

Concept Note

Project/Programme Title: Project on Zero Emission Electricity System in Vanuatu

Country(ies): Republic of Vanuatu

National Designated Authority(ies) (NDA): Ministry of Climate Change, Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management

Accredited Entity(ies) (AE): Japan International Cooperation Agency

Date of first submission/
version number: [2021-02-] [V.0]

Date of current submission/
version number: [2021-02-] [V.0]



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Please submit the completed form to fundingproposal@gcfund.org, using the following name convention in the subject line and file name: **"CN-[Accredited Entity or Country]-YYYYMMDD"**

Notes

- The maximum number of pages should **not exceed 12 pages**, excluding annexes. Proposals exceeding the prescribed length will not be assessed within the indicative service standard time of 30 days.
- As per the Information Disclosure Policy, the concept note, and additional documents provided to the Secretariat can be disclosed unless marked by the Accredited Entity(ies) (or NDAs) as confidential.
- The relevant National Designated Authority(ies) will be informed by the Secretariat of the concept note upon receipt.
- NDA can also submit the concept note directly with or without an identified accredited entity at this stage. In this case, they can leave blank the section related to the accredited entity. The Secretariat will inform the accredited entity(ies) nominated by the NDA, if any.
- Accredited Entities and/or NDAs are encouraged to submit a Concept Note before making a request for project preparation support from the Project Preparation Facility (PPF).
- Further information on GCF concept note preparation can be found on GCF website [Funding Projects Fine Print](#).

A. Project/Programme Summary (max. 1 page)			
A.1. Project or programme	<input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	A.2. Public or private sector	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector
A.3. Is the CN submitted in response to an RFP?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, specify the RFP: _____	A.4. Confidentiality¹	<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Not confidential
A.5. Indicate the result areas for the project/programme	<p><u>Mitigation</u>: Reduced emissions from:</p> <input checked="" type="checkbox"/> Energy access and power generation <input type="checkbox"/> Low emission transport <input type="checkbox"/> Buildings, cities and industries and appliances <input type="checkbox"/> Forestry and land use <p><u>Adaptation</u>: Increased resilience of:</p> <input type="checkbox"/> Most vulnerable people and communities <input type="checkbox"/> Health and well-being, and food and water security <input type="checkbox"/> Infrastructure and built environment <input type="checkbox"/> Ecosystem and ecosystem services		
A.6. Estimated mitigation impact (tCO₂eq over lifespan)	<u>24,018,750</u>	A.7. Estimated adaptation impact (number of direct beneficiaries and % of population)	NA
A.8. Indicative total project cost (GCF + co-finance)	Amount: 50 MUSD	A.9. Indicative GCF funding requested	Amount: 10MUSD_
A.10. Mark the type of financial instrument requested for the GCF funding	<input checked="" type="checkbox"/> Grant <input type="checkbox"/> Reimbursable grant <input type="checkbox"/> Guarantees <input type="checkbox"/> Equity <input type="checkbox"/> Subordinated loan <input type="checkbox"/> Senior Loan <input type="checkbox"/> Other: specify _____		
A.11. Estimated duration of project/ programme:	a) disbursement period: 2023~2028 b) repayment period, if applicable:	A.12. Estimated project/ Programme lifespan	25 years (tentative)
A.13. Is funding from the Project Preparation Facility requested?²	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Other support received <input type="checkbox"/> If so, by who:	A.14. ESS category³	<input type="checkbox"/> A or I-1 <input checked="" type="checkbox"/> B or I-2 <input type="checkbox"/> C or I-3
A.15. Is the CN aligned with your accreditation standard?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	A.16. Has the CN been shared with the NDA?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
A.17. AMA signed (if submitted by AE)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If no, specify the status of AMA negotiations and expected date of signing:	A.18. Is the CN included in the Entity Work Programme?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
A.19. Project/Programme rationale, objectives and approach of programme/project (max 100 words)	The project consists of small scale hydropower plant (to be financed by JICA) and photovoltaic generation with battery system, and transmission lines which enhance resilience of the power system in the Republic of Vanuatu. Technical assistance in operation of the whole system is also included to secure sustainability. This project will contribute to attaining the ambitious renewable energy target of the country.		

