



SCIENTIFIC CONFERENCE of DRES2Market PROJECT.

Distributed generation-effective solutions for
the energy sector



Introduction of the DRES2Market Project:
scope and progress with reference to the large
penetration of renewables in the electricity
market

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952851

Objective

Developing a comprehensive and affordable approach to facilitate the effective participation of renewable energies and distributed generation in electricity markets and to enable them to provide balancing and reserve services according to market criteria.

DRES2Market. Main facts 2020

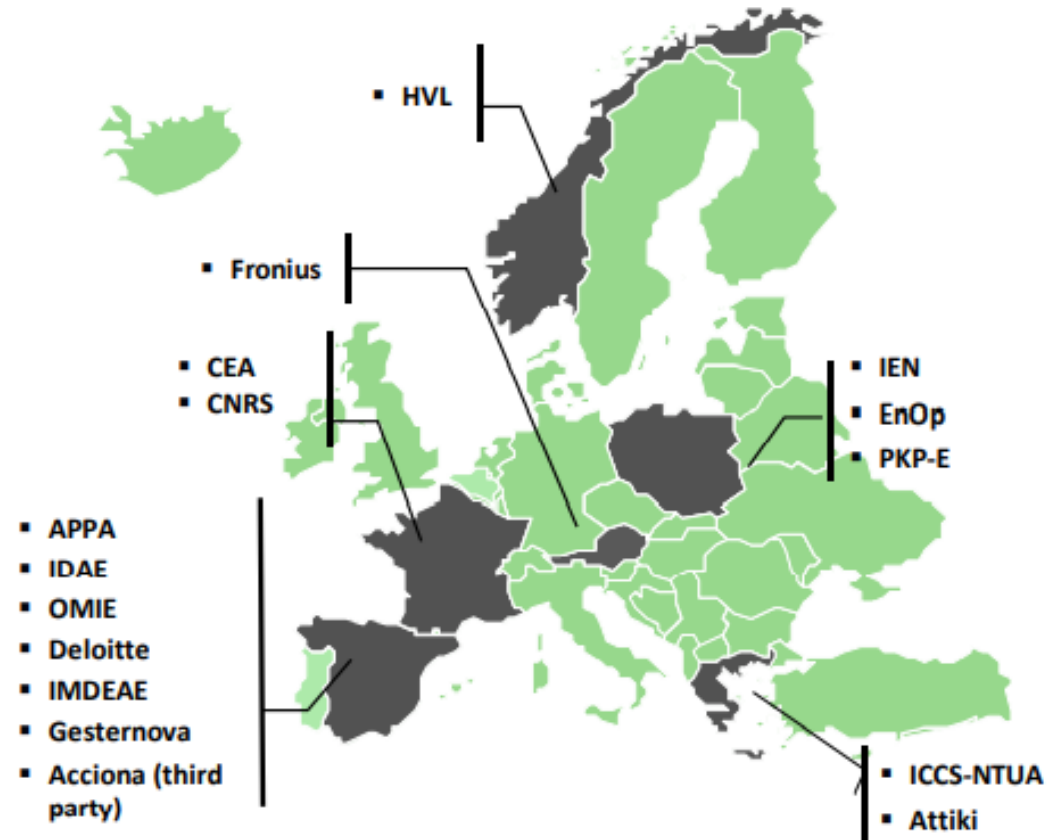
Carried out by 15 European partners (6 countries).

Countries involved: Austria, France, Greece, Poland, Norway, Spain.

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Budget: €2.9 million

Duration: 30 months, starting in August 2020, and finishing January 2023.



Project profile Consortium

DRES2Market consortium includes the key players for the system integration of variable renewable energy: balance responsible parties:

Key DRES2Market topics	DRES2Market partners
Large scale integration of RES at high voltage and distribution level	<ul style="list-style-type: none"> RES promoters: APPA, Acciona (third party) and EnOp Grid operator: EnOp. Experts in transmission and distribution connection of RES, technical assessments: CEA, ICCS-NTUA, IEN, IMDEAE, and Deloitte
Experts in electricity markets	<ul style="list-style-type: none"> Market operator: OMIE Retailers that could play the role of aggregator: PKP-E, Attiki, Gesternova and Acciona Energía, S.A. (DRES2Market third party), and APPA
RES distributed generation	<ul style="list-style-type: none"> Provider: Fronius. Promoters: APPA and Acciona. Distribution company (DSO): EnOp RES distributed experts: IMDEAE, CEA, IEN, ICCS-NTUA and Deloitte. Outstanding electricity grid simulator, transmission and distribution grids (SEIL): IMDEAE.
Manufacturers of equipment and devices	<ul style="list-style-type: none"> Technology provider: Fronius RES equipment manufacturers association: APPA
Energy government body focused on sustainable energy solution in charge to develop the regulatory framework with a clear view of the EU Energy Policy	<ul style="list-style-type: none"> IDAE
Final consumers	<ul style="list-style-type: none"> Prosumer association: APPA. Associations of electricity consumers (members of DRES2Market Stakeholders' Committee: Asociación de Consumidores de Electricidad (Spanish Electricity Consumers Association), Federacja Konsumentów (Polish Electricity Consumers Association).

