CONCEPT IDEA NOTE FOR CLIMATE RELATED ACTIVITIES THAT MAY BE FUNDABLE BY THE GREEN CLIMATE FUND AND OTHER FINANCIAL SOURCES

This Concept Idea Note is based upon the GCF Concept Note. It is designed to prepare any Concepts or Project Ideas with GCF financing in mind, however, can also be applicable to other financial institutions. Once the Concept Idea Note is completed please send to the CCCI office (as the GCF National Focal Point), where an assessment will be undertaken as to whether the Concept could be eligible for funding under the GCF or other financial source, or both. CCCI will then communicate the result of the assessment back to the proponent, and outline what will next happen to the Concept Idea Note, such as require more information to make a clearer assessment, the submitted Concept is GCF eligible for funding and the next steps, or a determination that outlines the Concept is not eligible for GCF funding but may get funding from another source.

Title of Concept OR Project Idea:

AITUTAKI RENEWABLE ENERGY PROJECT – Electricity Sector

Date of Submission: **25th October 2018**

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Indicate the areas for the Concept, which is based upon the CKI Country Program thematic areas	Mitigation: Reduced emissions from: ☒ Energy access and power generation ☐ Low emission transport ☐ Buildings, cities and industries and appliances ☐ Forestry and land use Adaptation: Increased resilience of: ☐ Most vulnerable people and communities ☐ Health and well-being, and food and water security ☐ Infrastructure and built environment ☐ Ecosystem and ecosystem services
Indicative total project cost	**Amount: NZD15,000,000**

Project/Programme rationale, objectives and approach of programme/project (max 100 words)

Brief summary of the problem statement and climate rationale, objective and selected implementation approach, including the executing entity(ies) and other implementing partners.

Aitutaki Island will soon achieve approximately 24% renewable energy, however, further considerable diesel fuel and greenhouse gas reduction can be achieved through a second stage renewable energy development, also opening opportunities to demonstrate solar powered desalination to mitigate exposure to climate vulnerabilities. To achieve its Nationally determined GHG targets, Cook Islands Renewable Energy Development Division (REDD) has planned a staged development for Aitutaki. Stage 2 would include installation of additional solar generation or wind turbines, and battery energy storage boosting renewable energy over 50%, saving 250,000 litres of diesel fuel and 670 t CO_2 per year. At times when excess generation is available, this will be diverted to a desalination plant to provide fresh drinking water. REDD has a successful history of implementing similar projects, with support of asset owner Cook Islands Infrastructure Corporation.

Context and baseline (max. 2 pages)

Describe the climate vulnerabilities and impacts, GHG emissions profile, and mitigation and adaptation needs that the prospective intervention is envisaged to address.

Please indicate how the project fits in with the country's national priorities and its full ownership of the concept. Is the project/programme directly contributing to the country's INDC/NDC or national climate strategies or other plans such as NAMAs, NAPs or equivalent? If so, please describe which priorities identified in these documents the proposed project is aiming to address and/or improve.

Describe the main root causes and barriers (social, gender, fiscal, regulatory, technological, financial, ecological, institutional, etc.) that need to be addressed.

Where relevant, and particularly for private sector project/programme, please describe the key characteristics and dynamics of the sector or market in which the project/programme will operate.

Aitutaki Island is a low lying atoll in the Pacific with a population of about 1,800. Aitutaki is a prized tourist destination with a sustainable industry but is isolated and vulnerable to climate change impacts and fuel supply security, high costs and volatility. The proposed project would boost renewable energy on the island substantially so that over 50% of electricity is generated from renewable sources, reducing exposure to supply side risks, enabling low cost desalination to mitigate climate variability and limited water supply, and reducing climate impact of power generation.

Currently, Aitutaki Power Supply generate approximately 3,650 MWh of energy per year using diesel generators, consuming approximately 1,000,000 litres of diesel fuel. The first stage Aitutaki Renewable Energy Project will reduce this fuel usage by about 24%, through the installation of 750 kW solar PV and a battery energy storage system (BESS).

The proposed second stage would add new renewable generation to increase fuel savings to 50%. Previous studies have suggested a combination of additional solar (at least 1.2 MW can be installed at the power station, in addition to existing generation) and medium scale wind turbines, with additional BESS at the power station, however, this needs to be revisited using latest data.

This project is fully aligned with the Cook Islands policy position of 100% renewable energy by 2020 (NDC). To date, 14 of the 16 inhabited islands have been converted to run on renewable energy. Aitutaki is one of two remaining islands and there is a strong commitment to completing this program. While there is currently sound processes in place to deliver this program, access to capital and technological support for these programs is a core requirement to achieve this mission.

The elevated and inland location of the existing power house provides good resilience for the assets to be deployed under this project to be protected from climate change impacts themselves.

Water supply

Aitutaki primarily relies on rainwater for its potable water supply (drinking and cooking only). Households collect rainwater from their own roofs and most have been supplied with 6,000 L polyethylene ater tanks for storage. There are also approximately 16 community water tanks on the islands, in various states of repair, some of which have been repaired with help from donor agencies.

