



PROPHET: The Future of Energy

Sustainable and competitive Energy Transition
The major technological challenge of the next decade

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Politecnico di Milano
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The most complex microgrid ever developed, embedded with the most advanced power electronics controlled by artificial intelligence and neural networks

In the last decade the increasing penetration of renewables has been contributing to phase-out traditional power plants and to put the role of energy storage systems under the spotlight.

This energy transition scenario was foreseen in advance by the EPS founders in 2005, which in collaboration with the Politecnico di Milano e Torino decided to focus over the management of [microgrids](#), [stationary battery storage](#) and [hydrogen technology](#).

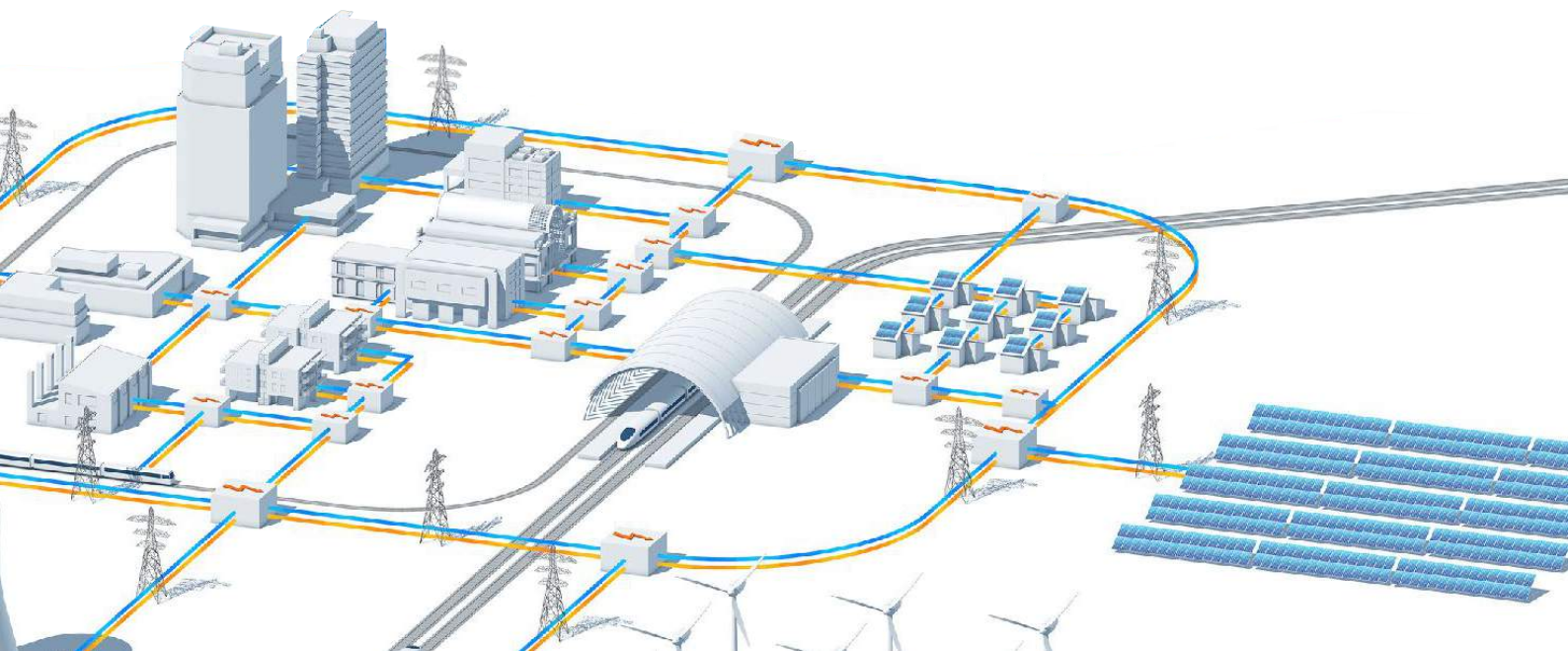
This pioneering vision contributed to make EPS one of the most successful technology players in the world, delivering one of the largest installed bases of commercial microgrids and utility-scale systems globally, as well as growing from a start-up to now a company leveraging on the ENGIE global reach.