The environment

- Renewables are currently **affordable solutions** for the electricity supply, from technical and economic points of view.
- **Ambitious targets for renewable energy** penetration in 2030 have been set.
- Their effective integration requires to **increase their flexibility to mitigate the volatility of the production and facilitate their participation in electricity and ancillary services markets.**
- **Technology and market approaches have been improved** in the last years to enhance large penetration of renewables.

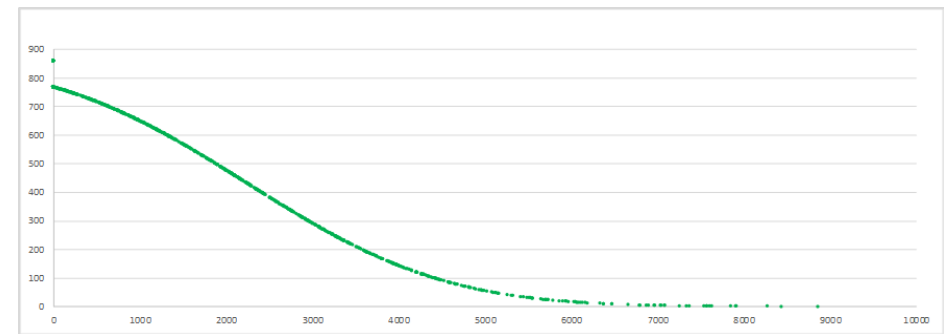
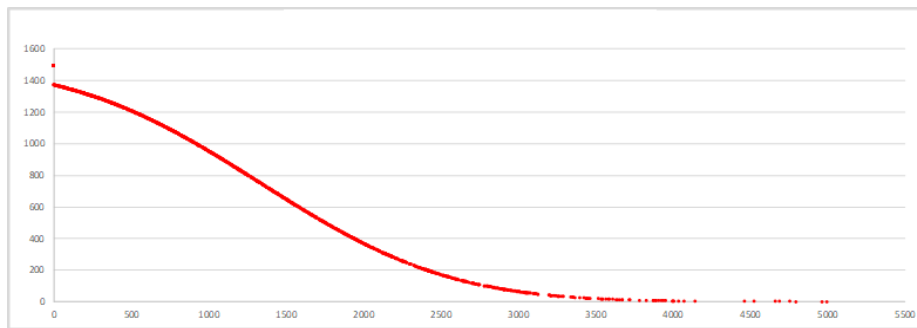
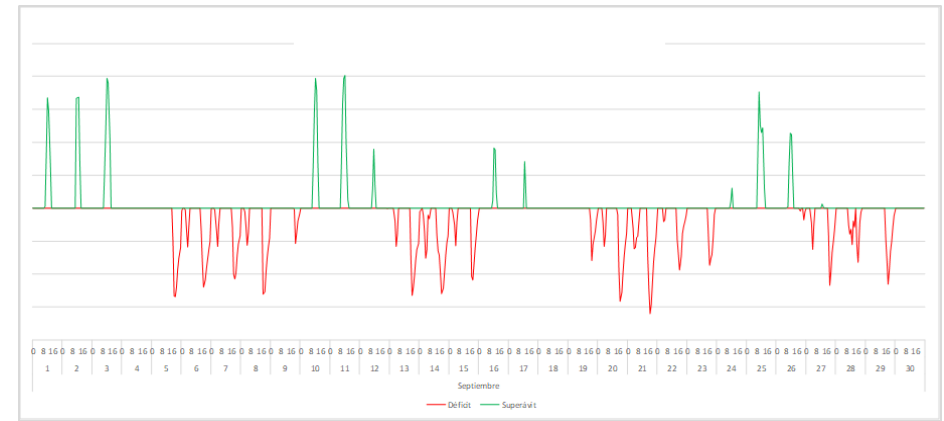
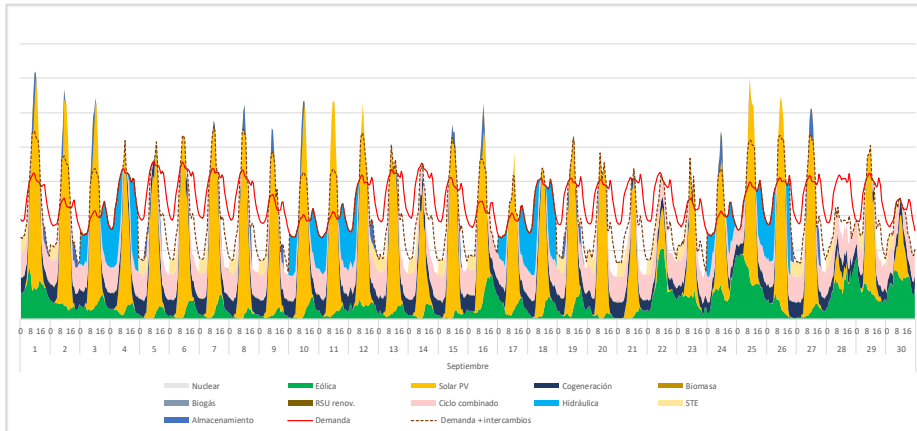
EU confirms plans to increase 2030 renewable energy target

