Towards high levels of RES in French Insular Systems

Ensuring the LVRT capability

EU islands and Eurelectric Webinar

November 2024

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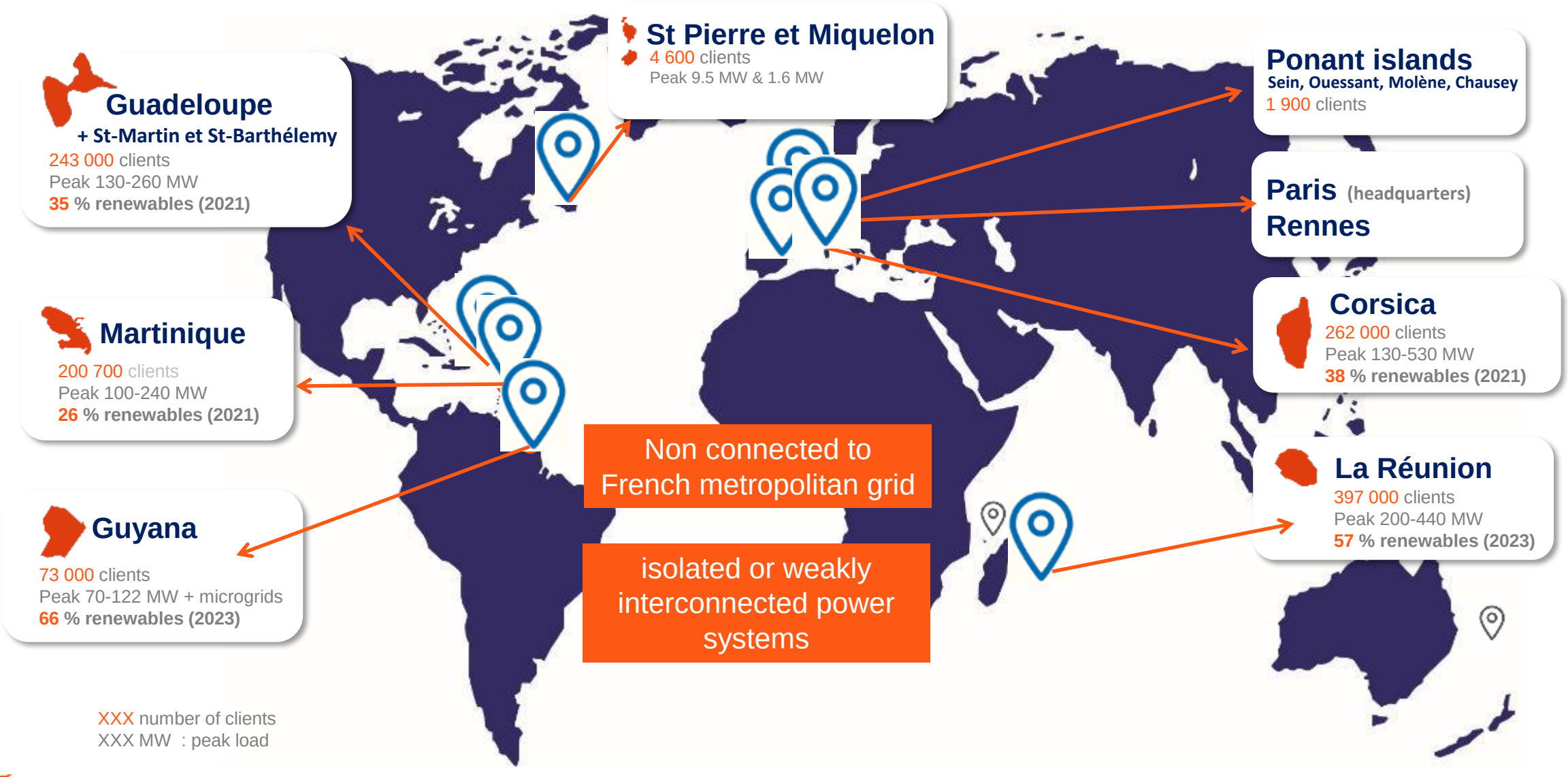
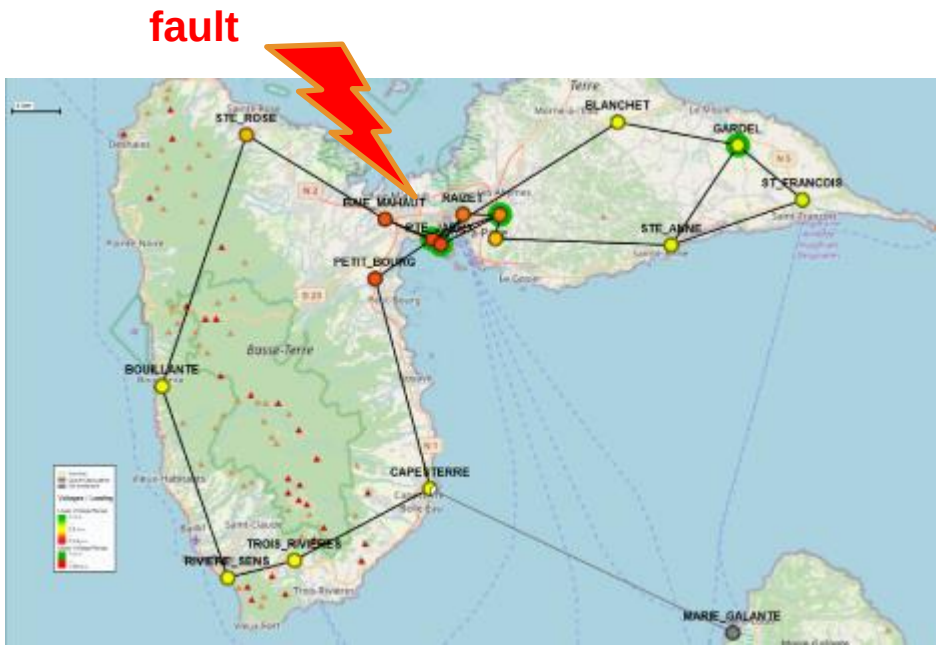
EDF-SEI IN SHORT - SYSTÈMES ÉNERGÉTIQUES INSULAIRES

