



HARVEY ENERGY: HOW A TRI-FUEL VESSEL IS SHAPING THE FUTURE OF SUSTAINABILITY

CHALLENGES

Integrating a lithium-ion battery power system aboard the dual-fuel (LNG/marine diesel) *Harvey Energy* to drive energy efficiencies and reduce emissions.

SOLUTION

Collaborating with Harvey Gulf International Marine, LLC. to deliver the first tri-fuel vessel by providing leading guidance in the integration of a hybrid power system. ABS was engaged to conduct technical reviews and survey verifications of vendor supplied equipment and their installation aboard the *Harvey Energy* and assist in getting Flag (US) approval.

RESULTS

With the ABS class notation ESS-LiBATTERY, the battery installation significantly enhanced the efficiency and environmental performance of the vessel and added a layer of redundancy. The overall fuel cost saving reported was over 20 percent, according to Harvey Gulf International Marine, LLC.

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OVERVIEW

American Bureau of Shipping (ABS) was selected to class two Offshore Supply Vessels (OSV) being retrofitted with a battery/converter system by Harvey Gulf International Marine. The *Harvey Energy* is the first ABS-classed dual-fuel (LNG/marine diesel) and battery vessel and the first U.S. flagged OSV equipped with a battery/converter system. Significant emissions reduction is expected to be achieved.

Harvey Energy is the first vessel in North America being powered primarily by liquefied natural gas (LNG). The pioneering offshore supply vessel (OSV) started operations in March 2015, serving Shell in its deepwater offshore operations in the Gulf of Mexico.

Harvey Gulf contracted Wärtsilä to supply an energy storage system, energy management system, transformer and drive, all mounted inside a single container of *Harvey Energy*.

CHALLENGES

Harvey Gulf's mission is to have the most fuel efficient environmentally friendly fleet of platform supply vessels in the Americas. *Harvey Energy* will be the first LNG fueled – and the first hybrid retrofit – Platform Supply Vessel (PSV) in the Americas. The 5,312-dwt vessel is currently powered by three Wärtsilä 6L34DF dual-fuel gensets providing 7,530 kW (10,100 hp) fueled by Wärtsilä's LNGPac system – a complete fuel gas handling system for LNG vessels.

Wärtsilä's hybrid solutions are based on a 'first-of-its kind' fully integrated hybrid power module. This combines engines, an energy storage system using batteries, and power electronics optimized to work together through an innovative, Wärtsilä-developed energy management system. The solution marks a new benchmark in marine hybrid propulsion.

Harvey Gulf chose ABS for its significant experience in LNG and dual fuel energy. ABS was selected to provide technical reviews and survey verifications of vendor supplied equipment and installation aboard the *Harvey Energy*.



SOLUTION

ABS worked closely with Harvey Gulf on the successful integration of the lithium-ion battery into the hybrid power systems aboard *Harvey Energy*. During the project, ABS provided several key reviews and verifications:

- Review test reports, specifications, and safety features to assess compliance with requisite rules and standards.
- Review structural documentation on battery container for compliance
- Witness testing of converters that transform battery voltage to ship system voltage
- Review technical documentation for structural, electrical, fire suppression, HVAC, safety system and the testing of system batteries, convertors, transformers, HVAC units
- Review technical documentation for installation of container on board that covered stability calculation, structural and electrical drawings
- Review modification of the switchboard drawings for hybrid system
- Review the integration with the existing ship systems

RESULTS

Harvey Gulf International reported that the installation of a Wärtsilä 1,450 kW battery hybrid solution, which has achieved the ABS class notation ESS-LiBATTERY, enhanced the efficiency and environmental performance of their vessel, seeing in excess of 20 percent fuel savings, as well as major reductions in carbon emissions.

The installation of a Wärtsilä 1,450 kW battery hybrid solution also absorbed electrical spikes caused by dynamic positioning (DP) operation, allowing the main engines to maintain an even load and produce less carbon.

Harvey Energy is one of five LNG-fueled platform supply vessels (PSVs) in operation in Harvey Gulf's fleet. Another PSV is under construction at its Gulf Coast Shipyard Group (GCSG) in Gulfport, Mississippi. All of the LNG-fueled PSVs are expected to be fitted with battery-hybrid technology.

Through projects like this ABS continues to deliver leading guidance for the safer development, deployment, and integration of hybrid power systems that enhance efficiency gains and environmental performance for marine and offshore assets.