

Accepted Manuscript

Metal hydride hydrogen compressors: Current developments & early markets

Emmanuel Stamatakis, Emmanuel Zoulias, George Tzamalīs, Zoe Massina, Vassilis Analytis, Christodoulos Christodoulou, Athanasios Stubos



PII: S0960-1481(18)30481-6

DOI: [10.1016/j.renene.2018.04.073](https://doi.org/10.1016/j.renene.2018.04.073)

Reference: RENE 10031

To appear in: *Renewable Energy*

Received Date: 27 November 2017

Revised Date: 21 April 2018

Accepted Date: 24 April 2018

Please cite this article as: Stamatakis E, Zoulias E, Tzamalīs G, Massina Z, Analytis V, Christodoulou C, Stubos A, Metal hydride hydrogen compressors: Current developments & early markets, *Renewable Energy* (2018), doi: [10.1016/j.renene.2018.04.073](https://doi.org/10.1016/j.renene.2018.04.073).

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.

Metal hydride hydrogen compressors: current developments & early markets

Emmanuel Stamatakis^{*,a,b}, Emmanuel Zoulias^b, George Tzamalidis^{a,c}, Zoe Massina^{b,a}, Vassilis Analytis^c,
Christodoulos Christodoulou^c, Athanasios Stubos^a

a. National Centre for Scientific Research Demokritos, 15341 Agia Paraskevi, Attica, Greece

b. DIADIKASIA Business Consulting S.A., 15232 Halandri, Athens, Greece

c. HYSTORE Technologies Ltd., RES&H2 Department, 30 Spyrou Kyprianou, Ergates Industrial Area, Nicosia 2643, Cyprus

* Corresponding Author: Dr. Emmanuel Stamatakis, stamatakis.emmanuel@gmail.com

Abstract

Compression is one of the most critical issues related to almost all hydrogen storage methods and its subsequent usage. Hydrogen compression is only part of the so-called “Hydrogen Value Chain”, but it is crucial for overcoming the entry barriers for a “Hydrogen Economy”. It is widely accepted that there is a strong need for significant improvements in efficiency, durability and reliability of hydrogen compressors as well as for cost reductions,

The basic scope of this work is to present the current developments on Metal Hydride Hydrogen Compressors (MH2C) and try to evaluate from both technical and economical point of view the potential integration of MH2C in real power systems comprising Renewable Energy Sources and Hydrogen technologies.

In this work, certain target markets for the MH2 compressor are identified, while all technical and financial issues of its integration in complete power systems have been assessed. Through a preliminary analysis of potential markets for the MH2 Compressor, it is shown that there are three major niche markets: (i) Chemical industry, by utilisation of waste industrial and/or available renewable heat; (ii) Hydrogen filling stations for vehicles and (iii) RES & H2 autonomous power systems for remote communities (e.g. off-grid islands).

A specific case study (the Greek island of Milos) is analysed in detail (using the HOMER software tool) with the aim of increasing RES penetration. A RES & hydrogen storage power supply system is proposed and examined from an economic, environmental and social perspective drawing the relevant conclusions.

Keywords: hydrogen compressor; metal hydrides; early markets; hydrogen economy; techno-economic analysis

Emmanuel Stamatakis

National Center of Scientific Research DEMOKRITOS

15341 Agia Paraskevi, Attica, Greece

stamatakis.emmanuel@gmail.com

Download English Version:

<https://daneshyari.com/en/article/6764167>

Download Persian Version:

<https://daneshyari.com/article/6764167>

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