

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: A shift to resilient and low-carbon buildings in the Cook Islands

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Special Projects Unit

<p>Indicate the areas for the Concept, which is based upon the CKI Country Program thematic areas</p>	<p><u>Mitigation:</u> Reduced emissions from:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Energy access and power generation <input type="checkbox"/> Low emission transport <input checked="" type="checkbox"/> Buildings, cities and industries and appliances <input type="checkbox"/> Forestry and land use <p><u>Adaptation:</u> Increased resilience of:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Most vulnerable people and communities <input type="checkbox"/> Health and well-being, and food and water security <input checked="" type="checkbox"/> Infrastructure and built environment <input type="checkbox"/> Ecosystem and ecosystem services
<p>Indicative total project cost</p>	<p>Amount: USD\$20 million</p>

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

Rarotonga, the administrative, economic and tourism capital of the Cook Islands, is threatened by sea level rise, warming temperatures, changes in rainfall patterns and intensifying cyclonic conditions due to climate change. Efforts to adapt the built environment to climate change and to mainstream climate resilience in the building and construction sector are hindered by limited capacity and local knowledge, absence of support and incentive mechanisms, and gaps in the policy and regulatory frameworks.

This project proposal seeks support from GCF to climate proof Government's current and proposed social infrastructure redevelopment projects and to achieve sustainable low-carbon performance standards in the new buildings; and to create pathways to sustainable buildings and construction for future projects in the public and private sectors.

Context and baseline (max. 2 pages)

Climate Vulnerability and Impacts

The climate of the Cook Islands can be defined as a warm tropical oceanic climate. There are mainly two seasons affecting these islands with a hot and relatively humid period from November to April, and a warm and relatively dry period from May to October. The more humid period is associated with the presence of the South Pacific Convergence Zone (SPCZ) over the islands. The Cook Islands climate varies considerably from year to year due to the El Niño Southern Oscillation (ENSO)¹, a natural climate pattern that occurs across the tropical Pacific Ocean affecting weather around the world.

The Cook Islands is located south of the equator in an area known for the frequent occurrence of tropical cyclones with damaging winds, rains and storm surge². Tropical cyclones occur in the summer months; and between the 1969-70 and 2009-10 seasons 47 cyclones passed within 400km of Rarotonga, an average of 11 per decade or just over one per year. However, there is a tendency for cyclones to occur in El Niño years (average of 15 per decade) compared to La Niña years (6 per decade)³. The intensity of tropical cyclones are expected to increase with lower frequencies. For 2018/19, seven to eleven named TC's are expected for the South Pacific Region⁴.

In 2005, five consecutive cyclones over a two-month period caused damages estimated at \$13.7 million. On average, destructions per cyclone totals \$4.5 million, or 2 percent of the country's GDP. PCRAFI estimates that in the next 50 years, the Cook Islands have a 50% chance of experiencing a loss exceeding 75 million USD and a 10% chance of experiencing a loss exceeding 270 million USD³.

Increases in annual average air temperature, sea surface temperature, and increases in the number of hot days and warm nights are projected². Average rainfall during the wet season is expected to increase due to the forecasted intensification of the SPCZ, with droughts occurring less frequently throughout this century.

The Coastal Vulnerability Assessment of the Avarua central town area carried out by the University of New South Wales Water Research Laboratory concluded that there is a high probability that over 2.0m high surge waves will affect the foreshore area in the next 25 years³.

The various studies highlight the highly vulnerable nature of Rarotonga and the economy to climate change and that immediate interventions are needed to safeguard its future.

Carbon Emissions

The Cook Islands emit a mere 0.00012% of the world's carbon emission but its 2.2 million square kilometers of ocean absorbs much of the carbon emitted by larger countries. The consequential increase in ocean acidification, warmer oceans and sea level rise affects the nation's coastal zones and low lying areas.

¹ Pacific Climate Change Science Program. (2011). *Current and future climate of the Cook Islands*
<https://www.pacificclimatechangescience.org>

² Pacific Catastrophe Risk Assessment and Financing Initiative (2011). *Country Risk Profile: Cook Islands*
<http://siteresources.worldbank.org/EXTDISASTER/Resources/CookIslands.pdf>

³ Blacka, M., Flocard, F., Rayner, D., Rahman, P., Parakoti, B. (2011) *A Case Study of Vulnerability to Cyclones and Climate Change: Avarua, Rarotonga*. Water Research Laboratory, University of New South Wales, Australia.

