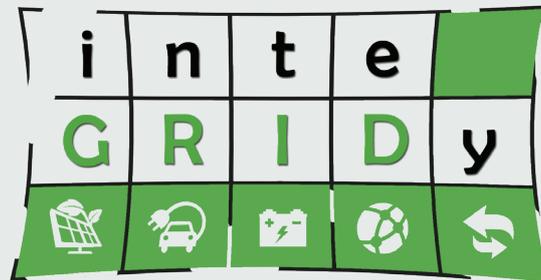


# INTEGRATED **SMART GRID** CROSS-FUNCTIONAL SOLUTIONS FOR **OPTIMIZED SYNERGETIC ENERGY DISTRIBUTION,** UTILIZATION STORAGE TECHNOLOGIES



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Dear reader,

It has been a while since we published our first newsletter back in June 2017. Now inteGRIDy has successfully achieved all first year milestones. This past year was crucial for the project, as we struggled to set the basis of the innovation yet to be deployed in our pilots. This way, we are now in a position where all inteGRIDy partners are aligned around a common understanding of the regulatory and market needs of each stakeholder, we have built a common reference architecture to be used for our energy tool fine tuning and integration and we have identified promising business cases for us to develop further.

There are still three challenging years ahead of us, but we have gained momentum and the next phase is now in force, with special focus on actual developments for our energy tools, towards a unified interaction and validation.

We would like to present in this newsletter what we consider our most remarkable outputs so far, namely the reference architecture and our first approach to business cases. In addition, we will continue the partner presentation with the following 5 consortium members in alphabetical order. Finally we will share the insights of all our past dissemination events and the plan for the first half of 2018.

We are thrilled to share all our achievements with you. Latest and updated news can be also followed through our web page ([www.integridy.eu](http://www.integridy.eu)) and our twitter account (@integridy\_H2020).

Please do not hesitate to interact with us!

**inte**egrated Smart **GRID** Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731268



Topic: LCE-02-2016 - Demonstration of smart grid, storage and system integration technologies with increasing share of renewables: distribution system

Objective: inteGRIDy is integrating existing technologies to implement a **smart grid distribution platform** which offers "**smart grid energy services**" for low voltage (LV) and medium voltage (MV) networks. In business to business (B2B), business to consumer (B2C) and business to business to consumer (B2B2C) market contexts.



Duration: Jan 2017 to Dec 2020

Partners: 30

Countries: 10 (Cyprus, France, Greece, Italy, Portugal, Rumania, Spain, United Kingdom)

Pilots: 10

Total Budget: 15.840.275 €

EU Grant: 12.329.013 €

Coordination entity: Atos

## PARTNERS

As the project consortium comprises 30 partners, several newsletters are used to formally present them all. We already presented our coordinator Atos together with ASM Terni, Azienda San Severino Marche, ATKearney and AIGUASOL in our previous issue back in June 2017. This second issue introduces the following 5 members, in alphabetical order, including inteGRIDy's technical coordinator.



[www.cperi.certh.gr](http://www.cperi.certh.gr)

[www.iti.gr](http://www.iti.gr)

Greece

### ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS

The Centre for Research and Technology-Hellas (CERTH) is the only research centre in Northern Greece and one of the largest in the country and it was founded in 2000. It is a legal entity governed by private law with non-profit status, supervised by the General Secretariat for Research and Technology (GSRT) of the Greek Ministry of Education and Religious Affairs.

From CERTH, Information Technologies Institute (ITI) and Chemical Process and Energy Resources Institute (CPERI) participate in order to fulfil the objectives of inteGRIDy.

CERTH/ITI as a strategic partner for inteGRIDy project with profound experience on pilot realisation and platforms implementation, actively participates in the inteGRIDy Cross-Functional Platform implementation, as well as leading the activities envisioned related with Small Scale Demonstration and Performance Monitoring at Pre-Pilot Use Cases.



[www.eac.com.cy](http://www.eac.com.cy)

Cyprus

### ARCHI ILEKTRISMOU KYPROU

Electricity Authority of Cyprus (EAC) is the incumbent power utility in Cyprus, following public body governance rules. EAC is responsible for almost all conventional power production, owner of the Transmission System (which is operated by TSO (Transmission System Operator)), owner and operator of the distribution system. So far, it is the only power supplier in Cyprus. Currently, it employs approximately 2200 employees, out of which around 200 are scientists and engineers, focusing their activities on the operation, on the maintenance and on the development of the power system.

