أديبك ADIPEC
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# ENERGY, ECONOMIC GROWTH AND EMISSIONS

CASE STUDY

## Exploring green hydrogen pathways to address the energy trilemma

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# Exploring green hydrogen pathways to address the energy trilemma

## CONTEXT

Developing countries, especially small island developing states (SIDS), face a trilemma of low energy access, lack of financing, and regulatory barriers. Despite being abundant in renewable energy resources, SIDS often rely heavily on external technology, knowledge, and financial resources to drive their energy transition towards cleaner power sources.

Global cooperation focusing on equitable partnerships and financial access can enable successful energy transitions for island nations. A recent collaboration between the Green Climate Fund (GCF), International Finance Corporation (IFC), Rubis, Hydrogène de France Energy (HDF), and the International Development Bank (IDB) is a perfect example of a successful undertaking to advance energy access.

This partnership is helping to develop Renewstable Barbados (RSB), a US$175-million project that aims to utilise green hydrogen for electricity generation in the country and also provide a base fuel for other sectors such as transportation and fishing.

Green hydrogen is emerging as a strategically important solution in the context of the energy transition and decarbonisation of electricity generation in the Caribbean and Latin America. The success of Renewstable Barbados could encourage more partnerships that finance and build the necessary infrastructure in SIDS, enabling small island developing nations to meet their climate goals.

### Organisations involved

- Green Climate Fund
- International Finance Corporation
- Renewstable Barbados
- Hydrogène de France Energy

### Industry

Green hydrogen / infrastructure

### Location

Barbados

### Investment

US$175 mn

## EQUITABLE PARTNERSHIPS ARE KEY TO FUNDING THE ENERGY TRANSITION

The IFC, GCF, and IDB Invest are working with HDF and Rubis to support the development of RSB, a 50-megawatt (MW) solar generation facility

**10GW**
Targeted renewable energy capacity in SIDS by 2030[6]

**7%**
Share of clean energy sources in electricity generation in Barbados[2]

**US$10 bn**
Amount of investment needed by SIDS by 2030 to meet renewable goals[7]

**70%**
Barbados's emissions reduction target by 2030, with international support[8]

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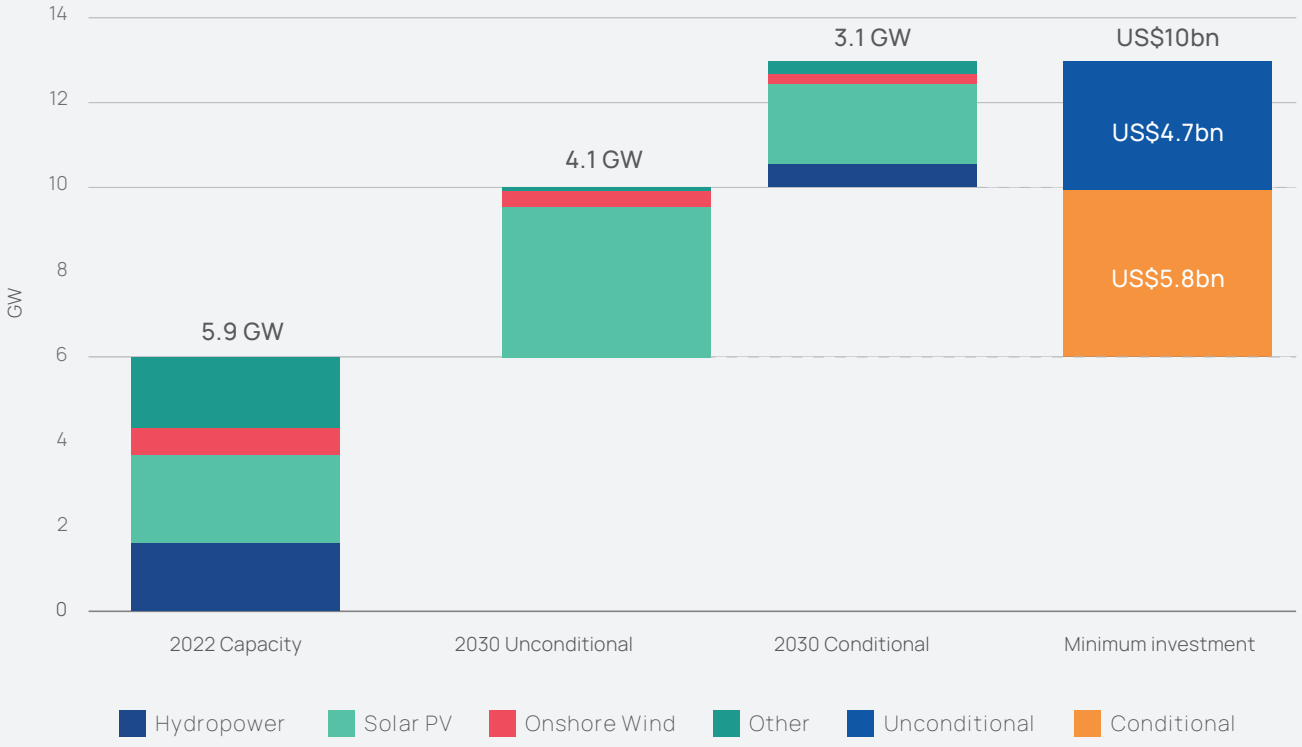
## Climate targets are set, but adequate financial assistance is lacking

