化工学报 2009 60 (9): 2276-2283 ISSN: 0438-1157 CN: 11-1946/TQ

能源和环境工程

动力系统利用液化天然气冷能的节能减排分析

熊永强, 华贲

华南理工大学强化传热与过程节能教育部重点实验室; 华南理工大学材料科学与工程学院

收稿日期 2009-3-19 修回日期 2009-5-6 网络版发布日期 2009-9-11 接受日期

摘要

针对动力系统CO_2减排能耗过高的问题，将液化天然气（LNG）的冷能集成用于空气分离制氧和CO_2近零排放动力循环的CO_2捕集，提出了一种利用LNG冷能的CO_2近零排放动力系统设计方案。研究结果表明：空分装置利用LNG冷能生产高压氧气、液氮和液氩等产品，生产能耗比传统空分装置降低57.6%，CO_2近零排放动力循环的火用效率可从52%提高至55.9%。同时，建立了CO_2近零排放动力系统利用LNG冷能的节能减排效益的数学模型，并对动力系统参数进行了分析。以一个进口量为3.0×10^6 t·a^{-1}的接收站为例，CO_2近零排放动力系统利用接收站的LNG冷能每年可节省用电2.78×10^8 kW·h，减少排放CO_2约3.87×10^5 t·a^{-1}，经济效益可达到2.19亿元·a^{-1}。

关键词

液化天然气 冷能利用 动力系统 节能 CO_2减排

分类号

扩展功能

本文信息

Supporting info

PDF(3230KB)

[HTML全文](0KB)

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

复制索引

Email Alert

文章反馈

浏览反馈信息

相关信息

本刊中 包含“液化天然气”的 相关文章

本文作者相关文章

· 熊永强

· 华贲

Analysis on energy-saving and CO_2 emission reduction in energy power system by utilization of cold energy from liquefied natural gas

XIONG Yongqiang，HUA Ben

Abstract

The CO_2 emission reduction in power system is a high energy consumption process.Aiming at this point, a nearly zero CO_2 emission power system is proposed, in which the cold energy from liquefied natural gas (LNG) is utilized in the process of air separation for oxygen production together with the capture of CO_2.It is predicted that the unit power consumption by the proposed system using LNG cold energy could be reduced by 57.6% than that of the traditional air separation device in producing high pressure oxygen, liquid nitrogen and liquid argon.The exergy efficiency of the power cycle could be increased from 52% to 55.9%.Meanwhile, a mathematical model for this energy-saving and nearly zero CO_2 emission power system is established, with which the process parameters of the power system are analyzed.For a terminal with 3.0×10^6 t·a^{-1} LNG input, the proposed power system could save 2.78×10^8 kW·h power per year and reduce 3.87×10^5 t·a^{-1} CO_2 emission, by which the economic benefits could reach 2.19×10^8 CNY·a^{-1}.

Key words

liquefied natural gas (LNG) cold energy utilization power system energy-saving CO_2 emission reduction

DOI:

通讯作者 熊永强 yqxiong1978@163.com