Embedded microgrids within the InterFlex project

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Co-funded by the European Union

A major European Horizon-2020 Smart Grid project

3-years project duration

2017 2019

with a total budget of

22,8M€

fostering collaboration among

20 project partners, thereof 5 major DSOs

Technical Director

DISTRIBUCE

Project Coordinator

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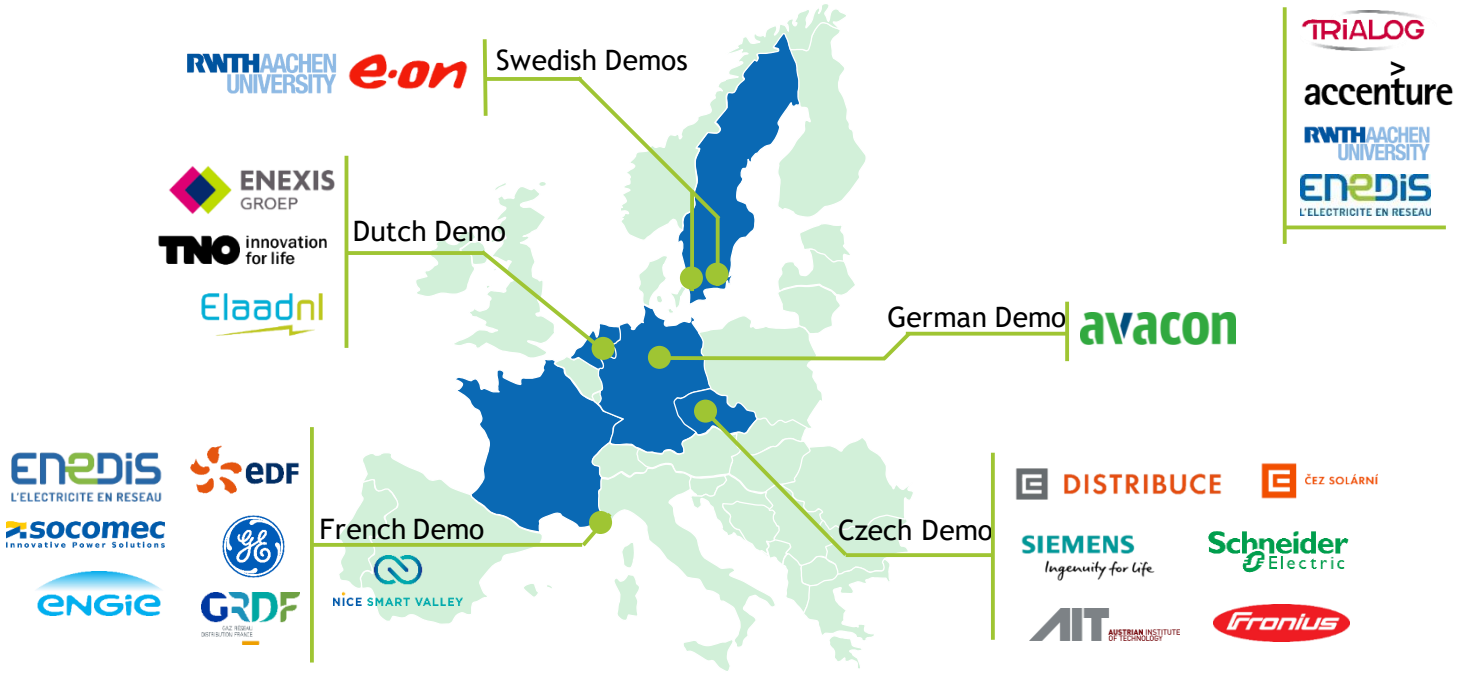
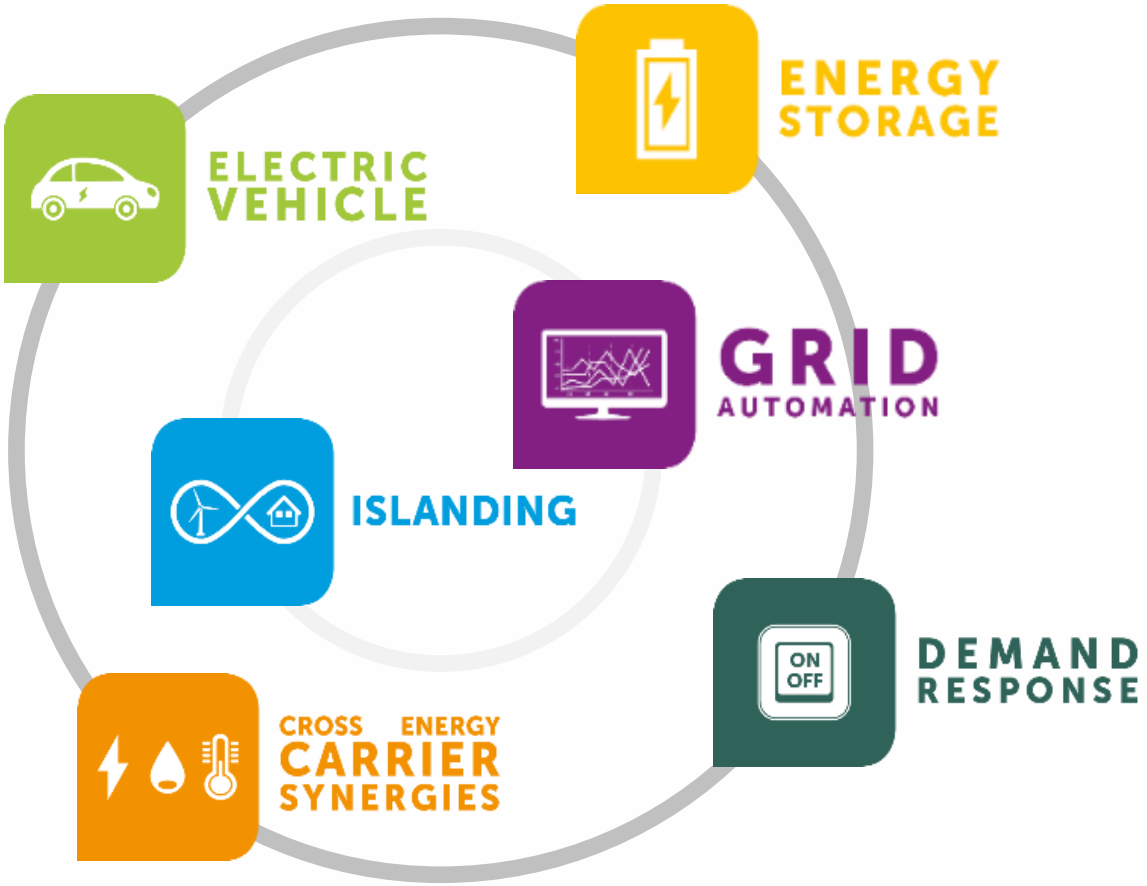
6 Real-scale demonstrators in 5 European countries

