

# POWER PROFILE

**Customer:** Themar Al Emarat

**Location:**

Sharjah, United Arab Emirates

**Customer Business Issue:**

Reliable power needed for remote, off-grid agricultural facility that also fulfills expansive sustainability goals

**Solution:**

Hybrid energy solution featuring 23,000 Cat® PVT117 photovoltaic modules, five Cat 3412 diesel generator sets and a 286 kWh/250 kW grid stability module

**Cat® Dealer:**

Al-Bahar



*The system features nearly 23,000 Cat® PVT117 photovoltaic modules that generate up to 2.7 MW of solar power for the facility during daylight hours.*

**POWER NEED**

In 2015, Themar Al Emarat executives began planning for a hydroponic farm in Sharjah, United Arab Emirates (UAE), that would provide locally grown, pesticide-free vegetables and produce for hotels, restaurants, wholesalers, retailers and supermarkets in the region.

With almost no rainfall and temperatures frequently exceeding 105 degrees Fahrenheit (40 degrees Celsius) in the summer months, the climate in the UAE is not favorable for growing crops outdoors. That's why company executives selected a soil-less, recirculating hydroponic system in a climate-controlled environment that supports the high-volume commercial production of beef tomatoes, cherry tomatoes, lettuce, herbs and other crops.

Facility designers created blueprints for five different greenhouses including a fully automated baby leaf system, greenhouse modules and open-air space to deliver high-quality crops through technologies that ensure the uniform growth and health of the seedlings. They also planned operations specifically dedicated to white button mushroom production, which would make it the largest mushroom farm in the UAE.

Motivated by a deep commitment to sustainability, company executives also sought to maximize the use of environmentally responsible processes throughout their operations. These include the recycling of irrigation water, the reuse of soil from the hydroponic system as an agricultural conditioner for traditional cultivation and the use of bumblebees for pollination.

To support these operations, facility planners sought a reliable, top-of-the-line solution to provide power for cooling equipment, water chilling, cultivation and other greenhouse

processes, but the local grid did not extend to the proposed location for the farm. The ideal power solution would provide energy for round-the-clock operations in a financially responsible way that also supports the company's extensive sustainability measures.

**SOLUTION**

Themar al Emarat selected the local Cat® dealer, Al-Bahar, to design, install and commission a comprehensive hybrid microgrid solution from Caterpillar that fully integrates advanced power generation, control and monitoring technologies. The largest single-site microgrid located in the UAE, the system features nearly 23,000 Cat PVT117 photovoltaic modules that generate up to 2.7 MW of solar power for the facility during daylight hours. Meanwhile, five Cat 3412 diesel generator sets in sound-attenuated, weather-resistant enclosures supply up to 3.3 MW of power in overcast conditions and at night.

Surplus energy is stored in a 286 kWh/250 kW grid stability module supplied by a grid-forming Cat Energy Storage System, which helps compensate for fluctuations in output from renewable energy sources while reducing the reliance on the generator sets.

"We researched best practices around the world to obtain the latest technology that would deliver the highest quality products for our hotel and retail customers," said Dr. Ghanem Al Hajri, chief executive officer of Themar Al Emarat. "We selected systems that would make this project economically viable, save power and water and address the needs of the community as well as our shareholders."

This industry-leading suite of technologies is designed to reduce fuel expenses, decrease emissions and reduce the total cost of ownership while increasing energy resiliency in even the most challenging environments.

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“At Al-Bahar, we aspire toward a sustainable tomorrow and create a vision through our strategies,” said Mohamed El Kaddour, vice president of the energy and transportation division for Al-Bahar. “We understand all the steps for utilizing clean energy sources as an investment toward the future.”

The entire system is managed by the Cat Master Microgrid Controller (MMC), which keeps loads continuously energizing with high-quality power at the lowest cost by managing the flow of power from every source in the system.

“The ability to switch between sources is important with an integrated hybrid system, whether it is the generator sets, energy storage or solar panels,” said David Crabb, regional manager for Caterpillar Inc. “The MMC provides peace of mind for customers by perfectly integrating all the elements of the system based on changes throughout the day — sunup, sundown or cloudy conditions.”

Cat Connect Remote Asset Monitoring provides data visualization, reporting and alerts from anywhere in the world through an easy-to-use web interface.

“It provides a complete, remote interface that allows customers to see the live performance of all the power assets of the plant and make operational changes via a phone or laptop,” said Syed Shahul Zindhanainar, account manager for Al-Bahar.

## RESULTS

The power solution has helped Themar Al Emarat achieve all of its production milestones to date. The company recently expanded its yield of white button mushrooms from six to ten tons a day, with total production capacity from its hydroponic operations surpassing 3.5 million plants per month.

“Caterpillar is the ideal solution because getting power at such a remote location can be difficult,” Zindhanainar explained. “Al-Bahar and Caterpillar have lowered operational costs by integrating the power system through Caterpillar’s complex control strategies.”

With limitations on transportation across borders, the COVID-19 pandemic demonstrated the value of Themar Al Emarat’s support for the UAE’s National Food Security Strategy 2051, an initiative that aims to achieve zero hunger by ensuring access to safe, nutritious and sufficient food all year round.

“We now grow crops that the UAE used to depend on receiving from overseas,” Dr. Al Hajri observed. “We have filled the gap by producing high-quality food that provides the quantities our customers need while meeting their quality standards.”

Under ongoing maintenance agreements, Al-Bahar can deploy technicians in about 20 minutes to deliver the service that will help Themar al Emarat maximize its return on investment.

“By selecting a system from Al-Bahar as a single supplier, they can trust us to manage the integration of multiple technologies and support the performance of the solution over the long term,” Zindhanainar emphasized.

For more information, please visit [cat.com/microgrid](http://cat.com/microgrid).



*The hydroponic system supports the high-volume commercial production of beef tomatoes, cherry tomatoes, lettuce, herbs and other crops.*