EAC's role in the inteGRIDy project is to support the design and deployment of the micro-grid at the University of Cyprus (UCY) premises, provide all necessary information and expertise for the design of the optimal demand response mechanisms to be applied to the pilot case. Additionally, will enable the bidirectional flow of information with the consumers, using smart-meters and PLC or GPRS communication technologies, enabling demand-side management.



[www.electrica.ro](http://www.electrica.ro)

Romania

### SOCIETATEA ENERGETICA ELECTRICA SA

SDFEE Electrica S.A. shortly named "Electrica", is a Romanian legal person, organized as a joint stock company, managed in the one tier system, and it carries out its business according to Romanian laws. Its object of activity consists in power distribution (DSO) and supply, providing communications infrastructure / information and energy services. The Company is a leader in terms of size of existing assets, since it has about 36% of electrical networks at various voltage levels. Regarding the geographical coverage, Electrica covers 18 counties and it serves about 42% of the number of consumers of the country.

In inteGRIDy project, Electrica develops, for the Romanian use case, an innovative infrastructure with energy consumers and energy providers whose demand and supply of energy are monitored. The aim is to reason on energy consumption and provision such that, by optimizing (reducing) the overall energy consumption a positive impact on environment can be ensured.



[www.powerstar.com](http://www.powerstar.com)

United Kingdom

## EMSc (UK) Ltd

EMSc (UK) Ltd is a UK energy solutions company which design and manufacture an innovative range of commercial energy management technologies. EMSc (UK) Ltd was formed in 2001, and has installed over 7,000 systems throughout the world, the company's solutions are exported to over 20 countries and the client base includes landmark sites, large blue-chip companies, public sector estates, government and local authorities and SME's across a range of industries.

In inteGRIDy project, EMSc acts as a supplier of 15 Virtue-EV stations with 60kWh's (each) of integrated energy storage that connects grid tied and connects to a B.T exchange Telecom site. This allow B.T to charge up to 30 vehicles simultaneously without having detrimental strain on the local electrical network, or forcing the network to be upgraded, resulting in large costs. The unit runs alongside renewable PV in order to provide extra energy to the batteries in order to reduce the overall reliance of the charging stations on the Isle of Wight Grid Network. EMSc supplies and connects the hardware as well as provides a DSR (Demand Side Response) platform, whereby local/ national aggregators can take control of the unit, and provide demand side management services.



[www.eng.it](http://www.eng.it)

Italy

## ENGINEERING - INGEGNERIA INFORMATICA SPA

Engineering Ingegneria Informatica S.p.a. is a leading provider of advanced Information Technology systems and services to diverse commercial and governmental customers, with a particular attention to the Energy and Smart Grid sector. Engineering Group is currently the first IT group in Italy has 40 branch offices in different countries. The Engineering Group operates through 7 business units; its innovation capability is supported by the Central Unit of Research & Development, with around 250 researchers currently involved in over 50 research projects co-funded by national and international authorities.

ENG works on the definition of the overall inteGRIDy architecture by contributing not only in the definition of scenarios and use cases and in the elicitation of requirements but also in the integration of the wide set of components, tools, methods and methodologies that the Consortium is putting at disposal of the project. A strong participation is foreseen also in tasks related to the optimization of energy flows, and, as large enterprise and IT company, also contributes to the definition of business models for the InteGRIDy future sustainability.

## KEY ACHIEVEMENTS

### INTEGRIDY ARCHITECTURE, FUNCTIONAL AND TECHNICAL SPECIFICATION

**Marilena Lazzaro**, Senior Researcher

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One of the main goals of the inteGRIDy project is to demonstrate a set of innovative technologies and solutions to enable demand-response, enhance smart grid management, and use novel storage techniques together on an integrated energy system. Pursuing this objective, inteGRIDy aims at delivering an integrated framework of tools compliant with the inteGRIDy reference architecture, which has been sketched in the project's proposal and provides preliminary guidelines for the integration of tools to be extended and improved to satisfy the specific Pilots' needs. These tools represent the Asset that each Technology Partner wants to bring in the project.

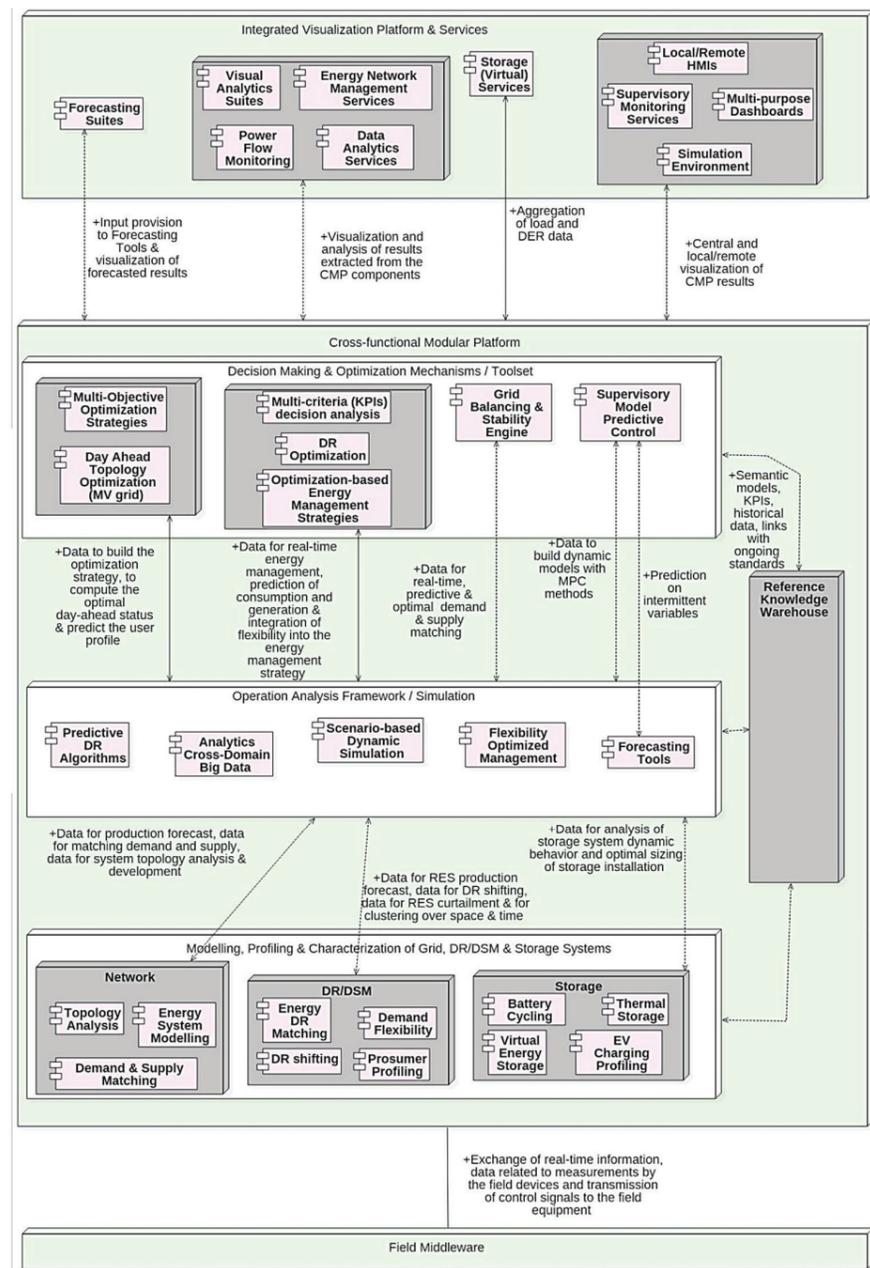
inteGRIDy Architecture, Functional and Technical Specification aims at accomplishing this goal by applying a specific methodology based on the Requirements elicitation process requiring the cooperation of both pilot leaders and technology. The outcome is produced as a reference architecture for the inteGRIDy Framework, as well as a set of functional and technical specifications for all inteGRIDy tools. On top of that, the data model used is agreed and described, so as to capture and formalise the conceptual model of the information data stored and maintained in the inteGRIDy Reference Knowledge Warehouse. The Non-

Functional Requirements (NFR) that the inteGRIDy system should meet are also described.