⁴ Media Release (8 October 2018) *Southwest Pacific Tropical Cyclone Outlook: Near-normal tropical cyclone activity overall, but increased east and reduced west of the Date Line; multiple severe tropical cyclones expected*. New Zealand's National Institute of Water & Atmospheric Research (NIWA) and Meteorological Service of New Zealand (MetService).

Mitigation and Adaptation Needs

The Cook Islands Government (CIG) wishes to integrate low-carbon and sustainability into the design and build process for its current and planned redevelopment projects, and at the same time create the enabling environment and support systems for future public and private projects to achieve the same. However, CIG's own capacity and resources to implement this initiative is constrained, and is therefore seeking GCF support.

Zero emission, building and construction sector – the Joint National Action Plan 2016-2020 promotes reliable infrastructure and low carbon development (strategy 7), however, the uptake of low carbon development in the local building and construction sector is relatively slow. A large part of this is due to the lack of knowledge of the multiple benefits of energy-efficient, resilient and sustainable buildings, including the total life-cycle cost savings and job opportunities presented by greener technologies. Sustainable pathways, including capacity development, technology access, energy codes and certification processes, and incentives to create a culture change are needed if the country is to make some positive progress, and contribute to lowering global carbon emissions.

Structural strengthening and flood mitigation – Rarotonga has a 40% chance of experiencing destructive to very destruction wind speeds at least once in the next 50 years⁵. There is also a high probability that the main business centre in Avarua will experience over 2m surge and wave impacts in the next 25 years^{Error! Bookmark not defined.}. Immediate interventions are required to strengthen and protect new and existing properties, both public and private, against damaging severe wind loading and sea/flood inundation.

Water security – The Cook Islands are currently experiencing one of the most extreme El Niño conditions. During El Niño, the Southern Cook Islands including Rarotonga experience drought. During the contrasting La Niña phase, flash flooding can occur in the south⁶. Rarotonga, through the Te Mato Vai water upgrade project, will see improvements to the water catchment, storage and distribution network around the island. Water is predominately rainwater harvested and therefore highly vulnerable in periods of no rain. Many properties have onsite rainwater harvesting with groundwater gallery facilities (where available) but more needs to be done at the property level to ensure water security during periods of drought.

Renewable energy and energy efficiencies – The Cook Islands has set ambitious targets to become 100% renewable-energy powered and has made significant headways to achieving this goal. Supporting initiatives have included the Independent Power Providers and Net Metering schemes, and Pacific-wide promoting energy efficiency measures and energy labelling standards programmes. However, economic development, digital world advancements, and rising air temperatures have become catalysts for increasing energy demand and consumption within the country and globally⁷. Greater efficiencies at all levels of society, particularly at the consumer and property owner level, are needed to offset increasing energy usage. As mentioned above, there are barriers to overcome i.e. lack of knowledge on the benefits of energy efficiencies, to make more positive progress. Onsite power generation through renewable sources i.e. solar PV, is accepted as being a must-have component of new buildings, but the cost of onsite storage is fairly high, and IPP-net metering has been suspended until the grid and storage expansion is complete⁸. Alternative technologies such as appliance–direct energy generation (i.e. cooling systems connected directly to solar PVs) are areas to be considered for new buildings and retrofit projects.

Temperature control – The annual maximum and minimum temperatures in Rarotonga have increased since 1950 at a rate of 0.04°C per decade and temperatures will continue to warm with very hot days in the future⁹. Many commercial and residential property owners, and public buildings on Rarotonga have resorted to mechanical air conditioning (AC) systems. Split type AC systems are the most common type locally, and while many available on the market today are efficiency rated, they utilize refrigerants with high ozone depleting potential (ODP)¹⁰. This also applies to a recently completed College rebuild project on Rarotonga. Rarotonga has a relatively well established AC supply market with good technical support for ongoing servicing. Lack of

⁵ Pacific Catastrophe Risk Assessment and Financing Initiative (2011). *Country Risk Profile: Cook Islands*
<http://siteresources.worldbank.org/EXTDISASTER/Resources/CookIslands.pdf>

⁶ 2nd Joint National Action Plan 2016-2020 - *A sector based approach to Climate Change and Disaster Risk Management*

⁷ International Energy Agency and the United Nations Environment Programme (2018): 2018 Global Status Report: *towards a zero-emission, efficient and resilient buildings and construction sector.*

<https://www.worldgbc.org/sites/default/files/2018%20GlobalABC%20Global%20Status%20Report.pdf>

⁸ Suspended until storage expansion is complete (around end of 2020).

