



**INTEGRATED SMART GRID CROSS-FUNCTIONAL SOLUTIONS
FOR OPTIMIZED SYNERGETIC ENERGY DISTRIBUTION,
UTILIZATION STORAGE TECHNOLOGIES**

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From inteGRIDy to INTERPRETER: a framework for added value energy services

A white paper by the inteGRIDy and INTERPRETER teams

Javier Valiño, Nuria Rodríguez, Maria Carbonell, Malena Donato

ATOS SPAIN

ARTICLE INFORMATION	ABSTRACT
<p>Published January, 2021.</p> <p>Keywords: Distribution Grid, efficiency, smart grid, microgrid, DSO</p>	<p>The European strategy and its latest key targets for 2030 focus on sustainability and energy efficiency. Reducing CO₂ emissions has become the highest environmental priority, which is a cooperative work of all social agents. “Smartening” of the Distribution Grid (DG) will increase the efficiency, reliability, flexibility and adaptability of the power system and will reduce the overall expenditure of electricity generation and distribution. Research projects such as inteGRIDy and INTERPRETER offer innovative solutions supporting smart grids in the effective management of energy supply and demand.</p>
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Introduction

The European strategy, and its latest key targets for 2030, focus on sustainability and energy efficiency. Reducing CO₂ emissions has become the highest environmental priority, which is a cooperative work of all social agents. From policy makers, to electricity companies or individual users, improving energy efficiency implies a change in perspective, law and consumption habits, which must go hand in hand with technological and infrastructure development.

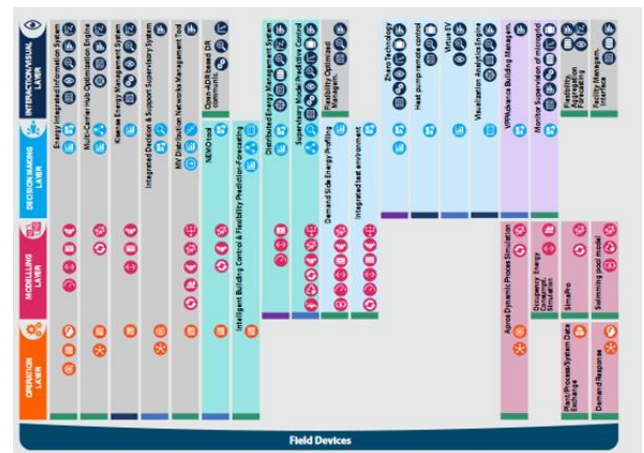
The Challenges

The electricity grid has a fundamental role in achieving the objectives set by the European Union. Hence, “smartening” the Distribution Grid (DG) will improve control and automation systems. Moreover, precise monitoring tools and the integration of micro-grids and virtual power plants will increase efficiency, reliability, flexibility and adaptability of the power system and will reduce the overall expenditure of electricity generation and distribution.

To address these challenges, innovation is needed in system integration, interoperable technologies, services, tools, business processes and regulatory regimes. Different research projects in the field of smart grids focus on validation, upscaling and replication, integrating the layers “technology”, “marketplace” and “adoption”. inteGRIDy and INTERPRETER are among these initiatives.

Solution implementation

On the one hand, inteGRIDy offers a **framework of interoperable tools**, oriented to different stakeholders and with special emphasis on the Distribution Grid. The ~30 **inteGRIDy tools** work at different layers (field, model, decision and visualization) addressing different needs and requirements in the form of macro-functionalities, facilitating optimal and dynamic operation of the Distribution Grid (DG), fostering the stability and coordination of distributed energy resources and enabling collaborative storage schemes within an increasing share of renewables. All inteGRIDy tools are developed to be compliant with a comprehensive and interoperable-by-design reference architecture.



These tools are currently being tested through 10 pilots in 8 different European countries (Spain, UK, France, Portugal, Greece, Romania, Italy, Cyprus) for validation in real-life conditions and under different market regulations.

Moreover, the inteGRIDy business model & replicability tool analyses the context and provides an assessment on how to address this replication in different markets, taking into consideration both

economic and regulatory factors, and supporting, thus, industry practitioners in developing novel business models.

On the other hand, INTERPRETER offers a **modular grid management solution** consisting of a **grid modelling tool** together with a set of **10 software applications** (interoperable off-line and on-line software tools) for an optimal design, planning, operation and maintenance of the electricity grid – with a special focus on the distribution network – that will be offered to grid operators through an open-source interoperable platform. These tools will support DSOs and TSOs to move from a traditional grid management approach to an active system management approach, addressing the whole power system (i.e. both distribution and transmission level) and considering the rapid deployment of distributed energy resources (variable renewables and storage) as well as growing environmental concerns.

