

# SUPPORTING RENEWABLE ENERGY IN THE PACIFIC: PHES SYSTEMS

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POLICY BRIEF - ISABELLA BOONE, JAZMIN WRIGHT, ISABELLA KENNE, & EMILY BORGIO

# EXECUTIVE SUMMARY

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Pacific Island Nations have incredibly low rates of electrification, high rates of potential renewable energy resources and are the most at risk from climate change. [1] Only 30 per cent of households in the Pacific have access to electricity and the majority of this energy is derived from unsustainable sources. [2] Small Island Developing States (SIDS) in the Pacific have strengthened their Nationally Determined Contributions ahead of COP26, including increased commitments to switching to renewable energy. [3]

As the Climate Crisis worsens, adaptation is rapidly needed in the Pacific. It is Australia's time to step up and support our neighbouring SIDS. Utilising the existing infrastructure-based development aid programs in the Pacific and resources, Australia should begin to support the development of versatile renewable energy infrastructure. This policy suggests Pumped Hydro Energy Storage (PHES) Systems. PHES Systems are an energy production and storage technology that harnesses the movement of water.

In order to promote an effective policy rollout of PHES Systems in the Pacific, Australia should initially target Vanuatu and Papua New Guinea as target states, due to their geography, availability of resources, existing resources, and relationships with Australia. The program should then be expanded to alternate suitable SIDS.

The policy recommendations are as follows. Australia should:

1. Engage in community consultation throughout the entire process
2. Establish a research collaboration with recipient countries
3. Invest in infrastructure development of PHES systems

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## BACKGROUND

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As the world continues to make the shift towards renewable energy in response to climate change, energy storage systems are becoming increasingly important to support the new sustainable transitions.

Prior to the 2021 United Nations Climate Change Conference (COP26), Papua New Guinea (PNG) and Vanuatu, alongside other small island developing states (SIDS) in the Pacific, strengthened their commitments to achieving sustainable energy within the nationally determined contributions (NDCs). [4]

Vanuatu's new submission, using 2010 as a baseline year in which they had 11.69 per cent renewable energy generation and grid connection, revises its targets to achieving 100 per cent household access to electricity in off-grid areas, 100 per cent access for public institutions, and total electrification by 2030. More incremental targets are shown to be 50 per cent by 2025. [5] According to the Pacific Energy Update, [6] Vanuatu has reached a 75% electrification rate and a 65 per cent renewable energy share. [7] As of 2018, they had achieved 62 per cent access to electricity surpassing their 50 per cent by 2025 goal. [8]

According to PNG's submission to the UNFCCC, it has enhanced its NDCs in the energy sector, targeting carbon neutrality within the energy industries sub-sector by 2030. PNG aims to enhance the levels of renewables in the energy sector and capacity for on-grid electricity generation from 30 per cent (2015) to 78 per cent in 2030. [9] In its submission to the UNFCCC, PNG acknowledges the challenges it faces with its geography and dispersed population and therefore has set a more conservative target so as to be realistic. [10]

In addition, their new Electricity Industry Policy is pursuing three goals: to improve access to electricity, to improve the reliability of electricity, and to ensure affordable power for consumers. [11] PNG's progress reports show 59 per cent of the country has access to electricity.

PHES Systems are the most widely used form of energy storage worldwide. [12] Pumped Hydrogen Energy Storage is well suited to the Pacific Islands and viable sites have been identified by ANU's RE100 Group in both PNG and Vanuatu. [13] PHES systems offer a more reliable and efficient form of energy storage and according to ARENA, will play a significant role in transitioning to renewable energy.

# THE PROBLEM

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In the Pacific Islands, there is an issue of accessibility of electricity, with only 30 per cent of households in the Pacific Islands having access to electricity. [14] Even for those with access to energy, traditional sources are largely fossil fuel based, having negative impacts on the environment, and further contributing to climate change, of which the Pacific Islands are most susceptible to the impacts. Beyond the environmental impacts, traditional sources have detrimental impacts on human health.

To combat the inaccessible and detrimental sources of electricity, the policy proposes a joint infrastructure development project of pumped hydro energy storage systems. The aim of the policy is to increase access to energy through clean and renewable sources, ultimately helping achieve the Nationally Determined Contributions of the respective recipient country. Australia's role in the partnership would assist governments and industries in the Pacific in developing pumped hydro energy storage capabilities, through utilising Australia's knowledge and resources in PHES technology.

# POLICY RECOMMENDATIONS

## 1 ENGAGE IN COMMUNITY CONSULTATION

Australia should actively seek to engage in community consultation with the Pacific Island communities which are potential recipients of infrastructure investment and development aid. It is widely documented that the most effective approach to development projects is a 'bottom up' approach. The diversity between Pacific Island Nations, and the communities within each nation is extensive and the needs of those specific communities must be reflected in the development and implementation process. The United Nations Declaration on the Rights of Indigenous Peoples stipulates in Articles 18, 19 and 27 the process of stakeholder engagement specifically for indigenous populations. [15] Australia's process in Pacific Island engagement should be reflective of these international principles, beginning with community consultation and engaging the community at every stage of the process.

## **2** ESTABLISH A RESEARCH COLLABORATION

'Australian universities, research institutes, think tanks and private organisations should share their extensive research in PHES systems through a research collaboration. These organisations have conducted considerable research into the technology, implementation, and benefits of PHES, which should be utilised to assist with the implementation of PHES systems in the Pacific Islands. A research collaboration between Australia and Pacific Island Nations would not only broaden the data on PHES systems across varying locations but would further assist the successful implementation of PHES infrastructure and operation under recommendation 3.

# 3 INVEST IN INFRASTRUCTURE DEVELOPMENT

Australia should invest in Pumped Hydrogen Energy Storage systems as a form of energy infrastructure investment and climate change mitigation in the Pacific Islands. An expansion of the Australian Infrastructure Financing Facility for the Pacific (AIFFP) to be inclusive of PHES systems would be a prime opportunity for Australia to utilise the existing resources dedicated to energy infrastructure development in the Pacific. The investment projects should prioritise the use of local labourers and markets to stimulate the local economy, whilst also creating a sense of infrastructure ownership. Australia should invest in the infrastructure for PHES systems in locations which are otherwise unusable surface areas, such as ex-mines or steep hillsides, to increase the productivity of land and minimise the disturbance to existing environments.

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# CONCLUSION

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With only approximately 30 per cent of households in the Pacific Islands having access to electricity, our policy proposal seeks to address this issue by working with communities to establish a joint infrastructure development project utilising PHES technology. In doing so, the policy seeks to support Pacific Islanders' electricity needs in both the short-term, and into the future, as energy needs and systems adapt and respond to climate change. The three policy recommendations put forth in this paper are firstly to engage in community consultations with Pacific Islanders to assess the suitability of PHES sites and implementation processes; secondly to initiate collaboration on research and development between Australian and Pacific Islander universities and relevant organisations; and lastly the implementation of PHES systems. Australia should seek to develop the policy of energy storage systems in the Pacific Islands, by identifying suitable countries and specific locations for the technology. Through ongoing consultation with Pacific Island communities, the policy envisions culturally appropriate, community-owned, affordable, and sustainable renewable energy infrastructure partnerships. Ultimately, the policy aspires to address the issues surrounding energy accessibility in the Pacific Islands through PHES systems.

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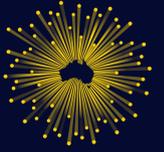
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