Bringing flexibility provided by multi energy carrier integration to a new MAGNITUDE

Régine BELHOMME, EDF, France
Emmanuelle DA SILVA, ARTTIC, France

The MAGNITUDE Project

MAGNITUDE aims to develop business and market mechanisms as well as supporting coordination tools to provide flexibility to the European electricity system, by increasing and optimizing synergies between electricity, gas and heat systems.

MAGNITUDE will ultimately:

- Provide flexibility options to support variable Renewable Energy Sources (vRES) cost-effective integration and decarbonization of the energy system, and to enhance the security of supply.
- Bring under a common framework, technical solutions, market design and business models.
- Contribute to the ongoing policy discussion in the energy field.

A set of targeted objectives

1 - ENABLE

Provide tools and models to enable the provision of flexibility to the electricity system from the integration of multi energy systems' operation.

2 - EXPLOIT

Develop business and market mechanisms to exploit the full potential VALUE of the flexibility provided

Identify potential regulatory barriers.

3 - VALIDATE

Validate the solutions on case studies of multi-energy systems of different sizes and technological features, located in Austria, Denmark, France, Italy, Spain, Sweden, United Kingdom.

4 - MAXIMIZE THE IMPACT

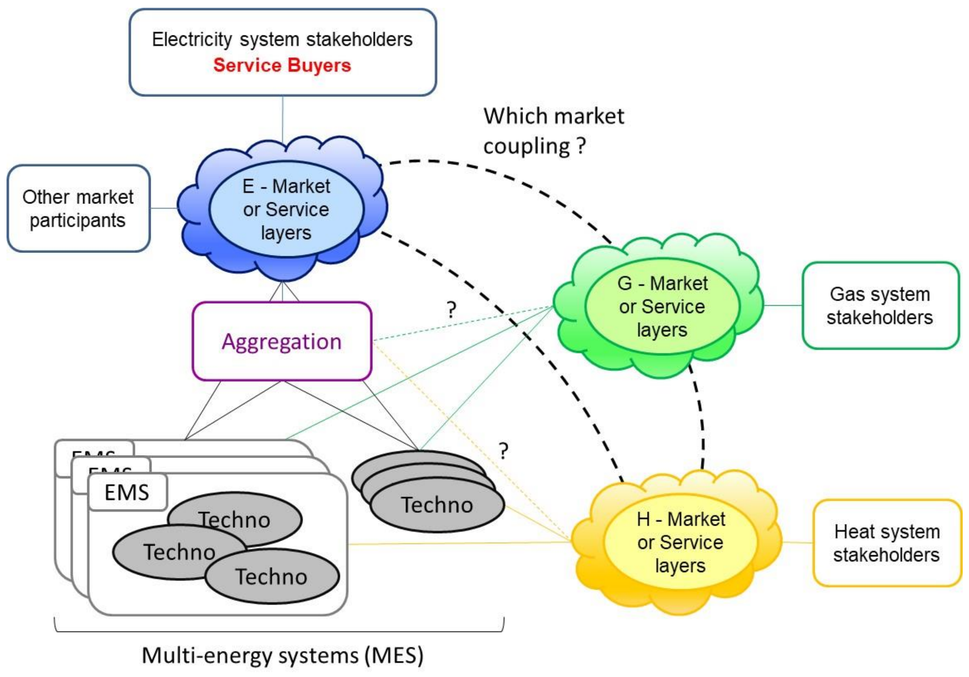
Disseminate the project results, achievements and lessons learnt towards the stakeholders in the electricity, heat and gas sectors.

Propose recommendations and contribute to the definition of policy strategies in a pan-European perspective.

The MAGNITUDE Approach

To make this possible, the MAGNITUDE approach is based on a set of activities aiming to:

