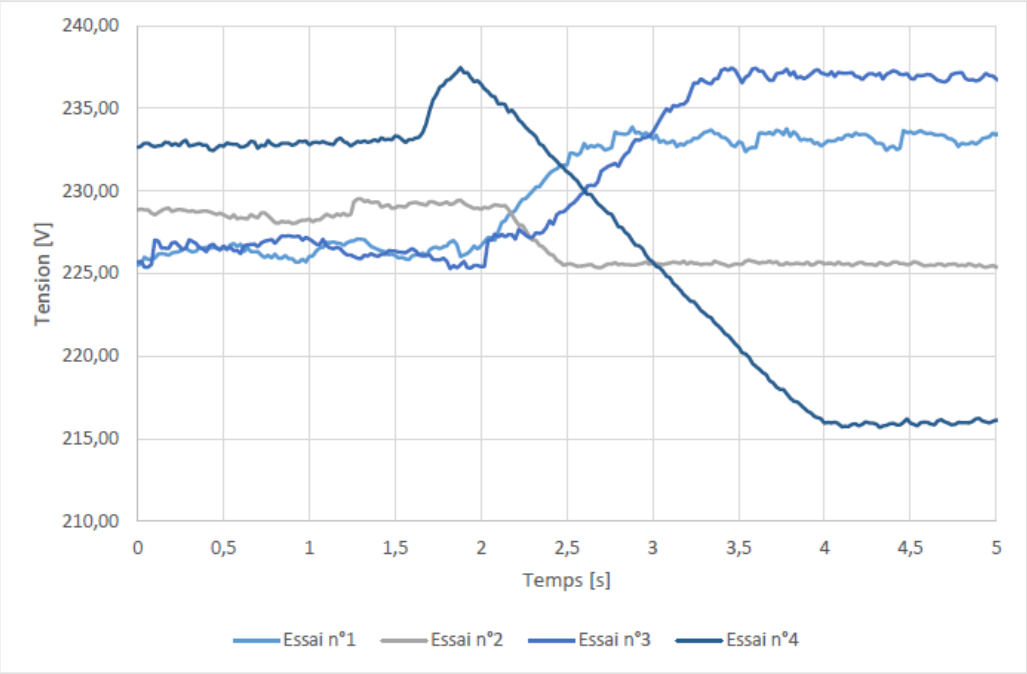
Medium voltage islanding
Grid Stability - Blackstart – unforseen islanding



- The storage system energises all the transformers as well as part of the MV network
- Loads are connected to the networks as it starts
- Voltage variation <8%
  (within the EN 50160 limit <10%)

➔ Blackstart process is validated

Medium voltage islanding
Grid Stability - Scheduled islanding

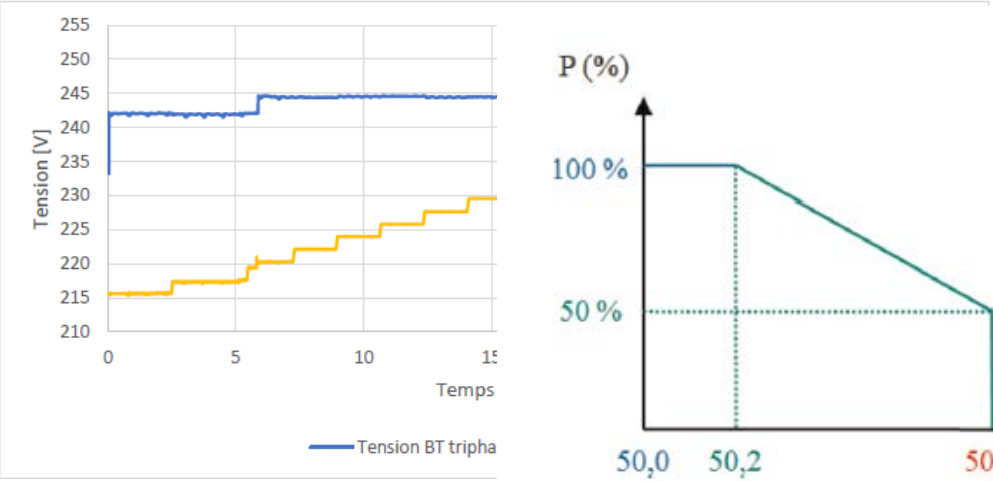


- Voltage variation <7%
  (within the EN 50160 limit <10%)
- Frequency is stable at 50Hz
  (within the EN 50160 limit <1%)

