

The Areti's Path: From Automation to Flexibility

RomeFlex  areti

Reshaping Operational Method to run grid Flexibility

Areti in the European and Italian Energy Scenario

Market positioning and activities

Areti is the DSO of Rome and Formello (IT), is one of the Main Italian Operator with 10 TWh of Electricity Distributed and serving 2,8 mln inhabitants (plus ~ 1 mln floating population), on + 1,300 km² of Territorial Extention.

MARKET CONTEXT

ARETI TODAY



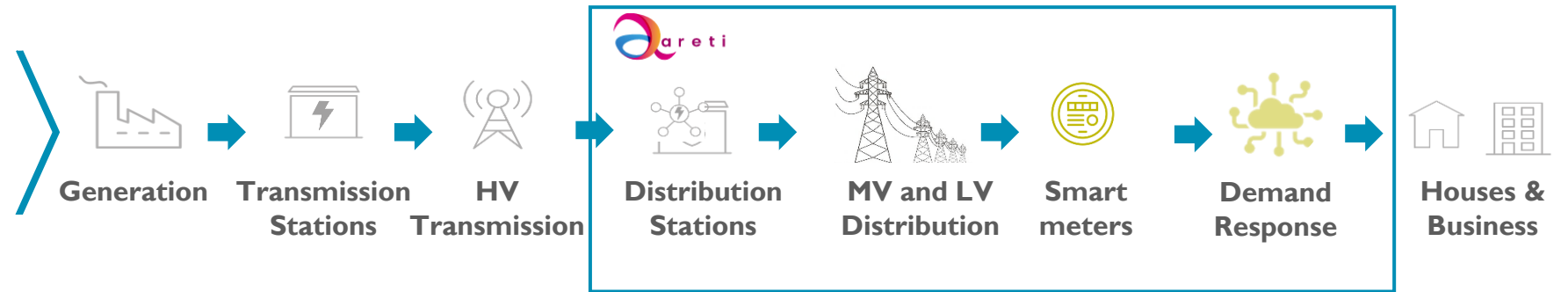
Role
on the value chain



Positioning
in the Market



Public and Artistic
Lighting of Rome



1,6M

Connections in Rome

2°

Italian Operator for Number of Connections,

3°

Italian Operator for Distributed Energy

220.000

Lighting Points
in LED Technology

8.200

Km of Public Lighting
Grid

International Leadership

The skill gained in the technical operation of PL and the artistic abilities gives to areti a Recognized International Leadership

Areti in the European and Italian Energy Scenario

Overview



«...**Interconnected and stable energy networks** are the backbone of the EU's internal energy market and **key to enable the green transition...**»



40% of Europe's grids are over 40 years old

Connection requests at distribution level increased on average by **19%** in a single year in 2021



In this decade alone, **€584 billion in investments** are necessary for the electricity grids, with a substantial part needed in distribution grids



Improve the **long term network planning** to allow the system to **integrate more renewables** and deliver the **demand generated by the electrification** of economy



Incentivate a **better usage of the grids** increasing transparency and adapting grid tariffs to a **reality made of efficient innovative technologies**



Improve the access to fundings giving **more visibility to the EU Programs** funding smart grids and the **modernization of distribution grids**