Data shows nationally determined targets by small island developing states (SIDS) by conditionality and level of financing required




Source: IRENA, 2023

with green hydrogen and lithium-ion battery storage that will provide firm and clean electricity to the Barbadian grid.

Reflecting on the importance of this collaboration, Henry Gonzalez, Deputy Executive Director, GCF, said: "Our partnership with IFC is grounded in the ambition to deliver transformative projects that can deliver climate impact at scale. This investment offers a solution that can be replicated in Barbados and other small island states, ensuring their prosperity while increasing their resilience to climate events."

RSB is a special purpose vehicle of HDF and Rubis. Upon completion, the project will be the largest hydrogen power plant in the Caribbean, featuring a 50-megawatt peak (MWp) solar photovoltaic plant, a 15-MW lithium-ion battery, and 90-megawatt hour (MWh) hydrogen storage capabilities[1]. The system will generate electricity from the photovoltaic solar park and feed it into the national grid. In parallel, it will use an electrolyser to convert water to hydrogen, store the resulting hydrogen in the form of compressed gas, and then produce firm power from the hydrogen using a fuel cell. When completed, RSB, which is estimated to cost US$175 million, will increase Barbados's energy security, lower electricity tariff trajectories and fuel imports, and reduce the carbon footprint of the country's energy sector[1].

The project is being developed in line with Barbados' ambitious goal of reaching 100% renewable energy by 2030, mitigating the intermittency issues typically associated with solar and wind power and ensuring a steady supply of electricity. By harnessing solar power as its primary energy source, the facility will utilise green hydrogen and battery storage to deliver a consistent energy supply around the clock. As of 2022, low-carbon, clean energy sources contribute 7% of Barbados's electricity consumption, while fossil fuels constitute the rest[2].

The impact of this project also extends to greenhouse gas (GHG) emissions mitigation, with an anticipated reduction of 693,000 tonnes of carbon dioxide over its lifespan. It also introduces hydrogen as a foundational

fuel for the transportation sector and the fishing industry, highlighting its versatility and impact. This supports Barbados's nationally determined contribution (NDC) commitment of a 35% relative reduction in emissions by 2030 or a 70% reduction with international support.

Globally, green hydrogen is emerging as a crucial element in the transition to sustainable energy and net-zero emissions economies. It is 100% sustainable and represents a highly advantageous energy storage solution, particularly for remote islands where alternatives such as diesel generation are costly and dependent on fuel imports.

Financing the necessary infrastructure for such projects, however, remains a significant challenge for SIDS. The current system of climate finance is ineffective for island states due to its complexity and fragmentation. Financial instruments like concessional financing are unsuitable as eligibility is based on prosperity metrics like income per capita, ignoring the unique vulnerabilities of SIDS. Debt financing on the other hand hinders sustainable development efforts. With approximately 94% of climate finance structured as return-seeking, where investments are made through loans or non-concessional grants—which means that the funders expect financial returns on their investments—SIDS find their fiscal flexibility constrained[3]. This perpetuates high debt burdens and traps SIDS in a cycle of financial strain.

According to the International Renewable Energy Agency (IRENA), SIDS will require approximately US$5.9 billion annually to meet their renewable energy targets by 20304. A blend of public and private investments is crucial to bridging the financing gap and facilitating the energy transition.

The collaboration and financial support from IDB, IFC, and GCF to Barbados represents a commendable initiative in the realm of renewable energy, bringing together the public and private sector. The success of RSB should serve as a catalyst, encouraging further collaborations and investments in similar projects across SIDS, ultimately advancing global energy sustainability and resilience.

> "Our partnership with IFC is grounded in the ambition to deliver transformative projects that can deliver climate impact at scale. This investment offers a solution that can be replicated in Barbados and other small island states, ensuring their prosperity while increasing their resilience to climate events."

**Henry Gonzalez**
Deputy Executive Director, GCF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