



## CASE STUDY

# Cummins Battery Energy Storage System (BESS) commissioned in Dubai

## Project overview

Cummins Arabia achieved a major milestone in Q3 of 2025 with the installation and commissioning of a Cummins Battery Energy Storage System (BESS) at its Al Quoz facility and workshop in Dubai, UAE. As the first Cummins BESS installed and commissioned in the Europe, Middle East, India and Africa (EMEIA) region, it will help showcase Cummins' new energy solutions portfolio, while moving the branch towards its energy management goals.

## PURPOSE

Install and commission a Battery Energy Storage System (BESS) at the Cummins Arabia, Al Quoz facility in Dubai, UAE, to enhance energy management, support peak-hour loads and reduce diesel dependency.

## SUPPLY

Cummins C400B5ZE Battery Energy Storage System (BESS) rated 422 kWh / 200 kW.

## WHERE

Dubai, United Arab Emirates

The system’s primary operational objectives are to:

- **Reduce diesel generator runtime** during peak-demand hours.
- **Lower fuel consumption** by shifting load to stored energy.
- **Cut on-site emissions**, supporting Cummins Arabia’s sustainability objectives.

## Introducing Cummins Battery Energy Storage Systems

Cummins Battery Energy Storage Systems (BESS) offer safe, scalable, and reliable energy storage. Designed to meet a wide range of energy nodes from 200 to 2280 kWh, they serve various energy storage needs across diverse applications, from commercial and industrial facilities to mission-critical operations. These fully integrated energy storage systems enable customers to reduce on-site carbon emissions and fossil fuel dependency while improving power resiliency with dependable backup power, even during outages. For this project, a C400B5ZE BESS rated 422 kWh / 200 kW was selected to meet the specific operational objectives.

### BESS key technical specifications

Parameter	Specification
Battery chemistry	Lithium iron phosphate (LFP)
AC output voltage/ frequency	380 – 415 V AC, 50 Hz
C-rate / IP rating	0.5 C / IP 55
Operating temperature	-30 °C to +50 °C
Cooling system	Liquid-cooled batteries + HVAC



### Three layers of fire and gas protection

Cummins’ BESS design emphasizes a layered Fire Fighting detection and suppression system with smoke, fire and Li-ion gas detection and suppression mechanisms:

**Level 1 – Battery pack protection:** Each cell within the pack is individually monitored, enabling the system to immediately isolate an anomalous pack to prevent fault propagation to the rest of the battery system using fluid immersion.

**Level 2 – Fire suppression:** The container is equipped with an FK-5-1-12 (perfluorohexane) extinguishing system to extinguish any fire inside the BESS container.

**Level 3 – External fire-fighting interface:** A built-in water-spray pipe to be supplied from an external fire hydrant.

## Commissioning excellence by New Energy Solutions (NES) EMEIA team

The NES Commissioning Engineering team collaborated with Cummins Arabia at every stage of BESS integration, from initial receipt and inspection at the warehouse to supervising the electro technical installation and, finally, leading pre-commissioning, setup, and final testing. The team performed functional tests, safety validation, settings calibration, commissioning, charge and discharge testing and demonstrated the Sequence of Operation under live operating conditions, confirming that the BESS integrated with the facility's existing power infrastructure as designed.

Even after commissioning was successfully completed, the team continued to closely monitor BESS performance for 90 days, ensuring that every subsystem operated as designed and that the integrated BESS met Cummins' global performance standards.

Working with 750 V DC high-voltage systems, the team followed Cummins' stringent HSE protocols throughout the project. As a result, the team achieved zero safety incidents, a proud milestone that reinforces Cummins' reputation for operational excellence and its commitment to employee well-being.

## Project operation

The C400B5ZE BESS – rated 422 kWh / 200 kW – operates as a standalone AC-output storage unit, designed to power the facility's loads during the peak load consumption hours in the building from 7:00 am to 3:00 pm.