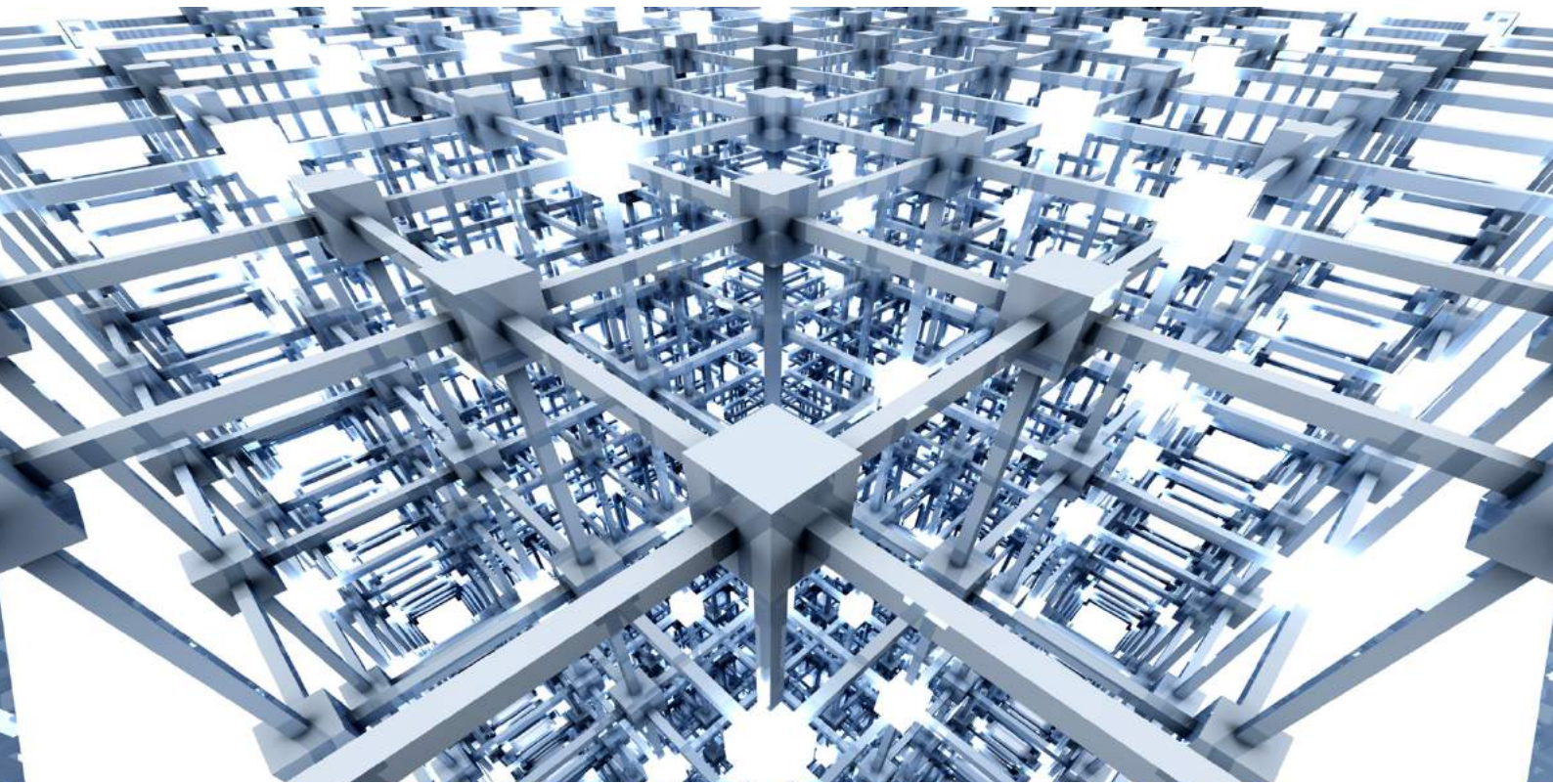
Similarly, Politecnico di Milano decided to invest in the Department of Energy in 2008 which now is a Department of Excellence recognized in Italy. The Excellence title was granted based on the research activity in the mobility field.

EPS and Politecnico di Milano decided to join their excellence to face the challenge of replacement of conventional centralized power plants with renewable energy and new businesses related to the EV as the integration of their charging stations in distribution networks

In emerging countries, 2.4 billion people reliant on diesel generation which will be replaced by renewable energy taking advantage of the reduced cost combined with the maturation of the energy storage market.

