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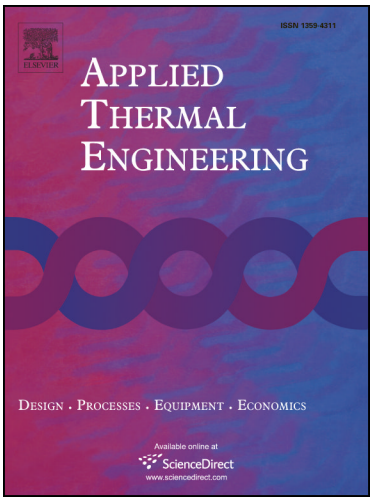

Research Paper

Cold recovery from LNG-regasification for polygeneration applications

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PII: S1359-4311(17)36614-0
DOI: https://doi.org/10.1016/j.applthermaleng.2017.12.073
Reference: ATE 11594

To appear in: *Applied Thermal Engineering*

Received Date: 15 October 2017
Revised Date: 14 December 2017
Accepted Date: 20 December 2017

Please cite this article as: A. Atienza-Márquez, J. Carles Bruno, A. Coronas, Cold recovery from LNG-regasification for polygeneration applications, *Applied Thermal Engineering* (2017), doi: https://doi.org/10.1016/j.applthermaleng.2017.12.073

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Cold recovery from LNG-regasification for polygeneration applications

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Abstract

Liquefied Natural Gas (LNG) has a high exergetic potential because of its low temperature (around -162^{o}C), although usually the cold released from LNG regasification is wasted. In this paper, the LNG supply chain and the conventional regasification technologies are reviewed and analyzed to identify the cold recovery opportunities. Also, an overview of the applications and technologies for LNG cold recovery is presented. Although there many applications and technologies for this purpose, most of them are immatures and their implementation is not widespread. Besides, most of the literature is focused on exploiting LNG cold for a single application, while LNG cold offers a lot of possibilities of exploitation via polygeneration. In the second part of this paper, a polygeneration plant for power and cold production is proposed and modelled as a case study for cold recovery from LNG-regasification. The structure of the plant is engineered to operate with high flexibility. The LNG exergy is exploited in cascade for power production and cold generation in a district cooling network with three different temperature levels. The plant achieves an equivalent energy saving of 81.1 kWh/ton-LNG with an exergetic efficiency of 34.7%. The seawater consumption is reduced 67.6% respect to the typical LNG regasification.

Keywords: Liquefied Natural Gas regasification; Exergy recovery; Polygeneration; Combined cold and power production; Performance indicators

1. Introduction

Natural gas (NG) is the fossil fuel with the lowest carbon footprint and the most clean combustion [1–3]. At present, NG accounts approximately a quarter of world primary energy

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