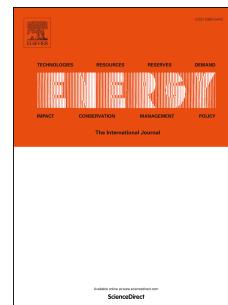


Accepted Manuscript

Investigation of a hybrid water desalination, oxy-fuel power generation and CO₂ liquefaction process

Bahram Ghorbani, Mehdi Mehrpooya, Hossein Ghasemzadeh



PII: S0360-5442(18)31164-2

DOI: [10.1016/j.energy.2018.06.099](https://doi.org/10.1016/j.energy.2018.06.099)

Reference: EGY 13141

To appear in: *Energy*

Received Date: 2 February 2018

Revised Date: 13 June 2018

Accepted Date: 16 June 2018

Please cite this article as: Ghorbani B, Mehrpooya M, Ghasemzadeh H, Investigation of a hybrid water desalination, oxy-fuel power generation and CO₂ liquefaction process, *Energy* (2018), doi: 10.1016/j.energy.2018.06.099.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Investigation of a hybrid water desalination, oxy-fuel power generation and CO₂ liquefaction process

Bahram Ghorbani^{*1}, Mehdi Mehrpooya^{2,3}, Hossein Ghasemzadeh^{2,3}

¹Faculty of Engineering Modern Technologies, Amol University of Special Modern Technologies, Amol, Iran

²Renewable Energies and Environmental Department, Faculty of New Science and Technologies, University of Tehran, Tehran, Iran,

³Hydrogen and Fuel Cell Laboratory, Faculty of New Sciences and Technologies, University of Tehran,

In this paper, an integrated liquefied natural gas (LNG) production process, carbon dioxide separation and liquefaction, and fresh water production is proposed and analyzed. The hybrid system consists of three sections: power and heat generation by the process of combustion with pure oxygen, natural gas liquefaction with a two-stage refrigeration cycle (absorption refrigeration cycle and multi-component refrigerant), and multiple-effect distillation (MED) desalination. This integrated process produce 593.3 ton/h LNG, 84.62 ton/h carbon dioxide, and 74.58 ton/h fresh water. Exergy analysis shows that the highest exergy destruction is related to the shell and tube heat exchangers, which is about 38.8% and the lowest exergy destruction is related to the air coolers, 0.84%. Integrated process has an overall electrical efficiency (LHV Base) of 36.3%, a specific power of 0.179 kWh/kg LNG. Also the amount of energy consumed for producing carbon dioxide is 0.005 kWh/kg CO₂, and gained output ratio(GOR) of 2.87 is achieved by three-stage MED desalination. A sensitivity analysis is done to investigate and identify the important parameters affecting the integrated process performance.

Keywords: *Multi effect desalination; Liquefied natural gas; carbon dioxide capture; oxy-fuel power plant; exergy analysis; Sensitivity analysis.*

*Corresponding author. Faculty of Engineering Modern Technologies, Amol University of Special Modern Technologies, Amol, Iran
Tel.: +98 9113220801. E-mail addresses: b.ghorbani@ausmt.ac.ir.

Download English Version:

<https://daneshyari.com/en/article/8071229>

Download Persian Version:

<https://daneshyari.com/article/8071229>

[Daneshyari.com](https://daneshyari.com)