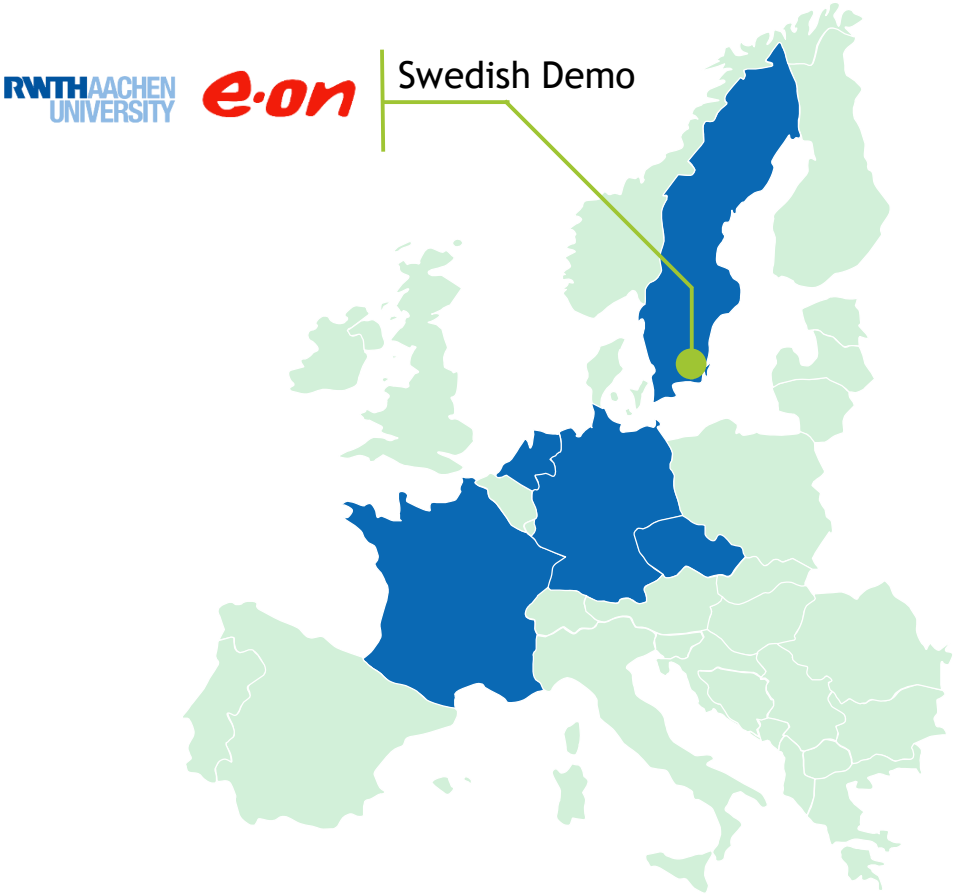


Innovation streams



New models are investigated using storage and flexibilities for the management of embedded microgrids

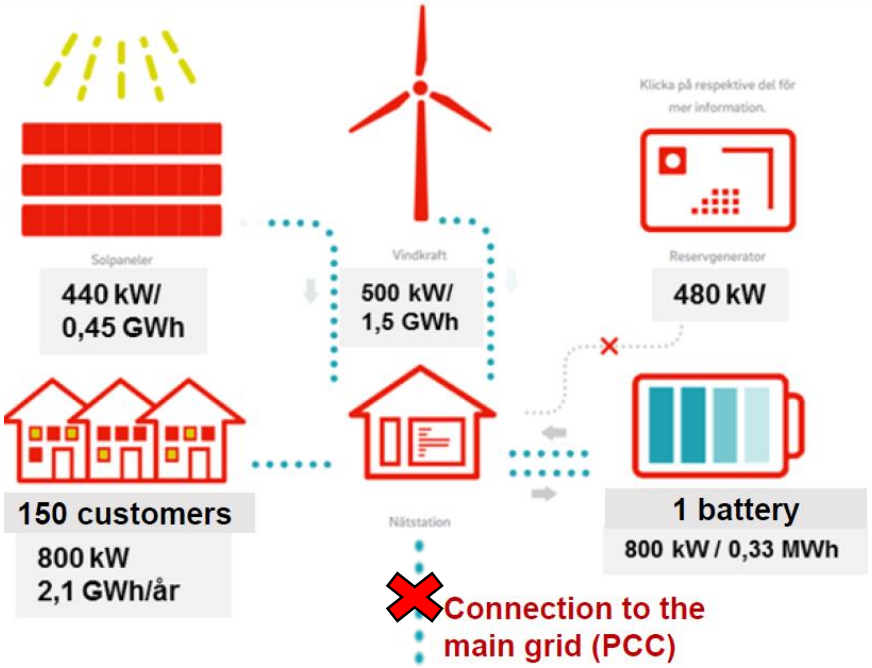
E.ON Demo is testing islanding, constraint management and DSR in the village of Simris, Sweden



Simris Demo a new part of Sweden's pride

Simris became in October 2017 the first energy island in Sweden running on up to **100% renewable energy**.

Services provided to a Local Energy System



Autonomous transition from grid-connected to island mode

3 types of generation

- Seamless transition between grid-connected and islanding by opening conventional circuit breaker
- **Island mode**: maintain frequency, voltage and power quality in a zero inertia power system, curtailing generation and operating the backup generator when required
- **Connected to the main grid:** ancillary services including constraint management, peak lopping, voltage control