Figure below provides an overview of the all high-level macro functionalities comprising the inteGRIDy reference architecture and the data flow between the cross-functional modular platform (CMP) and the lower and upper layers. Indeed the inteGRIDy architecture is organized per layer; the middle layer corresponds to the core of the architecture, the CMP, an integrated framework comprising all inteGRIDy tools. The CMP can be also decomposed in sub-layers, grouped by the specific functionalities that are exploited. This way, inteGRIDy will create synergies between existing models/modelling tools brought by consortium partners in order to have a wide base of models, profiles & storage characterization. Moreover, the project will implement the innovative operation analytics techniques, applying forecasting, prediction, big data analytics and simulation techniques in the energy domain. Finally, techniques able to optimise, take decisions, and schedule strategies related to the smart control of the energy resources of the system will be delivered. The lower and the upper layers of the inteGRIDy reference architecture represent the Field Middleware and the Integrated

Visualization Platform (IVP) respectively. The first one provides the basic interface with the physical world and is mainly responsible for gathering the data that will be processed. The second one relies on the analysis and interpretation of the data and provides valuable and visual information for stakeholders such as DSOs and final users.

This reference architecture and its different views represent the starting point of inteGRIDy development activities. This first proposal is subject to iteration, with a refined and complete specification expected by the end of this year, taking into account both the developments and integration activities carried out through the project.



Overview of the all high-level macro functionalities comprising the inteGRIDy reference architecture

## SHAPING INTEGRIDY'S BUSINESS MODEL

**Alina Margolina**, Junior Project Manager,  
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Today, the energy industry faces spectacular developments, which force all market players to reassess its current business models. Technological developments play a significant role in this transformation. According to the PwC Annual Global Power & Utilities Survey, 51% of respondents agree that smart metering and grid deployment will have a profound impact on the energy market. These developments have already started to shape new market strategies, giving a rise to innovative business models. The inteGRIDy project has an ambition to contribute to shaping the future of the energy market as well.

inteGRIDy aims at developing, testing and integrating smart grid technologies into a scalable framework connecting energy networks with diverse stakeholders, 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. To make such a highly technologically driven integration commercially viable and valuable for all stakeholders involved, an appropriate business model approach needs to be developed.

Tasks related with analysis of Environmental, Business Models & Financial Mechanisms, aim at accomplishing this objective by

conducting activities to provide the foundations for the commercialization of the developed framework and its various components, and to develop new business models as an outcome. When developing dynamic business models, one of the key challenges is to ensure that energy market specifics are analysed and taken into consideration. With regard to the inteGRIDy project, this becomes particularly relevant as the project partners have committed to validate the Cross-Functional Platform in 10 different pilots located in 8 different EU states. Each pilot operates under particular market conditions peculiar to a country it is based in.