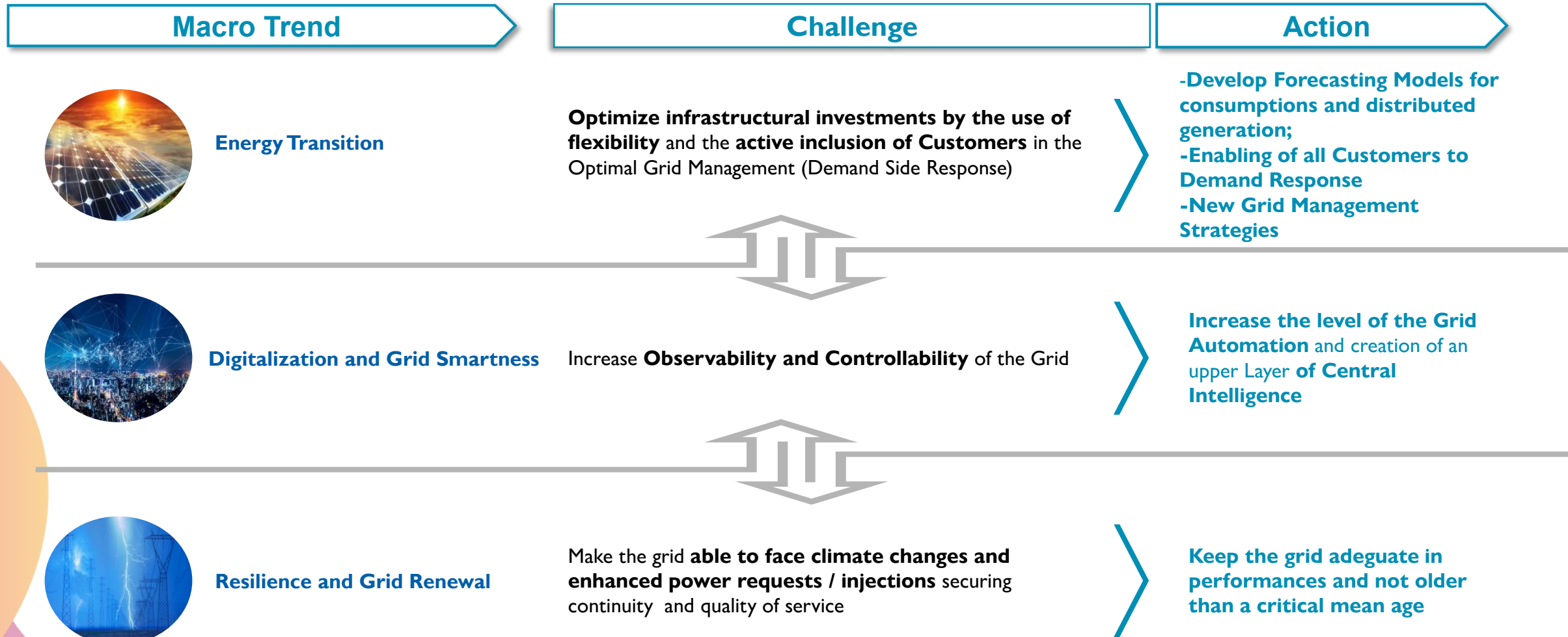


Encourage the **faster granting of needed authorisations** to **upgrade the grids** supporting technically the relevant authorities

The Areti Industrial Plan fully reflects the EU Action Plan for Grids, focusing on the Optimal Network Planning, the Grid Smartness, Enabling Flexibility Markets, Including Customers in the Energy Management of Rome

Areti in the European and Italian Energy Scenario

The New Areti's Paradigms to Upgrade and Modernize the Grids of Rome



The targets of the areti plan 2024–2028

«Achieve **national leadership in service quality** by increasing the **resilience of the electricity infrastructure**»

«**Growing in "smart infrastructure"** technologies to offer **new services to citizens**»

Making Grids Smarter

Infrastructure Strengthening through interventions on **Automation, Remote Control e Grid Digitalization**, improving **service levels**

100% of the MV grid Remotely Controlled

Operation Process Optimization of Customer's Service requests **to improve service quality**

40% of the LV Grid Remotely Controlled

Implementation of **Technologies and Platforms to Run Local Flexibility Markets for Ancillary Services to the Distribution Grid** (e.g., Demand Response, Smart Charge, V2G...)

300 MW of Demand Response Capacity available by Market Mechanisms

Customer Services

Offering of **«Smart Infrastructure Solutions»** for the Cities (e.g. public lighting, energy management...)