Non-potable (bathroom, cleaning, toilet, laundry, agriculture etc.) water supply is sourced from seven groundwater infiltration water galleries (three at Vaipeka; one at Vaipae, Tautu, Vaimaru and Vaitekea), with the Vaipeka galleries providing the bulk of the supply. Pumps supply water from the galleries to elevated reservoirs around the island from which the water is distributed to homes via a piped reticulation network. All galleries are operated by the Island Government and the water is brackish/saline.

"In most cases, since the onset of drought in November 2013 the recharge rates of groundwater has slowed down forcing the operating hours of the pumps at the galleries to be reduced. Recharge of the groundwater is very important to allow the water resource to recover" says Vicky Clarke of OPM. Careful management of the groundwater harvesting must be done to ensure we don't over utilize the resource and avoid pumping saline water into the reticulation system.

With the reliability on rainwater and gallery supplies (which are directly related to rainfall) for the island's water supply, the island is prone to water shortages. The increase in variability in rainfall in recent times due to climate change means all the more important need to efficiently manage water supply on the island.

Installation of high penetration renewable energy provides a unique opportunity to address this challenge. High penetration renewable energy systems typically experience times of excess generation. While some of this can be stored in batteries (and this will be included as part of the plan), there are inevitably periods of spill which effectively provide energy for new load at zero marginal cost. After Phase 1, only about 10% of renewable energy will be in excess, but with the proposed system increasing to just over 50% renewable energy, this excess increase substantially, and is likely to exceed 3,600 MWh (depending on the mix of wind and solar and batteries). This excess is all available to support the water supply, which can be configured as a schedulable load.

For instance, on sunny days when there is too much solar PV output for the customer load or batteries to absorb, this can be directed into either pumping groundwater to the elevated reservoirs, desalinating ground water or sea water and pumping this to the elevated reservoirs, or even desalinating sea water and pumping this to the galleries. The selection can be based on the health of the galleries and groundwater supply, and fill level of the reservoirs.

The water management system can equally benefit from advanced control systems being implemented at the power station to manage generation from multiple sources, to schedule monitor and select water options as required.

Private sector

Private sector investment is often an option, generally for relatively simple renewable energy projects such as a solar PV plant.

While private sector involvement (IPPs) is envisaged for renewable power generation the main island of the Cook Islands, Rarotonga, this is not a viable option for Aitutaki due to its increased isolation and relatively small size making it less attractive to IPPs. This adds considerable developer premium (as well as narrowing

the field), and attracts a financing premium. As such, IPP projects on Aitutaki to boost renewable generation are not considered economically efficient for Aitutaki.

Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)

Please describe how engagement among the NDA, AE and/or other relevant stakeholders in the country has taken place and what further engagement will be undertaken as the concept is developed into a funding proposal.

The Aitutaki Renewable Energy Project Phase 1 falls in package of the Southern Group Renewable Energy Project managed by the Project Management Unit within the Office of the Prime Minister and steered by a Project Steering Group of the following entities; Chief of Staff of the Office of the Prime Minister, Financial Secretary of MFEM, CIIC, TAU, DCD, ADB, Project Owners Engineer.

Sustainability and replicability of the project (exit strategy) (max. 1 page)

Please explain how the project/programme sustainability will be ensured in the long run and how this will be monitored, after the project/programme is implemented with support from the GCF and other sources.

For non-grant instruments, explain how the capital invested will be repaid and over what duration of time.

The proposed project is expected to have a 25 year life. The asset will be owned by Cook Islands Investment Corporation (CIIC), and managed by Aitutaki Power Supply (APS), part of CIIC. CIIC is responsible for managing Cook Islands government assets and state owned enterprises, and is therefore very well placed to provide a long term asset management strategy for the project.

As part of the Phase 1 Aitutaki Project, APS performance has been reviewed and records show low numbers of non-financial customers, typical losses (technical and non-technical), and overall generally sound and sustainable financial performance.

With the implementation of the project, APS will continue to collect tariffs from customers at current rates (adjusted from time to time). Fuel savings will be allocated towards O&M of the system and repayment of the loan (or, in the case of a grant, provisioning for system replacement at end of life). The long term viability will be overseen by CIIC as part of its asset management program. Repayment of loans will be administered through the Ministry of Finance and Economic Management.

APS has sound, experienced and qualified technical specialists to operate and maintain the system, including increased renewable equipment.

Performance monitoring of the system, to be implemented by CIIC and APS, will include review of metrics on fuel savings (and associated GHG reduction), and water production against predicted performance on an annual basis. It will also include basic asset management steps including record of spares on hand, maintenance log and review against manufacturer requirements, periodic inspection and condition assessment, and maintenance of equipment register on its Assetfinder system.

The performance of the system, and in particular the desalination component, will be used as a basis for determining roll-out of similar systems across other islands.

Assessed By and Date:

Recommendation: