The Electrical System of the Italian Islands

25/11/2024

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Introduction

Electrically speaking, **islands** are mainly divided into **two** categories:

CONNECTED ISLANDS

Connected islands have an electrical system with a power quality comparable to the mainland grids. The main issue with such systems is that the island's hosting capacity depends on the capacity of the submarine cable

NON INTERCONNECTED ISLANDS

19 islands face typical challenges of a system not connected with the national grid. This reflects on the quality of service provided to citizens, which, considering also an increase in future electricity demand and an increase of renewable energy generation, will be affected by more frequent blackouts compared to the mainland

Given the challenges of non-interconnected islands, in the Italian context it is necessary to strengthen their entire electrical system

Focus on non-interconnected Islands

Challenges and obstacles to «green» production

e-distribuzione

MAIN CHALLENGES

- **Island grid current state**
  (closed system, not interconnected with the RTN[1])
- **Renewable energy sources (RES) integration**
- **Increase in energy demand**

⚠ ***Power Quality issues***

⚠ ***Increased frequency of power outages***

*It is therefore **necessary** to **strengthen** the electrical system of the non-interconnected **island** through the implementation of a **smart grid***

1: RTN - Rete elettrica di Trasmissione Nazionale - National Transmission Grid

TECHNICAL OBSTACLES

- Inability to **coordinate** the different **production plants**, such as diesel generators, with the **intermittent** and **non-programmable** production of **renewable energy** plants
- Without the appropriate **smart systems** for monitoring, protection, control and automation, the island grid would not benefit from the RES **installation**, as their presence would **exacerbate** the issues related to service **quality** and system **reliability**

REGULATORY OBSTACLES

- E-d needs **approval** from ARERA and relevant **Ministries** for:
  - *allocation of public funding directed to the electric distributor*
  - *recognition of its role in planning and dispatching on non-interconnected islands*
  - *statements for BESS regulation*
- **Environmental** and **legal** authorizations are required for both DSO investments and RES installation:
  - *environmental permits*
  - *work in protected areas*
  - *other necessary permits*

Solution and benefits

E-d proposal

WHAT CAN E-DISTRIBUZIONE DO?

- **Ensure the integration of the electrical system with the flexible energy demand**
- **Optimize the performance of the grid and plants** to increase the amount of renewable energy sources (RES) that can be safely integrated
- **Innovative** and **flexible management of load and energy production**

Solution and benefits

E-d proposal

STRUCTURAL & SMART INTERVENTIONS FOR SMART GRID IMPLEMENTATION

Technological **upgrade** of the grid to adapt new loads and installation of **smart devices** capable of:

- collecting field data;
- monitoring, automation, control

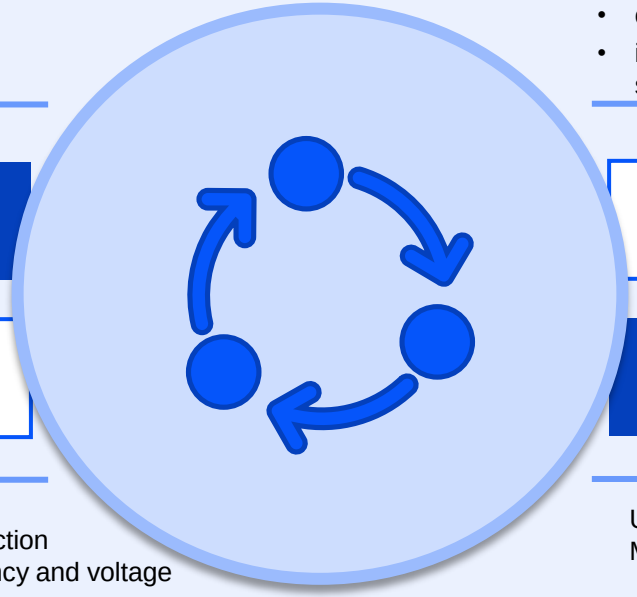
to ensure continuity and security of the electrical service

MV/LV LINES REINFORCEMENT & SMART DEVICES INSTALLATION

BESS INSTALLATION

BESS *(Battery Energy Storage System)* **helps:**

- reducing fossil produced energy in favor of RES production
- balancing energy demand and supply fostering frequency and voltage regulation (high quality of service)
- allowing efficient thermal plants operation optimizing the machine's performance



The **MGC** *(Micro Grid Controller)* **improves:**

- optimal dispatching of energy production sources
- optimal integration of passive loads and storage systems
- improvement of efficiency and stability of the electrical system

CONTROL SYSTEM MGC

TELECOMMUNICATION CHANNEL

Using **optical fiber** to enable the connection between MGC, BESS, production sources

Implementing a Smart Grid will bring benefits to citizens, to the environment fostering the gradual installation of renewable energy, and to the island's economy, which will be able to rely on a safe electricity supply with progressively lower costs