100% of Public Lighting grid Remotely Controlled

Implementing a **full Real Time Metering of Customers' Consumptions / Productions** to enhance System Observability

100% of Second Generation Smart Meter Rolled Out

Areti Plan Infrastructure Investments, Targets

Areti Plan supports energy transition with strong investments in digitization, loss reduction and "Smart City" evolutions



Starting Point at 2023



Developments at 2028



Cumulative Capex 2024-2028



Energy Transition

Maximum Power Peak Handled ~2GW
to be enhanced due to consumptions' electrification

Increased penetration of electric vehicles, heat pumps, induction cooking and distributed generation lead to peak power of ~3GW, **to be managed through infrastructure and flexibility**

406 Mln€



Digitalization, Grid Smartness and Smart City

57% of lines automated
67% of Substations MV Remote Controlled, 5% of Substations LV Remote Controlled

100% of automaded lines
100% of Substations MV Remote Controlled
40% of Substations LV Remote Controlled to increase **grid observability and controlability**

749 Mln€



Resilience Enhancement and Grid Renewal

Renewal and Upgrade of MV grid for 130km
and of **LV grid for 171km** during 2023

1242 km of New MV grid and **822 km of LV grid** to minimize outages risks and reduce network losses

472 Mln€

Flexibility Markets and Demand Response in the Areti Plan

The Areti Network Planning use the Leverage of Flexibility to Optimize the Use in energy of the Existing Grid to Face the Increase of the Power Peak in Rome from 2,1 GW (2022) to 3,3GW (2032)



Heat Pumps: 55% of Residential Customers penetration:
850 MW Installed Power



Induction Hobs: 20% of Residential Customers penetration:
310 MW Installed Power



Charging Stations for E-Mobility:
1.800 MW Installed Power

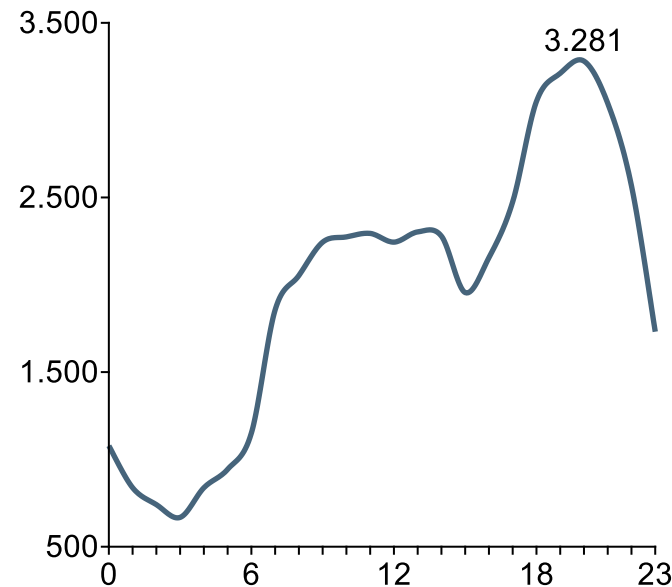


Further Electrification:
+5% of Power Consumption



Distributed Energy Productions and Storages:
+350 PV's Power Generation Installed

Note: The Curve Peak will be Reached in Winter Time...



Infrastructuring for a 3,3 GW of grid capacity is not efficient (only for 1,000 h/year the grid faces >2,6 GW of demand), it is necessary **to handle 0,7 GW through Demand Response and Flexibility Markets**

3.281

Power Peak in Rome at 2032:
for only 1,000 hours a Year Power Curve will overcome 2,6 GW

2600MW – future infrastructuring

2100MW -2022

8760 hours



1,2GW of Peak Increasing handled by an Optimal Mix:
0,5GW by Grid Reinforcements and 0,7GW by Flexibility

Areti is an European Leader in Research and Innovation Projects Applied to Energy Grids

Areti is a European reference for Research and Innovation applied to Energy Grids:

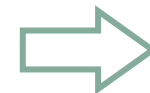
all the developments achieved in the EU Projects and the resulting technologies, **are continuously industrialized** for the Digitalization and the Flexibility of Rome **always with a EU scalable and replicable vision**