➔ Islanding process is validated

Medium voltage islanding

PV production during an islanding



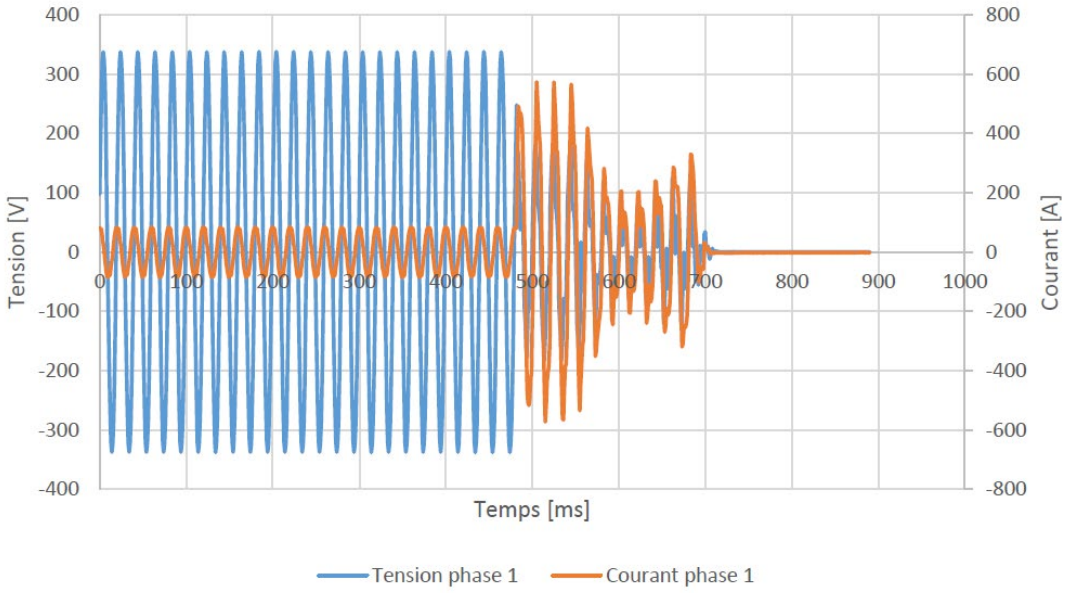
of voltage increase due to
increase

ge is stable even though
ency is growing (linked to
evel of SoC)