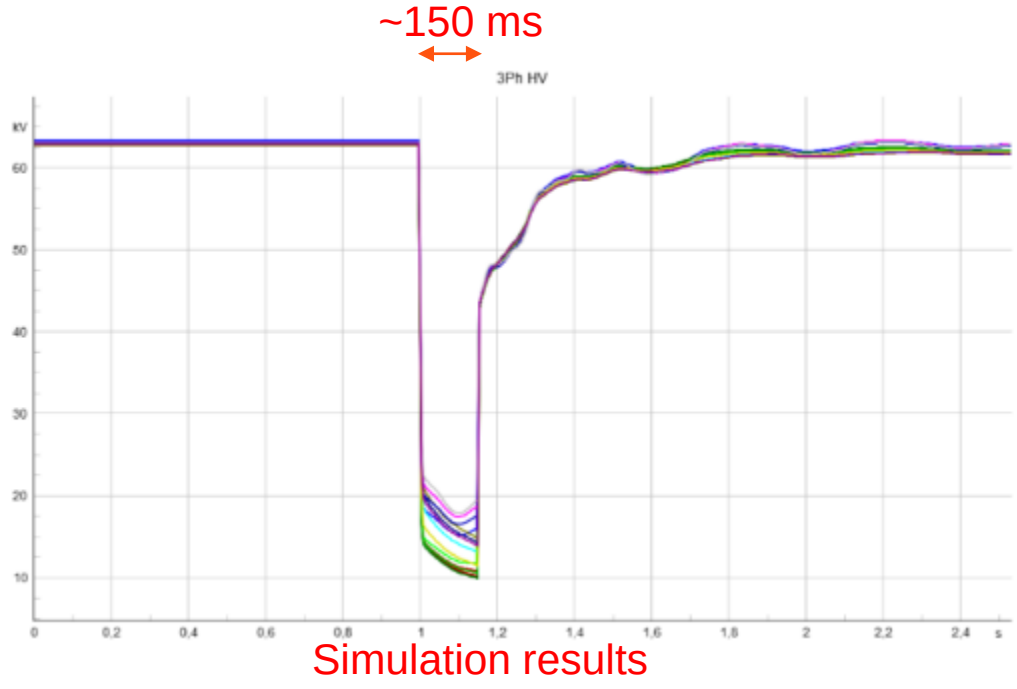


Total consumption : ~10 TWh
Total customers : ~1,2 M

SYSTEM STABILITY MUST BE ENSURED DURING VOLTAGE DISTURBANCES

- Typically, faults can temporarily induce very low voltages
- In a non interconnected system, voltage dips impact all the system contrary to mainland systems



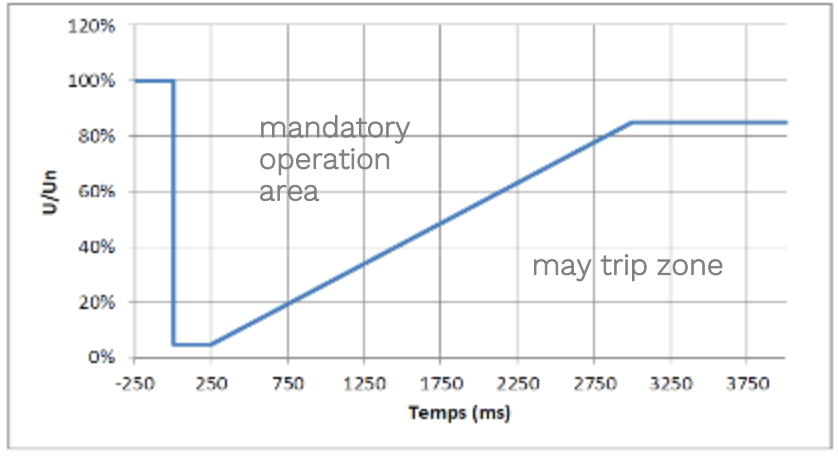


Simulation results

- Voltage dips can trigger instabilities in generators, especially among decentralized renewable assets

ENSURING LVRT CAPABILITY OF DECENTRALIZED GENERATORS : A KEY POINT FOR A SAFE SYSTEM

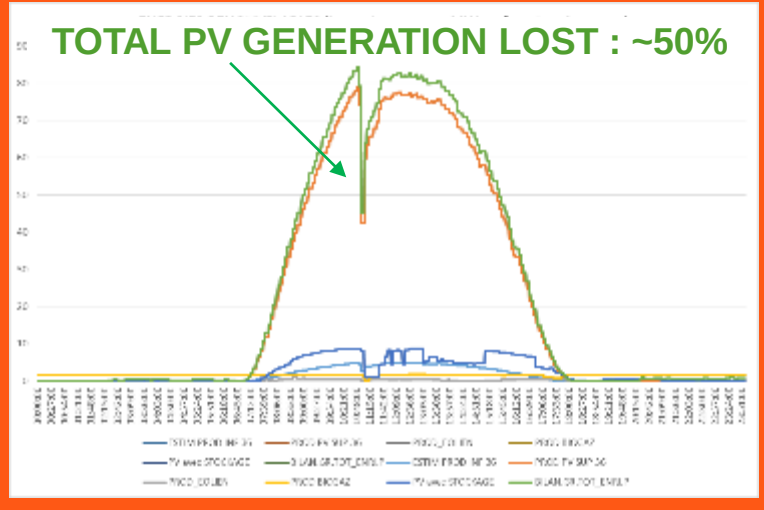
- **LVRT : Low Voltage Ride Through Capability**
- **Since 2008 : Mandatory Operation Capability for all installations > 10 kVA**
- **New requirement since 2018 (new template in accordance with EN50549) : for all installations interfaced by power electronics and > 10 kVA**



- **LVRT requirement is not enough, it is also essential to reinject energy very quickly after the fault has been eliminated**
- **SEI requirement : reinject within less than 100 ms after the fault elimination**

OK, but what happens in real life ?