INSIEME



RomeFlex



To Other DSOs and TSOs



The «Evolutionary Approach» Deployed by Areti

"Infrastructuring" alone is not sufficient to enable the energy transition in the required time and is not efficient in the energy/capacity ratio: DSOs therefore need an observable and controllable network to:

- Selectively identify the Portions of the Network that primarily require Development and Reinforcement Interventions
- Enable Automatism for Quick Fault Selection
- Minimize Grid Losses
- Develop Asset Management Strategies and Plans that Maximize Efficiency and Effectiveness of Investments, also Exploiting the Flexibility of Consumptions and Production (Demand Response)
- Enable Advanced Optimized Network Management Features such as the Distribution Management System for Real-Time or Scheduled Network Reconfiguration

The Observability and Controllability Growth of the Areti Grids

Areti has implemented an Evolutionary Strategy for its network towards "Smart" Functions, Creating Functional Layers over time and Constantly Evolving according to a Predefined Order:

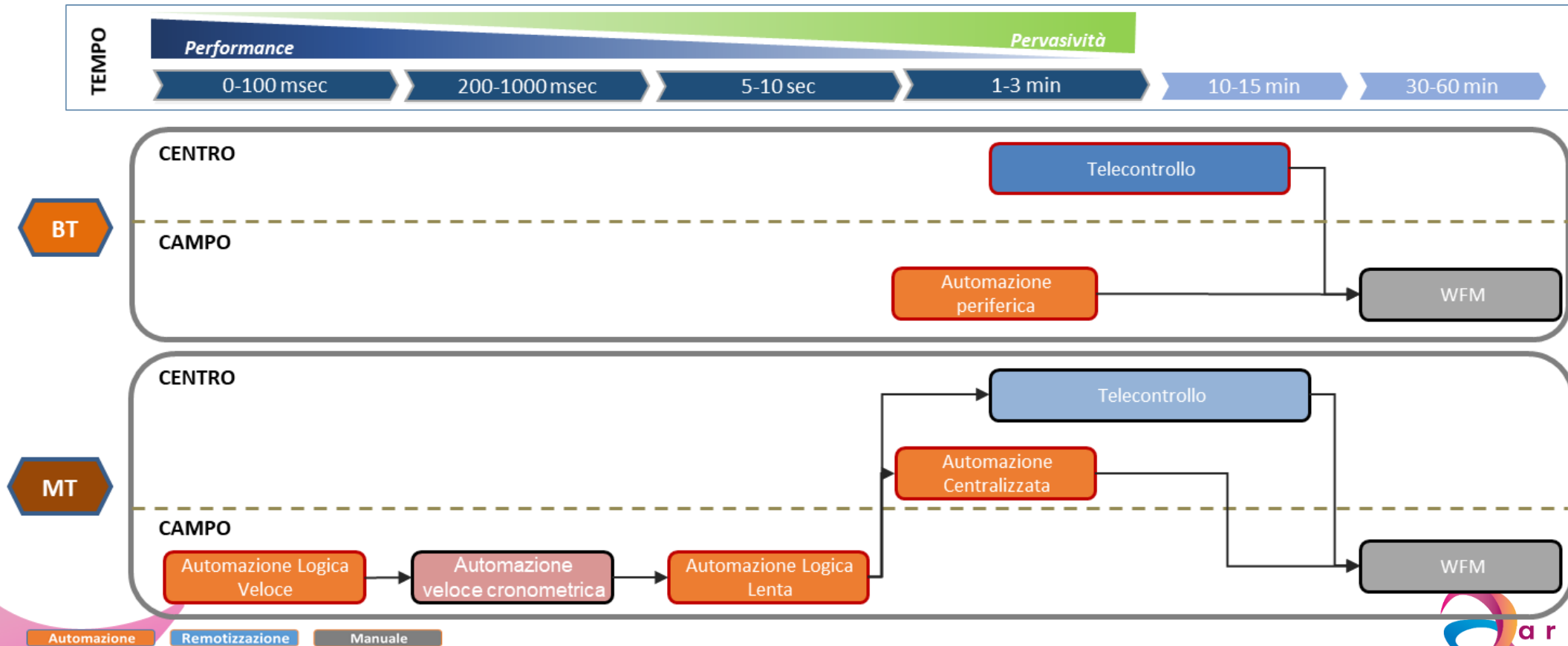
The first step was the automation and progressive remote control of the networks and systems starting from High Voltage to reach Low Voltage

