FEDECOM (FEDErated -system of systems- approach for flexible and interoperable energy COMmunities)
Press release – Project launch.

The FEDECOM Consortium

February 10th 2023

The new Horizon Europe project FEDECOM (FEDErated "system of systems" approach for flexible and interoperable energy COMmunities), coordinated by Veolia, started in October 2022 and involves 17 partners. This 48-month project focuses on the implementation of integrated local energy systems through sector coupling and cross-energy vector integration. FEDECOM will provide a scalable and adaptable cloud-based platform consisting of analysis, modelling, and optimisation services for the planning, monitoring and control of integrated local energy systems.

A project responding to climate and energy emergencies and a paradigm shift in the energy sector.

Environmental and climate change demands investment in a faster uptake of solutions for energy systems decarbonisation. This will lead to improved, innovative low carbon solutions and enhance the penetration of renewable energy sources (RES). The many challenges posed by renewable energy production and constraints on traditional energy network models (stability of network operation, intermittent nature of renewable energy production, business models, etc.) make this paradigm shift even more necessary. FEDECOM will target these issues by designing solutions to predict, control and manage intermittent energy sources for highly variable load profiles. Sector coupling between energy carriers (to introduce additional degrees of freedom for energy conversion and dispatch, by improving the hosting capacity of renewable energy sources)presents itself as a relevant solution, as it unlocks demand flexibility.

Building on the results of recent European projects, FEDECOM tackles the current lack of integration in local energy systems. FEDECOM is a Horizon Europe project, coordinated by Veolia, which started on October 1st, 2022 and will run for 48 months. It brings together 17 partners from different types of structures (private companies of various sizes, non-governmental organisations, universities) spread across 7 European countries (Belgium, France, Germany, Serbia, Spain, Switzerland and the United Kingdom).

FEDECOM aims to help integrate the energy sector and in particular electricity through the optimisation of synergies between complementary deployment strategies for direct and indirect electrification. FEDECOM will enable the coupling of renewable energy, storage and power-to-X technologies, ensuring efficient, stable and reliable grid operation. To achieve this goal, the consortium will develop a scalable and adaptable cloud platform capable of analysing, modelling, and optimising services for planning, monitoring, and controlling integrated local energy systems. Pilot sites will demonstrate the integrated operation of hybrid RES/storage infrastructures, while enabling a holistic cooperative demand response (DR) strategy through federated energy communities.

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The concept of federated energy communities, the heart of the FEDECOM project.

This concept unlocks flexibility through energy exchange and coordinated actions between nearby and remote sites, while maximising the positive impact on the transmission level of the grid. To achieve this, FEDECOM will rely on a multi-layered federated system-of-systems approach across energy carriers and sectors. This will allow for optimal energy management of the federated communities, as well as better interaction with the grid.

FEDECOM's ambition is therefore systemic and multi-faceted. The project intends to develop a technical and commercial ecosystem to demonstrate the potential of energy sector coupling and integrating local energy systems through the federation of communities to provide economic benefits, improve grid stability and reliability, contribute to the decarbonisation of the energy system and reduce its carbon footprint. This will be achieved through the project's three major objectives: Integrate existing and emerging information and communication technology (ICT) tools to deploy the FEDECOM solution enabling integrated, reliable and decarbonised energy systems based on sector coupling, distributed generation and storage, and high demand flexibility services, while improving RES hosting capacity towards the 40% share by 2030 target in the EU. Specifically, the project will:

- Validate the FEDECOM solution in three large-scale pilots across Europe in different technical, market and climatic contexts, while demonstrating improved grid resilience through the integration of cross-energy vectors and the optimisation of local energy system operations, while unlocking at least 30% demand-side flexibility.
- Develop viable partner-supported plans for large-scale replication of the FEDECOM solution in three "follower" communities to demonstrate the positive impact on the broader energy infrastructure, environment, local economy, and social aspects through sector coupling, increased RES share, and improved grid operation.

FEDECOM implementation revolves around three large-scale pilots - in Spain, Switzerland and the Benelux region - each represented by a federation of energy communities. These pilot sites represent diverse geographical and climatic areas, with different local energy systems and grid coupling possibilities, in the residential, commercial, tertiary and industrial sectors, including green hydrogen production, electric and hydrogen mobility. The pilots offer an optimal opportunity for experimentation. Each of them is already well advanced in terms of monitoring and energy infrastructure, and will be enhanced over the course of the project to meet the demonstration needs.

The FEDECOM solution is attractive for a multitude of stakeholders, including aggregators, energy service companies (ESCOs), energy utilities (single or multiple energy-carrier), grid operators at both transmission and distribution levels, technology providers (of RES and storage units, power-to-X assets, control and management tools, etc.), energy communities and municipalities.

FEDECOM’s ambition and expected impacts.

The project addresses the following ambitions:

- Multi-vector optimisation approach for integrated systems control.
- Advanced grid analytics for optimal grid operation and improved resilience.
- Holistic, cooperative DR strategy at community level.
- Life-cycle assessment and planning of cost-optimised network coupling.
- Predictive data-driven analytics for joint demand flexibility assessment.
- Improved integration and interoperability across systems and stakeholders.
- Open marketplace and multi-stakeholder trading built upon blockchain.

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- Innovative business models for the federation of energy communities.

Expected results and impacts to contribute towards the change of paradigm:

- Over 20% of final energy savings.
- Increased local RES hosting contributing to the EU 2030 target of 40% share.
- Contribution to the EU 2030 target for greenhouse gas emission reduction of at least 55%.
- 20 - 50% energy cost savings for the final consumers.
- Up to 30% saving in total grid capital and operational expenditure by means of cross-energy vector coupling and DR services, together with improved system stability and reduced grid maintenance.
- Over 30% of the total load available for grid balancing and ancillary services, unlocking demand side flexibility in energy communities.

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FEDECOM is coordinated by Veolia and kicked-off on October 4th, 2022. Various activities, including the identification of operational challenges and demonstration scenarios' needs have already begun. Communication activities aim to generate wide interest amongst both market players and the general public.

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To follow us:

- ✓ LinkedIn: FEDECOM-Project - https://www.linkedin.com/company/fedecom-project/
- ✓ Twitter: @FEDECOM_project - https://twitter.com/FEDECOM_project

The website will be available soon (www.fedecom-project.eu)

The project partners:

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