DSR systems tested in the Simris demo

Solutions for new and existing installations

Controls for water heater

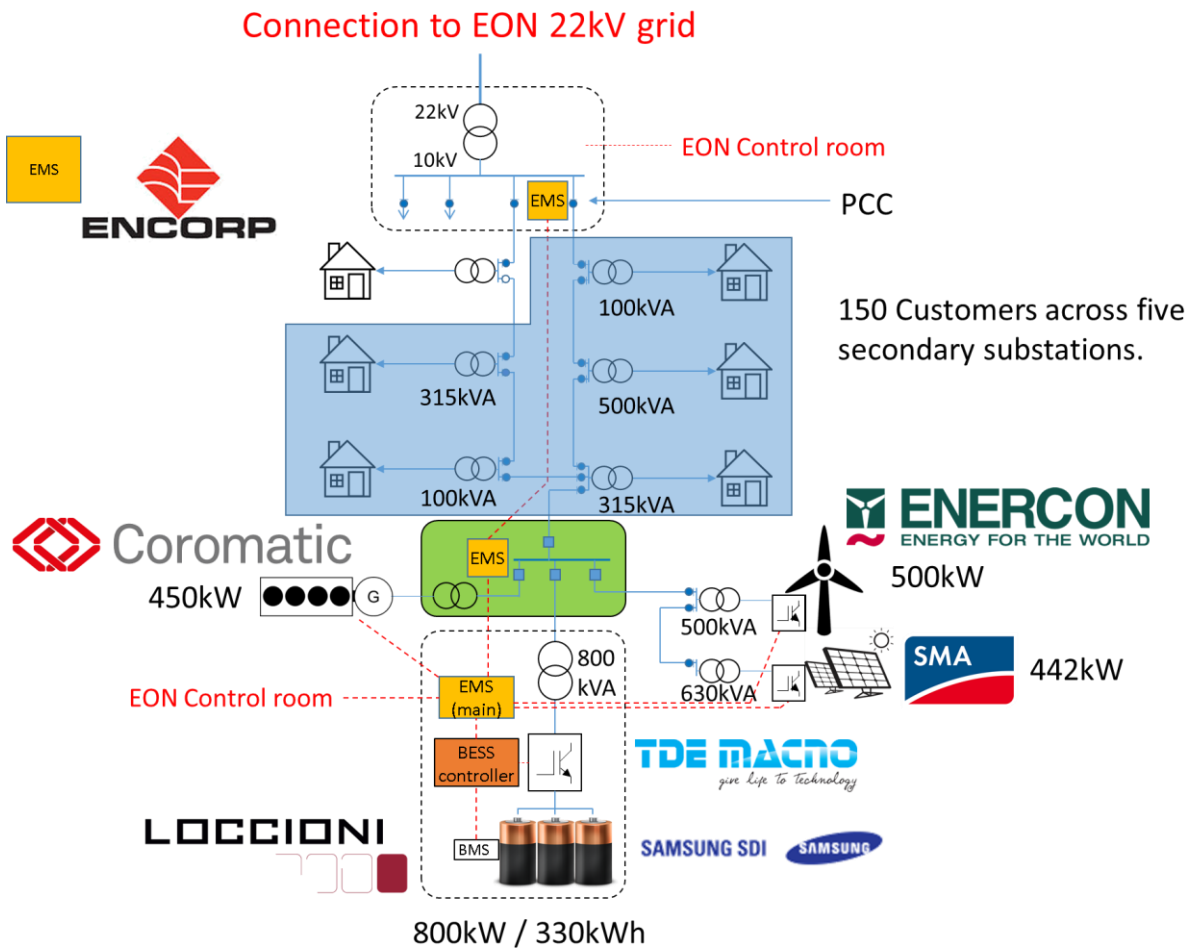
New controllable heat pump

Controls for heat pump

Controllable PV+Battery solution

- Flexibility as a combination of thermal and distributed battery systems are being installed and controlled to support prolonged islanded operation
- Customers rewarded for participation
- Direct comparison between the value and cost of grid-scale battery vs cost and availability of exploiting flexibility service
- Advanced control systems being developed to include forecasting