A framework of "data management platforms" able to exploit field and central devices was therefore superimposed on this "infrastructural" layer, enabling the observability and controllability of the network

Advanced flexibility and Demand Side Response functions are now being developed on data management platforms through experimental pilot projects.

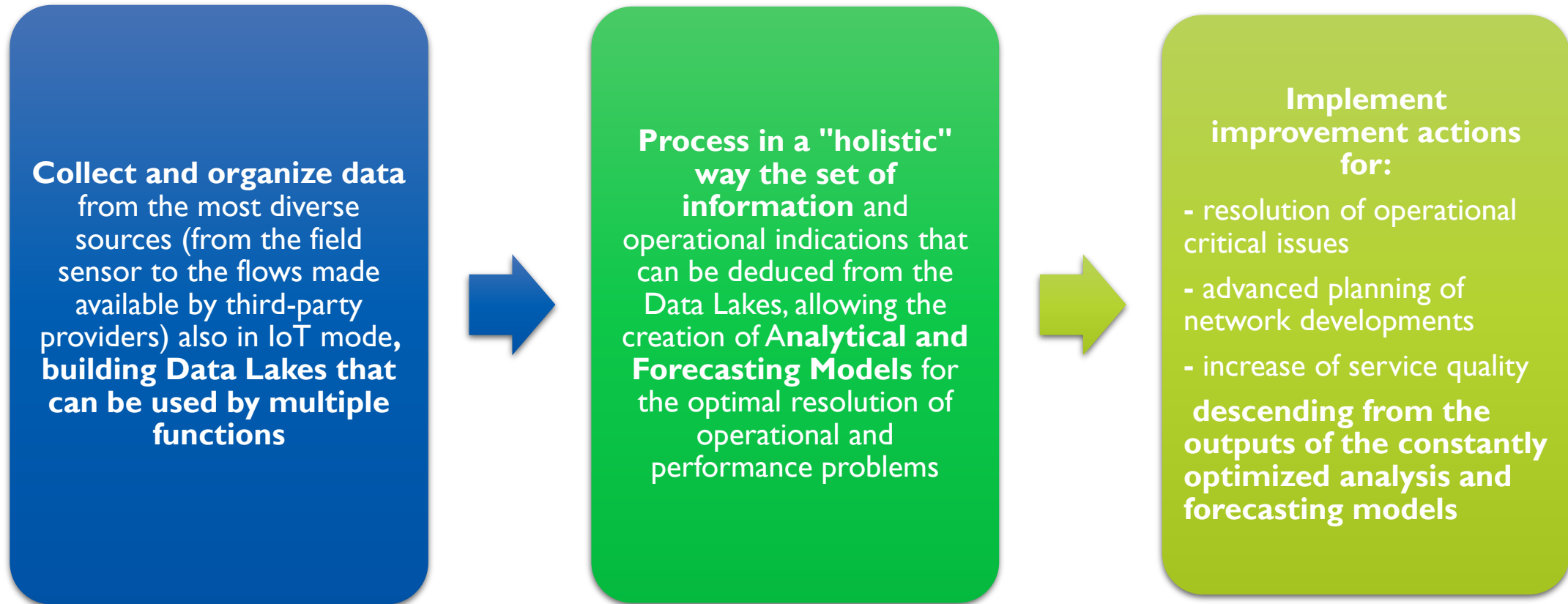
The First Area of Development: NETWORK AUTOMATION

