Exergy developing Organic Rankine Cycle unit for LNG plants

Italian company's latest technology opens door to oil & gas market. By **Roberta Prandi**

Exergy, an Italy-based specialist in Organic Rankine Cycle (ORC) applications, has begun working on an ORC unit designed for waste heat recovery from gas turbines in LNG regassification plants.

Luca Xodo, Exergy's head of sales, explained the technology behind Exergy's ORC as well as specific details about how the system can be applied to LNG plants.

"ORC is basically a steam cycle with vapor from organic fluid instead of water. This is a more efficient cycle for smaller size installations (smaller than conventional steam turbines) and lower temperatures," he said. "Turbines around 5 MW power output can produce in combination with ORC up to 7 or 8 MW power."

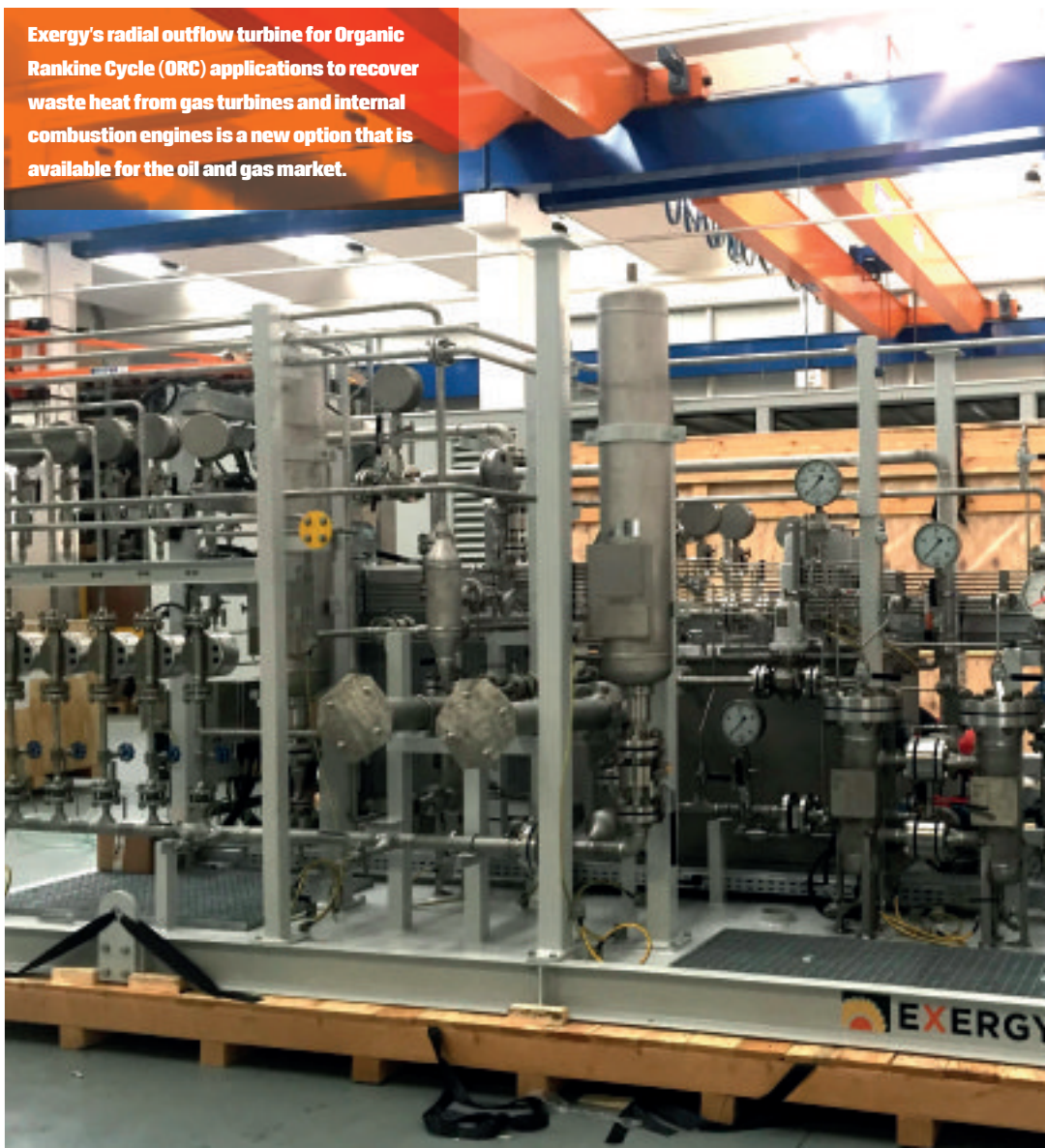
Exergy uses its own radial outflow turbines in versions that are essentially the same from a mechanical perspective but almost always customized to the needs of the customer and characteristics of the installation, Xodo said.