- **Summer loads (Mar – Oct):** The BESS delivers an average of 4 to 5 hours of energy, covering the facility's average load of 80-90 kW, which eliminates the need for prime generator runtime and avoids utility peak charges.
- **Winter loads (Nov – Feb):** In the winter, the chiller loads are reduced, and the load drops to 30-20 kW on average. The BESS provides energy for 8 – 10 hours daily, maximizing BESS utilization at lower facility loads.



Beyond powering the facility's daily operations, the C400B5ZE BESS has become a showcase for Cummins' energy storage expertise across the region. It now enables sales and marketing teams to host sessions with consultants, contractors and end customers, creating opportunities to demonstrate real operating performance in a live environment.

Through guided, real-time demonstrations of its operating modes and performance data, regional DBUs and customers can see the system in action and gain confidence in its tangible value, energy-savings potential, and proven reliability in Dubai's demanding climate.

### Tangible results and measurable impact

- **Energy saving:** Reducing the generators’ runtime by 4 - 5 hours in the summer and by 8-10 hours in the winter, as the load drops to around 20KW, the average generator runtime reduction across the year is 5.15 hours per day. The BESS helps the facility operate more efficiently while extending the life of traditional power generation equipment.
- **Lower OPEX:** During the peak-demand hours from the grid, the BESS quietly supplies the building loads, reducing dependence on the grid and keeping costs under control without compromising resilience and reliability.
- **Actual financial benefits:** During Q4 2025, the BESS system delivered net cost savings of \$7,112.97 after deducting the charging cost from the utility; the savings were achieved by reducing the diesel consumption and lowering the generators’ maintenance costs, a direct result of reducing the generators’ runtime.
- **Maintenance cost savings for the generators:** Reduced generators’ runtime by 382 hrs. In Q4 2025, the frequency of the scheduled minor

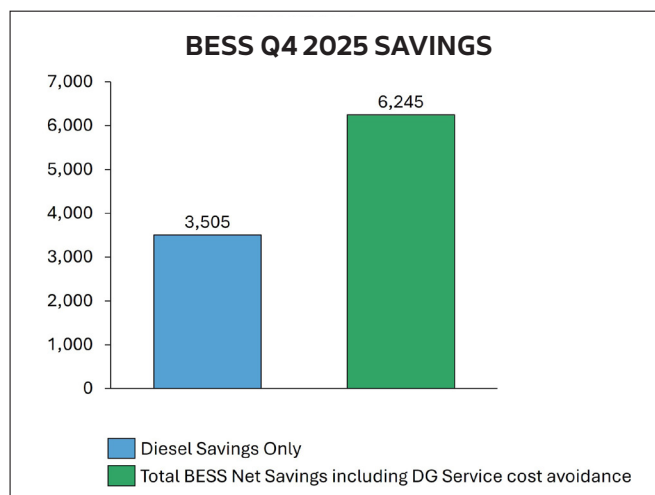
and major maintenance costs also reduced, lowering the facility’s long-term operating costs and improving the generators’ health.

