Case study

Enhancement of the smart grid infrastructure in Romania by implementing the innovative solution EIIS (Energy Integrated Information System) in 'InteGRIDy' Ploiesti Pilot

The InteGRIDy project tackles four innovation challenges in energy: Demand Response, Smartening the distribution grid, Energy storage and Smart integration of grid users from transport, and proposes ten pilot deployments in eight countries across the European Union (United Kingdom, France, Spain, Portugal, Greece, Cyprus, Romania and Italy). The Romanian Pilot – Ploiesti Pilot is focused on the Demand Response pillar of InteGRIDy, aiming to pursue how the electrical grids of the future could operate in targeted/specific areas and analyze the positive outcomes of implementing such innovative solutions for the DSO and consumers.

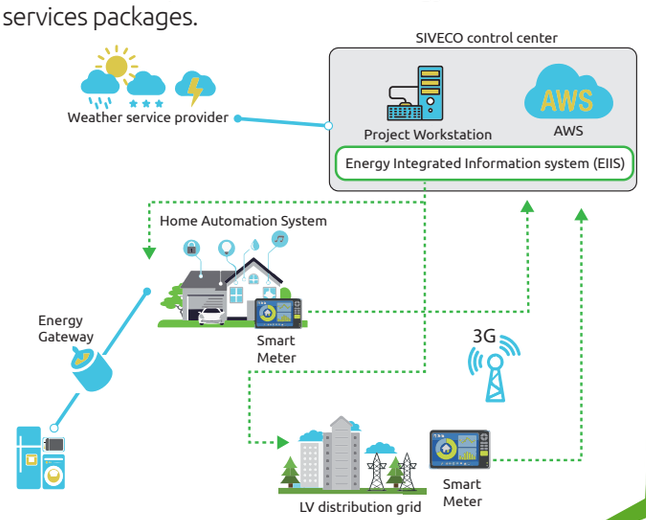
"ELECTRICA SA (DSO) and SIVECO Romania (technological partner) are project partners for implementing the Ploiesti Pilot in the EU Horizon 2020 funded program 'InteGRIDy'."

The challenge

Pilot Ploiesti is implemented in relation to the 'InteGRIDy' project's Demand Response pillar. The purpose of implementing the EIIS (Energy Integrated Information System) within the Ploiesti Pilot is to ensure a Demand Response (DR) Smart Grid for a residential area, where buildings' energy management and control systems will operate based on critical peak pricing and intelligent DR programs/algorithms.

The challenge of implementing the Ploiesti Pilot is to deliver an innovative solution which provides specific functionalities such as monitoring and control of the operation of DR programmes in order to decrease the peak of power consumption, engaging consumers in DR, testing and validating the concept of a DSO (Distribution System Operator) as user of demand-side flexibility. Moreover, the consumer behaviour has to be analyzed to increase flexibility of energy consumption using specific DR intelligent algorithms with the final goal of providing trade flexibility solutions.

ELECTRICA SA, as a large Romanian DSO, will use the results of Ploiesti Pilot implementation to improve the offered services and to provide innovative energy distribution services packages.



The solution

The Ploiesti Pilot is based on electric energy consumption data for residential users.

Particularly for the Romanian Pilot, the energy demand and supply are matched by means of an intelligent solution, the EIIS (Energy Integrated Information System), aiming at delivering a direct impact on overall energy consumption. The Ploiesti Pilot is a solution developed from the scratch. The economical objective of the Pilot is to analyze the effect of the proposed automated DR solution, based on smart meters infrastructure, on the energy consumption in targeted/specific areas and the positive outcomes of implementing this type of solutions for the DSO and consumers.

ELECTRICA SA will develop within the Pilot an innovative infrastructure with energy consumers and energy providers whose demand and supply of energy will be monitored. Dedicated smart meters installed on site (smart metering infrastructure) provide data about consumption (using specific communication lines and software) which are used together with historical data to implement and validate DR algorithms.

The core integration platform of EIIS developed by SIVECO will handle several DR profiles, which could then be tested. The resulted web-based solution will provide relevant information about the power demand and evolution of consumption and also easy-to-interpret data visual representations and reports.

Such an implementation could then serve as a main starting point for latter more complex DR profiles, like Demand Side Management (DSM) and bring elements of automated decision-making, based on various profiles or criteria.

Ploiesti Pilot is based on four major data exchange flows:

- Data collection / simulation (Load measurements, Environmental measurements)
- Data analysis (based on facility & user consumption profiles)
- Data processing based on DR programs and algorithms (modelling, optimization, forecasting)
- Outputs: Alerts and notifications.

The benefits

Main savings concern microgrid resources optimisation (e.g. increasing of self-consumption, internal losses reduction), green energy consumption maximisation, network reliability and resilience improvement. Furthermore, on the distribution network, loss reduction is expected, as well as power quality improvement. In particular, ASM Terni aims at reducing SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index), reducing voltage fluctuations.