Exergy's turbine portfolio is divided into two main families: one for geothermal applications, usually characterized by lower temperatures and high power (for ORC cycles) with two frames – 10 and 25 MW; and one for heat recovery applications with three frames – 2.5, 5 and 10 MW.

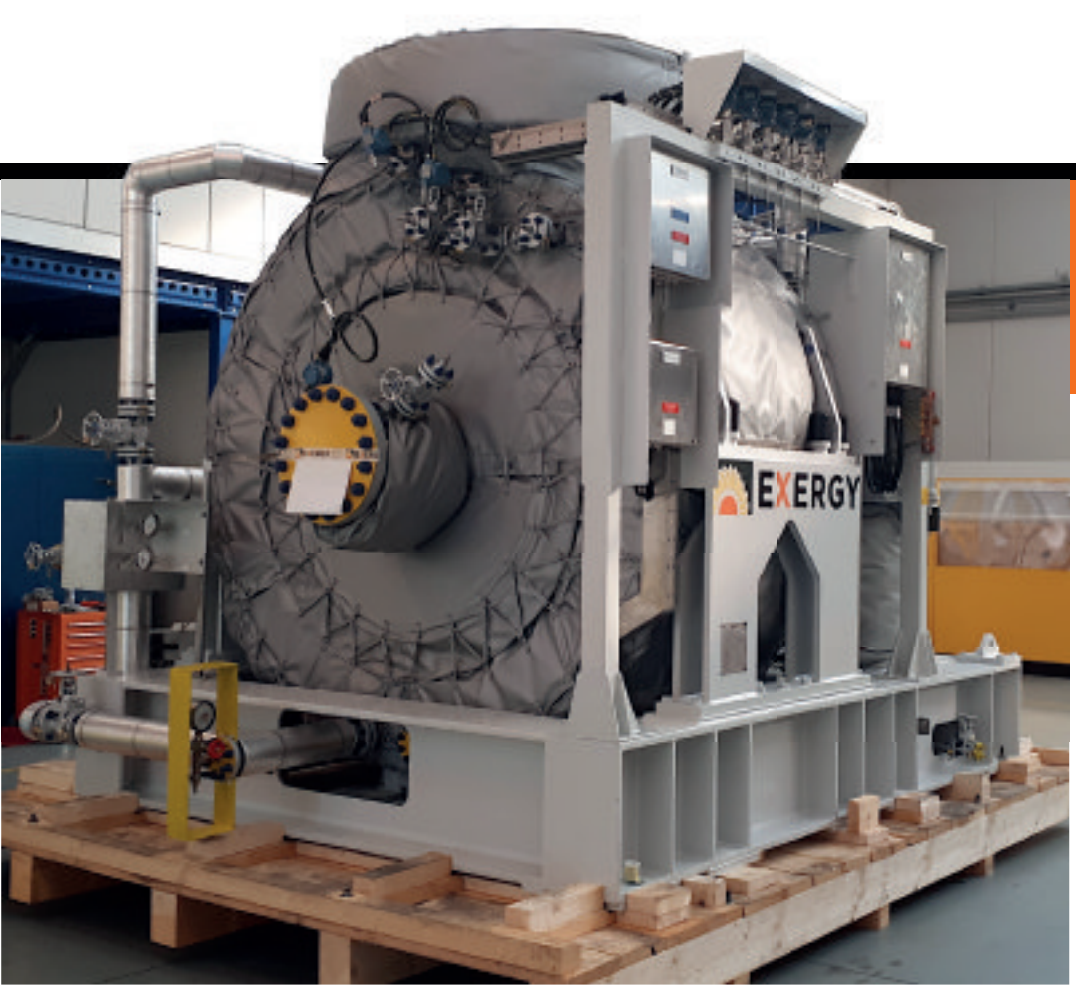
440 MW installed

The company has about 440 MW of power installed with its ORCs, 350 MW of which is operating with proprietary radial outflow turbines. Typically for an ORC application, Exergy will deliver the turbine along with the entire system, composed of heat exchangers, pumps, valves, a condenser system and the organic fluid of choice.