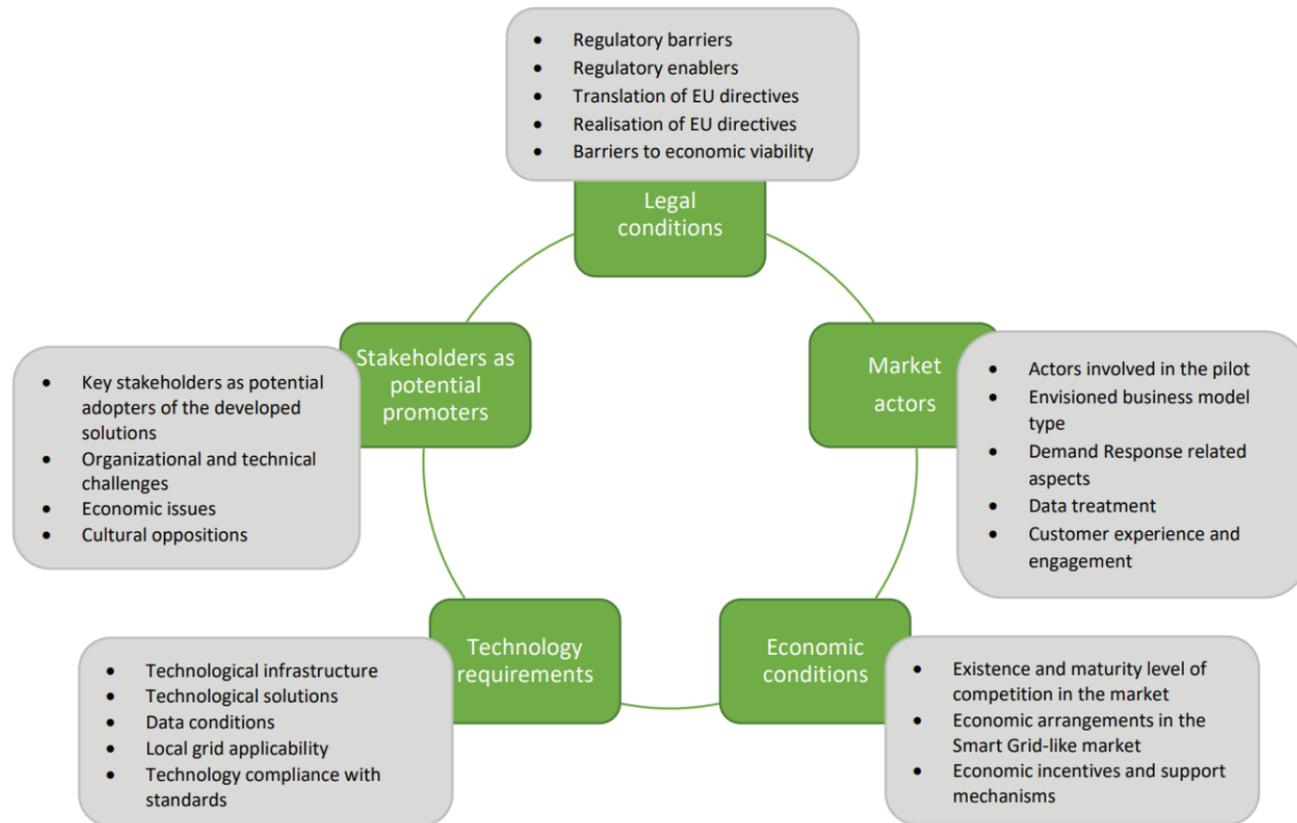
To address this task, inteGRIDy studied the Business cases and Financial Mechanisms, conducting an extensive market design analysis, as well as considering the financial benefits associated with the implementation of the inteGRIDy's solutions.

For the market analysis, the following five domains were considered: legal conditions, market actors, economic conditions, technology requirements, and stakeholders as potential promoters of the demonstrated solutions. Aspects within these five domains were analysed either by pilot country or by pilot, depending on what was defined more appropriate per domain.

Moreover, the analysis provides the initial business case assessment for the

framework as well as for its components. Both analyses provided valuable results with regard to the current attractiveness of each market for the realization of the developed solutions. The results

will be utilized to design dynamic value propositions, define ways to create, deliver and capture value for all the stakeholders involved.



Energy market analysis: key factors analysed

## PROJECT NEWS



### 28-30.06.2017 - Participation in Sustainable Places 2017

In June, Lena Holzner and Rene Bohnsack (Universidade Catolica Portuguesa) represented inteGRIDy at Sustainable Places 2017 conference. They presented a keynote named “Business models challenges for sustainable energy firms”. In addition, Vladimir Vukovic (Teesside University) provided a general inteGRIDy presentation during the Smart Grid and Storage Workshop.

Sustainable Places 2017 (SP2017) was the 5th Sustainable Place iteration, and part of the official EU Sustainable Energy Week (EUSEW) Energy Days initiative. It brought together key stakeholders on Energy-efficient



Buildings (EeB) and smart grids to further commercial, scientific, and technological advancements across interdisciplinary fields.



### 12-13.09.2017 - Plenary Meeting in Milano

inteGRIDy held its second plenary meeting back in September 2017, kindly hosted by Politecnico di Milano. This meeting was a good chance for project partners to present the results and outcomes of the first phase of the project lifetime, where the requirements setup, the regulatory and market framework analysis and the business case elicitation is conducted.

The feedback collected and the discussions maintained provided valuable information for the project to produce the first reports and set the basis for the next coming technical activities.

These technical activities were officially kicked off during this meeting. The reference architecture discussions started and the tool development/adaptation based on this architecture were also started.