The European Commission presented its plan on how to reduce EU greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. Executive Vice-President Frans Timmermans and Commissioner Kadri Simson announced that legislative proposals will be presented by June 2021 to implement the new target, including a revised and expanded EU Emissions Trading System, and reinforced energy efficiency and renewable energy policies. A critical milestone is the confirmation that the European Commission will increase its 2030 renewable energy target from the current 32% up to 38–40%, for which a proposal will be submitted by June 2021.

SEPTEMBER 18, 2020

Price Coupling of Regions (PCR) is the project of European Power Exchanges to develop a single price coupling solution to be used to calculate electricity prices across Europe respecting the capacity of the relevant network elements on a day-ahead basis. This is crucial in order to achieve the overall EU target of a harmonised European electricity market. The integrated European electricity market is expected to increase liquidity, efficiency and social welfare. PCR is open to other European power exchanges wishing to join

The environment



Large penetration of renewables and distributed generation will give rise to high volatility in the electricity markets, and excess or deficit of production, and reduce the electricity system inertia.

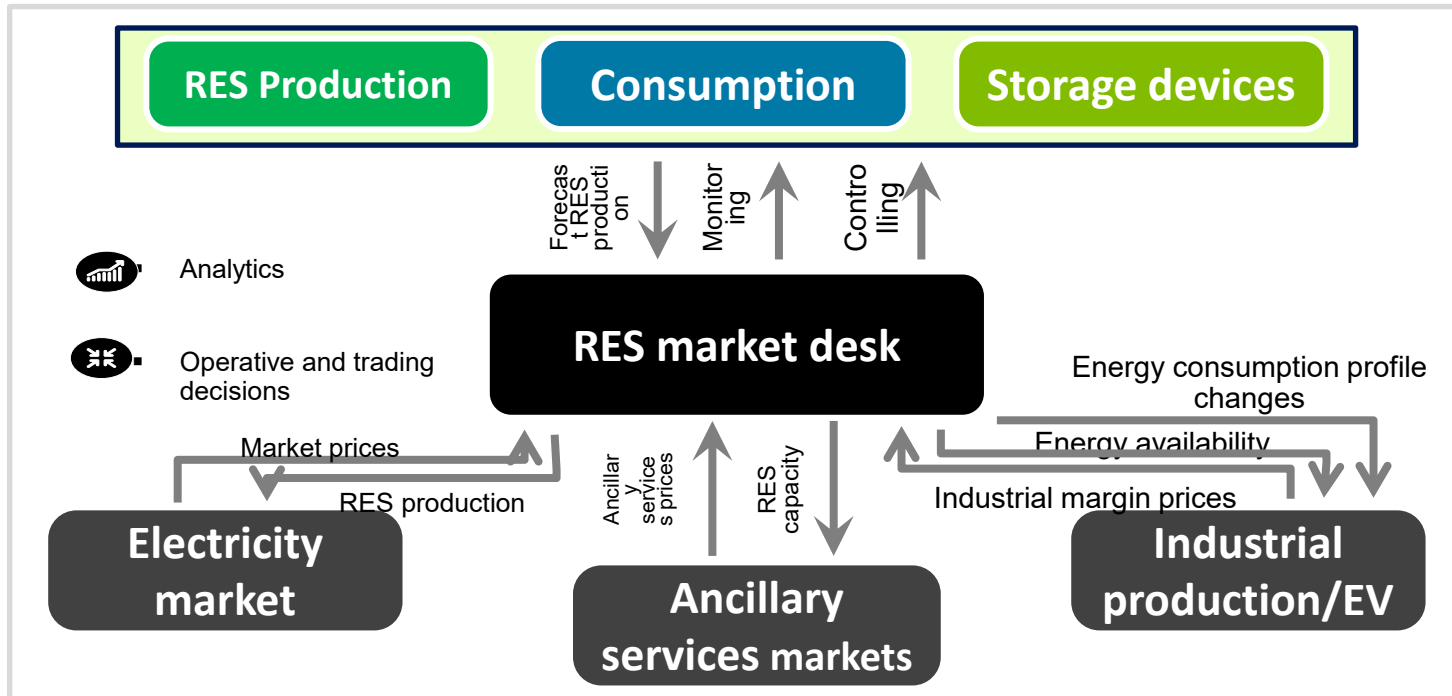
DRES2Market is focused on identifying suitable solutions to mitigate this impact.