Electrical capabilities demonstrated in the Simris demo

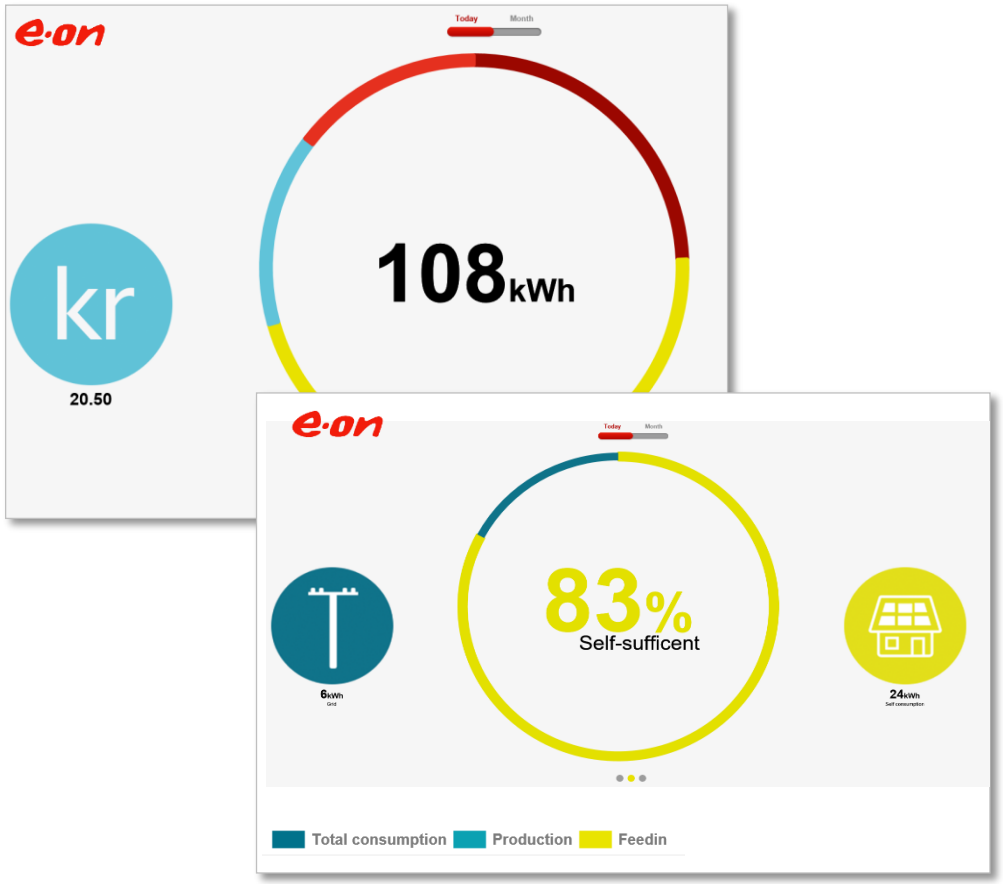


- Dynamic protection system optimized for both grid-connected and islanded operation
- Sustained off-grid operation on renewables only

Market Models investigated in the Simris demo

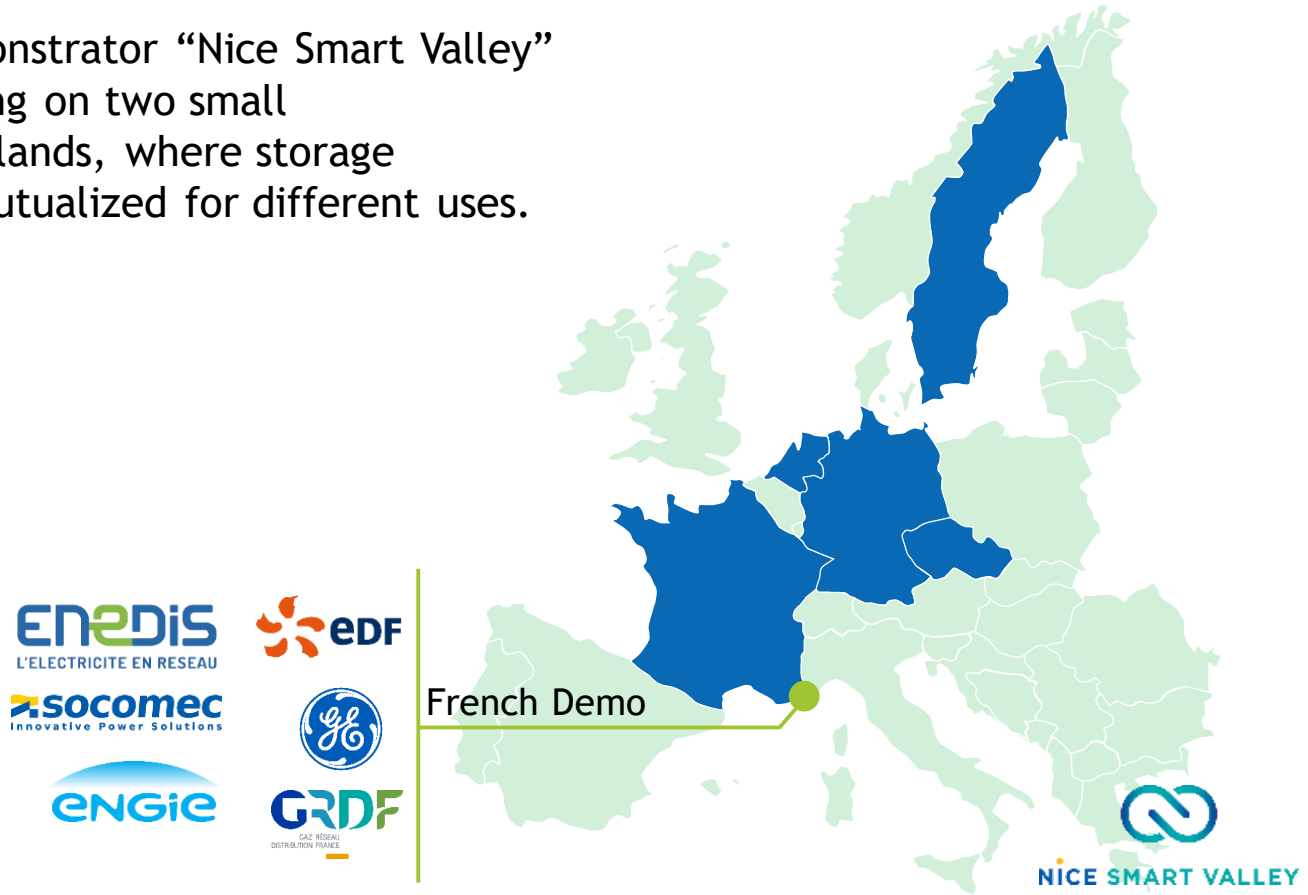
- Direct operation of a Local Energy System by the DSO as an alternative to traditional copper reinforcement solutions
- Demonstrated capability to increase security of supply for locations with unreliable grid
- Customer flexibilities (market platform) to reduce the cost related to the need of central batteries