Regarding the pilot site, ASM Terni aims at increasing both efficiency and sustainability, from an environmental point of view. Environmental improvement involves CO2 emission reduction and self-consumption increase. From an economic point of view, these improvements can be considered as revenues. In actual fact, green certificates can be obtained by GSE (the energy services manager).

The pilot exploits a rural microgrid and represents a good opportunity in providing improved electric service reliability and better power quality to the end customers. Microgrid can also furnish the local utility with additional benefits by providing dispatchable power to be used in peak load conditions; moreover, there is a benefit also for the DSO related to the possibility to alleviating or postponing distribution system upgrades.

Due to the increasing amount of distributed generation, many independent and private microgrids similar to the one involved in this Pilot are envisaged in the near future. Therefore, the Terni Pilot may be taken as a benchmark for the management of similar DER clusters connected to the distribution network.

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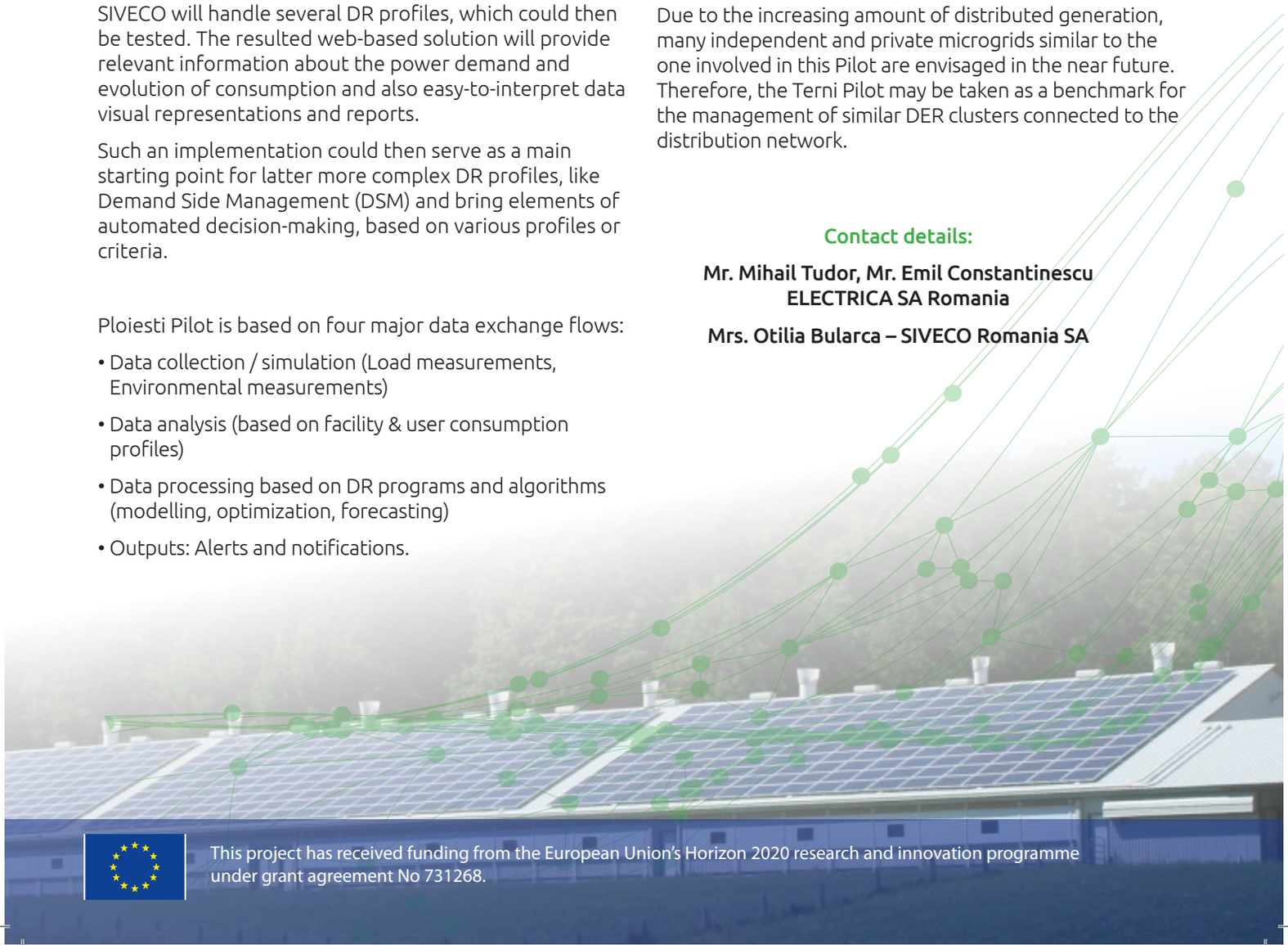

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