The overall solution and each of INTERPRETER modules will be developed, tested and validated in close collaboration with 2 DSOs and partners from 6 different EU countries, providing a set of representative use cases, thus ensuring the replicability and uptake of INTERPRETER solutions across Europe.

The Use Cases are:

- Electricity grid in rural areas, characterized by long power lines with stability and power quality problems;
- Congested grids in urban areas due to a massive penetration of distributed generation (PV) and/or excessive demand (new loads);
- Old electricity grids with frequent power outages;
- Electricity grid extension in new urban and rural areas;
- Connection of new large industrial loads to the grid;
- Connection of new large variable generation units (PV or wind) to the grid.

Conclusions

Following a pilot-driven approach that ensures the replicability and uptake of the inteGRIDy framework and the INTERPRETER solution across Europe, both projects offer a set of interoperable tools and services incorporating trending technologies with the objective of enhancing the capability of the grids, moving from a traditional grid management to an active system management approach and leading to a more dynamic smart electricity network.

The grids will benefit from the innovations developed in these projects including:

- Decarbonization of the electricity grid by the integration of large shares of renewables.
- Increased local energy self-consumption, self-sufficiency, new service provision, energy cost savings or increased energy efficiency and compensation through the integration of innovative smart grid technologies (e.g. IoT, predictive algorithms, forecasting engines, visual analytics).

- Full compliance with the European directives and regulatory framework.

Visibility of H2020 project solutions is key to guarantee reusability and best practice transfer. The EC is currently fostering this through BRIDGE cluster of projects, where common interest topics are analysed from the perspective of all involved projects (currently over 60 projects, including inteGRIDy)

Atos will keep working across the different active projects in its portfolio and in close collaboration with BRIDGE so that the outcomes of each project can benefit from the feedback and agreements (especially on the data management, architectural and harmonization topics) extracted from multiple sources. This way, the overall proposed framework of solutions would be scalable, interoperable and reusable.

About Atos Spain

Atos Spain (ATOS) is a global leader in digital transformation with over 110,000 employees in 73 countries and annual revenue of over € 11 billion. European number one in Cloud, Cybersecurity and High-Performance Computing, the Group provides end-to-end Orchestrated Hybrid Cloud, Big Data, Business Applications and Digital Workplace solutions. The group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos Syntel, and Unify. Atos is a SE (Societas Europaea), listed on the CAC40 Paris stock index. The purpose of Atos is to help design the future of the information technology space. Its expertise and services support the development of knowledge, education as well as multicultural and pluralistic approaches to research that contribute to scientific and technological excellence. Across the world, the group enables its customers, employees and collaborators, and members of societies at large to live, work and develop sustainably and confidently in the information technology space.

Atos Research & Innovation (ARI) is the R&D hub for emerging technologies and a key reference for the whole Atos group. With almost 30 years of experience in running Research, Development and Innovation projects, ARI has become a well-known player in the EU context.

As industrial strategic partner, Atos is the [inteGRIDy](#) project coordinator and in [INTERPRETER](#) Atos is leading the Integration of the grid modelling tool and SW applications in a common framework and existing platforms facilitated through the FUSE platform.

Information about the authors

Javier Valiño is the Head of the Energy, Climate and Decarbonization Unit in ARI. In his role of Head of Unit, Javier is managing a portfolio of ~10 research projects and is responsible for FUSE, an open-source framework that enables the integration of devices at the edge by fully exploiting the available data from local and distributed energy resources to build value-added services for several user profiles. With a wide experience in European projects, he is the project coordinator of inteGRIDy.

Nuria Rodríguez is the Head of the Communications and Marketing group within ARI Innovation Hub team, aiming at maximizing the impact of the research projects and promoting their value to addressed targets by standardizing and professionalizing the communication processes, methodology and guidelines in the team. In parallel, she is also leading the communication tasks in various H2020 projects, and more specifically in inteGRIDy.

María M. Carbonell has a degree in Marketing from University of Murcia with a Master Degree in Neuromarketing and Customer Behavior from Complutense University of

Madrid. She has been working in Atos as a Marcomm expert in charge of communication, market research and event organization and collaboration activities for different projects (among others SODALITE, INTERPRETER, MERLON, ASSET).

Malena Donato is a Business Consultant and working for business development in the Atos Research & Innovation group. Her expertise focuses on business planning, market analysis, and exploitation for IT research projects. She has more than 12 years of experience. Malena holds a degree in International Relations at The American University, Washington DC, USA and a master's degree in International Economics & Cooperation, at Complutense University of Madrid in Spain. She is the Innovation Manager in INTERPRETER and business consultant in MERLON and ASSET.

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