To pave the way towards these goals, in 2017 EPS and Politecnico di Milano launched a four years research plan, under the name of [PRedictive OPTimizations Heading to the Energy Transition \(PROPHET\)](#). Throughout the whole project a combination of traditional optimization techniques (e.g. MILP) and novel Artificial Intelligence and Neural Networks Algorithms is going to be deployed for unravelling complex energy engineering dilemmas, as the fuel minimization in multigoods microgrids, electric vehicle recharging or the real time battery state estimation.





A cutting edge microgrid: solar, wind, combined heat and power, battery and hydrogen storage to power lighting, heating, desalination, electrical vehicles and electrical bikes

This ambitious project, involving different academic research teams, ENGIE corporate research centres as well as a handful of external industrial partners, aims at the following goals:

- **Grid-connected Distributed Energy:** optimally manage Behind the Meter (BtM) grid connected storages and renewables in combination with onsite load and distributed generators, to replicate the success of the US programs but without any need for subsidies and incentive schemes
- **Off-Grid Microgrids 4.0:** furtherly increase the fuel savings and add robustness in off-grid microgrids, through a novel optimization layer making use of load and photovoltaic forecasters to achieve 100% load coverage and power 2.4 billion people entirely by renewables at a dramatically cheaper cost compared to the current fossil alternatives.
- **Prosumer Aggregation:** test and improve a commercial Virtual Power Plant platform for enabling the access of storages and other prosumers to the electricity market, leveraging on the new regulatory framework
- **EVs as a Distributed Energy Resource:** analyse the viability of EV battery usage for supporting the grid frequency, through so called Vehicle

to Grid (V2G) service, with the aim to transform vehicles into a real grid asset and a profit center for the car owner

- **Storage as EV Fast Charge enabler:** design an EV fast charging solution infrastructure for replacing present oil-pumps without grid reinforcements, enabling a real deployment of fast charge infrastructures in urban areas

This world class cutting-edge program will be developed by **EPS** and **Politecnico di Milano** leveraging on a **state-of-the-art microgrid plugged into the campus of the Politecnico di Milano**, that will start operations on **September 2018**. That microgrid couples the most advanced power generation sources (solar, wind, combined heat and power) storage (electrochemical batteries and hydrogen) and the loads of the next generation urban areas (lighting, heating, desalination, electrical vehicles, and electrical bikes).

The cutting-edge innovation rig will be used not only for research purpose but also for validating external technologies of the **EPS partners in the context of the most advanced Open Innovation Technology Platform** developed together with the **Politecnico di Milano**.

Eventually, the goal of the PROPHET project from the competitiveness perspective would **lead EPS and Politecnico di Milano to achieve in 2020, five years in advance, the 2025 best in class multi-good grid design and management achieving cost targets** set by the most

PROPHET Symposium: AGENDA

14:00 – 14:15	Opening Speech	Fabio Inzoli Head of Energy Department, Milan Polytechnic
14:15 – 14:30	Keynote Speech	Carla Alberto Guglielminotti , Chief Executive Officer, EPS
14:30 – 15:00	PROPHET Academical objectives	Prof.ssa Sonia Leva , Milan Polytechnic Prof. Giampaolo Manzolini , Milan Polytechnic
15:00 – 15:30	PROPHET Business and Development goals	Daniele Rosati , Chief Technology Officer, EPS Pietro Raboni , Head of System R&D, EPS
15:30 – 17:00	Roundtable Moderator: Prof. Ennio Macchi	Olivier Jacquier Chief Executive Officer, ENGIE Italy Antonio Volpin Director and Senior Partner, McKinsey Luigi Michi , Head of Strategy, Development and System Operation, Terna
17:00- 19:00	Opening Ceremony Visit to microgrid, PROPHET Lab	Prof. Ferruccio Resta , Dean, Milan Polytechnic

The participation to the event must be confirmed to Anna Maria Pullè

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- by car, the address is via Lambruschini 4, 20156, Milano (GPS coordinates 45.503169 N, 9.156967 E);
- by public transportation, it is two-minutes’ walk from FNM Bovisa Station. FNM Bovisa Station is connected to Milano Porta Garibaldi underground (Suburban lines S1 S2 and S13, two stops) and Cadorna Stations.