The Areti's Automation and Remote Control Strategy includes a new Digital Solution on the LV Network and the Integration on the MV Network of various field automation logics, Coordinated with logics implemented on the Central Systems, able to guarantee Fault Selection from a Few Milliseconds to a Few Minutes



The Second Area of Development: DATA MANAGEMENT PLATFORMS

The availability of Field Hardware and Scada Systems, generating a large amount of data, Makes it Necessary to Develop "Intelligent Platforms" Able to:



The Third Area of Development: THE FLEXIBILITY OF NETWORKS

Once the Data Acquisition and Processing Layers were created, as well as the implementation of managing and grid reconfiguring tools, it was possible to launch the experimental flexibility market Project “PLATONE” aimed at:

Develop communication and interaction technologies with user equipment, guaranteeing accuracy, integrity and security of the data and commands exchanged

Analyze the state of the network in real time to highlight critical issues that can be resolved through active management mechanisms of demand and distributed generation, according to standardized methods and services

Implement a local flexibility market, in coordination with the TSO, capable of exposing flexibility requests and remunerating the flexibility actions consequently taken by users connected to the distribution network

RomeFlex Project, pursuant to ARERA Decision 372/2023

RomeFlex massively enables DERs to the local flexibility market, allows DSOs to purchase ancillary services through transparent and certified mechanisms, fostering the growth of an open and inclusive market for benefit of all the energy sector stakeholders

The Services



Active Power Regulation for Congestion Solving

The Project Ecosystem



Market Platform
Flexibility Register
DSO Technical Platform
BSP Platform
PGUI

The Market



Local Flexibility Market
Run by a Third Party:
- Long Term Tenders for Capacity Allocation
- Spot Market, Day Ahead e Intraday, for Service Procurement

Procurement Mechanisms:



Transparent Mechanisms always based on market approach and settlement certified by Blockchain

Main Features:



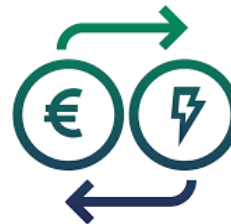
Service Granularity: 15 minutes
Minimum DER size: 3 kW in withdraw or injection
Minimum Service Size: 300 W

