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- Théo DRONNE - University Paris Dauphine (France)
- Wookyu CHAE - KEPRI (South Korea)



WORKING GROUP
2019 - 2

CONTACT

✉ m.delville@aim-association.org

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Microgrids business models
and regulatory issues

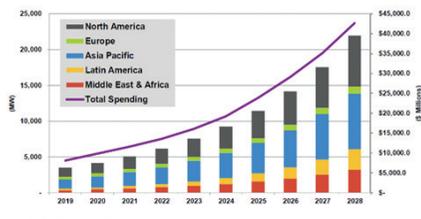
June 2021

Background

Microgrids, which can be operated either while connected to the surrounding power system or while islanded, can be a solution to improve resiliency or continuity of supply and to facilitate the development of various services to power systems. The development of microgrids depends on the business models of involved stakeholders. It raises complex regulatory issues, including, for instance, the rights and duties of parties, the impact on costs for participating vs. non-participating customers, the economical or societal value of socializing some costs, etc.

Microgrids are spreading around the world, except

Annual Microgrid Capacity and Spending by Region, Base Scenario, World Markets: 2019-2028



(Source: Navigant Research)

in Europe. The CIRED 2019-2 Working Group led an analysis of the business models & regulation of microgrids, to pinpoint the key added-value of microgrids.

Scope

The Working Group studied 12 real microgrids examples and led to the following conclusion: each microgrid is one-of-a-kind!

We decided to build a tool to make the understanding of each microgrid easier: it is the below 3x3 magic matrix!

- In rows are described the key abilities:
 - Reliability of the quality of supply
 - Resiliency of the grid toward contingencies (weather...)
 - Efficiency: energy & losses savings, investment deferral...
- In columns are described the key benefits of microgrids:
 - Economical benefit
 - Local & social benefit
 - Environmental benefit

Key Ability	Benefit		
	Economical	Local & social	Environmental
Reliability <ul style="list-style-type: none"> Improve Quality of Supply <ul style="list-style-type: none"> Electrification Continuous supply Power Management: voltage & frequency quality Deferral or with/without grid reinforcement investments 	<ul style="list-style-type: none"> Increase local & social acceptance of Grid projects 	<ul style="list-style-type: none"> Only solution when there is no environmental right to build a line Enables DERs & microgrids contributions for reducing fuel consumption & CO2 emissions 	
Resiliency <ul style="list-style-type: none"> A microgrid is better than no grid: re-challenging and reducing the number of emergency generators or storage Improved resiliency against Grid contingency Black-start services 	<ul style="list-style-type: none"> Providing emergency shelters: army, hospitals, hospitals, universities... 	<ul style="list-style-type: none"> Allow to face extreme weather conditions with climate change (cf. fire with India, Australia, heat flow in France, clicking snow...) 	
Efficiency <ul style="list-style-type: none"> Energy savings <ul style="list-style-type: none"> Phase Balancing improvement Local generation reduces losses Energy Management: storage & demand management reduce the Peak load Local Energy Market participation & revenues (Local settlement, P2P, Blockchain) May reveal the full value of Resiliency (Local DER services and Materialize local Non Distributed Energy Value?) 	<ul style="list-style-type: none"> Plug and Play in MV as in LV, 10 kV... "Self care": local actors take care of the grid and their consumption Opportunities toward new energy governance of local Energy Communities 	<ul style="list-style-type: none"> Reduce CO2 emissions Multi energy & cross sector coupling 	

Structure of the final report

The final report starts by defining what are Microgrids and why Microgrids are useful through the 3x3 Magic Matrix.

Then it demonstrates that there is a continuum in microgrid ownership, from private to public: local customer-owned microgrids, private microgrids, utility-owned microgrids, local energy community with an energy management system, peer-to-peer platform using only the DSO network...

Regulation will have a lower influence on microgrids' development than the business models issues.

In developing countries, off-grid microgrids seem to be a competitive solution to bring green electricity on areas at the edge of the grid, or in electrical deserts.

In Europe, the excellent quality of the grid limits the interest of microgrids. However, if their prices decrease significantly, the Energy Management System embedded in each microgrid may lead to new services as such as:

- In the country land, higher resiliency and local fresh PV start-up
- In cities, microgrids appear as a specific form of Energy Communities, but not every Energy Community will be a microgrid. Microgrid may foster peer-to-peer exchanges or new kinds of services.

As an outlook, we guess that the worldwide decrease of DERs and EV price will allow, in a middle or long term future, a profitable development of DC microgrids. A future CIRED Working Group will analyze the value of specific services allowed by DC systems & regulation.

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