PACIFIC COMMUNITY

FFIFTH PACIFIC REGIONAL ENERGY AND TRANSPORT MINISTERS MEETING
(Port Vila, Vanuatu, Thursday 8-12 May 2023)

AGENDA ITEM E9 – FUELLING THE PACIFIC THROUGH GREEN HYDROGEN – APPLICATIONS AND POTNETIAL OF GREEN HYDROGEN IN THE PACIFIC

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Purpose

1. The purpose of this paper is to shed light on green hydrogen, the current developments globally and in the Small Islands Developing States (SIDS), as well as its challenges, advantages, and opportunities.

Background

2. In 2050, hydrogen and its derivatives might account for 12% of final energy use and 10% of carbon dioxide (CO_2) emissions reductions in a net zero emission world. Ensuring a low-carbon, clean hydrogen supply is essential for many countries, especially those with hard-to-abate sectors like chemical and metals. Hydrogen can further contribute to decarbonize international shipping and potentially long-haul aviation and be utilized as a seasonal storage option. Key derivatives to achieve these goals are likely to include green ammonia and methanol. While there is potential to produce aviation fuels, the research on these products is not well advanced. Current and future sourcing options include conventional fossil fuel-based hydrogen production (grey hydrogen); fossil fuel-based hydrogen production combined with carbon capture, utilisation, and storage (CCUS; blue hydrogen); and hydrogen from renewables (green hydrogen). This latter pathway which comprises the use of renewable energies to produce green hydrogen could potentially play a role for SIDS to reach a 100% renewable energy system.

Current status

3. Green hydrogen remains a high priority on the global energy policy agenda. Project announcements and offtake agreements aiming to kick-start international hydrogen trade, accelerated in 2022 and are expected to increase further in 2023. The majority of project announcements involve governments and companies in future demand centres without sufficient hydrogen production potential to meet possible demands, such as Europe and East Asia. However, countries with major renewable energy potential are also exploring opportunities to produce renewable hydrogen and derivatives for domestic energy intensive industry development but also for potential export.

4. Most green hydrogen developments and discussions are occurring in the non-SIDS countries. The potential of green hydrogen in SIDS, is portrayed by two IRENA's recent works. In coordination with the relevant governments, IRENA developed Renewable Energy Roadmaps for Antigua & Barbuda and for the Republic of Palau. Both roadmaps express the importance of setting renewable energy deployment on top of the agenda for a successful system transformation. This would also be a requirement for the possible incorporation of green hydrogen into the system. However, manufacturing green hydrogen in SIDS would require an abundance of spare renewable electricity, water, expensive plant, skilled workers and infrastructure. Importing hydrogen might be a more cost-effective option.

5. The Asia-Pacific region has also gained significant momentum in hydrogen developments. Two players in proximity to the Pacific SIDS are committed to play an important role in the future international hydrogen supply chains: Australia and Japan. Australia is striving to leverage its renewable energy potential to produce hydrogen and derivatives to meet growing global demand. Japan has initiated discussions with numerous potential power-to-X technology[1] suppliers and plans to increase its energy security by importing hydrogen (and its derivatives) from diverse sources, including Australia. Other relevant regional players for the Pacific also include Singapore, China and India. The production of green hydrogen within non-SIDS countries will depend on the potential scale of renewables deployment, which should first be directed towards direct use, particularly in electricity, as well as the economics of local, relatively small-scale production, versus clean hydrogen derivative imports from larger suppliers.

6. One demonstration project shows the potential impact this could have on Pacific SIDS. It aims to transport green hydrogen produced in Australia to the Republic of Palau. In Queensland solar power will be used to produce the green hydrogen that will be applied in Palau's shipping sector. The project includes plans to retrofit gasoline-fuelled vessels to hydrogen-fuelled vessels and to implement stationary fuel cells as backup power sources to replace diesel fuel. A consortium of Japanese companies (including Sojitz Corporation, CS Energy Ltd. and Nippon Engineering Consultants Co., Ltd.) is in charge for the overall project management and for generating the hydrogen in Australia. One part of the project is a feasibility study to assess the future hydrogen demand in Palau and other Pacific SIDS. The study will also assess the optimal maritime route and best hydrogen carriers to transport hydrogen to Palau. According to Sojitz, the consortium received public funding from the Ministry of the Environment of Japan (MOEJ).

Issues and Opportunities

7. A combination of energy efficiency and direct use of renewable energy sources can deliver the bulk of the emission reductions needed to meet the goals of the Paris Agreement. Accelerated renewable energy deployment for its direct use is therefore most important step on the way forward to reach net-zero and enhance energy security for SIDS. It will also decrease the exposure to external price shocks in the fossil fuel market and the dependency on fuel imports. As the Renewable Energy Roadmap for the Republic of Palau indicates, Palau has the potential to come very close to achieving a system based 100% on renewable energies by simply increasing its renewable energy capacity, particularly solar PV and wind, and deploying battery storage. Following those efforts, hydrogen deployment is a solution to close the decarbonisation gap for applications where direct use of renewable electricity or fuels is not a technically viable or cost-effective solution. Therefore, the first energy sector transformation action should be energy efficiency, followed by the deployment of renewables. Green hydrogen as a grid flexibility option and to decarbonize end-use sectors could potentially play a role to reach the last step to a 100% renewables-based system. Other jurisdictions in the region will of course have different renewable potential and hence possible mixes of local green hydrogen production versus international market participation.

8. Given the insular condition of SIDS, maritime transportation represents a key sector in their economies. The use of green hydrogen fuels for decarbonising maritime transport could be a potential application of green hydrogen. One option could be the use of green hydrogen based synthetic fuels (e.g. green ammonia or methanol), however, renewable synthetic fuels production is still in its early stages and needs further scale-up in production. Another option to decarbonize the maritime sector in Pacific SIDS could be the deployment of hydrogen fuel cell speed boats. On the other hand, further

[1] Power-to-X refers to the conversion of electricity into other products, such as synthetic fuels or raw materials.

technological progress can be expected in battery-powered boats, which could eventually lead to fast, highly efficient battery-powered boats that meet the requirements of maritime transport in the Pacific SIDS. Other key potential applications are in aviation fuels, and perhaps longer-term energy storage to assist integrating high renewable penetrations into the region's electricity sectors.

Recommendations

9. The meeting is invited to:

(i) **recognise** the potential of green hydrogen and its derivatives to contribute significantly to the decarbonisation efforts in the Pacific SIDS and **call** on development partners to support green hydrogen development initiatives.

(ii) **acknowledge** the need to focus on energy efficiency and accelerating the deployment of renewable energies, particularly solar and wind technologies, coupled with battery storage as first energy sector transformation actions.

(iii) **encourage** PICTs and development partners to ensure that identified geographical locations for solar and wind farms are aligned with grid infrastructure developments.

(iv) **support** a comprehensive assessment that captures Pacific SIDS green hydrogens issues / needs such as: policy; capacity; infrastructure; applications, safety in relation to transfer, storage and use; domestic manufacturing versus importing; and investment and funding instruments.

(v) **support** the development of the Pacific regional green hydrogen strategy, and the deployment of appropriate planning tools to assess renewable energy penetration, electrification opportunities and green hydrogen production across the region.