Romeflex Stakeholders



Household appliance and home automation systems manufacturers

RomeFlex

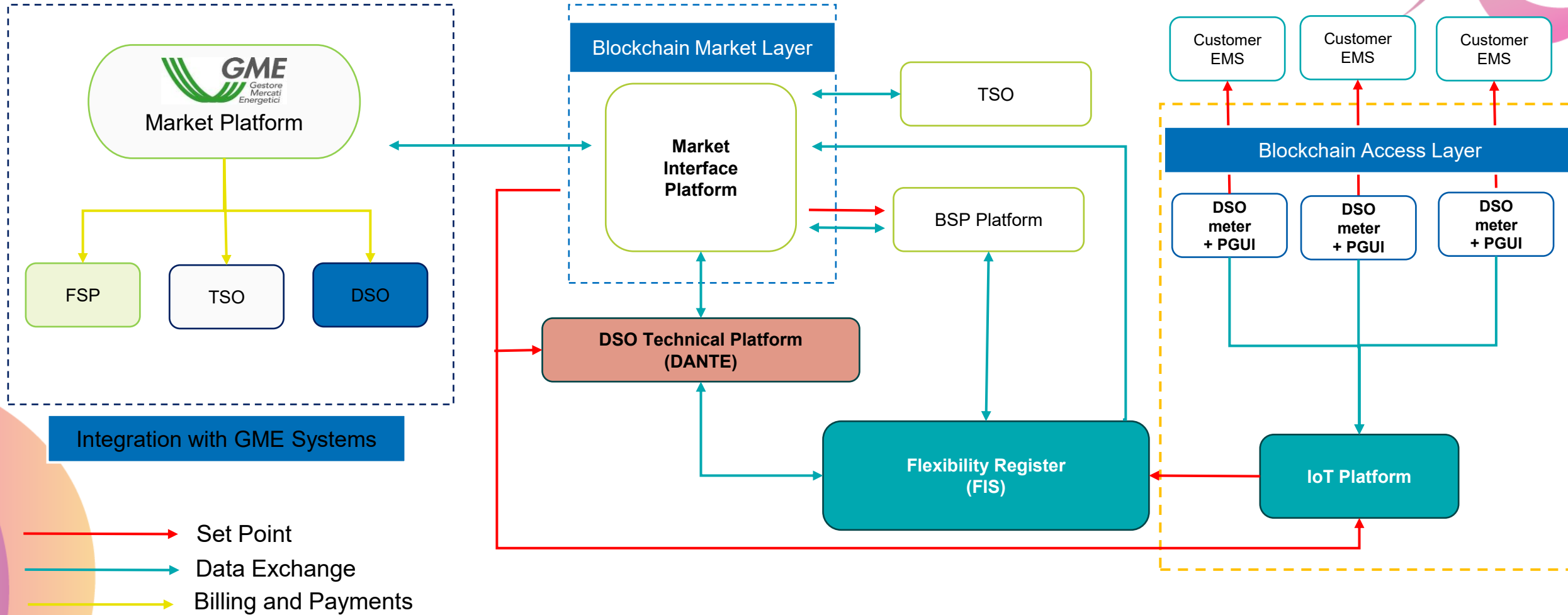


***13 Balancing Service Providers
managing 160 resources:
- 45 MV resources
- 115 LV resources***



Energy-intensive company and SME

RomeFlex Architecture, the Electrical System Perspective



RomeFlex has been designed following an «Electrical System Perspective», providing all the market actors with all the needed platforms and processes necessary to run a flexibility market

Local Flexibility Market

Functions



In the forward negotiation session, the DSO searches the areas of interest for resources that will be available to offer the flexibility services; in doing so, it guarantees the operators representing these resources a capacity tied to the actual installed power made available

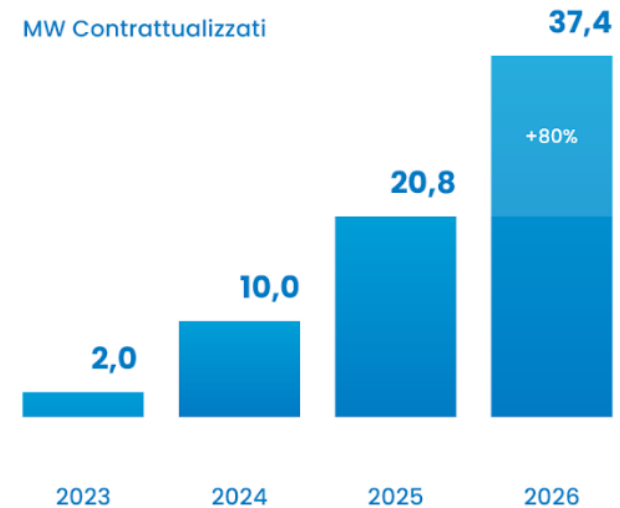
In the spot trading sessions, the DSO procures actual flexibility services by indicating to market participants the amount of effective Flexible Power needed and the resources through which to deliver it

RomeFlex Market Liquidity at February 2026

13 Balancing Service Provider
1.500 Flexible Resources
37 MW of Flexible Capacity

*** Flexibility Needs at 2035: 300 MW**

**Trend in costante crescita
della potenza contrattualizzata
in RomeFlex, con un +80% sul 2025**



Power Grid User Interface (PGUI)

Description, activities and features

The **PGUI** allows you to:

