Muscat community microgrids

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The revamped microgrid at the Sultan Qaboos University in Muscat will improve reliability and lower costs by combining electricity from solar, wind and battery storage, according to Siemens.

Under the project, Siemens will add smart grid features to an existing microgrid setup in the Smart Grid and Protection Lab at the department of Electrical and Computer Engineering.

The smart grid software includes intelligent control algorithms to optimize power production, energy storage and consumption in real-time, according to Siemens. With the Siemens" smart grid software, students will be able to simulate different situations and monitor the microgrid"s behavior through a control panel.

Siemens expects microgrid deployment will increase in Oman and across the Middle East. Researchers at the university have been exploring the possibility of linking microgrids in rural parts of Oman where communities are supplied by diesel generators. The generators could be replaced with wind and solar generation.

"We are seeing greater adoption of renewable energy across the Middle East, and this is driving demand for microgrids, which increase grid resilience, efficiency and reduce the cost of transmission and distribution," Claudia Vergueiro Massei, CEO of Siemens in Oman, told Microgrid Knowledge. "We think microgrids will become more common in the region, because they diversify and improve power supply and provide consumers the option of selling excess energy to the grid."

In a recent study, researchers from the university studied a hypothetical microgrid on an Omani island. They found the net present cost and the leveled cost of energy for a microgrid with a renewable-only mix coupled with battery storage was $108.3 million and 18.9 cents per kWh, according to a paper in the May edition of the International Journal of Smart Grid and Clean Energy. In contrast, a microgrid with renewables, diesel generators and storage would cost $63.6 million and produce electricity at 10.8 cents/kWh, according to the report.

A wind-diesel-solar-storage microgrid achieves a lower net cost and levelized cost than diesel-only, wind-diesel-battery storage, or solar-diesel-storage microgrid options, the researchers found.

Learn more about university microgrid projects by downloading "The Genius of of University Microgrids," a free report produced by Microgrid Knowledge in partnership with Siemens

"A microgrid using a renewable-only mix will become cost competitive if the increasing trend in the price of diesel and the decreasing trend in the cost of renewable technologies persist," the researchers said.

The university microgrid upgrade grew out of a cooperation agreement between Siemens and the SQU"s

College of Engineering that was signed earlier this year. The agreement formalized an existing relationship, and includes seminars with Siemens experts, summer internships, knowledge exchange activities and the contribution of the microgrid lab, according to the company.

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Esmaeli A (2016), Stability analysis and control of microgrids by sliding mode control. International Journal of Electrical Power and Energy Systems 78: 22-28.