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Italian university envisions microgrids

Kathleen Wolf Davis | Sep 24, 2014



We're traditionally a magazine that talks to utilities. But, these days, we're chatting more and more with newer options and entrants into the power industry field. Today, we chat about a microgrid project at the University of Genoa's Savona campus with Federico Delfino, professor of power system engineering at the university.

Intelligent Utility: Why did the University of Genoa decide to install a microgrid on the Savona Campus?

Delfino: The Smart Polygeneration Microgrid (SPM) project is a joint special project in the energy sector between the University of Genoa and the Italian Ministry of Education, University and Research (MIUR), which is the public body fully financing the initiative with 2.4 million euros. It is aimed at creating an R&D facility based on the use of both renewable and fossil sources to produce thermal and electrical energy in accordance to a distributed generation strategy. This facility was conceived in order to develop applied research programs together with industry in the smart grid sector and, at the same time, to reduce operating costs and CO2 emissions of the whole Savona campus.

Intelligent Utility: What was the process for installation, and did it all go smoothly?

Delfino: The SPM project and its technical features were fully developed by the power systems research team of the University of Genoa, while its construction was assigned to Siemens, as the winner of the public tender issued by the university. One of the major criticality in implementing the SPM project was to deal with the different protocols used by the various equipment of the SPM to communicate. In addition, all the devices are typically arranged to be supervised by their own proprietary monitoring program and not by a third party SCADA. This problem was fixed by exploiting the capability of the remote terminal units (RTUs) installed on the field to act as gateways allowing the communication among a large number of protocols. Another peculiarity of the SPM is the close coupling between thermal and electrical systems, typically controlled and monitored by different kind of sensors and SCADAs. In this respect, SPM could be considered a pioneer project at international level.

Intelligent Utility: What benefits do you expect from the microgrid?

Delfino: Basically, we expect the following benefits from the day-by-day operation of the SPM:

- a reduction of the campus annual operating costs,
- a reduction of the overall CO2 emissions,
- a reduction of the global use of primary energy,
- new R&D opportunities jointly developed with industry and DSOs,
- a boost in fund-raising at EU level,
- to demonstrate effective control systems and strategies,
- to be a prototype for similar applications in urban or industrial districts.

Intelligent Utility: How will this microgrid project evolve to add additional

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resources and accommodate additional demand?

Delfino: Currently, our microgrid encompasses sufficient resources to supply about half of the campus' current energy needs, but it was designed to accommodate additional resources to eventually power the campus fully. Indeed, all the network equipment (switchboards, cables and so on) was sized to this aim.

Intelligent Utility: What would you say you've learned from this microgrid installation process?

Delfino: The SPM Project was very useful for us to learn about the following items:

- the interfaces among devices and the system SCADA should be faced since the very beginning of the design stage;
- the ability of the SCADA to manage a mixed electric & thermal system should be investigated very soon;
- the regulatory aspects concerning with the delivery of energy to the external grid should be analyzed in details. It is worth noting that this issue is often a critical point, since the regulations are different from country to country and generally fast evolving.

Intelligent Utility: Looking at the power industry overall, how do you see microgrids being incorporated into larger power grids and systems in the next few years?

Delfino: The construction of new microgrids incorporated into the power delivery system could undoubtedly enable energy saving at the customer side, just think, by way of example, to a shopping center equipped with PV field on the roof and tri-generation plants to meet thermal and cooling energy needs. The possible future spread of such kind of installations has an impact on the evolution of the role of the DSO and could facilitate a bottom-up push towards renewal of MV distribution networks in a "smart grid" perspective. At the end of the day, this could result in the overall increase of the power system efficiency and in a wider involvement of the end-users in sustainability issues.

Intelligent Utility: Should utilities be excited or afraid of the evolution of microgrids?

Delfino: In spite of a greater complexity in network management, a DSO should look favorably at the penetration of microgrids into its distribution infrastructures, since it can benefit from ancillary services provided by microgrids like voltage support, congestion resolution, frequency regulation etc., which can help in meeting supply continuity and power quality requirements.

Intelligent Utility: What advice would you give others who are contemplating installing a microgrid--whether in a university setting, an industrial setting or within a utility?

Delfino: Developing a microgrid project in a university setting should mainly focus on the so-called "technology diversity," that means using different kind of generating sources, different typologies of storage devices, advanced communication systems and so on, in order to carry out innovation at product and process level.

The perspective changes in an industrial setting, since here cost control should be the main task to perform and therefore attention should be paid at the microgrid planning level in order to choose consolidated technologies and to avoid unnecessary enhanced features.

Learn more about microgrids and the utility of the future at the upcoming Smart Cities conference Nov. 3-5, 2014, in San Diego, California. More information available here: <http://smartcities.energycentral.com>

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