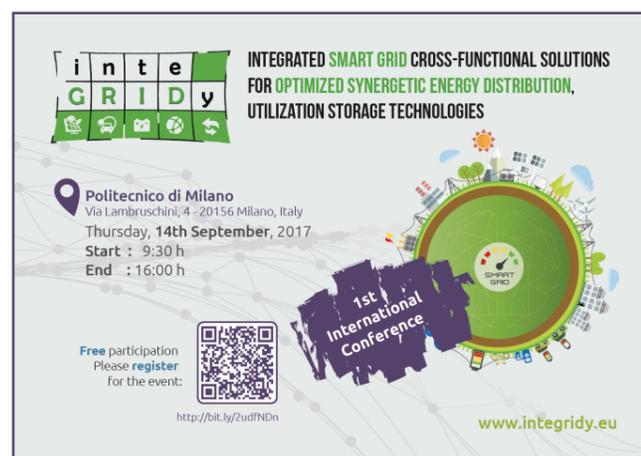
## 14.09.2017 - 1st International Conference inteGRIDy

Hosted in the framework of inteGRIDy, this project organized event gave the opportunity to set up an interactive dialogue among the ongoing European H2020 R&I Projects on innovative technologies for smart grid on MV/LV in the topics of Demand Response and intelligent distribution grid. The event was organized as an open discussion among representatives from National Authorities for Energy and European DSOs.

During the conference, a specific session (in the form of roundtable) involving representatives from different countries was scheduled so as to discuss about different future policy visions for evolving the current electricity market. Specific questions were answered by expert guests in order to assess if the innovations promoted in inteGRIDy had been oriented in the proper direction.

The event was mainly organized into three sessions:

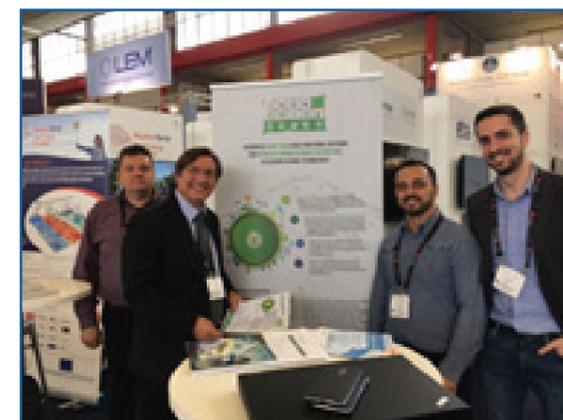
- Session 1. Discussion on the EU ongoing and future policies for the European energy market.
- Session 2. Roundtable with speakers from National Energy Authorities.
- Session 3. Presentation of related EU projects which can foster, from the technological point of view, the flexibility on the smart grid, underlining their commonalities with inteGRIDy.



## 03-05.10.2017 - inteGRIDy in European Utility Week 2017

inteGRIDy participated at the EUW17 in Amsterdam, disseminating the project scope and outcomes and raising a lot of attention. This was done in collaboration with BRIDGE initiative, which gathered together a number of H2020 projects.

In addition, our coordinator, Andrea Rossi (Atos), presented the project in the Hub sessions - H2020: EU Research and Innovation. Andrea introduced the main highlights of the project, a technical description of inteGRIDy's framework and a description of all 10 inteGRIDy pilots.



## 11.10.2017 - ASCENT Blog entry



Andrea Rossi, head of the energy sector for Atos Research and Innovation and Coordinator of inteGRIDy project, published an article in Atos Blog titled "New utility horizon", where he presented inteGRIDy project as one of the H2020 projects that will help supporting a reliable, sustainable and competitive energy system.

In the full article is accessible at: <https://atos.net/en/blog/new-utility-horizons>

## 21-22.11.2017 - inteGRIDy project with BRIDGE initiative

inteGRIDy was represented on BRIDGE Working Group and coordination meeting held in Brussels back in November 21st and 22nd. This is the first time inteGRIDy members attended the Working Group, which is a great chance to foster deep collaboration on key topics addressed on the cluster. In addition, the project was also involved in the coordination meeting for the second time, taking advantage of the overall guidance of the EC for the whole set of BRIDGE projects.

- Tracey Crosbie (Teesside University) represented inteGRIDy on the Regulations Working Group acting as Standardization, Analysis, Regulations & Privacy Policy leader.
- René Bohnsack (Universidade Catolica Lisboa) represented inteGRIDy on the Business Modelling Working Group acting as Analysis of Environmental Business Models and Financial Mechanisms leader.
- Javier Valiño (Atos) represented inteGRIDy on the Data Management Working Group acting as Project Management leader.
- Andrea Rossi (Atos) represented inteGRIDy on the Coordination session acting as project coordinator.



