

Smart Energy panel summary

Francesco Gennaro | STMicroelectronics
Eloy Ortega Gonzalez | Indra Sistemas

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Distributed Energy Resource Grid Integration



DIF2017

Distributed generation with its occasional inverse power flows, new storage capabilities, new digital prosumers with their smart meters and other intelligent devices, together with the need for operating closer to the design limits are radically modifying the conditions under which distribution grids operate impacting their reliability and efficiency.

This radical change in the way of generating, transporting, distributing, and consuming energy creates many challenges that affect the entire business model around electricity.

These challenges will transform the network operation process, providing new services to final users, optimizing the use of energy resources and gaining significant knowledge on the generation and demand trends in these very dynamic and volatile environments.

Distributed Energy Resource Grid Integration



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Quote: The current power system is prepared for this radical change in the way that we produce and consume electricity. There will be no significant impact on the grid capacity by the introduction of distributed energy resources, even when EV presence is taken into account. The presence of renewable energy asks for infrastructure upgrade for worst case operation, adding also storage.

Quote: Distributed grid control centers will be more and more necessary.

Quote: Cloud energy can be considered as parallel of cloud data.

Quote: A mentality change is necessary for the new grid monitoring and control infrastructure, regulation will follow.

Quote: This business is not only about energy anymore, but also data, financial transactions and communications.

Active Grid Monitoring



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The business challenges brought by the introduction of distributed energy resources combined with the massive volumes of information generated by the new distribution grids and the big number of assets to monitor and control down to the customer level, require the convergence of Information and operation Technologies (IT+OT) into advanced grid management ecosystems for the active management of the grids.

An Active Grid ecosystem supports the dynamic operation of a distribution grid where intelligent grid assets, connected consumers and new distributed energy resources continually interact in a more reliable and efficient grid operation.

Active Grid Monitoring



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Quote: Current ICT infrastructure based on the traditional SCADA/M2M architectures is not ready to handle the huge increase in the number of devices and associated volumes of information that we are already witnessing in the power grid.

Quote: There is a clear need of convergence of IT and OT into a common grid monitoring platform for the active management of the grid.

Quote: Security challenges need to be clearly addressed and tackled in this IT/OT convergence process.

Quote: Semantic data models will enable the interoperability requirements among devices, nodes, and systems in a common data space for an Active Grid ecosystem to function properly.

Energy Consumption Optimization



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Energy consumption is facing sustainability challenges that are leading to a profound transformation of Energy Management. In this emerging context, a deeper understanding of energy consumption is needed. To meet this goal, advanced platforms that are capable to gather, compute and display data regarding energy usage and processes performance using the most innovative devices in the field are widely needed.

Acknowledging how energy is employed is a necessary first step in order to make better decisions in our everyday lives and create a deep, long lasting and positive impact.

The energy consumption optimization subdomain usually is subdivided in two clear areas: Smart Home and Smart Buildings.

Energy Consumption Optimization



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Quote: Consumers are not always willing to participate in energy consumption optimization schemes.

Quote: Optimization in terms of price is accepted, provided that there is a clear win-win approach with the customers.

Quote: Customer's behaviour is key to energy consumption optimization.

Quote: Security and interoperability have been an obstacle to the early deployments of Smart Home / Smart Building solutions.

Quote: Smart Home / Smart Building solutions are the first step to enable Transactive Energy Markets.

Transactive Energy



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The Energy industry is facing a radical transformation from asset ownership to shared economy. This trend is being propelled by the introduction of horizontal business platforms that will be based on digital platforms which bring together:

- Those with excess to goods and/or services, willing to "share / sell it."
- Those without goods and/or services interested in "using / buying it."

The new energy value chain will be 'transaction centric' enabled by a multi-sided market and it will be characterized by localized, connected, transactive markets:

- **Localized** because by 2020, centralized generation will be replaced by 20% from distributed energy resources, resulting in about 1/3 a profit loss for utilities.
- **Connected** because the Internet of Things (IoT) will connect people, processes, data and devices to deliver the right information to the right person at the right time.
- **Transactive** because there will be decentralized generation and flexible consumption, resulting in transactive interactions among multiple actors and stakeholders.

Transactive Energy



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Quote: The market is ready for Transactive Energy schemes, but utilities are not.

Quote: Transactive Energy is all about energy being provided as a service.

Quote: New players will come for providing these energy services.

Quote: We are still in the pilot phase. There will be no big developments in the next 5 to 10 years. Some pilot cases are ongoing but with no DSO involvement (NYS). There is big potential in the developing world, such as in Africa, specially in the areas where there are no major infrastructure investments.

Disruptive Energy Technologies



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We are moving away from the era where large (traditional) corporate and/or government balance sheets are required to fund energy and other market verticals (e.g. manufacturing, transportation, etc.). Increasingly, “non-traditional” companies and individual entrepreneurs can combine insight, resource diversity, substitution and scarcity (context); and “lessons-learned” (experience) to invent new business models.

We are facing some X-ponential changes in the near future throughout all aspects of life, including the energy domain. Here is a summary of these X-ponential changes:

- Speed of change: We see that technology and customer expectation is changing faster than business culture and regulation.
- Speed of adoption: Today there are 2,000+ innovation projects globally, approximately 70% of them in demonstration phase (obsolescence vs. ROI). They are supported by:
 - Computing (Moore’s Law): 2 x every 18 months
 - Communication (Fiber Law): 2 x every 9 months
- Socio-Economic business case: Max. value through integrated approach across value chain and capabilities (TOTEX: $1 + 1 < 2$, VALUE: $1 + 1 > 2$)
- Presence of disruptive players: Amazon, Google, Tesla, “Big Box” retailers, etc.

Disruptive Energy Technologies



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Quote: There is no disruptive change happening in Energy Technologies right now, just evolution.

Quote: Artificial Intelligence relying on information gathered by future IoT deployments will have a profound impact.

Quote: Other technologies that can have an important impact on the Energy domain are nanotechnology, artificial intelligence, new materials, augmented/virtual reality, drones, 3D printing.

Quote: Artificial Intelligence and other technologies are helping operation but not changing the business model for the time being.



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Thank you for your attention