⁹ Pacific Climate Change Science Program. (2011). *Current and future climate of the Cook Islands*
<https://www.pacificclimatechangescience.org>

¹⁰ Hydrofluorocarbon is the most common refrigerant used in AC units on Rarotonga.

demand coupled with tropical thermodynamic conditions make access to alternative environmentally friendly systems difficult and costly. Research and access to alternative cooling systems such as chilled water and geothermal cooling is a challenge that is prohibiting a transition to environmentally friendly cooling.

National Development Goals and Priorities

Te Kaveinga Nui National Sustainable Development Plan 2016 – 2020 (NSDP) articulates key development goals for the Cook Islands underpinning good governance principles. Specific goals supporting delivery of the proposed intervention include:

Goal 5: *Build resilient infrastructure and Information Communication Technologies to improve our standard of living.*

Goal 13: *Strengthen resilience to combat the impacts of climate change and natural disasters.*

2nd Joint National Action Plan (JNAP2) - A sector based approach to Climate Change and Disaster Risk Management 2016 – 2020

The proposal contributes to the following strategies:

Strategy 7: *Infrastructure- Promote reliable infrastructure and low carbon development*

Strategy 8: *Climate and disaster risk resilience- strengthen climate and disaster risk resilience through integrated planning and programming*

Main root causes and barriers

Geographic and economic isolation: the upfront cost of construction in the Cook Islands is considerably higher than other developing nations due to a reliance on imported building materials coupled with the physical distance between the islands and key supply markets such as New Zealand. Climate change interventions amplifies the initial cost burden on the local developing economy therefore delaying adaptation interventions and prolonging climate vulnerabilities.

Sector characteristics and market barriers: the building and construction sector is fairly well established relative to the population size and construction demand. For the 5-year period 2013-2017, 440 new building construction permits were issued, valued at \$91.27million NZD¹¹. With the exception of natural resources i.e. sand and metal for concrete, materials are sourced through local on sellers from neighboring markets such as New Zealand, Australia and Fiji. Buildings are mainly of concrete masonry and timber construction, and the materials for these typical construction methods are readily available in the local market. There is also a fairly large number of building contractors for small to medium sized projects. For larger construction activities workforces are supplemented with foreign workers where needed. Building designs are similar across residential and commercial developments and any changes, whilst minor, have been set through a *follow-by-example* trend. Consumer behavior and demand plays a large part in determining the availability of materials and skills in the local building industry, and the cost. Over the past 5-8 years there has an uptake of small piecemeal green technologies such as onsite solar PV installations (notably amongst the higher income earners and commercial properties) and efficient lighting appliances, and the market has adapted itself to provide a relatively good supply chain. Affordability continues to be a barrier for those in the low-middle income bracket, warranting incentive mechanisms to help facilitate their transition.

Policy frameworks: The revised National Building Code 2017 (pending adoption) has set higher design requirements for new buildings to adapt to climate change. These changes include requiring public buildings to be designed for category 4 or 5 cyclone wind loads, and residential/commercial properties for a category 3. There is also a requirement for the ground floor of all buildings to be at least 1 metre above the high water mark to mitigate risks from future sea level rise. While these requirements will increase the nation's climate resilience there remains to be gaps in the regulatory frameworks to promote, support or mandate low-carbon construction in order to combat climate change, and to adapt existing, already vulnerable buildings.

¹¹ MFEM Statistics, Misc_Statistics_Tables_201802 <http://www.mfem.gov.ck/statistics/social-statistics/miscellaneous-statistics>

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

Consultations on current redevelopment projects have taken place to varying levels, by the Government Agency responsible for the management of crown assets, the Cook Islands Investment Corporation (CIIC). This concept idea note was prepared by CIIC following calls for GCF proposals, and was later revised after consulting with Climate Change Cook Islands, the NDA.