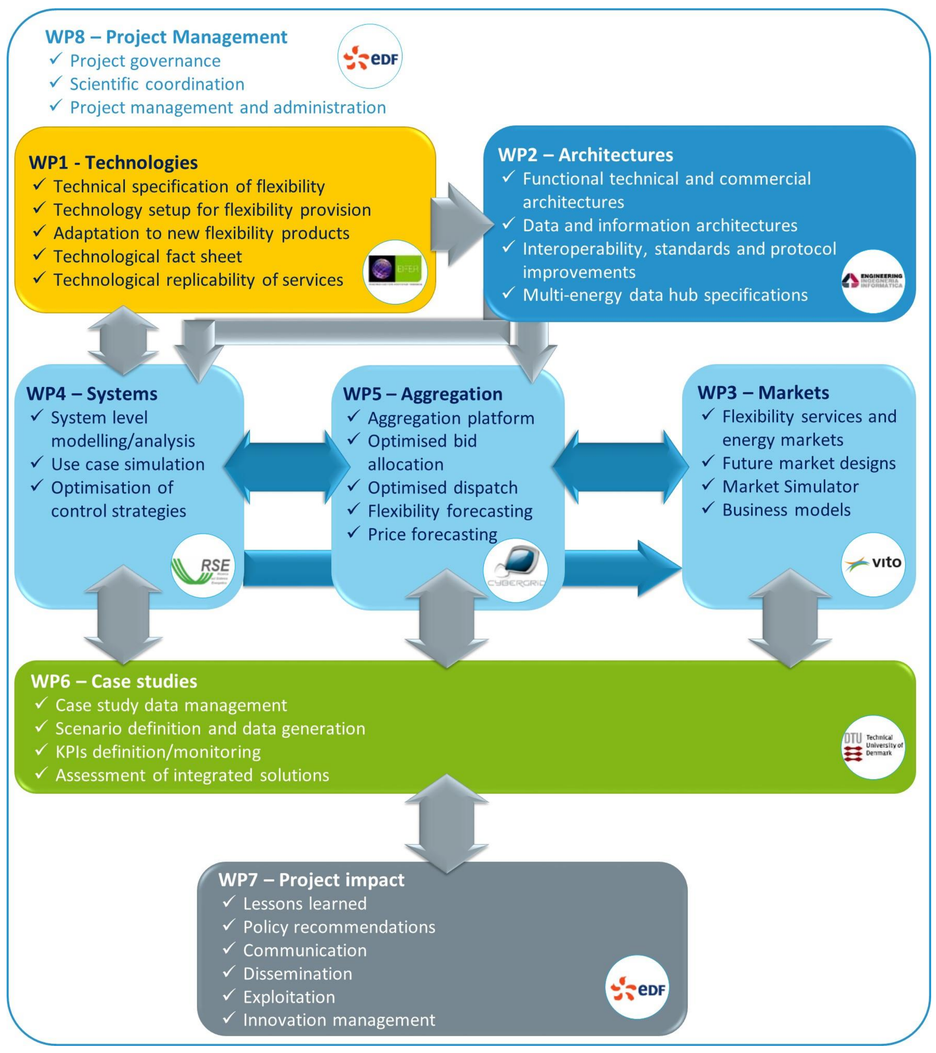
1. Select the most relevant flexibility services towards the electricity system to be provided by Multi-Energy Systems and which allow to increase the share of RES, avoid curtailment of vRES, enhance security of supply and increase trading between energy sectors.
2. Study the real flexibility options that the identified technologies and systems can provide to the electricity sector as well as their compatibility with the current regulation and market design.
3. Simulate and optimise the control strategy to improve the operations of such technology systems to maximise the flexibility provision.
4. Propose improved market designs for synergies maximisation that will be modelled in a market simulation platform for the project case study countries.
5. Quantify the benefits of pooling flexibilities from decentralized multi energy systems through an aggregation platform.
6. Exploit the achieved results by developing policy strategy and recommendations – including technology, market, business models, and regulation – and related considerations for feasibly increasing synergies between networks in representative EU countries



The MAGNITUDE Concept

A structured work plan

The MAGNITUDE work plan contains 8 work packages (WPs), each of them coordinated by a WP leader, responsible for the WP management and results.



The MAGNITUDE work plan and WPs interdependencies

A methodology based on real-life case studies

To ensure the validity of developed results, MAGNITUDE is built on 7 real life case studies, of multi-energy systems located in different European countries (with different regulation, support schemes, geopolitical characteristics, technological development) including key "cross-sector" technologies.

Case Study	Technologies										Networks		
	Biomass boiler	Gas boiler	Steam turbine	Gas turbine	Gas engine	Chiller	Thermal energy storage	Heat pump	Electric boiler	Anaerobic digestion	Electricity	Heating/ cooling	Gas
Mälarenergi Sweden	■		■			■	■	■			■	■	
Paper mill Austria	■	■	■				■				■	■	
Hofor Denmark							■	■	■		■	■	
ACS Italy		■			■		■	■	■		■	■	
Neath Port Talbot, UK	■	■	■	■							■		■
EMUASA Spain			■		■					■	■		
Paris Saclay France		■					■	■			■	■	

Existing technologies in the 7 real life case studies

A multidisciplinary and complementary consortium

Consisting of 16 partners from 9 different EU countries, the MAGNITUDE consortium brings together:

- Energy related experts from industry, consulting and academia, capable of coping with technologies and tools among the whole spectrum of multi energy systems;
- Experts for energy market simulation, analysis and industrial market actors from the trading and retail markets;
- SMEs that develop IT based solutions for system operation optimisation and aggregator companies;
- Local multi utility companies operating energy networks and facilities;
- Operators of industrial, public service facilities;
- Experts in the definition and implementation of dissemination strategies.

CONTACT

MAGNITUDE coordinator: Dr Régine Belhomme, EDF, regine.belhomme@edf.fr

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774309

www.magnitude-project.eu