End-customer monitoring and market platform



Microgrid business cases are evaluated based on mutualized storage capacities for various uses

The French demonstrator “Nice Smart Valley” is testing islanding on two small Mediterranean islands, where storage capacities are mutualized for different uses.



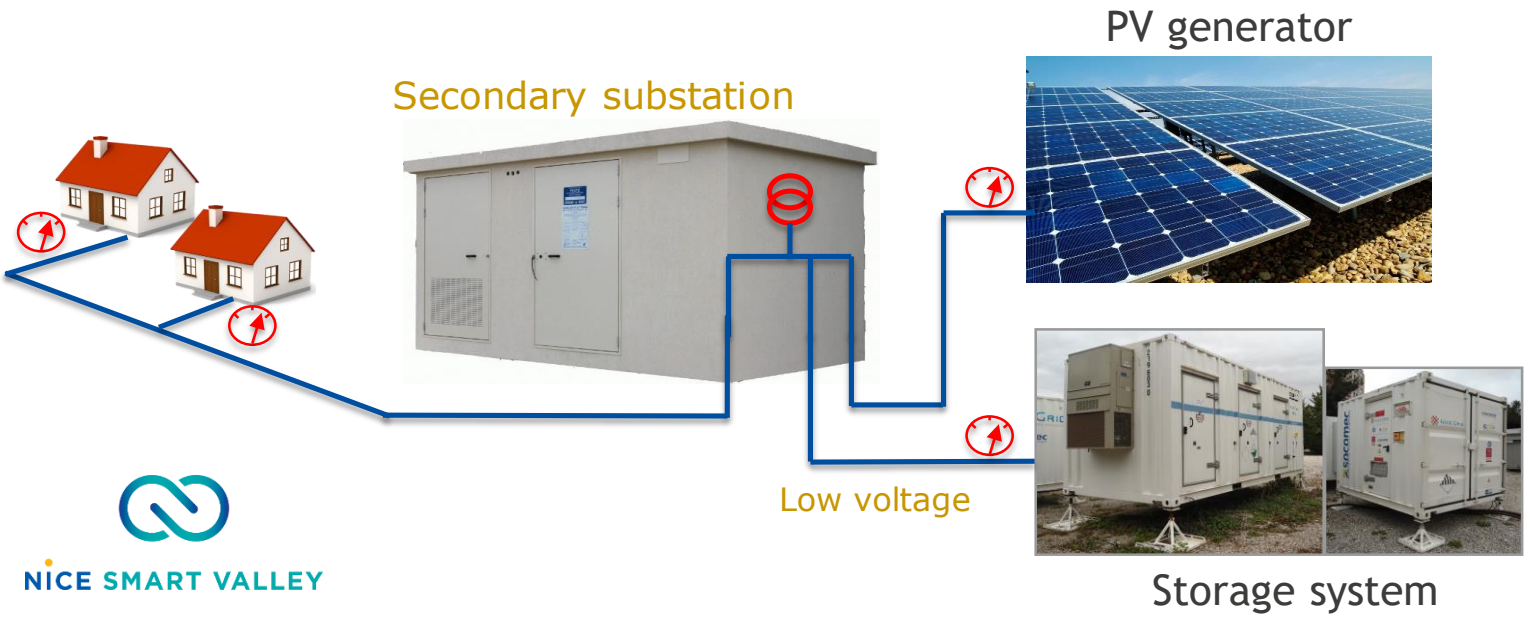
Islanding for resilience reasons: is there a sustainable solution based on DER and batteries?

