Medium Voltage Microgrid Islanding

Nice Smart Valley Project

4th Hybrid Power Systems Workshop
23rd May 2019
Agenda

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

- 5 €
- 6 Industrial Partners
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.
Why the Lérins Islands?

A new cable is costly and bringing gensets on site is long.
SOCOMEC USE CASES

Explanations and results
SOCOMEC Use Cases

• Medium Voltage Islanding

• Grid Protection Plan

• Anticipated Islanding

• Wireless Communication Between Two Storage Systems

• Operating Modes
Medium voltage islanding
General drawing

Opening of the islanding switch

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

- Step of voltage increase due to load increase
- Voltage is stable even though frequency is growing (linked to level of SoC)
- When 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
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

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!