Example from Réunion (2019) : abrupt disconnection of renewable energy production during a short circuit



What if tomorrow PV accounts for 80% of the generation at noon ?

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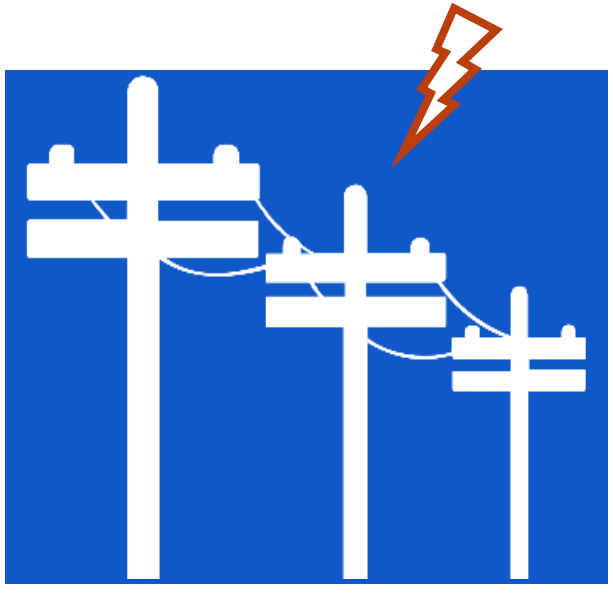
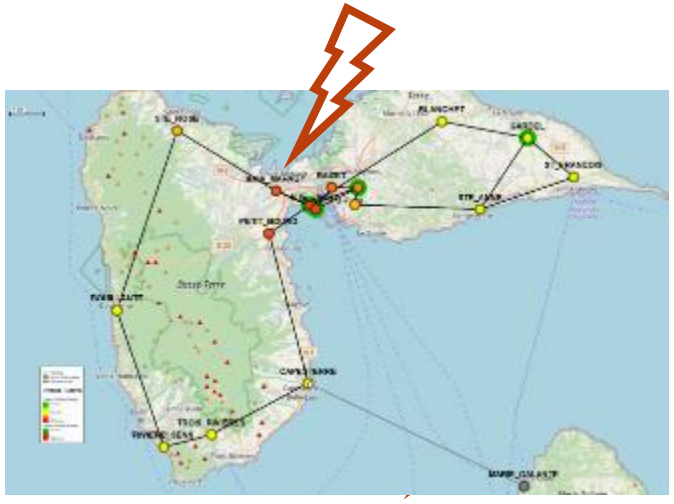
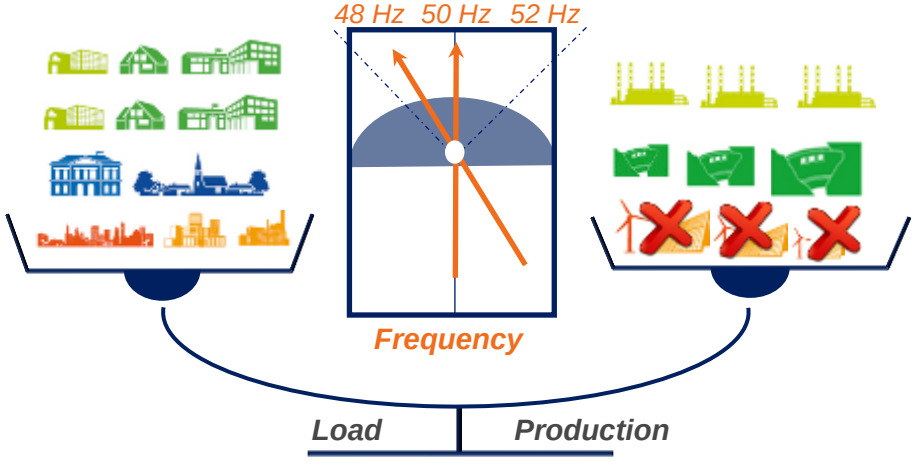