¹ Concept notes (or sections of) not marked as confidential may be published in accordance with the Information Disclosure Policy ([Decision B.12/35](#)) and the Review of the Initial Proposal Approval Process ([Decision B.17/18](#)).

² See [here](#) for access to project preparation support request template and guidelines

³ Refer to the Fund's environmental and social safeguards ([Decision B.07/02](#))

B. Project/Programme Information (max. 8 pages)

B.1. Context and baseline (max. 2 pages)

The Republic of Vanuatu is a small archipelagic island country, which consists of 83 islands, stretching over 1,300 km from north to south in the Western Pacific Ocean. Major islands have volcanic mountainous terrain, including several active volcanos, which have been erupting for many years, causing serious natural disasters such as volcanic eruptions, earthquakes, tsunami continuously. Also, Vanuatu is topographically located on the passage route of the tropical cyclones. Only in the past 10 years, Vanuatu has been hit by 20-30 cyclones, of which several cyclones caused catastrophic damage. Recently, a cyclone named PAM caused a great deal of damage throughout the country in 2015. These natural disasters have a huge negative impact on the economic growth. Moreover, amongst the small island developing states (SIDS), Vanuatu is considered to be one of the most vulnerable countries to climate change. This has had a negative impact on all sectors— agriculture, water, coastal and marine resources, tourism and infrastructure etc. Electricity power supply on SIDS used to be dependent on the diesel power plant generation with isolated grid because interconnection with other islands was difficult, which makes energy cost and greenhouse gas emission higher. The proposed location of Espiritu Santo Island (Santo Island) is the largest island, and the town of Luganville is Vanuatu's second-largest city which accounts for 20% of total population in Vanuatu. Santo is producing a huge quantity of Beef, Copra, and Kava, for both domestic consumption and export. Also, Santo's beautiful environment, especially the coastal and marine resources attract most of the tourist traffic amongst the outer islands (in Vanuatu, tourism is a fast-growing sector, having contributed to 48% of GDP in 2018). Stable electricity supply is critical for the economic growth of tourism industry and the other industries such as Kava and meat processing factory in Santo. The proposed project is designed to align with the Updated National Energy Road Map (Updated-NERM) to establish a power system, fully based (100%) on renewable energy by 2030 as a way to reduce GHG (Green House Gas) emissions; provide affordable, reliable energy access; and facilitate green growth. This Updated-NERM target would replace nearly all fossil fuel requirements for electricity generation in the country. This contribution would reduce emissions in the energy sector by 72Gg by 2030. In Santo, as an implementing agency of ODA, JICA; Accredited Entity (AE) for this project, had facilitated the implementation of the construction of the Sarakata River Hydroelectric Power Station as a grant aid project in 1994 and 2005. And this renewable energy power generation has been the main power source for the Luganville grid system. However, due to the increasing power demand in the island, it is necessary to generate power using diesel power generation even for the night time. Moreover, the peak demand is expected to increase to 2,800kW by 2030, and the total coverage ratio of renewable energy will drop down from 68 % in 2017 to 38% in 2030. Given such a situation, in order to meet the Updated-NERM target, JICA and Vanuatu's relevant authorities including Department of Energy (DOE) have come together and come up with the "100% renewable energy project", which includes components such as construction of a new hydropower plant, PV, battery, new construction and upgrading of transmission line. In addition, the project component includes the capacity building component (technical assistance), which could play an important role in the paradigm shift mentioned in the Updated-NERM. This project could be replicated to other islands of the nation and further spread to other Pacific Island Countries.

B.2. Project/Programme description (max. 3 pages)

The Implementation of Roadmap is focusing on increasing of the share of renewable energy in electricity generation. The target of the government of Vanuatu is "close to 100% renewable energy in the electricity sector by 2030". In order to achieve this target, the activities proposed in this programme will contribute to increase the share of renewable energy. The components of this programme are shown below;

Component-1: New Hydropower Plant (Sarakata-2, 1,000kW)

New hydropower plant is planned to be developed by Japanese Government Grant Project at downstream of the existing hydropower (Sarakata-1) plant on the Sarakata River. The installed capacity of the new hydropower (Sarakata-2) will be 1,000kW. The project period will be 2023 – 2025.

Component-2: Expansion of Existing Hydropower Plant (Expansion of Sarakata-1, 300kW)

Vanuatu Utilities Infrastructure Limited (VUI), a concessionaire to supply electricity in the Santo Island, plans to expand the existing Sarakata-1 Hydropower Plant adding 300kW by their own fund. The project period will be 2023 – 2025.

Component-3: Additional Transmission Line from Sarakata to Luganville (2-lined transmission line)

Since the existing transmission line from Sarakata to Luganville (20kV) is the single line, the electricity supply tends to disconnected because of line accidents, power failure, and natural disaster such as cyclones. The main electricity supply is currently made by the Sarakata-1. When the Sarakata-2 is to be operated, the importance of the transmission line from Sarakata to Luganville will be increased. Therefore, upgrading the transmission line is essential to improve reliability of supplying electricity and infrastructure resilience. By constructing additional transmission line, the transmission loss will be decreased as well as improving the reliability, which will contribute to increase the share of renewable energy. The project period will be 2023 – 2025.

Component-4: Installation of PV Facility

PV facilities are planned to be installed to compensate the decreased electricity power generation by hydropower during dry season. The PV system will contribute to increase the share of renewable energy even in dry season by substituting the power generation by diesel. The project period will be 2026 – 2028.

Component-5: Installation of Battery System

The Battery system is planned to be installed to store the electricity generated by Hydropower plant and PV facilities in the daytime and supply in the peak hours. By replacing the night time usage of diesel oil to the usage of battery system, it will contribute the share of renewable energy even in dry season. The project period will be 2026 – 2028.

Component-6: Technical Assistance (TA)

The components of above introduced programme such as combining low carbon technologies: Hydropower, PV and battery systems, will be the advanced case for Vanuatu. In order to utilize hydropower, PV and battery system effectively, combination and optimization between weather and hydrological forecast in the short and middle term and power demand and supply forecast will be important to be reflected to manual and standards of operation and maintenance for the staff of DOE and concessionaire. After installation of equipment and facilities, the study on above subjects will be conducted under the technical assistance in parallel with usual operation. Once the knowledge of operating the system is to be established in the Santo Island, these system will be spread to all over other islands in Vanuatu, which will contribute to increase the share of renewable energy in all over Vanuatu. The project period will be in 2028