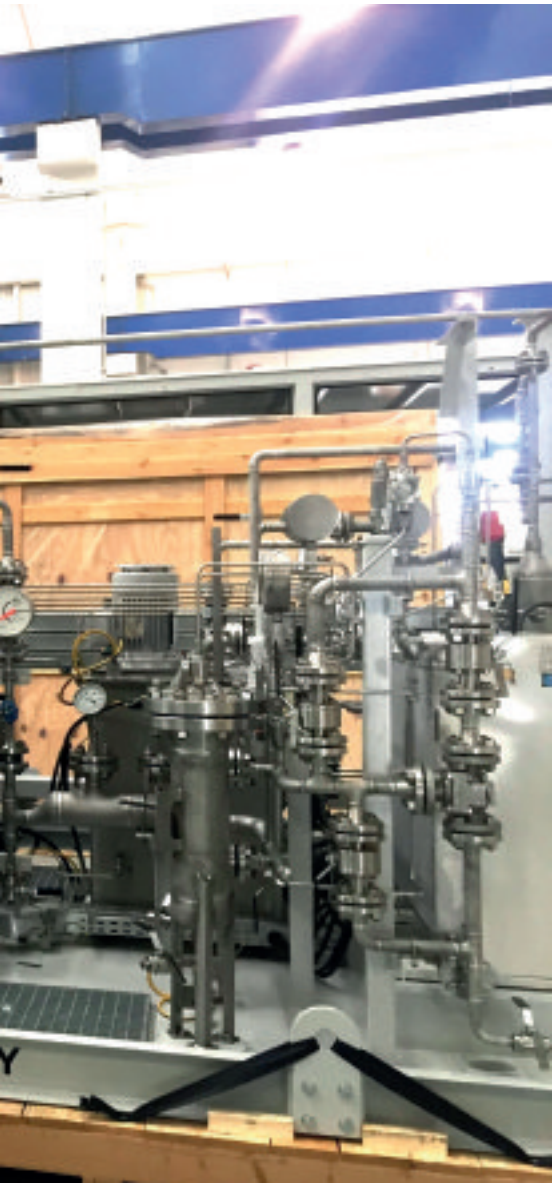
"We utilize a palette of up to 10 different organic fluids, including all hydrocarbons (butanes, pentanes), refrigerants, siloxanes and perfluorinated compounds," Xodo said. "A new product will be available in the course



Exergy's radial outflow turbine for Organic Rankine Cycle (ORC) applications to recover waste heat from gas turbines and internal combustion engines is a new option that is available for the oil and gas market.



The lube and seal oil console by Exergy is compliant with API technical standards for oil & gas applications.



of 2019 that is capable of a direct exchange thermal cycle using a non-flammable fluid (which sometimes is a specific request in the projects for the oil & gas market).

"The product is currently being developed with some important partners and will be optimized using a limited number of components, thus aiming at being more price competitive," he said, adding that Exergy plans to launch this product later in the year.

The application of ORC to LNG plants opens two new markets for Exergy: pure power generation in combination with gas turbines or internal combustion engines; and the oil & gas industry, where Exergy's ORC can be used for downstream internal combustion engines or turbines when used for driving compressors in pipeline compressing stations.

"In both markets, the absence of water consumption and the automatic operation of the plants is seen as a great advantage and less risk for the operator," Xodo said. "It also makes this application very suitable for remote plants as well.

"Our technology is very flexible and easy to scale up, as the history of Exergy shows," he said. "Our first ORC was installed in 2011 with an output of 1 MW; in 2014, installations reached 4 MW output, while 12 MW were touched in 2015. In 2016, the threshold was set at 25 MW. The very quick upscaling of our technology let us believe that there is still a great potential for increases.

"The application of our technology in the midstream and downstream sectors of the oil & gas Industry will be a primary focus of our strategy in the near future, as we have seen outstanding growth of the demand in this sector in the recent years and forecasts set a promising target of US$14.90 billion by 2023," Xodo said. **CT2**

EXERGY IN THAILAND

Exergy has been selected in partnership with Baker Hughes, a GE company (BHGE), for the engineering, design and construction of a 5 MW ORC unit for waste heat recovery from gas turbines in an LNG regassification plant in Thailand.

The customer, Samsung Engineering Co., acts as the engineering procurement construction (EPC) contractor for the final customer and user PTT LNG in its regasification terminal located in Rayong.

Exergy's ORC solution, equipped with radial outflow turbine technology, recovers the exhaust heat downstream generated from two Solar Mars 100 gas turbines installed in the LNG plant, generating 5 MW of electric power.

The cooling system employs cold water from the regassification cycle as heat sink, in a temperature range between 41° and 100.4°F (5° and 38°C) without water consumption.

The heat recovery plant exploits a large amount of the residual heat, otherwise discharged by the gas turbines in the atmosphere, thus increasing the efficiency of power production and reducing the environmental footprint of the power plant.

The ORC will start commercial operation in the first half of 2019.