Voltage dip
Main causes : lightning, insulation failure of a grid component

+

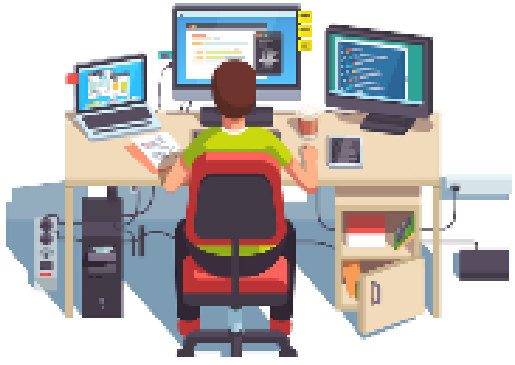
Small territory + lack of LVRT capability of decentralized generators

=

Frequency collapse → power cuts (load shedding), blackouts

EDF-SEI SOLUTION TO ENSURE DECENTRALIZED GENERATORS AND BATTERIES LVRT CAPABILITY

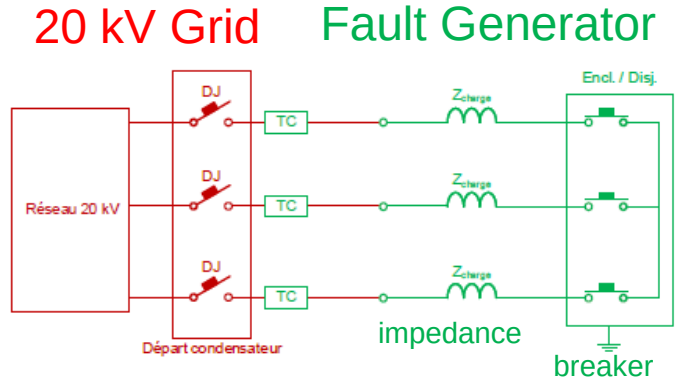
Continuous E-monitoring

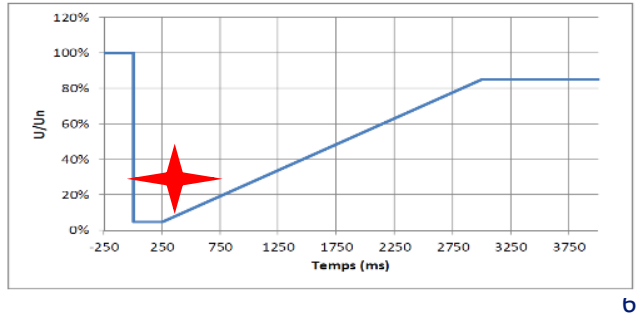


Mobile fault generator for in-situ testing campaign

Goal : provoke very rapid and locally low voltage dips to assess the LVRT capabilities of all VRES and BESS connected to the substation

