

Italy



From Disturbance to Defence

Real-time digital twins for validating new approaches to system stability in a renewable-rich scenario





enhanced
dynamic
simulations

advanced
protection tests

New defence
system strategies

improved grid
stability

Concept

A real-time Digital Twin of selected portions of the Sardinian high-voltage grid to simulate and assess tailored defence logics for power system stability and security, supporting major-events and blackout prevention. Validation is performed via Hardware-in-the-Loop using a Real-Time Simulator interfaced with physical devices

Key outcomes

- Network real-time simulation
- HIL validation of protection and control logics
- DERs strengthen weak grids by providing fast, local flexibility

Impact/added value

- Improved dynamic simulation fidelity and validation through real-time HIL testing
- Test the Sardinian defence strategy in a protected environment under real-like conditions
- Evaluate the possible role of DERs to support network stability



Time for deployment

1 year

Potential users

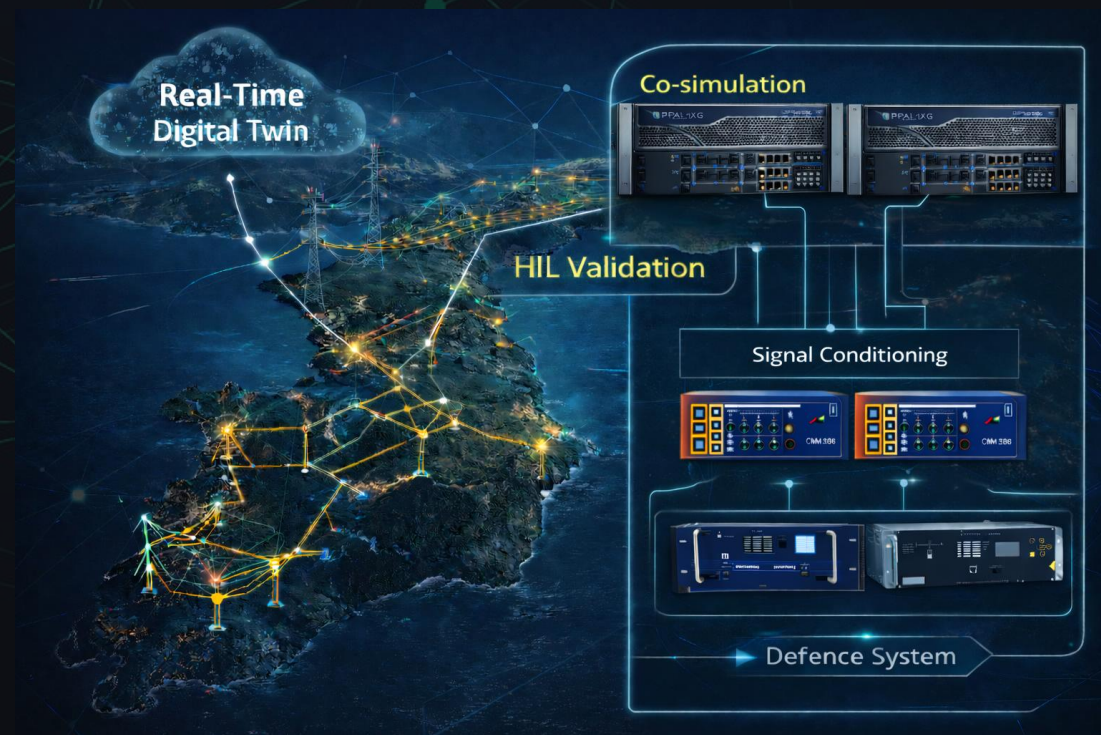
- TSOs
- DSOs
- Research centers

Lesson learnt

HIL/PHIL testing provided a robust and repeatable way to validate protection and defence logics, reducing uncertainty before field deployment.

Technology Readiness Level

1 2 3 4 5 6 7 8 9



Demo leader:



Demo partners:

enel

enel x



e-distribuzione



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N°101136119

TwinEU