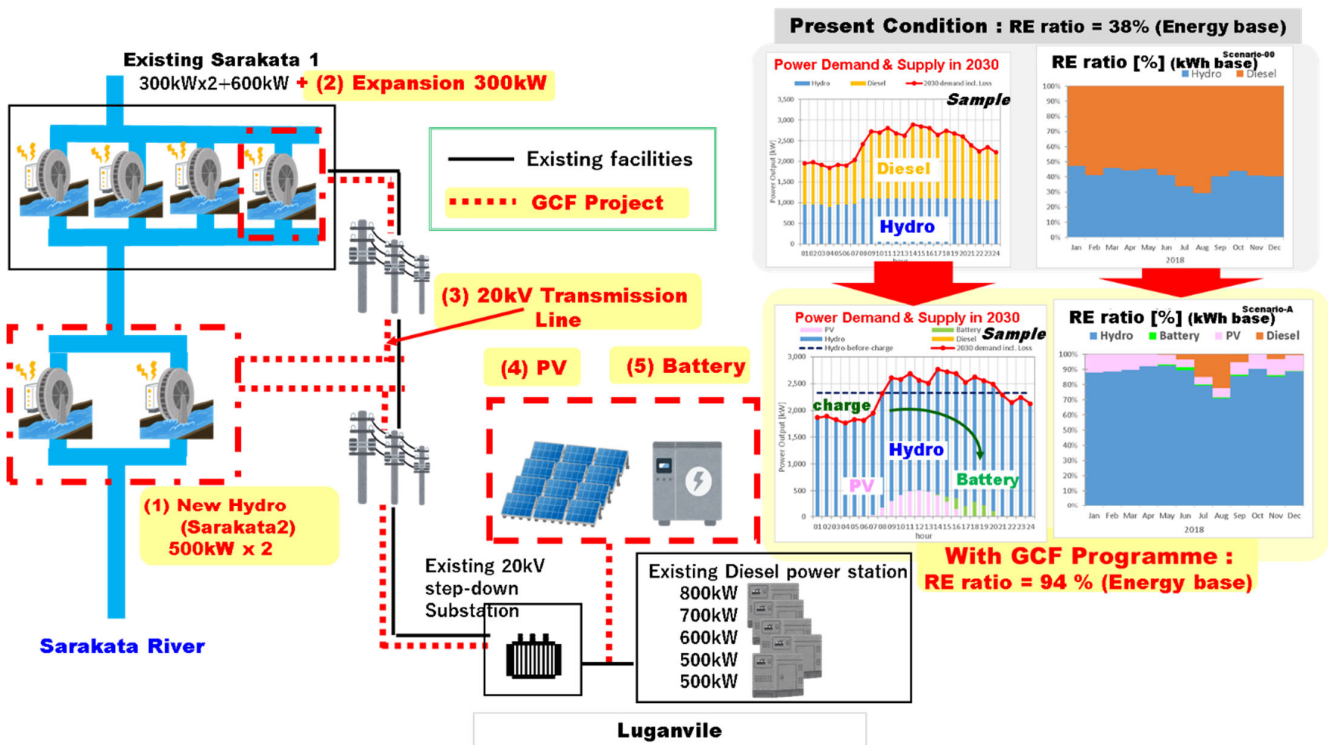


Figure - 1 Overview of the Programme

B.3. Expected project results aligned with the GCF investment criteria (max. 3 pages)

Impact Potential

This project consists of hydropower plants, PV plants, batteries and energy management system with 2-lined transmission line, will contribute to reduce 10,675 MWh/year diesel power generation shifting to renewable energy power generation. The reduced diesel fuel cost will be 2,710,000 USD per year.

Paradigm Shift

Electricity power supply on SIDS used to be dependent on the diesel power plant generation with isolated grid because interconnection with other islands was difficult. Fortunately, large amount of electricity power on the Santo Island used to be provided by Sarakata-1 hydropower plant on the Sarakata River in addition to diesel power generations. Japan's cooperation for additional hydropower generation will help decrease dependency of diesel generations, however it is

not enough to attain the Vanuatu's renewable energy target of 100% by 2030, The proposed project, which consists of photovoltaic generation and battery system, and transmission lines, is crucial to change the power system landscape to realize sustainable development. Transmission line component is very important as the main power demand center is Luganville city, which is far from the Sarakata hydropower plant. Therefore, power supply is easy to be disconnected by accidents of the transmission line, fallen trees, and natural disasters such as cyclones because the transmission line from Sarakata and Luganville is only a single line. The proposed transmission line will contribute to improve reliability of supplying electricity and infrastructure resilience, which is crucial for Vanuatu to combat against expected serious damages caused by climate change.

Sustainable Development Potential

Environmental Benefit: Environmental Sustainability is the cornerstone of the project design.