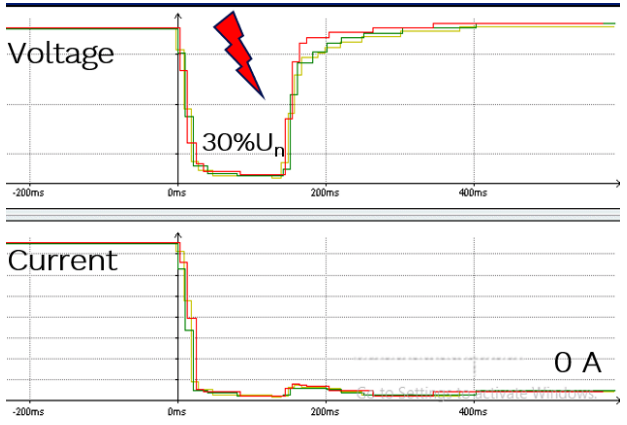
Experimental device





Required template must be respected

ON FIELD TESTS IN CORSICA AND GUADELOUPE



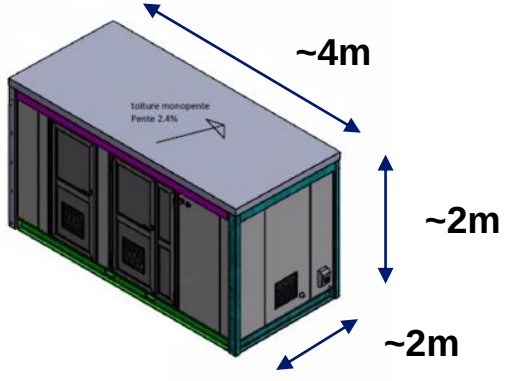
Example of a neighboring solar generator that did not withstand the requirement

First In Situ tests successfully carried out

➔ Industrial process has been launched to carry out regular test campaigns

From and R&D experimental device…

…to a packaged industrial solution easier to transport and to use

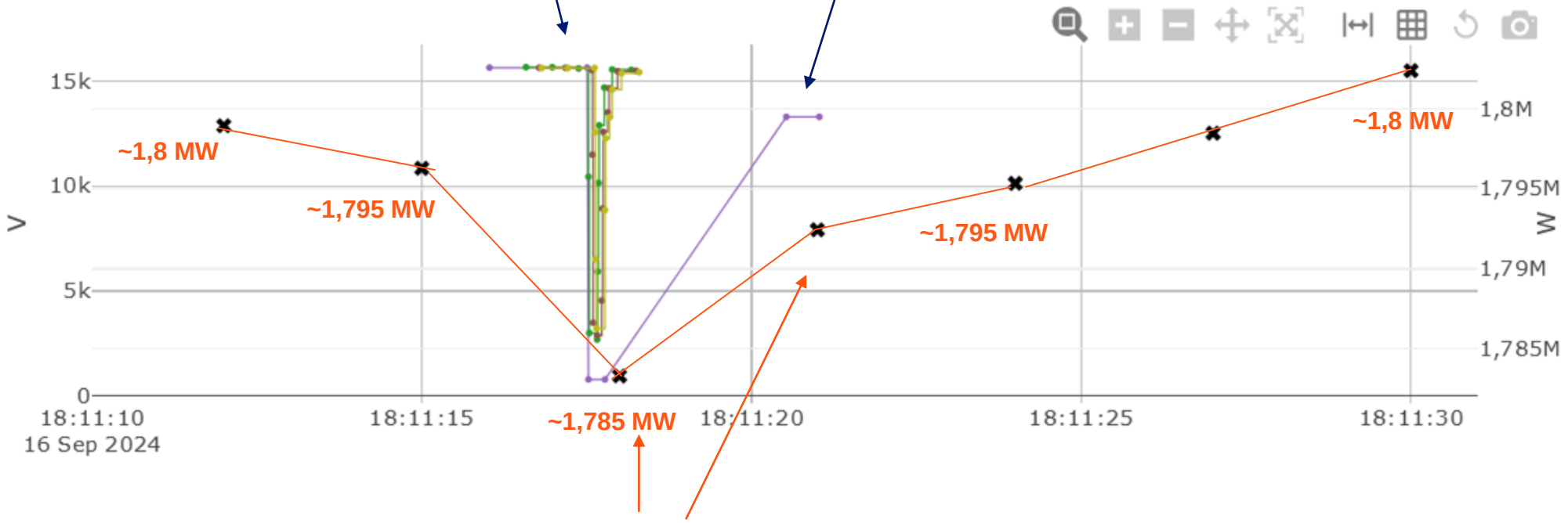


Thank you

E-monitoring - illustration

Voltage dip (~20% Un) provoked by a medium voltage fault

Specified template



The generator stays connected and recovers its initial power injection once the default is cleared

→ This generator is compliant