- The islands are connected to the mainland through a single 10kV submarine cable
- In case of an incident, traditional backup solutions generally make use of fossil fuelled generators
- InterFlex is exploring a local multi-battery-system designed to increase the supply security

Shared use of batteries

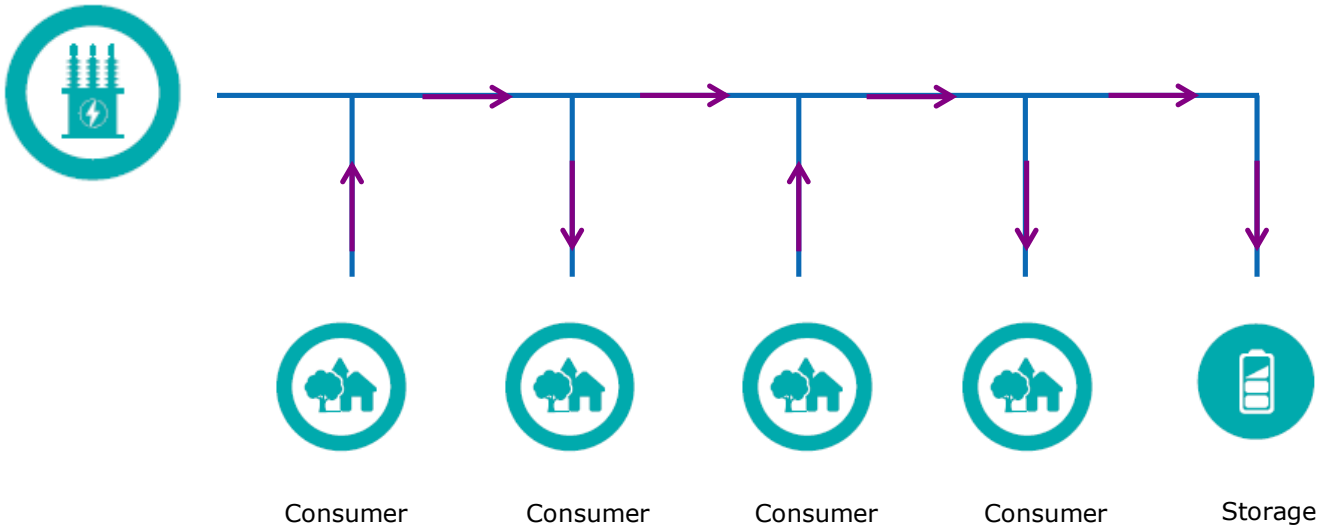
Investigated Business Models

- Share batteries for different uses
- Maximize benefits both for the distribution grid and market-related activities such as **renewable self consumption**



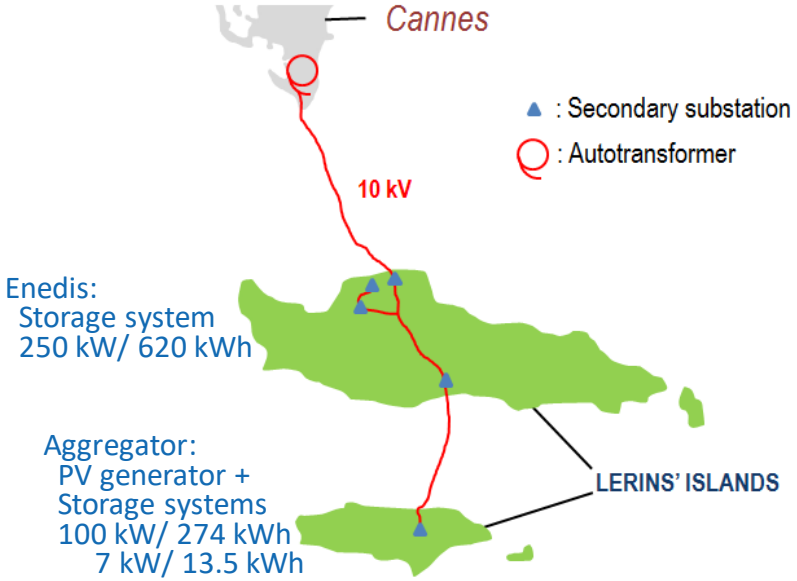
Shared community self consumption

- A legislative decree in France allows for collective self consumption downstream of a given secondary substation
- Meters will contribute to reconstitute the share of consumed/generated/stored energy