Renewable energy generation from hydro and solar power will reduce reliance on imported fossil fuel and facilitate to reduce the GHG emissions. Moreover, the reduced usage of diesel fuel could also result in the reduction of transportation fuel and GHG emissions. It should be noted that the project contributes to climate change mitigation effort by satisfying the electricity demand with clean and sustainable energy.

Social Benefit: The anticipated benefits are 1) reducing tariffs for electricity, 2) improved reliability of electricity supplies, 3) improve the educational opportunities and access to health-care treatment. These will lead to more social and cultural benefits, for example, a local resident could improve the awareness of using renewable energy and its importance, which in turn could enhance the image of their hometown. As for the gender aspect, the use of renewable energy can reduce the labour burden of women for collecting fuels and deliver opportunities such as providing income-generating opportunities for both men and women at all stages.

Needs of Recipient Country

The proposed project is highly expected to achieve the goal of Updated-NERM by 2030. By expanding the share of renewable energy, the project will reduce the financial burden of the country which depends on imported fossil fuels for generation. Also, it contribute to climate change mitigation needs of recipient country by improving energy self-sufficiency rate to ensure energy security and reduction of greenhouse gas emissions. In addition, the project will contribute to the formation of resilient infrastructures to adapt to climate-driven extreme disasters. Since it is difficult to develop these infrastructures through limited budget of Vanuatu Government, financial contribution by GCF is necessary.

Country ownership

Project's Executing Entity (EE): Department of Energy (DOE), which is placed under the Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Energy, Environment and Disaster Management (MOCCA) in Vanuatu has full responsibility for achieving the Updated-NERM target as an energy sector's implementing agency. The Department of Climate Change (DOCC) which is recently appointed as the Vanuatu's National Designated Authorities (NDA) of GCF is also placed under the MOCCA, in parallel with DOE. Both EE and NDA have developed solid cooperation system for this project implementation and operation.

Efficiency and Effectiveness

This Programme consists of hybrid renewable energy sources system including, hydropower, PV, and battery. The costs and mitigation targets for the project are summarized as follows;

- | | | |
|--|---|--------------------------------|
| a) Total Program Cost | : | 50 million USD |
| b) Requested GCF amount | : | 10 million USD |
| c) Fuel (diesel) consumption reduction | : | 3,203 litres/year |
| d) Fuel cost reduction | : | 2.71 million USD/year |
| e) Expected annual tCO ₂ e _q reductions: total | | 960,750 tCO ₂ /year |
| Component-1 : New Hydropower (Sarakata-2) | : | 602,280 tCO ₂ /year |
| Component-2 : Expansion of Existing Hydropower (Sarakata-1) | : | 71,100 tCO ₂ /year |
| Component-3 : Transmission Line | : | 65,700 tCO ₂ /year |
| Component-4 : PV | : | 147,600 tCO ₂ /year |
| Component-5 : Battery | : | 11,700 tCO ₂ /year |
| Combination of Component 1 - 5 | : | 62,370 tCO ₂ /year |

As for the cost effectiveness and efficiency, total detailed cost estimation will be calculated in further study. Since concerned technologies are progressing year by year, AE continually observe and assess the prices, efficiency and effectiveness to ensure that best available at the time of project implementation. As a result of further studies, programme components should be considered in the view of not only from a cost-effectiveness perspective but also a life cycle cost.

B.4. Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)

The proposed GCF project and the Concept Note has been developed in close cooperation with key stakeholders from AE (JICA), EE (DOE), and fully supported by NDA (DOCC) and VUI: concessionaire which was appointed by the Government of Vanuatu. These key stakeholders brought together and recent multilateral consultations on forming project component were conducted on November 2019 in Vanuatu. The above stakeholders were actively engaged in the design process of the Concept Note, also on defining their roles within the proposed project. To further enhance cooperation and communication among the key stakeholders, DOE under the MOCCA will take an important role for coordinating the project.