n high SoC is reached the
photovoltaic system is
disconnected

Grid Protection Plan

Low voltage fault on 1 phase

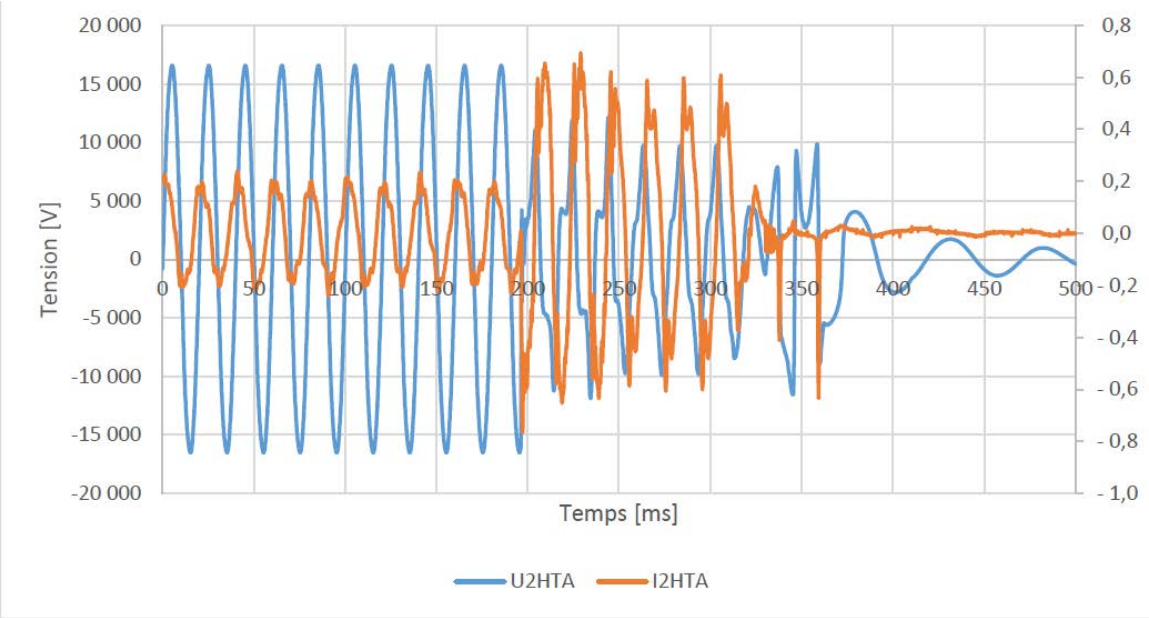


- The short-circuit current is above the battery maximum current
- The storage system opens ≈200ms after a fault takes place

➔ The protection plan is respected

Grid Protection Plan

Medium voltage fault between two phases



- The storage system opens ≈200ms after a fault takes place
- The second storage system (GSU) has no impact on the behaviour of the GFU during those faults

➔ The protection plan is respected

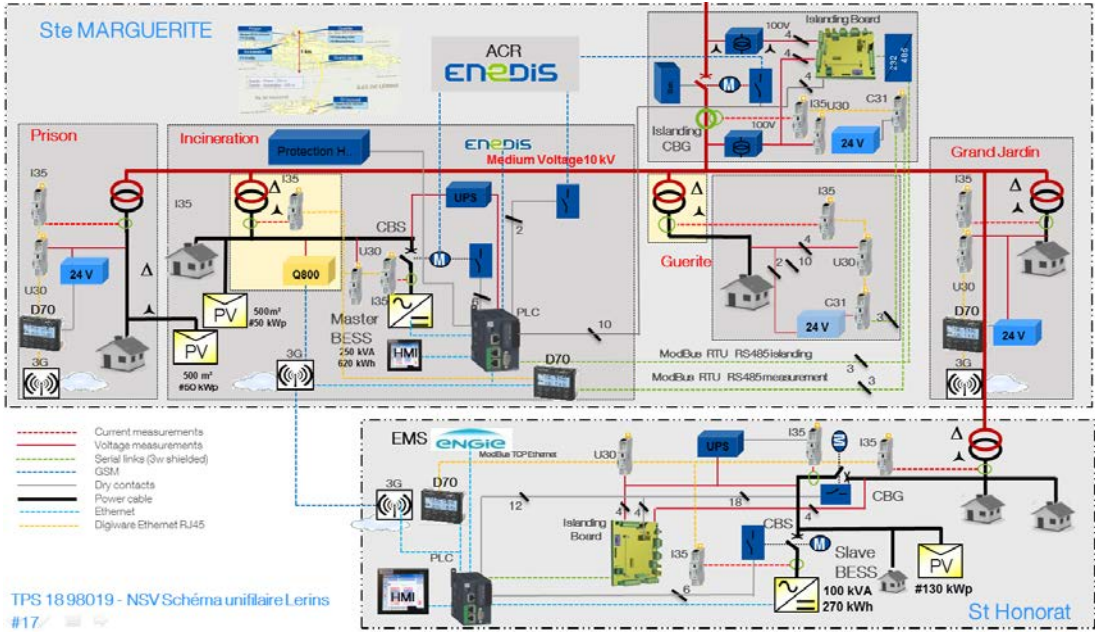
Anticipated Islanding

- Target

Keep service continuity ➔ Switch to islanding mode before voltage disturbances

- How
  - > U, F and THD measures at the LV level
  - > External events information

