Namibia - Its potential role in the development and application of green hydrogen

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INTRODUCTION

The need to reduce carbon emissions in order to mitigate against greenhouse effects of global warming has necessitated research into alternative renewable green technologies. One of these technologies is the production and application of green hydrogen[1]. It is important to note that hydrogen is not a primary source of energy but rather a carrier[1]. The cheapest and cleanest current production route for hydrogen is electrolysis[2], although the cost can be brought down to as low as 1.5 USD/kg when utilising wind energy together with a low-cost electrolyser[3]. It is also noted that Africa has made plans to participate in the green hydrogen revolution through the Africa-EU energy partnership[4].The overarching aim of the paper is to establish the role Namibia can play in the green hydrogen revolution, given the country's renewable energy potential.

METHODOLOGY

The methodology used in this study was based on a detailed review of available literature on the developments in this area. In addition, a qualitative approach was adopted that included interviewing key stakeholders in the industry about the extent of their awareness and plans for contribution in this growing field.

THE NAMIBIAN SET UP

The Harambe Prosperity Plan II (HPP2) of Namibia outlines the need to investigate the feasibility of setting up a green hydrogen industry[5]. To achieve this target Namibia has proposed to set up an Inter-Ministerial Green Hydrogen Committee, draft a National Green Hydrogen and Ammonia Strategy by the end of the third quarter of the 2021/2022 financial year, a detailed feasibility study to be conducted and completed by the end of 2023, and develop the Southern Corridor Development Initiative (SCDI). Namibia is primed for the green hydrogen capability through its abundance of natural renewable resources.

[1] Ayodele, T.R., Munda, J.L. (2019). Potential and economic viability of green hydrogen production by water electrolysis using wind energy resources in South Africa. International journal of hydrogen energy, 4 4, 1 7 6 6 9 -1 7 6 8 7

[2] Nicita, A., Maggio, G., Andaloro, A.P.F., Squadrito, G. (2020). Green hydrogen as feedstock: Financial analysis of a photovoltaic-powered electrolysis plant. Int. J. Hydrog. Energy 45 (20), 11395–11408.

[3] AbouSeada, N., Hatem, T.M. (2022). Climate action: Prospects of green hydrogen in Africa. Energy Reports 8 (2022) 3873–3890

[4] https://africa-eu-energy-partnership.org/wp-content/uploads/2021/04/AEEP_Green-Hydrogen_Bridging-the-Energy-Transition-in-Africa-and-Europe_Final_For-Publication_2.pdf (accessed 09.05.2022)

[5] http://hppii.gov.na/wp-content/uploads/2021/03/HPP2.pdf (accessed 09.05.2022)

THE LUDERITZ PROJECT

The town of Lüderitz is the prime candidate for the green hydrogen project, for several reasons. Lüderitz has a mean wind speed of 9.21 m/s at 100 m above ground level, and estimated capacity factors (P50) of approximately 50%[6]. Besides its proximity to the ocean (a source of water, though requiring desalination), the renewable energy capability of the area allows for the implementation of the green hydrogen project.

ROLE OF EDUCATIONAL INSTITUTIONS

To augment the efforts of the government, the institutions of higher learning namely, University of Namibia (UNAM) and Namibia University of Science and Technology (NUST) have come up with policies for development of green hydrogen. UNAM has established the Namibia Green Hydrogen Research Institute[7], while NUST has incorporated green hydrogen strategies in its strategic plan[8]. The role of the institutions is to be involved in and lead the green hydrogen research and policy drafts, skilling, reskilling and upskilling of the workforce in preparation for a green hydrogen future.

GREEN HYDROGEN FOR DECARBONISATION

It has been reported that green hydrogen is one of the limited and viable options for many decarbonising industrial sectors[9]. In the mining industry, green hydrogen can be used to power equipment, trucks and other vehicles and it may be used in certain metallurgical processes as a reductant[10]. Initiatives to decarbonise in South Africa are already gathering momentum[11] and this provides an easy market for Namibian-green hydrogen.

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6 https://www.nampower.com.na/public/docs/projects/luderitz/Luderitz%20Wind%20Project%20Fact%20Sheet_18May21_v3.pdf (accessed 10.05.2022)

7 https://www.nghri.com/index.htm (accessed 14.07.2022)

8 https://www.nust.na/?q=news-tag/vision-2030 (accessed 09.05.2022)

9 Griffiths, S., Sovacool, B.K., Kim, J., Bazilian, M., Uratani, D.M. (20210. Industrial decarbonization via hydrogen: A critical and systematic review of developments, socio-technical systems and policy options. Energy Research & Social Science 80 (2021) 102208

10 https://www.csiro.au/en/work-with-us/industries/mining-resources/resourceful-magazine/issue-21/moving-to-hydrogen#:~:text=%22There's%20a%20strong%20drive%20to,reductant%2C%22%20Dr%20Roberts%20says.

11 https://mybroadband.co.za/news/energy/443480-worlds-biggest-hydrogen-trucks-now-operating-at-south-african-mine.html