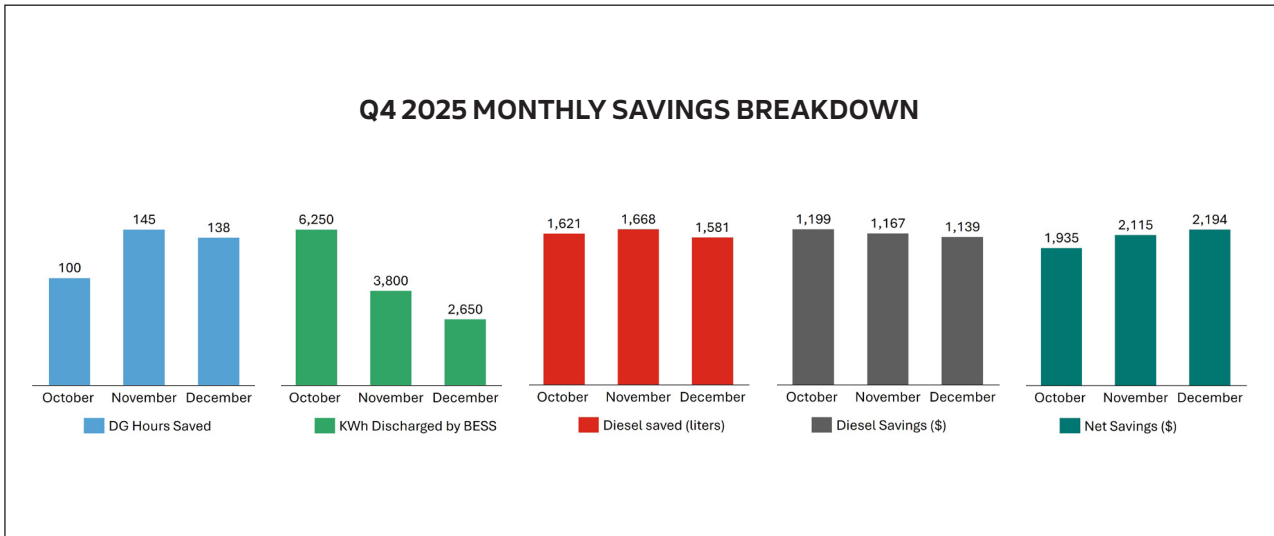
Before the BESS integration, the diesel generator was operating in prime mode for more than 12 hours per day, reaching the 250-hour maintenance interval every month and requiring monthly servicing by Cummins Arabia, which drove high recurring maintenance costs. After the BESS was installed, the generator runtime was significantly reduced, leading to far less frequent maintenance, lower operating costs, reduced mechanical wear, delayed engine overhauls, and improved overall asset reliability and lifecycle performance.

- **Noise reduction benefits:** The containerized generators produce approximately 85 dB(A) @1 meter, while the BESS runs at a significantly lower level, 70 dB(A) @ 1 meter, with the only noise generated being from the HVAC cooling fans and pumps. This difference improved on-site comfort and reduced the overall noise pollution.

### Actual operational results Q4 2025

Parameter	Value
Total energy discharged	12.7 MWh
Total number of hours BESS supplied loads / total DG hours saved	382 hrs.
Diesel saved in liters	5,443.5 L
Diesel cost saved in USD	\$4,373.37
Generator maintenance savings because of the BESS	\$3,851.2
Charging cost from the utility in USD	(\$1,111.6)
<b>Actual recorded net savings achieved Q4 2025</b>	<b>\$7,112.97</b>





## Projected annual savings

Based on the actual operating data recorded on-site, the projected annual savings are calculated assuming the BESS supplies the load for an average of 6.5 hours per day, five days per week, across 52 weeks of operation.

Parameter	Value
Projected annual diesel savings	<b>28,425.63 liters</b>
Projected annual DG running hours savings	<b>1,363.25 hours</b>
Projected diesel cost savings considering the average price of 0.7\$/L	<b>\$19,897.94</b>
Projected monthly savings	<b>\$2,511/month</b>
Net projected annual savings from diesel and O&M service avoidance	<b>\$30,141</b>

## BESS Energy Management Controller (EMS) screens

The EMS interface consists of several key screens:

- HOME Screen:** Displays real-time power flow (21 kW), Main/Bus Voltage (393 V), and Main/Bus Frequency (49.990 Hz). It includes status indicators for BESS charging/discharging and various setpoints.
- BATTERY Screen:** Shows battery health metrics such as MAX Allowable Charge (211 kW), Real Time Total Battery Volt (714.5 V), and SOC (12.0 %).
- PCS Screen:** Features a large power gauge showing -21 kW and various operational modes (I, O, VF, PQ).
- TRENDS Screen:** Provides a historical view of BESS SOC and PCS P over time, with a 10-minute resolution.

## Innovation for change

The integration of the C400B5ZE BESS at Cummins Arabia is a key achievement, reflecting Cummins' commitment to designing and building every component of a fully integrated energy system. The BESS will be used in the region as a showcase, demonstrating that Cummins innovations drive real change and pave the way for a smarter, more resilient energy future.

To see the full journey of this BESS, from delivery and installation through commissioning and final inauguration, please follow the [link here](#).



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