- Evaluation of the existing technologies (power generation, energy storage solutions, smart technologies, active demand management and so on) to design appropriate approaches for the effective integration of RES and distributed generation.
- Assessing the existing grid codes and market rules to enable the participation of variable renewable energy.
- Identifying opportunities for the active participation of final consumers in the RES penetration.
- Validating the most promising solutions and approaches using simulation processes with real data conditions: electricity markets and system simulation and testing in real environments.

- Validation of solutions, technologies and approaches.
- Recommendations for standards of equipment and devices to enhance RES integration.
- Recommendations for the regulatory harmonization inside of the EU.
- Identification of arguments to obtain the social acceptance of these technologies, making citizens aware of the positive impact of these solutions.

Validation processes. Sizing the prosumer solution

- Hourly electricity flows simulation (consumption and production) during the equipment useful life
- Cash flows simulation



- NPV and IRR
- Optimal size
- Necessary investment
- Self-consumption level
- Self-consumption cost

Collaborative approach between variable renewable energy generation project developers and consumers: testing in simulation environments and real operation.

Prosumers integration with wholesale market:

- Intra-day continuous market.
- Local markets

Case Studies

The following cases will be considered during this first DRES2Market test:

- Test Case 01 - Evaluate the **technical challenges of distributed generators providing fast frequency response and voltage support.**
- Test Case 02 - Evaluate the **technical challenges of distributed generators providing black-start functionalities.**
- Test Case 03 - Analysing the impact of **massive penetration of PV self-consumption.**
- Test Case 04 - **Large renewable energy penetration impact in the energy system.**
- Test Case 05 - **Local Energy Communities manages local flexibility for their needs and if possible, to sell the flexibility in the wholesale market.**
- Test Case 06 - DERs participation (individually or aggregated) in local flexibility markets.
- Test Case 07 - **Integrate large volumes of renewable energy and flexible demand in continuous intraday market through an aggregator.**
- Test Case 08 - **Integrate a large volume of electric vehicles in the energy system**
- Test Case 09 – Integration of **energy storage in the grid.**
- Test Case 10 - **Repowering of installations.**
- Test Case 11 - **Hybridization of installations.**
- Test Case 12 - Integrate "Dynamic Line Rating".
- Test Case 13 - Market agents' registration and DERs habilitation process to allow participation in local flexibility markets.

Case Studies. Advantages

- Active participation of prosumers in the electricity wholesale market.
- Optimization in the use of distributed generation capacity: avoiding surpluses.
- Optimization in the use of energy storage devices.
- Promoting active demand management based on market signals.
- Economic signal for adapting demand patterns.
- Contribution for balancing at system and local levels.

1st.-Based on a Microsoft Excel file, a year with an hourly detail electricity market simulation (hourly demand profile and its volatility, power generation structure and its volatility and cost structure) has been developed. **This tool considers the operative of renewable energy solution profiles and its volatility, energy storage device capacities and their level of losses.**

2nd.- A customized framework of the European Continuous Intraday Market Simulator of OMIE to evaluate the impact of renewable energies and distributed generation in this market and test the use of automatic tools to operate in this market.

3rd.-An electricity flows simulator for high and low voltage to evaluate the impact on large penetration of renewable energies and distributed generation in the transmission and distribution grids. The grid service market will be simulated taking into consideration the large penetration of renewable energies and the active role of the demand side in these markets. This procedure will be carried out using the grid simulator of IMDEA and taking into consideration the reliability and security criteria of the grid operators.

4rd.- An electricity flows simulator for distribution grids to evaluate the impact of distributed generation and self-consumption and storage devices on the congestions in the distributed grids.

Some conclusions and recommendations

- Renewables have a positive impact on auxiliary services and ancillary services.
- Renewables and batteries contribute to the stability of electricity networks.
- The benefits of these services are more relevant for high levels of integration of renewables.
- However, high levels of integration of renewables can cause instabilities and, for these cases, it is advisable to check stability during the planning stage.
- It is necessary to analyze the aspects of network stability with an overview of all the elements.

A large version of the DRES2Market logo, identical in design to the one in the top right corner, centered on the page.

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