Cloud: to analyse and create an algorithm



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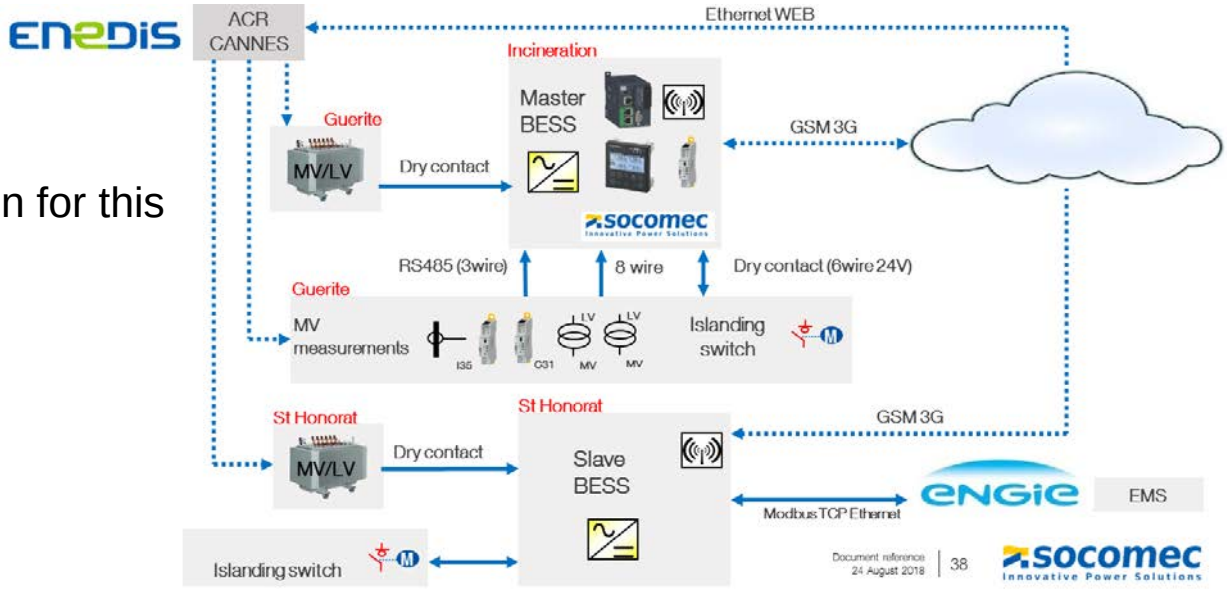
Wireless Communication Between Two Storage Systems

- Target

Use several storage systems that are not next to each other without huge cabling

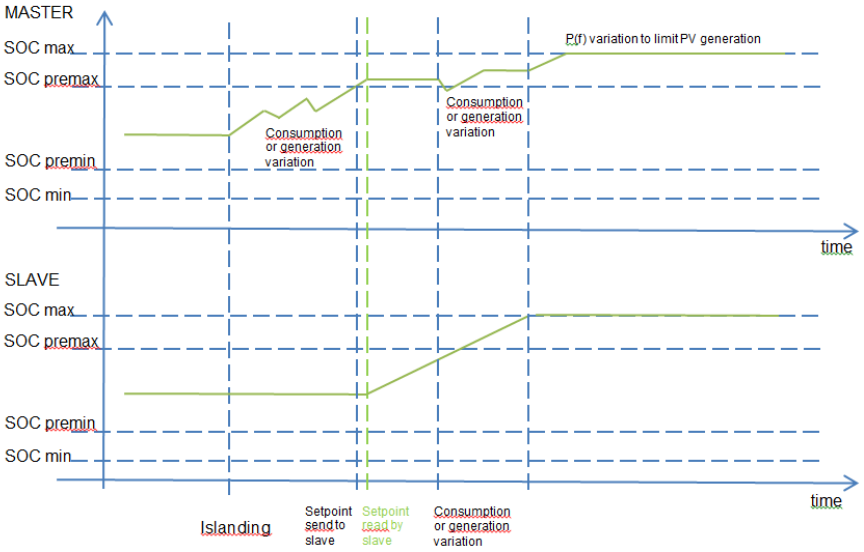


- GSM solution has been chosen for this project
  - > Distance
  - > Quantity of data
  - > Environmental layout

Operating modes

- In On-Grid
  - Master ESS is piloted by Enedis
  - Slave ESS is piloted by Engie
- In Off-Grid
  - Master BESS sends set points to the Slave
  - Maximise the use of the GFU – GSU only in support

Production > Consumption	1st: Charge the Master Battery 2nd Charge the Slave Battery 3rd Reduce the production
Production < Consumption	1st: Discharge the Master Battery 2nd Discharge the Slave Battery 3rd ACR reduce the consumption if possible or islanding will be Stopped. Option transfer in on-grid if mains present. To be confirmed by ENEDIS



New function to test: both ESS in voltage generators

To be continued

- Real tests on the 2 islands will go on till end of the year!

thank you **SO** much!