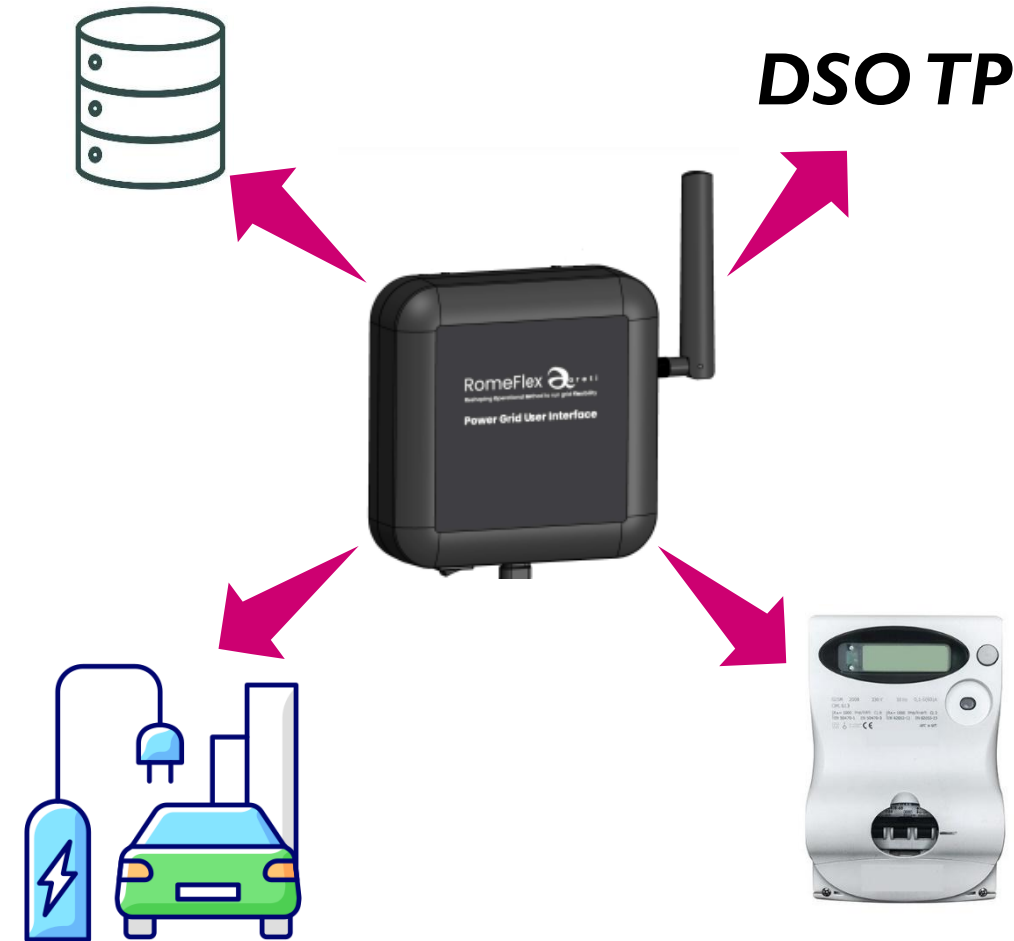
- **Acquire measurements** at the PoD
- **Certify electrical measurements** in an immutable way on **Blockchain technology**
- **Transmit remote acquisition data** to the **Flexibility Register**
- **Enable the provision of flexibility services** (it is able to receive activation signals from outside and make them available to the customer's modular assets)

The **PGUI** allows for the massive enablement of flexibility potential available in distribution networks.

It is a device capable of certifying transactions of flexible energy exchanges supplied by **LV** (Low Voltage) and **MV** (Medium Voltage) users.

Strengths:

- Ease of installation
- Ability to acquire measurements via smart meters (**chain2**, etc.)
- **Interoperability** thanks to the multiple communication modes supported (e.g., 4G).



An aerial photograph of a city with a large lake in the foreground. The city is densely packed with buildings, and a tall skyscraper is visible on the left. The lake is surrounded by greenery and a few smaller buildings. Overlaid on the image is a network of white lines and glowing nodes, suggesting a digital or technological theme. The sky is a mix of blue and purple, with some clouds. The word "Thanks" is written in a large, stylized font in the center of the image.

Thanks