Batteries serve different uses

Remote control of the islanding from the DSO's Regional Grid Operation Centre



Services provided

- Main storage system: grid-forming asset of the island grid
  Frequency and voltage control
- Secondary storage system: grid supporting unit to deliver a complementary service to the DSO
- Islanding is supported by aggregators through customer's load management
  Aggregators are service providers for the DSO to increase the islanding duration

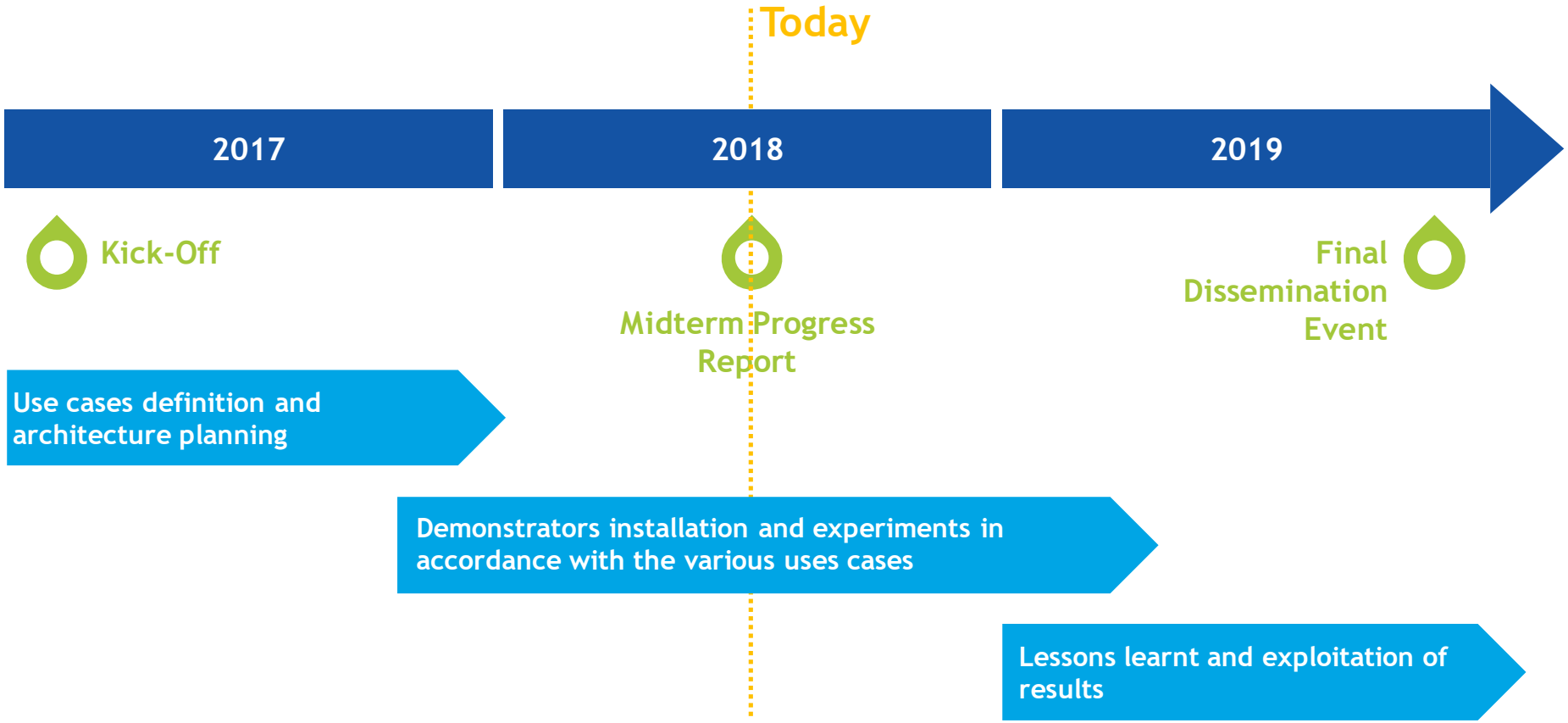
Regulatory and contractual challenges

Technical and control issues

Conclusion

- Islanding makes it possible to reinforce the resilience of areas where power supply is critical.
- Both in Simris and on the Lerins islands the Local Energy System's stability is guaranteed by a local battery.
- InterFlex' islanding experiments intend to show how storage can provide valuable grid services (frequency and voltage regulation) as well as congestion management.
- Contractual frameworks and potential business models between stakeholders are being investigated

Project status



Thank you for your attention

Christian Dumbs,
InterFlex Project Coordinator

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