



# Unlocking European grid local flexibility through augmented energy conversion capabilities at district-level

## The Challenge

Europe's electricity system is in a period of profound change characterized by a shift from centralized fossil fuel power generation supplying passive households, businesses and industry to distributed and decentralized power generation system where households, businesses, and industry are active participants in the grid by offering flexibility and generating renewable energy. Moreover, Europe has committed to ambitious 2030 energy and climate objectives consisting of 40% greenhouse gas reductions, 27% renewable energy increase and 27% energy efficiency increase.

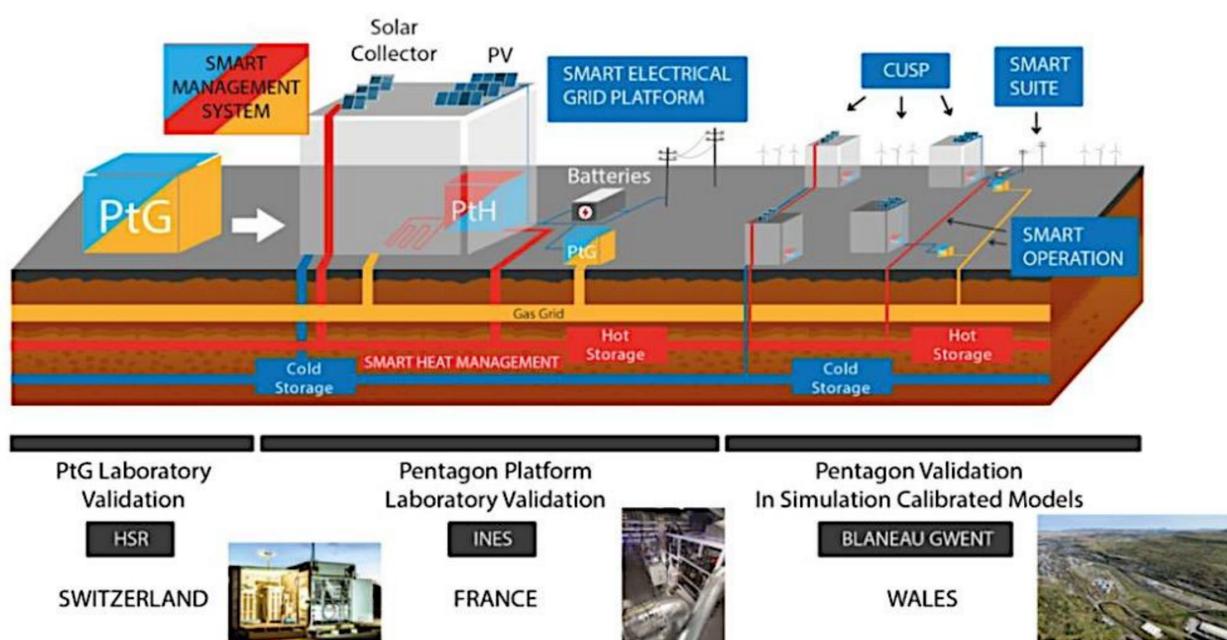
## PENTAGON

PENTAGON aims at paving the way for a new generation of eco-districts, leveraging on enhanced energy conversion systems and a high level integrated management platform simultaneously acting on different energy carriers (thermal, gas and electric).

The core of the project is formed by the development of two ground-breaking technologies:

- An innovative power to gas technology at the district level.
- An intelligent, versatile and service based ICT platform for holistic, multi-vector energy management

Power to gas is one of the most promising future smart grid technologies because it has the potential to solve the grid problems due to the distributed generation of clean energy sources. This will enable a higher penetration of renewable energy.



*PENTAGON Concept and Validation Approach*

To bring these technologies closer to the market, PENTAGON will follow a three-step validation strategy that relies both on focused technology deployment (Power-to-Methane, ICT district management platform) in experimental facilities for 'live' assessments on a small scale and on more extensive simulations to assess the impact at the low and medium-voltage grid levels, considering different levels of RES penetration.

PENTAGON will also posture toward future market uptake (adoption and large-scale deployment) of the solution delivered through an evidence-based exploitation roadmap for next generation European eco-districts, particularly aimed at local authorities and ESCOs.

## PENTAGON CONSORTIUM

