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# Economics of LNG Cold Energy Utilization by Generation of Electricity

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## Abstract

Liquefied natural gas (LNG) is stored as liquid at -162°C. It must be gasified by heating before it is transported as natural gas to consumers in a pipeline. Approximately 220 kWh/Mt of heat energy is required to regasify LNG into natural gas. This heat is traditionally supplied by cooling seawater in an open rack vaporizer (ORV) or by the combustion of natural gas in a submerged combustion vaporizer (SCV).

It has long been recognized that this "cold energy" is a valuable energy resource and its utilization can improve the economics of an LNG regasification terminal. At present, the utilization of this cold energy is done to a significant extent only in Japan. However, in recent times, there is a growing interest in the recovery and utilization of this cold energy, as evidenced by the increasing number of publications on this subject [1].

In this review, IHS Markit PEP examines one such process—the production of electricity using LNG cold energy in an organic Rankine cycle (ORC). The base case considered is an LNG regasification terminal with a processing capacity of 4 MMtpa of LNG using open rack and submerged combustion vaporizers.

This review addresses the technology and economics of the generation of electricity using the cold energy of LNG regasification in an ORC using propane or ethane as the motive fluid. It includes the process flow diagram, material balance, major equipment sizes, and specifications. Cost data, including battery limits and offsites costs, variable costs, capex, opex, and the overall production costs are provided. This review will be beneficial for planners, producers, and designers who are looking for independent data of LNG cold recovery using propane/ethane ORC. An interactive iPEP Navigator module of the process is included, which provides a snapshot of the process economics and allows the user to select the units and the global regions of interest.

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