## 23.11.2017 - Participation in IV Congreso Smart Grids

Atos represented inteGRIDy project in the “IV Congreso Smart Grid” held in November in Madrid. The congress included the communication “inteGRIDy- Plataforma habilitadora de la transformación de los Smart Grids”.

This congress is the main professional forum for the Smart Grids sector in Spain. It is a multidisciplinary event that includes all stakeholders and different sectors, integrating the different aspects around energy sector, such as: technological achievements, strategic



policies, economic scenario, current and future R&D and commercial projects, normative, administrative considerations, legal advice, etc.

This communication was also published in the digital magazine Smartgridsinfo.es (<https://www.smartgridsinfo.es/comunicaciones/integridy-plataforma-habilitadora-transformacion-smart-grids>)

## 23-25.11.2017 - Participation in IoT for the Supervisory Control and Management of Smart Grids with RES and Batteries, 2nd Energy Technologies Workshop

In this national event held in Athens, inteGRIDy project was represented by our partner CERTH. In the 2nd Energy Technologies Workshop Dr. Spyros Voutetakis presented a work that proposes an integrated methodology for managing and supervisory control of small-scale smart grids and it is implemented using flexible Energy Management Strategies (EMS). The grid networks into consideration are powered by Renewable Energy Sources (RES) and have local energy storage using batteries and / or hydrogen. The objective of the EMS is to efficiently exchange energy between the smart grid stations to maximize the use of available stored energy at the network level and to exploit the overall power produced by RES. To achieve this goal, the behaviour of the involved systems is modelled and the requirements for



energy management in a dynamic and distributed environment are determined. It also demonstrates the implementation of Internet of Things architecture (IoT). The reference system which is used as a motivating example of autonomous smart grids is located in SUNLIGHT’s premises is a standalone intelligent power grid that includes three stations with local energy storage capability using lead-acid batteries.

## 24-01-2018 - Launching inteGRIDy official video

In January this year, inteGRIDy released its first introductory video, where main objectives, technical insights and expected outcomes are explained in a nutshell.

The video is uploaded on a dedicated Youtube channel, which was opened for the project. It is also published on the project’s webpage ([www.integridy.eu](http://www.integridy.eu)) and disseminated through the project’s twitter account (@integridy\_H2020)





## 21-22.02.2018 - Palermo WP4 meeting

The core partners of WP4 met in Palermo at Engineering premises in a 2-day face-to-face meeting to present the work done in the different tasks of this work package. The discussions mainly focused on the different layers of the reference architecture, composed by the Cross-functional Modular Platform, the middleware API layer and the Knowledge Reference Warehouse.



## NEXT STEPS AND EVENTS



### Plenary Meeting in Cyprus

inteGRIDy partners plan to meet together on the 3rd plenary meeting in March this year, kindly hosted by UCY. The meeting will be used to officially close the work related to requirements and market analysis and speed up on the common understanding and collaboration around the reference architecture, specially oriented to tool providers and pilot participants.



### Participation in IRES2018

Marco Merlo by Politecnico di Milano will participate in March in the 12th International Renewable Energy Storage Conference (IRES 2018) representing inteGRIDy project.

In this event, a paper will be presented, focused on one of the InteGRIDy Pilots. The Smart Grid architecture deployed in San Severino Marche Pilot will be presented and the algorithm adopted in order to optimize the MV feeder will be detailed.



### Participation in PEMD 2018

Our colleagues from Newcastle University will participate in April in the 9th International Conference on Power Electronic, Machines and Drives, PEMD 2018 with the paper "Modelling and simulation of a smartgrid architecture for a real distribution network in the UK"



### Participation in EEEIC

Giuseppe Paterno from Engineering – Ingeneria Informatica SPA will participate, representing inteGRIDy project, in the IEEE 18th International Conference on Environment and Electrical Engineering and 2nd Industrial and Commercial Power Systems Europe to be held in Palermo next June.

Atos

SIEMENS



AT&T Kearney



TREK consulting



S'imples energia



@inteGRIDy\_H2020



[www.integridy.eu](http://www.integridy.eu)



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