Capacity of AE : The Government of Japan / JICA implemented a project to construct the Sarakata River Hydroelectric Power Station as a grant aid project, and it has been operated over 2 decades as a main power source of the Santo Island. Also, JICA launched the strategy called "Hybrid Island Initiative" in the pacific island regions and has been leading several renewable energy projects (such as solar, wind) over decade. The long term experience and high engineering technology will contribute to developing this 100% renewable energy project more effectively.

Capacity of EE; DOE has enough experience and knowledge for implementing and operating projects since they have been working on the renewable energy projects with other international partners. This experience will enable the efficient and effective project implementation for this proposed project.

C. Indicative Financing/Cost Information (max. 3 pages)

C.1. Financing by components (max ½ page)

Component/Output	Indicative cost (USD)	GCF financing		Co-financing		
		Amount (USD)	Financial Instrument	Amount (USD)	Financial Instrument	Name of Institutions
New Hydropower (Sarakata-2)	38,000,000	0	-	38,000,000	Grants	Government of Japan / JICA
Expansion of Existing Hydropower (Sarakata-1)	2,000,000	0	-	2,000,000	Own resources	VUI
Transmission Line	3,000,000	3,000,000	Grants	-	-	-
PV	2,000,000	2,000,000	Grants	-	-	-
Battery	4,000,000	4,000,000	Grants	-	-	-
Technical Assistance	1,000,000	1,000,000	Grants	-	-	-
Indicative total cost (USD)	50,000,000	10,000,000		40,000,000		

C.2. Justification of GCF funding request (max. 1 page)

One of the main objectives of the GCF is to contribute to the reduction of GHG. In the Updated-NERM, Vanuatu aims at a GHG reduction in the energy sector by 72Gg by 2030. Despite the good political will of the country, responses to climate challenges are still limited for various reasons such as financial and technical constraints. In addition, Vanuatu's electricity supply is operated by the concessionaire and imposing installation cost on the concessionaire, such as VUI is not realistic. Also, considering national budget of Vanuatu, the Government does not have enough budget to allocate the installation cost of 2-lined transmission line, solar panels and battery storage as a priority even though Luganville is the second largest city in Vanuatu. As this project is aimed to contribute to the reduction of GHG and enhancing the resilience of climate change in one of the most climate vulnerable island country, applying GCF fund will be fully justified.

C.3. Sustainability and replicability of the project (exit strategy) (max. 1 page)

Power generation equipment used for renewable energy (hydropower and solar power) require lesser maintenance fee compared to the generation by diesel oil, which could cut down the maintenance cost. In addition, there are fewer expendable parts when compared to the diesel generation. Therefore, this project will result in economic sustainability. Moreover, renewable energy generation will not require diesel fuel and save the huge amount incurred in fuel fees. The Government of Vanuatu can further invest in renewable energy related project using their own savings, which will also enhance the environmental sustainability. By combining the TA, the trained local engineers could maintain the operation with their own skills. Also, developing a concrete manual will assist the local engineers to transfer their maintenance knowledge, and this will benefit the other islands in case study.

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

D. Supporting documents submitted (OPTIONAL)

- Map indicating the location of the project/programme
- Diagram of the theory of change
- Economic and financial model with key assumptions and potential stressed scenarios
- Pre-feasibility study
- Evaluation report of previous project
- Results of environmental and social risk screening

Self-awareness check boxes

Are you aware that the full Funding Proposal and Annexes will require these documents? Yes No

- Feasibility Study
- Environmental and social impact assessment or environmental and social management framework
- Stakeholder consultations at national and project level implementation including with indigenous people if relevant
- Gender assessment and action plan
- Operations and maintenance plan if relevant
- Loan or grant operation manual as appropriate
- Co-financing commitment letters

Are you aware that a funding proposal from an accredited entity without a signed AMA will be reviewed but not sent to the Board for consideration? Yes No