FAST TRACK TO INNOVATION H2020
ResilientGrid-as-a-Service (RGaaS)

Title: "Balancing demand-response platform integrating dynamic maps for an efficient, reasonably priced and sustainable electricity market"

Submission Deadline: Feb 21st 2019

The Commercial Need and Opportunity

Balancing electricity supply and demand, traditionally, is achieved by adjusting electricity supply to match the expected demand, that varies at different hours of the day. This passive, unidirectional model, however, is **unable to integrate the share of energy generated from intermittent renewables such as wind and solar-PV**, to meet demand without creating unbalancing in the electricity grid.

In this new ecosystem, balancing feed-in (response) and consumption (demand) of electricity from/to the grid, normally over quarter-hour periods, is the responsibility of **Balance Responsible Parties (BRPs)**. Shorter-term fluctuations are managed by the **Transmission-System Operators (TSOs)**, who will ask operators to increase generation or reduce demand accordingly.

The new EU regulation[1], as well as USA recommendations[2], is favoring the control of flows shifts from suppliers and generators to ESPs, customers and DSOs. As the energy grid transforms into a cleaner, more distributed, evermore intelligent and increasingly mobile infrastructure, additional opportunities for capital-efficient and customer-centric products and services are emerging. Evolving customer demand, technology innovations and the rollout of progressive regulations across the electric industry indicate this transformation is already well underway:

- Investment in customer-centric technologies will triple by 2030.
- Large-scale and distributed renewables will account for 50% to 100% of generation, with electric vehicles (EVs) representing more than 200 TWh of load, globally.
- Artificial Intelligence and communications infrastructure will transform energy grids into autonomous and self-healing networks that integrate clean, distributed, intelligent and mobile energy, while enhancing safety, reliability and affordability.
- Network orchestrators, energy service providers and *prosumers* will emerge as active stakeholders, further enhancing the value of the energy grid.
- Electric company business models will transform from bulk-asset and supply-based solutions to individualized service and network-based solutions, more attuned to customers' shifting demands.

The Proposed Technological Solution & State of Development

The proposed project ResilientGrid-as-a-Service (RGaaS) is aimed at generating a balancing demand-response platform for the electricity market and predict, through the use of machine learning, congestion points thanks to the virtual zones data flows. The software platform manages all raw data coming from different points of the electricity grid to solve problems due to electric imbalance (i.e. blackouts), caused by the varying demand and fluctuations in energy generation from renewable sources.

RGaaS creates dynamic maps of these Virtual Zones which are by nature flexible and adaptive to the constraints of the electricity network defined by both Transmission System Operators and the electricity system due to national security. The math system behind produces sets of autonomous systems (virtual zones) that are aggregated in a dynamic way through machine learning algorithms. RGaaS starts from the Virtual Node electricity planning to create the virtual zone map. It avoids blackouts by predicting network

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[1] Europe Strategic Energy Technology Plan (SET Plan) addresses the 5th dimension of the EU with 10 Key Actions that address the whole innovation chain, from basic research to market uptake –see https://setis.ec.europa.eu

[2] US Department of Energy Building Technologies Office (BTO) and US DOE Improves Home

congestion and optimizing the energy supply through the generation of associated virtual energy flows that can detect anomalies and isolate them.

Through the identification of these virtual zones, it is possible to attract: a) electric cars producers, through the indication of the recharging points in the maps; b) TSO as it is seen as a dynamic map of production and consumption; c) aggregators as it is perceived as a network orchestrator.

Potential Impact for you as Project partner

Project partners will have the following main advantages:
- International exposure: as the service provided can be easily deployed worldwide.
- New commercial partners: given that the synergies developed during the project can easily lead to the establishment of new commercial relationships, particularly with the end users involved to test and verify the system proposed.
- Costs-effective solution: reduce the amount and costs of back-up generation, producing a considerable impact also for those areas not in need for an increase in the energy reliability.
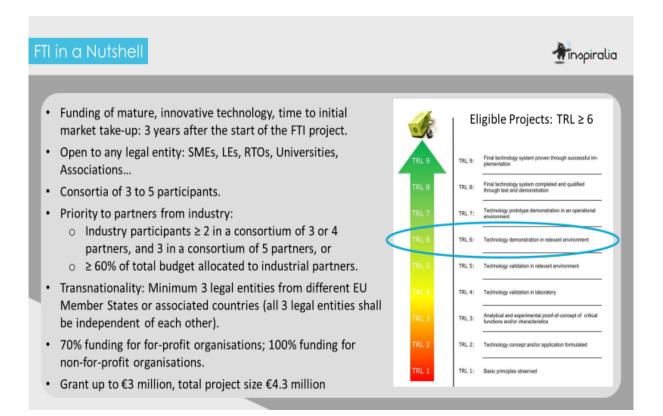
Market entry strategy

The imminent liberalisation of the energy market in Israel, makes it a suitable territory for the validation of the platform worked-out. This possibility has several exclusive advantages:
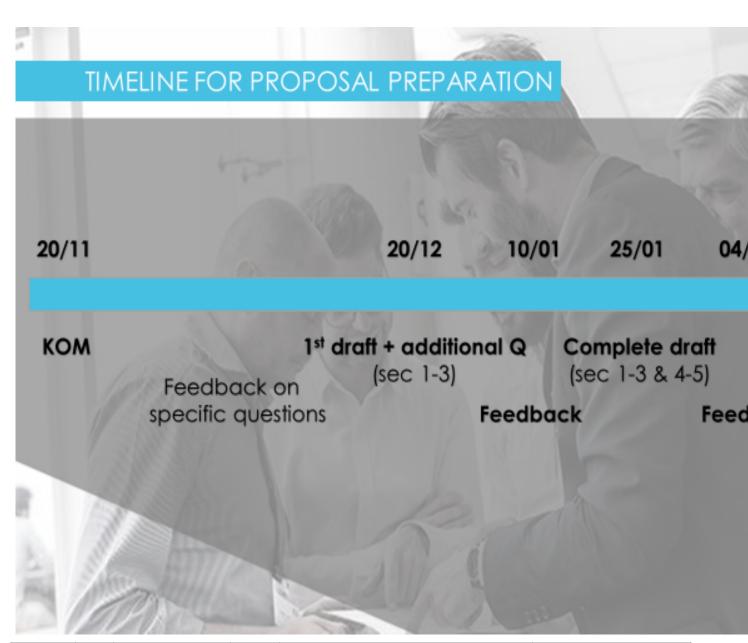
-Israel by its very nature is an isolated grid (energetically independent from other neighbouring nations)

-The presence of virtual zones already defined in a well delineated perimeter of consumption and production (270 kibbutz)

-The criticality of the network constraints associated with national security allows to develop a simulation system adjustable to external events and scalable.

EU Fast Track to Innovation program requirements

TIMELINE FOR PROPOSAL PREPARATION

20/11 — KOM

20/12 — 1st draft + additional Q (sec 1-3) / Feedback on specific questions

10/01 — Feedback

25/01 — Complete draft (sec 1-3 & 4-5)

04/ — Feed

Partner No & Type SME, LE, IAG, other	Already involved	Description of partner needed	Location preference Countries / regions	Role of partner Outline role in the proposal project	Benefits to partner For project duration AND beyond
COORDINATOR **SME 1**	YES	SME developing the math model at the base of the platform	Italy	**Project coordination:** integration of the data model in an ED&S platform and collection of real data to supply dynamic maps	SME1 will act as a key supplier of data, increasing the capacity of the platform and help customizing it for each application with the advanced algorithm developed/optimized in the project.

SME 2	NO	SME2 developer of energy demand&supply platform	Europe	SME2 will upgrade current ED&S platform through SME1 algorithm developed and will be in charge of scaling up production and commercialisation of the new platform released	SME2 will have a new product in its portfolio, and a new technology for its development (licensing rights), increasing its market takeup.
RTO	YES	RTO-AI and machine learning wide competence	Israel	RTO will apply machine and deep learning to energy demand and supply forecasting.	RTO will use the industrial pilot for R&D internal usage, expositions, training sessions of local and European operators.
SME3/LE	NO	Balancing Service Provider	Europe	SME3/LE will act as an end user, providing a testing site-use for the application of the platform. They will participate in the validation of final products, providing feedbacks instrumental to the final performance.	Contribute to new product development and exclusively test it in real environment applications and benefit of its outcomes.

Consortium table