To ensure ownership of the design and outcomes and to achieve a coordinated approach, more in-depth engagements will need to take place with the building and construction industry as well as the national Building authorities. This is expected to take place during the development of a full Project Proposal.

The Ministry of Finance and Economic Management is the proposed direct access Accredited Entity who will take the lead in developing the Project Proposal, supported by CIIC.

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

The project/programme seeks long-term outcomes and a transformation impact across the building and construction industry. It requires changes in culture through capacity building, community awareness, and ongoing development and access for consumers to green products and technologies. Public policies, regulatory frameworks and incentive mechanisms must also be in place to support the transition and ongoing drive towards a greener/low-carbon nation.

Specific targets must be established within the full project proposal to ensure the project performs and the outcomes are achieved. This project can be replicated in other infrastructure sectors i.e. roading, and in whole or part in other Small Island Developing States who suffer the same barriers and climate issues.

The table below illustrates how the project can be approached to achieve sustainable outcomes.

Goal	Outputs	Methodology and approach
To climate proof Governments current and proposed social infrastructure redevelopment projects and to achieve sustainable low-carbon performance standards in the new buildings	<p>New essential public service buildings are designed and built for Category 5 cyclone wind loadings</p> <p>Buildings and critical infrastructure components are elevated and/or protected in flood prone areas</p> <p>Water and energy security</p> <p>Temperature controlled with passive and active ventilation (zero ODP)</p> <p>Low carbon or carbon neutral performance measures established and targets met</p>	<p>Incremental cost methodology established for GCF component 1</p> <p>Designed and built by qualified expertise with local knowledge</p> <p>Energy baselines and quantified targets are set in the early design stage taking into account the whole-of life and circular economy approach, local environmental conditions, buildability and accessibility to/replicability in the local market.</p> <p>Appropriate Quality Assurance processes including testing regimes are in place</p> <p>Performance monitoring and evaluation plans (and systems) in place</p> <p>Training and awareness programs for staff/occupants and visitors</p> <p>Asset management plans including maintenance and renewals budgets in place and implemented immediately following construction completion.</p>
To create pathways to sustainable buildings and construction for future	A transformative impact and paradigm shift towards sustainable buildings and low-carbon development	<p>Review current industry and consumer practices and trends to establish baselines and specific targets for the country, and develop a transitional roadmap for the building and construction industry</p> <p>Establish a knowledge sharing and capacity development platform and network for the local building and construction</p>

projects in the public and private sectors		<p>industry. Consider the creation of a public help-desk to provide free advice to property owners/developers/occupants.</p> <p>Develop, publish and maintain a catalogue of sustainable materials, green technologies and building techniques with performance ratings, carbon content levels suited to the Cook Islands</p> <p>Review existing regulatory frameworks for incorporation of building energy code and certification program.</p> <p>Create a green/low-carbon financing incentive mechanism for private and public construction and refurbishment projects.</p>
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Indicative cost estimates

The Cook Islands is seeking a grant from GCF of up to USD\$20 million (cost is approximate only pending further design developments) over a 15 year duration. CIG has three significant redevelopment plans, current and proposed, that require support for climate proofing and sustainable building intervention. The redevelopment plans are estimated around NZD\$90 million, to be implemented over the next 10-15 years, and financed by CIG's national budget and other Official Development Assistance. Indicative project costs are provided below.

Project/Component	Timeframe	Total (NZD \$m)	GCF (NZD \$m)	CIG/ Other ODA partners (NZD \$m)
Vaikapuangi Redevelopment / GCF component 1A	2020-2026	40		
Base-build and fitout (including design & delivery)				30
Climate proofing/low-carbon support (including design & delivery)			10	
Tereora College Redevelopment Stages 2-3 / GCF component 1B	2026-2030	30		
Base-build and fitout (including design & delivery)				22
Climate proofing/low-carbon support (including design & delivery)			8	
Rarotonga Hospital Redevelopment / GCF component 1C	2028-2030	20		
Base-build and fitout (including design & delivery)				14
Climate proofing/low-carbon support (including design & delivery)			6	
GCF component 2	2020-2035	5		
Creation of enabling environment and support systems			5	
Total NZD (\$m)		95	29	66
USD (\$m) 0.68 conversion		65	20	45

Assessed By and Date:

Recommendation: