



GCF Readiness Project Private Sector Mobilization and Engagement:

Feasibility study to identify potential for crowding-in private sector investments in Papua New Guinea



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Key Abbreviations

ADB	Asian Development Bank
AE	Accredited Entity
AF	Adaptation Fund
APEC	Asia Pacific Economic Cooperation
BCPNG	Business Council of Papua New Guinea
BUR	Biennial Update Report
CSO	Civil Society Organization
CCDA	Climate Change and Development Authority
CCMA	Climate Change Management Act
CRGG	Climate Resilient Green Growth
DAL	Department of Agriculture and Livestock
DDA	District Development Authority
DFAT	Department of Foreign Affairs and Trade (Australia)
DFI	Development Finance Institution
DNPM	Department of National Planning and Monitoring
FREAGER	Facilitating Renewable Energy & Energy efficiency Applications for GHG Emissions Reductions
GCF	Green Climate Fund
ICCC	Independent Consumer and Competition Commission
MFAT	Ministry of Foreign Affairs and Trade (New Zealand)
PHAMA	Pacific Horticultural and Agricultural Market Access Program
POM CCI	Port Moresby Chamber of Commerce
SDG	Sustainable Development Goals
UNDP	United Nations Development Program
UOQ	University of Queensland
WBG	World Bank Group

Executive Summary

The private sector mobilization and engagement project was undertaken as part of the Green Climate Fund (GCF) Readiness Project for Papua New Guinea (PNG). Titled “Readiness Support to Strengthen PNG’s Engagement with the GCF”, the project is managed by the Climate Change and Development Authority (CCDA) as the National Designated Authority (NDA) to the GCF with support from the Global Green Growth Institute (GGGI) as the Delivery Partner. This report and accompanying database seek to provide background and information on opportunities to accelerate private sector engagement and action as a part of PNG’s climate change response.

Focusing on the Agriculture and Energy sectors, the approach involved desk-based scanning of companies that may play a role in accelerating action on climate change, one-one engagement with key stakeholders, development of project concepts, and interaction at a private sector forum.

The report is presented in six sections and covers aspects of the country and climate change context that act as drivers for private sector engagement, provides examples of GCF projects that may provide guidance for PNG companies, introduces several potential private sector project concepts for PNG, and finishes with suggestions on accelerating and sustaining private sector mobilization and engagement.

The section on **country context** highlights the richness and diversity of PNG’s resources, terrain and population. The country’s diversity brings its own opportunities and challenges, as does a rapidly growing population that requires education and employment opportunities.

PNG’s resources sector comprises a large part of the economy, accounting for the majority of export earnings. But the resources sector is capital intensive and the majority of people are employed in the informal sector, particularly smallholder farming, cash-crop and fisheries activities. In 2018 per capita GDP was USD 2,646.¹

The last few years have been challenging for PNG, and the coming years will be even more challenging as the world economy deals with the effects of COVID19. In 2019 GDP was 5.6 percent recovering from -0.8 percent the year before. Expectations were that GDP would be in the vicinity of 3 percent for the period 2020-22 but this does not take into account the long lasting impact of COVID19. For the worst impacts to be avoided there will need to be a strong government response, with all sectors of the economy playing a part.

The **climate change context** section illustrates PNG’s active participation in global activities to develop and implementation solutions to combat climate change. This international engagement is backed by a suite of domestic policies that outline PNG’s intentions and commitments and should provide private sector players guidance on where opportunities to engage may lie. Stated climate commitments include 100% renewable energy by 2050, reducing emissions where possible in the transport and forestry sectors, and improving system-wide energy efficiency.

¹ World Bank Group, Country Partnership Framework for the Period FY19-FY23
<http://documents.worldbank.org/curated/en/986831558749746464/pdf/Papua-New-Guinea-Country-Partnership-Framework-for-the-Period-FY19-FY23.pdf>

In 2018, CCDA, in collaboration with Government stakeholders, developed PNG's first Biennial Update Report (BUR1), as part of its UNFCCC commitments. BUR1 presented an overview of the national climate change circumstance, including an emissions inventory for the period 2000 – 2015.² In 2015, driven by increased emissions from energy industries, fugitive gas emissions and a reduction in forest cover, PNG moved from being a net carbon sink to a net emitter.³

The **climate finance section** illustrates increasing funds flowing into climate change related projects and highlights a concentration of funding on mitigation projects - particularly renewable energy. Global climate finance funds flows have been steadily increasing since 2016, reaching USD 579 billion in 2018. Although there is some positivity about the increased financing, a transformed approach to infrastructure and energy efficiency investment across the board is required to meet climate targets.

The section also introduces multilateral and bilateral institutions playing a significant role funding climate change and development related programs in Papua New Guinea. Numerous donor partners actively support the government's capital development activities, as well as support project implementation. This includes Australia, New Zealand, the United States, China, and the European Union. In addition, the World Bank Group, Asian Development Bank, and United Nations have all been active in the country supporting infrastructure development, social and economic programs, and working to strengthen government capacity.

The Green Climate Fund (GCF) and GCF Private Sector Facility present an opportunity to support private sector action. However, the need for proactive companies to not only work in collaboration with international and regional accredited entities, but also build capacity to lead projects themselves is highlighted. On-ground stakeholder feedback indicates that companies are interested in engaging but require more information and support. Lack of understanding of the operations environment, documentation, and long cumbersome processes hinder engagement in climate change related projects and programs.

The **international examples section** seeks to provide a insight into overseas projects that may help shape local opportunities or provide an avenues for funding. Examples covered include:

- Green financing for climate resilient and low emission smallholder agriculture in Niger
- Climate resilient agriculture
- Promotion of climate friendly cooking in Kenya and Senegal
- A global energy efficiency and renewable energy fund
- Pacific Island renewable energy investment program

All of the programs are multi-stakeholder efforts driven by private sector, government or international development organizations. Although the situations presented may not necessarily be replicated in PNG there are several ideas that can flow through into projects suited to the local market. There are many examples available to companies, but finding them can sometimes be challenging due to the amount of information available online. The accompanying database lists a number of resources that can be used by interested companies to understand opportunities.

The **concept notes section** introduces high-level concept notes for further development. The concepts broadly align with the Agriculture and Energy sectors, and provide potential examples

² Climate Change and Development Authority, 2028. Papua New Guinea First Biennial Update Report to the United Nations Framework on Climate Change

³ When compared to 2000 figures. Climate Change and Development Authority. (2018, December). *Papua New Guinea's First Biennial Update Report to the United Nations Framework Convention on Climate Change*.

of private sector led action across a project size. Although all may not be of a scale that attracts GCF funding support the concepts may garner support from other actors in the PNG market. Current potential projects include:

Solar Cocoa Dryers – Currently conceived as project led by Green Ltd, a PNG based solar systems integrator. The program aims to support PNG's cocoa growers by enhancing their cocoa drying techniques by moving away from wood fire based solutions that can add smoke taint to end products and reduce prices achievable on the international market.

Solar Farm at University of PNG – The University of PNG and the university's Centre of Renewable Energy, in collaboration with a local system integrator, Astra Solar, have investigating a potential 1.5MW off-grid solar farm on the University campus. The project aims to provide the University with cheaper and cleaner energy, increase reliability of power on campus, and provide an avenue to use the solar farm as a training facility for students.

Methane Capture and Electricity Generation – In 2006 New Britain Palm Oil Limited (NBPOL) worked with Carbon Bridge, a Singapore based carbon consultancy, to develop two methane capture and electricity generation projects utilizing wastewater treatment processes that were submitted for approval under the Clean Development Mechanism. NBPOL is keen to scale this concept and implement the solution in 8-10 other plants, reducing diesel use, reducing burden on the local grids, and in some cases providing access to electricity to local communities.

Morobe Agricultural Hub - The Morobe Agriculture Hub aims to create a central point in Lae for processing and storage of crops, best in class training, and access to resources for farmer groups. It is intended to bring together several stakeholders to alleviate challenges faced by smaller farm holder groups and continue to expand and build on Morobe's strengths in agriculture. Climate resilience will be at the centre of design principles for the hub.

Clean Cooking Market Development - It is estimated that around the world approximately 3 billion people have no access to clean fuels or technologies for cooking.⁴ Use of fuelwood in PNG is high – both foraged wood, as well as fuelwood purchased at peri urban or rural markets. There is an opportunity to create a market development project supporting the uptake of clean cooking technologies in PNG.

The **final section looks at private sector mobilization.** Building blocks to engage and develop private sector involvement in climate change projects are in place: an overarching policy environment, economic drivers that support projects that reach rural communities creating jobs and small business, a developing international environment for climate finance, and a regional market that has strong presence from international donors looking for the right partners and opportunities.

What can be done to strengthen engagement with private sector?

- Continue strengthening the policy enabling environment by ensuring ongoing private sector participation in the policy making process
- Establish or enhance focused and broad based platforms for engagement between private sector and government. This will include enhancing existing technical working groups, and creating a private sector advisory group.

⁴ <https://www.seforall.org/news/lack-of-clean-cooking-access-the-other-public-health-crisis-we-cannot-ignore>

- Create momentum and interest in climate change related projects and opportunities through accelerated on-ground implementation of a variety of projects (scale, technology, and financing route)
- Increase communication of opportunities, successes and challenges using multiple channels and partners. Possible channels include CCDA's website, business association newsletters and email groups, and social media.

1. Introduction

This report and associated database form part of the private sector mobilization and engagement work under the first Green Climate Fund (GCF) readiness project for Papua New Guinea (PNG). Titled “Readiness Support to Strengthen PNG’s Engagement with the GCF”, this first readiness project is being managed by the Climate Change and Development Authority (CCDA) as the National Designated Authority (NDA) to the GCF with support from the Global Green Growth Institute (GGGI) as the delivery partner.

The readiness project has 3 key outcomes: Strengthening Country Capacity (building capacity of CCDA to perform its role as NDA); Consultative Stakeholder Engagement (engaging stakeholders in the development of PNG’s GCF country programme) and Private Sector Mobilization and Engagement (exploring private sector potential to address climate resilience and implement climate compatible and low carbon development projects in PNG).

This report focuses on the feasibility of engaging and mobilizing the private sector in supporting activities to achieve adaptation and mitigation goals at the national and sub-national levels. Project activities included scanning selected sub-sectors in Papua New Guinea, understanding the current climate change policy and finance context, and seeking to understand and assess opportunities to accelerate and sustain private sector engagement.

The approach involved desk-based research, leveraging several recent reports that cover PNG’s climate change status, regulatory barriers, and climate finance landscape. This was backed up and further enriched by on-the-ground interviews and on-going engagement with key stakeholders.

Information contained in this report seeks to:

- Present existing information on PNG’s climate change action and climate finance landscape (domestic and international)
- Illustrate high-level international project and program examples that may be leveraged into PNG specific concepts and projects
- Introduce PNG specific high-level concepts for further development
- Suggest a platform from which ongoing engagement with the private sector can be developed and accelerated

Papua New Guinea has been a proactive participant in international action to plan for and limit the most damaging effects of climate change. In the past few years there has been significant action in PNG from government departments and development partners who have created data sets and high quality reports that support the call for climate action, highlight the context in which action will need to take place and clearly articulate barriers to enabling actions.⁵ Many of these documents are reflected in this report, with some key documents listed in the mobilization database for easy reference.

Stakeholder engagement has played an important part in this assignment. Potential stakeholders for engagement were identified through interviews with CCDA staff, engagement

⁵ A list of useful reports is provided as part of the project database and added to the project onedrive folder for easy access.

with GGGI and other development partners, and building on existing knowledge and contacts within the PNG market.

In-person stakeholder engagement was undertaken through three in-country missions between October 2019 and January 2020, including participation in a GCF Readiness Programme inter-ministerial meeting. A private sector forum was held in March 2020 bringing together government, private sector and civil society stakeholders. Discussions from the forum have fed into this report, provided additional avenues for engagement for the Country Programme team and acted as a starting point for a potential sustained private sector-government engagement in the form of an annual climate change forum.

Papua New Guinea is the Pacific Islands' largest economy and the range of potential areas and private sector companies with which to engage is substantial. As part of the project inception phase a broad sector scan was undertaken and specific areas for focus were identified: Agriculture, Energy and possibly Forestry. These sectors are well aligned with the Government's climate change priorities and provide opportunities for accelerated private sector engagement and action that also reach into communities that are most impacted by a changing climate.

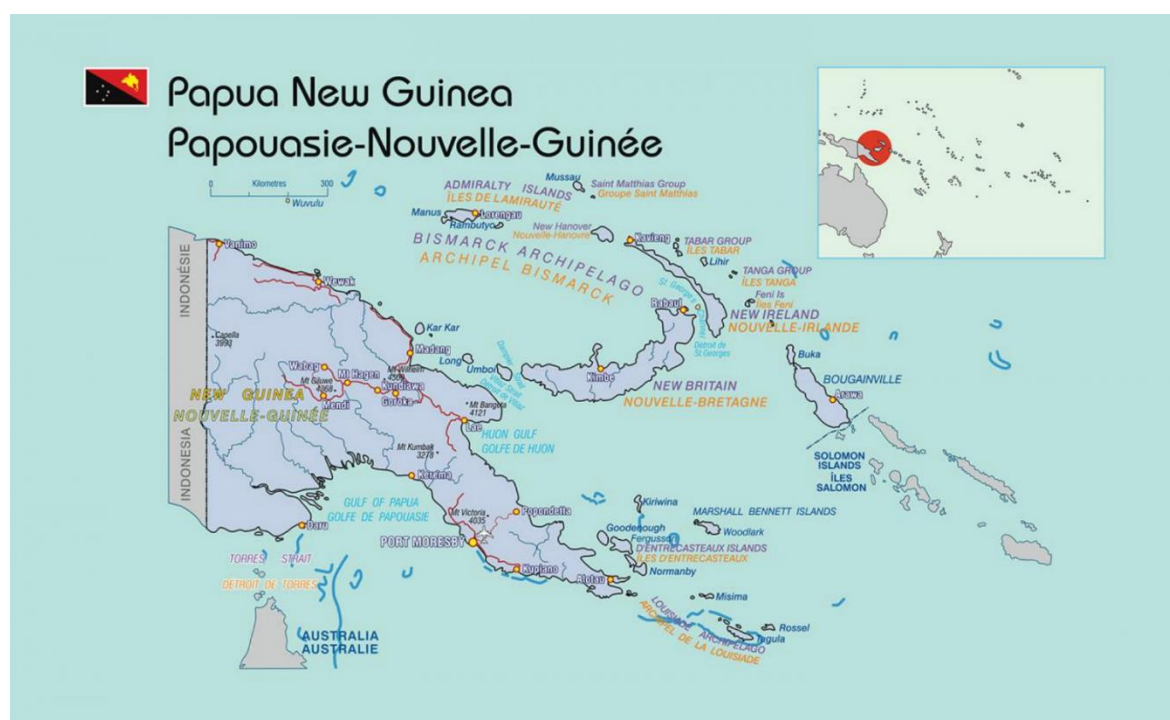
Further engagement showed there is already extensive work and discussion on Forestry and REDD+ underway, with several government, donor and civil society stakeholders involved. Consequently, this report focuses on Energy and Agriculture sub-sectors to identify further opportunities for private sector involvement in climate change projects. The examples and concepts presented in this report though focused on these two high-potential areas aim to establish a foundation of engagement that can be built upon and applied to other sub-sectors.

2. Country context

2.1 Country profile

Papua New Guinea is a large, diverse country. Bordering Indonesia, PNG occupies the eastern part of the world's second largest island and spans across numerous smaller Islands (Figure 1). The country is divided into four regions, comprising 22 provinces. Since the last census in 2000 there has been substantial population growth of 3 percent per annum and the current population is estimated at around 8.4 million people. The capital Port Moresby is home to around 300,000 people, followed by the industrial hub of Lae with a population of approximately 120,000. On the main island communities are dotted around the coast as well as up in the Highland regions. The difficult and vast terrain has contributed to great diversity across the country where there are important cultural differences across regions and over 800 languages are spoken.

Figure 1 Map of Papua New Guinea



Source: CCDA, 2020. GCF Country Program (under finalization)

The country is gifted with natural resources and fertile land but is also susceptible to natural hazards. Tropical rainforest covers around 75 percent of the country and is considered one of the most biologically diverse countries in the world.⁶ Ninety five percent of land is held under customary ownership. Being in a tropical region and close to the Pacific 'Ring of Fire' PNG is prone to natural disaster, including tsunamis, earthquakes, and volcanic eruptions.

⁶ World Bank, 2019. Country Partnership Framework for the Independent State of Papua New Guinea FY2019 - 2023

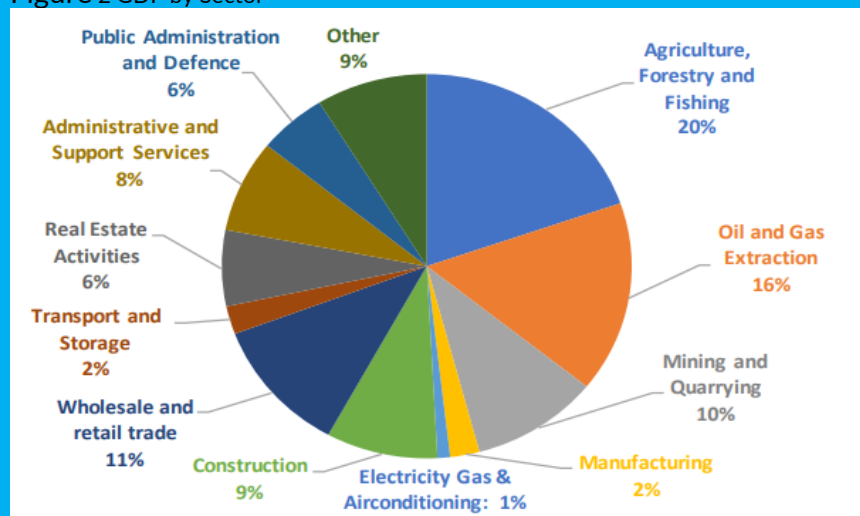
Growth, diversity and complexity create opportunities and challenges for the country. Ensuring that the fast growing, but still dispersed, population is engaged and provided with opportunities for engagement and growth is an ongoing challenge. As the World Bank Country Framework notes, the country has a human capital challenge to ensure ‘the demographic bulge is translated to a demographic dividend’. About 40 percent of the PNG population is under 15, yet entry into the formal workforce is less than 10,000 young people per year.⁷ Unable to find appropriate opportunities (educational, or workwise) many young people resort to opportunities in the informal economy. Additionally, there is a drift towards urban areas in search of employment opportunities that may or may not exist.

2.2 PNG economy

Papua New Guinea is categorised as a lower-middle income country and has a substantive resource sector. GDP growth in the country has largely been driven by the energy and extractives sector which is responsible for the majority of the country’s export earnings. The capital-intensive nature of the resources sector means it is not a large source of employment in the country, employing about 1% of the formal workforce.⁸ In 2018 per capita GDP was USD 2,646.⁹

Most people are a part of the informal economy. Over 85 percent of people live in rural areas with most depending on fishing, and subsistence and small cash crop farming for their livelihoods. Agriculture, fishing and forestry accounts for about 22 percent of the economy (Fig 2).

Figure 2 GDP by Sector



Source: World Bank 2019. World Bank Country Framework FY19-23; PNG Treasury

Beyond the resources sector, the private sector is considered relatively small and underdeveloped. There are 50,000 registered firms, of which 70 percent have fewer than 10 employees. There is limited depth to the finance markets with low competition among providers and limited capacity among non-bank financial institutions to provide finance to

⁷ World Bank, 2019. Country Partnership Framework for the Independent State of Papua New Guinea FY2019 - 2023

⁸ ibid

⁹ ibid

SMEs. Many of the SMEs run as almost informal companies.¹⁰ Examples of prominent private sector companies are listed in Table 1.

Table 1 Private sector companies (examples – not exhaustive)

Sector	Company
Agriculture	Trukai Industries, Mainland Holdings, Innovative Agro, New Britain Palm Oil
Transport	Patrick's Transport, Seeto Kui, Bismark Maritime, Steamships Trading
Financial Services	Bank South Pacific (BSP), Kina Bank, Westpac, ANZ (limited presence), Nambawan Supa, Nasfund (National Superannuation Funds)
Telecommunications	B-Mobile, Digicel, Telikom
Energy & Extractives	Oil Search, Total, Newcrest Mining, TruGas, Origin Energy, Exxon Mobil

Papua New Guinea ranks in the lower quartile for 'ease of doing business', with companies facing numerous ongoing challenges. The 'Ease of Doing Business' Survey in 2019 ranked Papua New Guinea as 120 out of 190 economies measured, and 16th among the 23 countries ranked in East Asia & Pacific.¹¹ Business constraints regularly identified include: access to foreign exchange and the poor exchange rate; poor infrastructure and related services; low access to finance; skills shortages; and political uncertainty and stability of rules.

Highlighted changes that have had a positive effect included making paying taxes less costly by abolishing a training levy, and easier by issuing value added tax refunds more quickly. Trading across borders was also made easier by implementing an automated customs data management system.

Business associations provide a collective voice for businesses in PNG. These organizations are a strong link between the business community and policy makers and are also engaged in some corporate responsibility activities (Table 2).

Medium and small enterprises are also an important part of the economy (mainly concentrated in wholesale, retail, agriculture, tourism and fisheries), and there is growing recognition of the need to target services for these enterprises.^{12,13} This has included the development of the MSME council separate from the associations supporting larger entities.

Each of the associations can be a channel for engagement with its membership base, and vice versa providing inputs and engagement to CCDA through association leadership as well as participation in technical working groups. Stakeholders from the Business Council of PNG and Port Moresby Chamber of Commerce expressed a willingness and interest in further engagement.¹⁴

¹⁰ Business Advantage, www.businessadvantagepng.com

¹¹ World Bank 2020. Doing Business 2020.

¹² Business Advantage PNG, 2019, Expanding SME sector critical to Papua New Guinea's future says MD of SME Corporation. <https://www.businessadvantagepng.com/expanding-sme-sector-critical-to-papua-new-guineas-future-says-md-of-sme-corporation/>

¹³ Business Advantage PNG, 2019, Help for Papua New Guinea small to medium businesses <https://www.businessadvantagepng.com/help-for-papua-new-guinea-small-to-medium-businesses/>

¹⁴ Contacts for organizations directly referred to in this report are available in the associated project database.

Table 2 Business Associations

Entity	Description
Business Council of PNG	The Business Council of Papua New Guinea is the peak body representing the private sector in Papua New Guinea across all sectors. Programmes areas are broad and include Law and Order, Security and Foreign Affairs • National and International Economic Affairs • Strategies for Nation-Building and National Unity • Telecommunication, Technology and Industry • Facilitating trade, investment and information seminars. BCPNG is also working with UNDP on establishing a Sustainable Development Goal Dashboard with 50 private sector companies targeted to take part.
Chambers of Commerce	The PNG Chamber of Commerce and Industry acts as the umbrella organization for regional Chambers throughout the country. Each of the chambers plays an important role in providing a platform for engagement with government, linkages to international organization, and as an independent voice of business. Port Moresby Chamber of Commerce actively supported the Private Sector Forum held in March.
PNG Chamber of Mines and Petroleum	The representative body for the mines and petroleum industry in PNG. Given the GDP contribution of the sector it is a substantial and influential industry body.
Micro, Small- and Medium Enterprise Council	MSME companies were previously represented by the Business Council of PNG, but the MSME council has been established to represent smaller businesses in PNG.

The last few years have been challenging for business in PNG and 2020 will be even more so with the COVID-19 crisis sweeping the globe. In 2019 GDP was 5.6 percent recovering from -0.8 percent the previous year, off the back of a revival in the resource sector and recovery following an earthquake in the Highlands. Expectations are that GDP will be around 3 percent for the period 2020-22 – but this does not take into account the deep and long-lasting economic impact of COVID19.¹⁵ Earlier economic updates also noted the resources revival appears to be masking slower growth in the non-resources sector. Business stakeholders noted the challenging business environment and a number of companies waiting on large resource decisions – particularly mining and LNG – to be taken which will also flow through to other businesses.¹⁶

There is a need for private sector to broaden its contribution to the economy. In its 2019 Economic Update ‘Slower growth, better prospects’, the World Bank noted the need for the private sector to play a leading role in developing PNG’s growth story. In assessing the potential role of the private sector, the authors draw a line between ‘resource’ and ‘non-resource’ sectors.

¹⁵ World Bank 2019. World Bank Economic Update: Papua New Guinea – Facing Economic Headwinds, 2019. These figures do not take into account the economic upheaval due to the COVI-19 pandemic.

¹⁶ Stakeholder interview, 2019

¹⁷ The resource sector has typically been the backbone of PNG's GDP growth and export receipts and accounted for the majority of the country's Foreign Direct Investment (FDI). However, it is noted that there is a substantive opportunity for the non-resource sector to play a more prominent role in the economy. But given the smaller size of these organizations and existing barriers to business, it is a challenge to make this happen.

¹⁷ The World Bank Economic update categorises the economy into resource and non-resource. Resource economy comprises Agriculture, Forestry, Fishing and Extractives, and the non-resource economy the balance.

3. Climate change context ¹⁸

Papua New Guinea is ranked as the 10th most vulnerable country in the world to the risks of climate change.¹⁹ The country has witnessed increased temperatures, changes in seasonal rainfall patterns and an approximate 7mm per year sea level rise. These climatic changes are predicted to increase and intensify.

3.1 CCDA organization structure

The Climate Change and Development Authority (CCDA) is the entity responsible for developing and coordinating climate change policy in PNG and is the country's National Designated Authority (NDA) as designated under the GCF. CCDA has three technical divisions: Adaptation & Projects; Mitigation and REDD+ and Monitoring Reporting and Verification (MRV) and National Communication (Figure 3).

There is a history of engagement with external stakeholders – particularly civil society organizations - and a growing recognition (internationally as well as domestically) of the importance of the private sector. In the existing CCDA structure the private sector is engaged through technical working groups, or ad hoc inputs through various forums. The technical working groups have a mix of government entities and selected private sector stakeholders and have a large membership (30-60 people). The groups provide policy inputs and are involved in reviewing documents as part of the No Objection Letter (NOL) process. Convening meetings can sometimes be challenging with issues cited including resourcing as well as a lack of priority being given to the meetings by private sector participants.²⁰

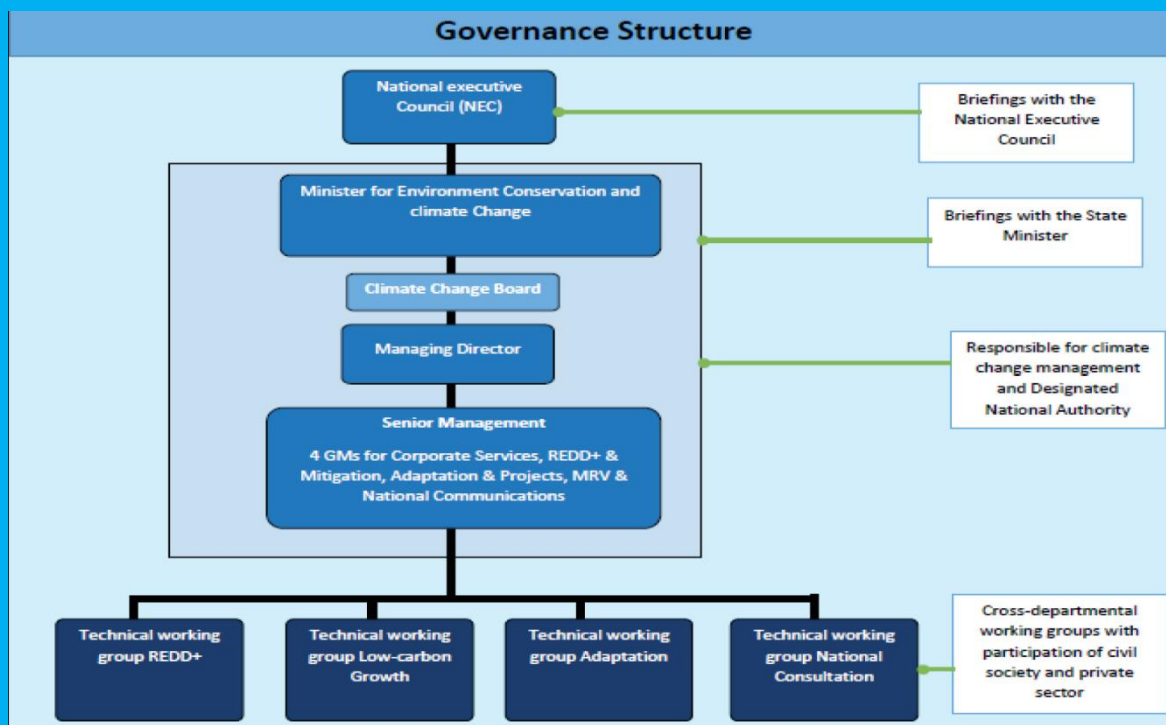
The Climate Change Management Act 2015 has provision for a National Climate Change Board, with a primary function to provide general control and guidance over the powers and functions of CCDA. The board has nine members, including one private sector member appointed from the PNG Chamber of Commerce, or PNG Chamber of Mining and Petroleum.

¹⁸ This section, particularly 2.1 extensively references information in the GCF Country Program document.

¹⁹ CCDA 2020, GCF Country Program Document

²⁰ Stakeholder communications, stakeholder engagement April 2020

Figure 3 Climate Change and Development Authority Structure



Source: CCDA Presentation, Private Sector Forum March 2020

3.2 Climate change action

Papua New Guinea has been an active participant in international climate negotiations and frameworks. PNG was one of the first countries to submit its First Intended Nationally Determined Contributions (INDC) under the Paris Agreement, which was submitted to the UNFCCC in 2015. A workplan is being developed for revision of the NDC in 2020 and will be a multi-stakeholder process.

Priorities identified in the existing NDC are:

- Reduction in per capita emissions from 2010 to 2030 of 22 percent;
- Per capita emissions average of 2.5 tCO₂/eq by 2030;
- Global rank of national emissions (excluding Land Use) of 128 in 2010 and 121 in 2030 (out of a total of 195 countries).²¹

Stated climate commitments include 100% renewable energy by 2050, reducing emissions where possible in the transport and forestry sectors, and improving system-wide energy efficiency.

²¹ University of Melbourne 2019. <http://climatecollege.unimelb.edu.au/indc-factsheets/papua-new-guinea>.; GCF Country Program Plan 2020

Priorities for PNG climate actions include:²²

- Increasing Papua New Guinea's resilience toward the adverse impacts of climate change, given the country's high vulnerability.
- Deploying renewable energy as an opportunity to increase the country's low electrification rate.
- Improving agricultural productivity, due to the high importance of agriculture for the country's mostly rural population, as well as food security and Papua New Guinea's economy.
- Conserving the country's extensive forests, due to their global significance for carbon storage, the role they play in sustainable agriculture, their provision of ecosystem services, and their economic potential.
- Improving infrastructure to enhance economic opportunities and reduce inefficient practices, especially through improved road infrastructure and shipping/port infrastructure.

In 2018, CCDA, in collaboration with Government stakeholders, also developed PNG's first Biennial Update Report (BUR1), as part of its UNFCCC commitments. BUR1 presented an overview of the national climate change circumstance, including an emissions inventory for the period 2000 – 2015.²³ Over time Papua New Guinea's emissions profile has changed. In 2015, driven by increased emissions from energy industries, fugitive gas emissions and a reduction in forest cover, PNG moved from being a net carbon sink to a net emitter.²⁴

Table 3 Papua New Guinea's Emissions by Sector

Sector ²⁵	GHG Emissions
Energy	Emissions from the Energy Sector amounted to 11,806.28 Gg CO ₂ -eq in 2015—an increase of 5,532.37 Gg CO ₂ -eq when compared to 2000.
Industrial Process and Product Use (IPPU)	Emissions from the Industrial Process and Product Use amounted to 35.29 Gg CO ₂ -eq in 2015, an increase of 1.38 Gg CO ₂ -eq when compared to 2000.
Agriculture	Emissions from the Agriculture Sector amounted to 796 Gg CO ₂ -eq in 2015, an increase of 114 Gg CO ₂ -eq (16.72 percent) when compared with the year 2000.
Forestry and Land-Use	Forestry is both a 'source and a sink'. The net removals from the Land Use and Land Use Change and Forestry (LULUCF) Sector amounted to 1,716.46 Gg CO ₂ -eq in 2015 compared to 21,635.94 Gg CO ₂ -eq in 2000 which is a total decrease of removals amounting to 19,919.48 Gg CO ₂ -eq.
Waste	Emissions from the Waste Sector amounted to 872.5 Gg CO ₂ -eq in 2015, an increase of 354 Gg CO ₂ -eq when compared to 2000.
Total	The total net greenhouse gas emissions in 2015 amounted to 15,193 Gg CO ₂ -eq compared to the emissions in 2000 which was 14,179 Gg CO ₂ -eq.

²² *Green Growth Potential Assessment - Papua New Guinea Country Report*. (2019). Retrieved from Global Green Growth Institute website: <https://gggi.org/report/green-growth-potential-assessment-of-papua-new-guinea/>

²³ Climate Change and Development Authority, 2028. Papua New Guinea First Biennial Update Report to the United Nations Framework on Climate Change

²⁴ When compared to 2000 figures. Climate Change and Development Authority. (2018, December). *Papua New Guinea's First Biennial Update Report to the United Nations Framework Convention on Climate Change*.

²⁵ CCDA 2020. GCF Country Program (under finalization)

Several short-term and medium-term focused policies and strategies are in place to support climate change related aspirations. The GCF Country Programme (currently being finalized) summarises PNG's climate change policies, and Development and Economic Policies and Strategies with climate related aspects highlighted (Table 4).²⁶

Table 4 Climate Related Policies – Timeline and focus areas

Year	Policy/Strategy	Key focus areas
1991	Forestry Act ²⁷	The Act focuses on the conservation, development, and management of Papua New Guinea's forest resources.
2009	Vision 2050	National development strategy to guide Papua New Guinea's social and economic development. Contains a strong focus on: <ul style="list-style-type: none"> • Environmental sustainability • Climate change
2010	Papua New Guinea Climate Compatible Development Strategy	The Strategy has an aspirational goal of carbon neutrality by 2050 while still achieving annual economic growth of 7%. ²⁸ Climate change mitigation through low carbon growth by: <ul style="list-style-type: none"> • Reducing emissions from deforestation and forest degradation and increasing forest carbon stocks (REDD+) • Greenhouse gas abatement in non-forestry sectors • Moving onto a low-carbon growth pathway Climate resilience through adaptation by: <ul style="list-style-type: none"> • Hazard identification • Identification of effective adaptation measures
2012	National Strategy on Responsible Sustainable Development	<ul style="list-style-type: none"> • Renewable resources
2012	National Food Security Policy (2012-2016)	<ul style="list-style-type: none"> • Climate change adaptation
2014	National Climate Compatible Development Management Policy	<ul style="list-style-type: none"> • Climate resilient sustainable economic development • Carbon neutral sustainable economic development
2015	Climate Change Management Act	<ul style="list-style-type: none"> • Coastal flooding and sea-level rise • Inland flooding • Food insecurity caused by crop failures due to droughts and inland frosts • Cities and climate change • Climate induced migration • Damage to coral reefs • Malaria and vector borne diseases • Landslides

²⁶ CCDA 2020. GCF Country Program Pg35, 36 (under finalization)

²⁷ Government of Papua New Guinea, 1991. Forestry Act 1991.

https://theredddesk.org/sites/default/files/forestry_act_1991_png_0.pdf

²⁸ GoPNG 2010.

Year	Policy/Strategy	Key focus areas
2016	Nationally Determined Contribution	<p>The NDC outlines the following mitigation options, which are conditional to financial and technical assistance:</p> <ul style="list-style-type: none"> • Increased energy efficiency, including through the adoption of energy efficient vehicles; • Reduction of emissions in the oil and gas sector; • Implementation of REDD+ activities under the UNFCCC; • Conservation, sustainable management of forest; • Enhancement of carbon stocks.
2016-2020	Papua New Guinea National Energy Policy ²⁹	<p>Key focus areas of the national energy policy are to:</p> <ul style="list-style-type: none"> • Strengthen institutional capacity and recruit right human capital to manage the energy sector. • Develop an integrated planning process for sustainable energy supply and utilization. • All energy resources will be developed by the State for the betterment of all citizens. • Promote a conducive environment for long term sustainable economic solutions in the supply of all energy sources. • Encourage involvement of the private sector in the development and provision of energy services. • Ensure energy resources are developed and delivered in an environmentally sustainable manner. • Promote efficient systems and safety in energy supply in all sectors (transport, residential, commercial, industrial and agriculture). • Diversify the development and utilization of energy resources for the nation's well-being and economic prosperity. • Promote energy efficiency and conservation measures and wise use of energy.
Source: GCF Country Programme, CCDA 2020 (under finalization)		

Various policies recognise the role of the private sector and potential for improved outcomes with strengthened engagement. For example, the National Strategy for Responsible Sustainable Development (STaRS) which states the benefits of mainstream sustainable development including private sector becoming 'aware and responsible for creating green jobs and achieving inclusive and innovative green growth'.³⁰

The energy sector has a great degree of interest from the private sector and the National Energy Policy recognises the role that can be played by different stakeholders, including private sector, to help increase rates of energy access across the country. A number of private sector companies have been pursuing business opportunities related to off-grid electrification, and are playing a proactive role as PNG Power Limited works to pilot a rooftop solar policy.

Although several framework policies articulate the expectation that private sector organizations be involved in helping meet climate change aspirations, there still appears to be significant room to share information and build capacity and capability to maximise emerging opportunities.

²⁹ Government of Papua New Guinea, 2015. Papua New Guinea National Energy Policy

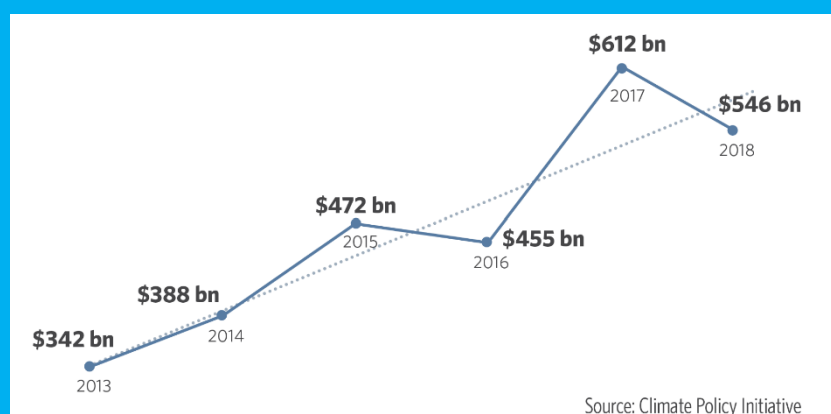
³⁰ <http://www.planning.gov.pg/images/dnpm/pdf/StaRS.pdf> (28 April - domain appears to be suspended)

4. Climate finance

“Climate finance refers to local, national or transnational financing—drawn from public, private and alternative sources of financing—that seeks to support mitigation and adaptation actions that will address climate change”.³¹

Global climate finance funds flows have been steadily increasing since 2016. The Climate Policy Initiative (CPI) has been tracking climate finance flows for six years, and notes that tracked climate finance in 2017 and 2018 rose to 579 billion, on average, representing a USD 116 billion increase from 2015/16.³²

Figure 4 Global Climate Finance Flows 2013 - 2018



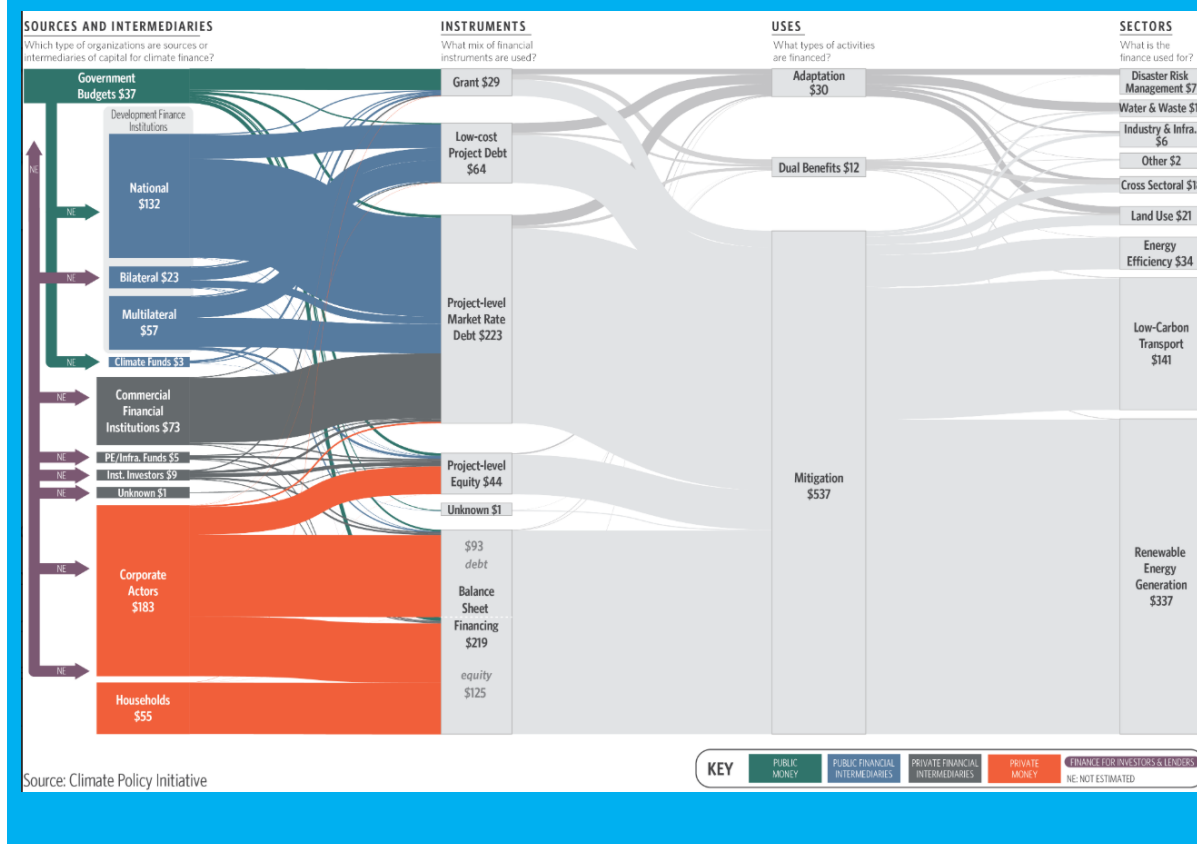
Climate Policy Initiative (2019). Climate Finance Landscape, 2019

Mitigation financing dominates the climate finance landscape. Until recently renewable energy projects have attracted the bulk of investor interest, but low-carbon transport is now also beginning to gain attention and investment (Figure 5).

³¹ UNFCCC, Website. Accessed April 2020. <https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance>

³² Climate Policy Initiative, 2019. CPI Climate Finance Landscape.

Figure 5 Global Climate Finance Landscape 2017/18



Source: Climate Policy Initiative (2019). Climate Finance Landscape, 2019

The CPI estimates that private sector accounts for about 56 percent of the climate finance flows in 2017/18, with the balance from Public sector sources (which includes DFIs). Again, the bulk of this - 85 percent - went towards renewable energy and 14 percent to low-carbon transport. Corporations account for the majority of funds flows, but there is a growing presence from commercial financial institutions. This trend towards renewable energy is also reflected in the Pacific region, where private sector companies are largely investing in mitigation projects – particularly solar -often using their own capital.³³

The investment in renewable energy projects shows growing comfort with the associated technologies, and possibly a positive influence of regulatory interventions intended to support growth of the sector. In PNG there is also some momentum towards increasing the share of solar in the energy mix, particularly harnessing decentralized grids and rooftop solar opportunities.

Although there is some positivity around the increase in finance flows towards climate action, more is required. It is estimated that by 2050 a 5-fold increase on 2015 investments in low-carbon technologies is required to support aspirations of limiting the effects of climate change

³³ CCDA-GGGI Private Sector Forum, 18 March 2020

to a 1.5- 2.0 degree increase.³⁴ A transformed approach to infrastructure and energy efficiency investment across the board will be required to make this happen.

In the Pacific, energy access and affordability remains a large challenge and in Papua New Guinea only 15% percent of the population has access to the electricity grid. The international finance landscape provides a useful indicator that the promotion of potential renewable energy projects in PNG may attract interest from financiers. However, there is still work required to remove barriers to implementing renewable energy projects at scale.

Multilateral and bilateral institutions play a significant role funding development and climate related programs in Papua New Guinea. This includes donor partners active in PNG supporting government's capital development activities, as well as supporting project implementation. Australia, New Zealand, the United States, China, and the European Union are all active in the market. In addition, the World Bank Group, Asian Development Bank, and United Nations have all been active in the country supporting infrastructure development, social and economic programs, and working to strengthen government capacity (Table 5). The support entities provide a mix of grant funding and loans.

Table 5 Active international organizations (examples)

Organization	Relevant Activities
Bilateral Support	<p>Australia - DFAT programs supporting climate resilience focused private sector players across energy, agriculture and transport. Examples include extensive support to the agriculture sector through PHAMA, AICAR, off-grid through Pawarim Komuniti.</p> <p>New Zealand - has supported mini-grid development and producer co-op development.</p> <p>European Union Support to PPAP (Cocoa component); STREIT PNG (a support for rural entrepreneurship, investment and trade).</p> <p>United States - increasing efforts to improve energy access, and will be rolling out a substantial electrification program.</p> <p>China - broad infrastructure development support, particularly in the form of loans.</p> <p>Australia, Japan, New Zealand, United States committed to increasing support to improve PNG's energy situation as part of statements made at APEC 2018.</p>
Multilateral	<p>Asian Development Bank International GCF AE, recent focus has been on transport infrastructure, promoting renewable energy, expanding access to finance and improving health services.</p> <p>World Bank Group International GCF AE. PPAP Program, support to DPE for the National Electrification Roll-out Plan (NEROP).</p> <p>UNDP International GCF AE, Facilitating Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER); REDD+ Readiness.</p>
International CSOs and Support Agencies	<p>PHAMA, World Vision, Oxfam, CARE - working across a range of interventions related to livelihoods, agriculture, health, gender projects and energy.</p>
<i>Source: Various, organization websites</i>	

³⁴ WRI, 2018. 8 things you need to know about the IPCC 1.5°C Report (Website)

The GCF and the GCF Private Sector Facility have the potential to play a catalytic role in private sector action, but challenges to fund deployment exist in PNG. The GCF Private Sector Facility (PSF) was designed to engage and encourage private sector to mobilise funds towards climate change related activities. As of October 2019, 25 projects had been approved amounting to USD 2.2 billion (Loans 67%, Grants 11%, Equity 22% and guarantees less than 1%) and an additional USD 7 billion in co-financing. PSF investments are made in alignment with the GCF result areas.³⁵

In PNG the GCF country programme is currently being finalized as part of the GCF readiness project which will strengthen CCDA's ability to engage with GCF. This work includes developing appropriate processes and procedures for engagement with the Fund to enable access. Interested companies are required to work with an Accredited Entity (AE). Currently all AEs that are working in PNG are regional entities or multilateral development organizations, which means interested companies will need to compete among regional and international structures and priorities.

PNG's GCF Projects³⁶

There are currently no in-country GCF projects, however one regional and one international project have been approved under the GCF, providing access for companies with relevant projects in PNG – further information on the projects is provided in Section 2.

GEEREF NeXt – an approved project under the European Investment Bank, it is a 'fund of funds' and builds on a recently concluded project. *Not yet under implementation.*

Small Island Developing States Renewable Energy Program – ADB is the accredited entity for this 15-year project which aims to replace polluting diesel sets across 7 Pacific Islands, including PNG.

Developing a conducive environment for climate finance will require collaboration and a strong understanding of roles and responsibilities. Government, development institutions, private sector and civil society all have a role to play in accelerating access to climate finance. There is recognition of the need to increase collaboration, including the formation of the *National Climate Change Board*, under the Climate Change Management Act 2015 (under review).³⁷ The review of the CCMA recognises a need to ensure that the appropriate levels of governance are in place to support both the CCDA's activities but also seek to ensure that regional stakeholders can support projects. In addition, PNG's '30 by 30 Climate Change Response Roadmap' highlights 30 actions the government will enable by 2030, including a strong investment framework for climate change.

The 2018 Climate Finance Options paper highlights several challenges and gaps facing the climate finance environment in PNG, with several points relevant to private sector mobilization³⁸

- No systematic or coordinated approach to access international climate change funding;

³⁵ More information on the GCF Private Sector Facility is available at: <https://www.greenclimate.fund/document/green-climate-fund-private-sector-facility>

³⁶ Both of these projects are in initial stages with no significant traction in PNG. It is suggested that interested companies first engage with CCDA.

³⁸ Pacific Islands Forum Secretariat, DNPM, CCDA 2019, *Options for Strengthening Climate Finance Coordination and Accessibility in Papua New Guinea Paper*. page 6.

- Lack of information sharing on funding opportunities between technical and central government agencies, and between government agencies and relevant stakeholders;
- Limited understanding of climate finance and processes by central government agencies

It is apparent that information, awareness, capacity are themes that run across government and private sector as key barrier to increased engagement and action.

Local examples of climate related finance are generally driven by international organizations, private sector led engagement has been limited. The only local GCF funding accessed to date has been for readiness support (technical assistance rather than a full-scale project with hardware implementation), with significant work underway by CCDA and support partners. There are also several other projects listed in the CCDA GCF pipeline, including projects involving UNDP and other international accredited entities and/or organizations.³⁹ The GCF is in existence to support and accelerate climate change related finance, but the reality of the administrative burden – very detailed project concept development, and rigorous monitoring and reporting requirements – associated with accessing funds means that there are very few private sector entities in Papua New Guinea that will be capable of leading the access to project and programme finance. Partnerships with more experienced entities to move through the funding application process will be vital, but it is important that larger local entities develop the capability to work through the process as a lead entity.

An example of proactive private sector engagement in mitigation activities involves New Britain Palm Oil, one of PNG's largest private sector organizations. In 2013 the company worked with a consultancy to structure two methane capture projects, utilizing waste product from their processes. The credits derived from the project were certified under the Clean Development Mechanism and made available on the voluntary carbon market.

On-ground stakeholder feedback indicates that companies are interested in engaging but require more information and support. Understanding the operations environment, accessing funds, documentation, and long cumbersome processes hinder engagement in climate change related projects and programs. Other challenges identified include, a need for greater information sharing (platforms for engagement); a dearth of financing (particularly from commercial banks); and a need for more capacity building. These issues are not necessarily specific to the development of climate change mitigation and adaptation projects but are typically exacerbated among projects where there is a higher perception of risk.

Along with organization capacity, a lack of financial support to build business cases and feasibility studies is a barrier to project development. Stakeholder engagement showed that there are a number of small organizations that are interested in accessing funds to support community level activities, but they lack the administrative capacity to bid for and then manage substantial amounts of money. In addition, companies engaged with (including those with concepts outlined in this report) noted the lack of budget to develop detailed business cases or feasibility studies as a major stumbling block to implementing projects.

³⁹ Available in the accompanying database – information provided by CCDA

5. International project & program examples

In seeking to understand and validate potential sub-sectors for private sector engagement and mobilization, several documents were reviewed, including UNFCCC submissions – particularly BUR1 – CCDA reports, and the Green Growth Potential Assessment by GGGI. Initial discussions with stakeholders were also considered. Other factors considered included:

- Importance of the sector to PNG (government focus and alignment to government climate change targets, potential to impact large parts of the population)
- Current activity including DFI and private sector participation
- Possible emissions reduction and value for money
- Co-benefits, including poverty reduction, gender, economic development
- Insights picked up from discussions with CCDA, GGGI, and other stakeholders as well as consultant understanding of the market.
- Ability to quickly build traction within the sector within the scope and timing of the private sector mobilization and engagement project.

The initial sector scan included Agriculture, Energy (non-extractives), Forestry (REDD+), and Transport.⁴⁰ Agriculture and Energy were decided on as sub-sectors for focus, but the approach can be applied to other sectors.⁴¹

The following examples are presented to enable discussion and exploration of project ideas. Two examples are also potential funding sources. The projects may not be an exact fit for the PNG country context but intended as a starting point for discussion.

GCF's Simplified Approval Process

Developing projects that fit the investment criteria of the GCF can be a daunting process. For companies in PNG this would include navigating the GCF processes, finding a regional or international AE to work with – , and then working through GoPNG approvals processes.

In recognition of the need to streamline and simplify approvals processes of some small scale projects, the GCF Board has approved a Simplified Approval Process (SAP). The simplifications are two-fold: 1. The application process is shorter, with a simplified form-filling. There are dedicated templates for Concept Notes and full Funding Proposals; and 2. The review and approval processes are streamlined.¹

An outline of the GCF project preparation process is available on the GCF website at: <https://www.greenclimate.fund/projects/process> and the SAP guidelines are also available on the GCF website at: <https://www.greenclimate.fund/sites/default/files/document/sap-guidelines.pdf>

⁴⁰ The scan was completed as part of the inception report.

⁴¹ Project inception report, November 2019

5.1 Inclusive Green Financing for Climate Resilient and Low Emission Smallholder Agriculture (Niger)⁴²

Status: Approved (November 2019) SAP – Simplified Approval Process | **Region:** Africa (Niger)
| **Accredited Entity:** International Fund for Agricultural Development (IFAD)

Themes and Result Areas:

Ecosystems and ecosystem services; Energy generation and access; Forests and land use; Health, Food and water security; Livelihoods of people and communities.

Project in numbers:

Project value – USD12.7 Million (GCF – 6.6, Loan, 2.8M Grant; co-finance – 2.3M Grant; 937.2k Grant – IFAD, Agricultural Bank of Niger - BAGRI)

The project will directly target 25,000 smallholder farmers and approximately 150,000 indirect beneficiaries already targeted by a new IFAD investment in Niger.

Background:

Niger is one of the world's poorest countries, ranking 189th out of 189 countries on the Human Development Index in 2017, with a poverty rate of 44% and per capita income of USD 420 in 2018. The economy is heavily reliant on agriculture, accounting for 44% of GDP (2018), and very susceptible to changing climatic conditions due to the rain fed nature of the agricultural practices. The crops developed are typically broken into rainy season (millet, sorghum, maize) and dry season (sweet potato, rice, and market garden crops such as tomato, etc). Niger has been impacted by a range of climate factors – particularly either drought conditions, or excessive rainfall. Poor agriculture conditions are exacerbated by poor agriculture practices. It is expected that negative impacts on agriculture production will only increase as climate variability and other weather-related factors grow.

Access to credit has a significant role to play in increasing farm productivity but remains a key constraint for smallholder farmers, farmers' organizations, cooperatives and micro, small and medium-sized enterprises (MSMEs).

The objective of this five-year project is to increase the resilience of smallholder farmers to adverse impacts of climate change. This will be done by removing traditional barriers to accessing green financial and non-financial services. Additionally, the project will adopt and implement innovative adaptation and mitigation measures. These measures include:

- Water capture • Borehole irrigation • In situ reintroduction of more stress-resistant breeds and crop varieties • Sand stabilization and other land management and agronomic techniques
- Ecosystem-based adaptation (EbA) • Capacity-building and awareness raising on adaptation and mitigation in agriculture • Renewable Energy Technologies (RETs) • Energy for water mobilization • Value addition along value chains (processing, packaging, maintenance)

Relevance to Papua New Guinea: Given PNG's reliance on agriculture (both for subsistence and income), there are potentially wide-ranging impacts due to changing climate conditions. Currently there are several organizations working with farmers and landowner groups who may

⁴² <https://www.greenclimate.fund/project/sap012>

be able to leverage this example into their work. It is important to note that this project cuts across several results areas which adds complexity to planning, monitoring and results measurement.

5.2 Acument Resilient Agriculture Fund⁴³

Status: Under Implementation (September 2019) Simplified Approval Process | **Region:** Africa (Uganda, Nigeria, Ghana) | **Accredited Entity:** Acumen Fund

Theme and Result Areas: Adaptation | Health, food and water security; Livelihoods of people and communities

Project in numbers:

Project value – USD56.0 million (GCF – 623M, Equity, 3.0Mn Grant; Co-finance – 3.0M Grant; 2.0M Equity, 25M Equity)

The project will directly target 2.1 Million beneficiaries and approximately 7.9 Million indirect beneficiaries.

Background

*The Acumen Resilient Agriculture Fund (ARAF) will improve climate resilience to ensure long-term sustainable increases in agriculture productivity and incomes for smallholder farmers. It will shift the pattern of investment in climate change adaptation activities in Africa from grants to a long-term capital approach, enabling smallholder farmers to respond to climate change more efficiently and effectively. It will support innovative private social entrepreneurs in micro-, small, and medium-sized enterprises (MSMEs) by providing aggregator and digital platform and innovative financial services to smallholder farmers.*⁴⁴

The project documentation identifies two principal challenges for smallholder farmers when faced with a choice of adopting an innovative solution or practice: 1. Poor incomes and extremely thin asset base means limited appetite to experiment. 2. Uncertainty associated with incomes mean conservative expenditure planning which results in limited appetite for new and untested solutions.

Through the course of stakeholder interaction, the Acumen team identified **Four Key Farmer Needs** that need to be addressed in a way that improves farmer incomes in a sustainable way while reducing income uncertainty. **1. Access to quality inputs** (to improve productivity) **2. Access to affordable credit** (to reduce costs – farmers make most input purchases on credit) **3. Access to extension and trainings** (to improve yield, reduce waste, improve climate resilience) **4. Access to off-take markets** (to improve profitability). In the traditional system, the middlemen offer all these solutions on expensive terms because farmers lack direct access to other market stakeholders (e.g., input providers, formal credit providers etc.). It is critical to enable farmers' direct access to markets (credit, input, off-take) to improve their livelihoods in a sustainable way and reduce income uncertainty. This will enhance farmers' appetite to adopt innovative solutions that enhance climate resilience.

⁴³ <https://www.greenclimate.fund/project/fp078>

⁴⁴ <https://www.greenclimate.fund/project/fp078>; project documentation

Relevance to Papua New Guinea: As with the agriculture green finance examples, many of the components identified in this example are relevant to the PNG context. Globally agriculture companies are facing a complex set of economic, social and environmental pressures. They are also increasingly understanding and grasping opportunities to increase responsible investments, improving outcomes for the farmers with whom they engage, the broader communities within which they operate, and the customers they serve. Agriculture is at the centre of Papua New Guinea's economy and are several support agencies are working with producer groups and co-ops to improve practices.⁴⁵ There is significant potential to augment current interventions and build new approaches, including the development of digital platforms.

5.3 Promotion of climate friendly cooking: Kenya and Senegal⁴⁶

Status: Approved (February 2019) – Full Project - Under Implementation | **Region:** Africa (Kenya, Senegal) | **Accredited Entity:** GIZ

Themes and Result Areas:

Mitigation | Buildings, cities, industries and appliances

Project in numbers:

Project value – USD26.1 million (GCF – 18.2M Grant; Co-finance – 7.9M Grant)

880,000 Tonnes of avoided emissions; 1.9 million (Direct) beneficiaries

Background:

Nearly 3 billion people worldwide use solid fuels such as firewood and charcoal as the primary source of fuel for cooking. These fuels are both harmful to the environment, as well as to the health of people using them. Also, the burden of these poor cooking fuels – as with poor lighting fuels - disproportionately falls on women and children. It is estimated that the global potential for greenhouse gas (GHG) emission reductions from the transition to improved cookstoves is 0.6 - 2.4 Gt CO₂eq/year.

This project aims to transform the market for cookstoves in Kenya and Senegal, creating a market that is technologically robust, has strong business models backed by entrepreneurs with strong business capabilities able to access commercial capital. The intended outcome of the project is to triple annual Improved Cookstove Solutions (ICS) production and sales in 5 years, and subsequently achieve a six-fold increase by 2030.

To do this the project works on the ICS market development by a) professionalizing ICS production, expanding distribution and retail chains and facilitating access to market-based finance (supply side activities) and b) by raising consumer awareness and creating an enabling market environment (demand side activities). This method of market development for clean

⁴⁵ <https://www.frontiersin.org/articles/10.3389/fsufs.2019.00003/full>

⁴⁶ <https://www.greenclimate.fund/project/fp103>

energy products has had success elsewhere, in particular the growth of the market for quality verified solar products across Africa, Asia and the Pacific.

Market Barriers Identified:

Supply Side:

1. Weak technological basis and capacities to improve productions processes and product design to suit consumer needs.
2. Under-developed ICS supply chain
3. Limited access to finance
 - a. Informal business nature
 - b. Lacking risk guarantee and own finance or property
 - c. Initial capital investments yield low returns
 - d. High interest rates
 - e. Unfamiliarity with loan applications and business planning

Demand Side:

4. Lack of confidence in new products/vendors
5. Low awareness of the risks associated with traditional cooking practices and multiple benefits of ICS, as well as their importance for family expenses, health and the environment
6. Non-favourable market environments

Interventions:

Supply Side: Strengthening ICS Supply and Delivery Chain

- Professionalization of ICS Production
- Expansion of distribution and retail chains
- Facilitating access to market-based finance for ICS supply chain

Demand Side: Enhancing Consumer Demand and ICS Market Environment

- Awareness raising of consumers
- Creation of an enabling market environment

In addition, there is a Global output focused on highlighting the contribution of ICS to NDCs.

The project has numerous partners, including Kenya: Ministry of Energy, SNV, GIZ. Senegal: ENDA Energie, ENDA Ecopop, GIZ

Relevance to Papua New Guinea: The Green Growth Potential Assessment identified cleaner cooking as a high potential area. In addition, University of Queensland has been working on the development of a 3-year clean cooking study focused on LPG. There is potential to work with stakeholders in PNG to create a concept that supports the development of a robust environment for clean cooking.

5.4 Global Energy Efficiency and Renewable Energy Fund (GEEREF) NeXt Fund⁴⁷

Status: Approved (April 2017) | **Region:** Latin America and the Caribbean, Africa, Eastern Europe, and Asia-Pacific (29 countries across these regions, including Papua New Guinea) | **Accredited Entity:** European Investment Bank – local contact, CCDA

Theme and Result Areas:

Mitigation | Building, cities, industries and appliances; Energy Access

Project in numbers:

Project value – USD765.0 million (GCF – 250M Equity, Grant 15M; Co-Finance – 470M Equity, 30M Loan)

Emissions avoided: 769 M tonnes

Background

GEEREF NeXt is structured as a ‘fund of funds’, with the aim of being a first investor (anchor investor) in renewable energy/ energy efficiency (RE / EE) investment funds, and encouraging other investors to co-invest.

GEEREF NeXt will operate either indirectly via specialised funds, or directly via investments into the beneficiary projects themselves. GEEREF NeXt is expected to finance more than 200 RE/EE projects through the course of its fifteen-year lifespan. GEEREF NeXt will provide the long-term and patient capital which is essential to bring RE/EE projects from early development to full operations. GEEREF NeXt will build capacity and track records of local fund managers in developing countries, which will help turn RE/EE investment into a mainstream asset class for institutional investors. The fund is approved and currently preparing for implementation. The project has an estimated lifespan of 15 years.

Relevance to Papua New Guinea: Although the GEEREF NeXT preparation team has reached out to beneficiary communities as part of planning stages, there is a risk that there will be challenges disbursing funds at a local level – a learning from the initial GEEREF project. Leading stakeholders in Papua New Guinea have an opportunity to work with CCDA and GEEREF NeXt to structure projects that are suitable for the fund. It is important to note that discussions with CCDA and the program are on-going and any interested parties should consult with CCDA for more information.

⁴⁷ <https://www.greenclimate.fund/project/fp038>

5.5 Pacific Islands Renewable Energy Investment Program⁴⁸

Status: Under Implementation (Approved April 2017) | **Region:** Asia Pacific (Cook Islands, Tonga, Nauru, Samoa, Marshall Islands, Papua New Guinea, Federated States of Micronesia |

Accredited Entity: Asian Development Bank

Theme and Result Areas:

Cross-cutting | Energy Generation & Access, Infrastructure & built environment; Livelihoods of people & communities

Project in numbers:

Project value – 29.2 million (GCF – 17M; Co-Finance – 12.2M Grant)

Emissions avoided: 3.0 M tonnes; 580k people (Direct)

Background

This programme covers seven countries in the Pacific (Small Island Developing States – SIDS): Cook Islands, Tonga, Republic of Marshall Islands, Federated States of Micronesia, Papua New Guinea, Nauru and Samoa.

The countries were chosen due to high electricity costs, poor supply and a reliance on diesel. The diesel used has added costs due to the need for importation and transport around islands. All SIDS targeted in this programme recognize the benefits of shifting from diesel to renewable energy. This will lead to not only reduced greenhouse gas emissions but also enhanced energy security and improved balance of payments through reduced fossil fuel imports. But they also face various barriers in achieving this aim. This includes the high initial costs of installing renewable energy, the current lack of private sector investment and the pressing need for energy sector reforms.

The programme is anchored by the USD 12 million grant to the Cook Islands to implement battery storage for solar systems, and a grant of USD 5 million for regional technical assistance. TA activities will include: ⁴⁹

- Sector planning (roadmaps and grid integration studies);
- Power utility management reform and capacity building;
- Tariff review and reform;
- Review and revision of regulatory and policy frameworks; and
- Promote private sector by identifying opportunities for independent power providers (IPP's), providing transaction advice and designing guarantee products.

Relevance to Papua New Guinea: This is strongly aligned to the energy access challenge in Papua New Guinea and may be a useful funding avenue for interest companies to explore. Other than the initial focus on Cook Islands, there is no country specific allocation and the TA has been executed on a 'first-come, first-served' basis. It is important to note that discussions with CCDA and the program are on-going and any interested parties should consult with CCDA for more information.

⁴⁸ GCF Proposal <https://www.greenclimate.fund/project/fp036>

⁴⁹ ADB Email communication, 12 March 2020

6. Concept notes

There are numerous private sector organizations active in PNG with ideas that, with appropriate support and funding, could contribute to achieving Government of PNG's climate aspirations. Through the course of stakeholder consultations several potential projects and ideas were identified and several are presented as concept notes in this section. The notes are intended to highlight opportunities that could possibly attract GCF support, but smaller private sector led projects and programs are also presented and may be more attractive to PNG's active donor community and other funding sources. It is intended that these project concepts will continue to be supported and developed beyond the life of the private sector mobilization and engagement project.

Each of the concepts below is introduced using common criteria eg. Whether it is a project or program (a program being defined by GCF as a collection of different projects), lead organizations, key result areas and background and next steps. Contact information for projects is available in the accompanying project database.

6.1 Solar Cocoa Dryers in PNG

Project or Program: Program

Lead Organization(s): Green Limited | Contact: Bernard George

Green is a PNG based developer and integrator of solar systems. This includes solutions for agriculture, schools, and health facilities.

Result Areas:

Mitigation - Reduced Emissions from:	Adaptation – increased resilience of:
<i>Energy Access & Power Gen</i> <input checked="" type="checkbox"/>	<i>Most vulnerable people and communities</i> <input checked="" type="checkbox"/>
<i>Low Emission Transport</i> <input type="checkbox"/>	<i>Health and well-being, and food and water security</i> <input type="checkbox"/>
<i>Buildings, Cities, Industries and Appliances</i> <input type="checkbox"/>	<i>Infrastructure and built environment</i> <input type="checkbox"/>
<i>Forestry & Land Use</i> <input type="checkbox"/>	<i>Ecosystem and ecosystem services</i> <input checked="" type="checkbox"/>

Project/Program Background:

Cocoa is grown across 14 of PNG's 22 provinces, with annual production around 43,000 tons with 90% of this produced by smallholder/village farmers. The industry has been building back up following an outbreak of Cocoa Pod Borer in 2008, but still faces numerous challenges around low, stagnant yields and inconsistent quality (some PNG cocoa has a very good international reputation). PNG only accounts for 1% of global production of Cocoa, but prospects for the global market are positive with global consumption increasing at 17% per annum, driven by increasing demand in emerging markets such as China, India and Brazil.

Although PNG cocoa has historically had a strong reputation, there are several avenues for improvement of the sector that are being worked on, particularly export processes and yields. Crop quality is a challenge, and due to poor upkeep of dryers smoke taint of beans is recognised as a barrier to greater interest from overseas markets, particularly Europe.

The Opportunity

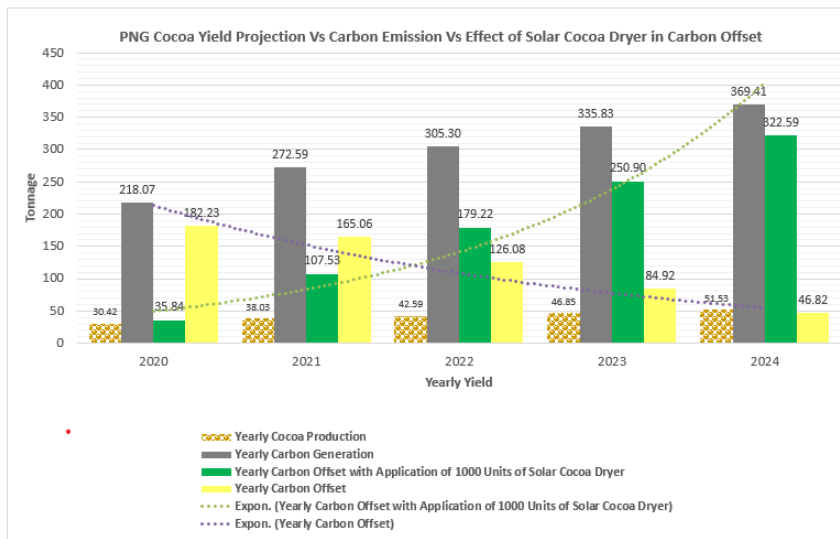
The proposed program seeks to work with Green Limited to support replacement of inefficient firewood based cocoa dryers with solar powered cocoa dryers. Green Limited has trialled a solar cocoa dryer in Arawa, in the Autonomous Region of Bougainville. For example, a 50-member farmer group in Torpanos has implemented a solar combination dryer (using optimised solar thermal and PV) benefiting up to 100 people.

Along with environmental and health benefits from reduced firewood usage, the project is well aligned with a Government desire to improve the quality of cocoa products thereby increasing the attractiveness of the product in niche overseas markets. There is a potentially significant direct economic benefit to small farmholders, and their communities which will need to be further quantified.

Green Limited has provided an initial offset projection and table with offsets from different system sizes.

Solar Cocoa Dryer and Carbon Offset Projection

GREEN
Future Embraced



* - Estimated sale of 500 units of Solar Cocoa Dryer Year 2020 / first year and 1000 units in the subsequent year

Potential Emissions Reductions

Powering Agriculture- Solar Cocoa Dryer- Carbon Emission Offset					
S.No	Solar Cocoa Dryer Model (kg)	Solar Air Dryer System- Heat Energy equivalent Electrical Energy (kW)	Energy Generation / Year (kWhr)	Carbon Offset / Year (Metric Ton)	Carbon Offset / 15 Years (Metric Ton)
1	20	0.4	146	0.143372	2.15058
2	50	1	365	0.35843	5.37645
3	100	2	730	0.71686	10.7529
4	250	5	1825	1.79215	26.88225
5	500	10	3650	3.5843	53.7645
6	1000	20	7300	7.1686	107.529
7	2000	40	14600	14.3372	215.058
8	5000	100	36500	35.843	537.645
9	10000	200	73000	71.686	1075.29

(Source: GREEN Ltd)

Challenges/Barriers

- Ensure alignment with existing programs seeking to improve product quality. Sun drying appears to be a strong form of drying for cocoa, with smoke taint coming from poor processes or poor maintenance of dryers.
- The farmer groups that would benefit from this technology is dispersed. Will need strong partnerships with cocoa boards, co-ops, and civil society organizations that support work (eg. PHAMA). It is also important that women are brought into the consultation process.
- Farmer groups will not necessarily have funds to purchase the equipment. Will need to take a decision as to whether this is a grant-based project, or whether an effective farmer financing mechanism can be developed.
- Further work will be required fully perceived policy or regulatory barriers hindering this work, but the main challenges currently is ensuring that the dryers adhere to any certification requirements in PNG and then aggregating demand.

Potential Partners/Stakeholders:

- PHAMA: support for stakeholder engagement (as part of their work to support and develop cocoa farmers)
- Provincial Authorities: Develop support for the program activities, may be a potential source of funds from DSIP.
- Producer Groups and Co-ops: Will require strong buy-in from producer groups to replace existing inefficient dryers with solar
- CSO: Possible collaboration with World Vision and CARE for implementation in areas that they are supporting.
- AE: Possible to engage SPC to see if there is interest but this project could be supported by other financing avenues, particularly DFAT Pawarim Komuniti.

Next Steps:

- The GGGI team has also been engaging with cocoa producer groups and it may be possible to bring in Cocoa producers via connections that are being made by the Climate Resilient Green Growth (CRGG) team in provinces.
- **A second option for this concept:** It is worth considering whether this concept could be established as an overarching program or financing facility for solar dryers, to be accessed by relevant parties and implemented by approved providers (eg. GREEN and others). This is a change to the concept as above but could potentially broaden the scope, size and projected impact. This would include engagement with other solar dryer providers, and possibly working with DAL on development and implementation of the concept. In this approach organizations such as PHAMA, and other civil society organizations working in the agriculture sector, would be potential partners for engagement.

Additional Information:

- Article: <https://postcourier.com.pg/solar-cocoa-dryers-interest-farmers/>
- Green Cocoa Dryer Brochure (on project OneDrive Folder)
- Supporting information note from Green Energy (on project OneDrive Folder)
- Report: PNG Specialty Cocoa: <http://phama.com.au/wp-content/uploads/2018/02/TR107-PNG-specialty-cocoa-market-study.pdf>
- PHAMA Article: <http://phama.com.au/news/papua-new-guinea-cocoa-best-cocoa-world/>

6.2 University of Papua New Guinea Solar Farm

Project or Program: Project

Lead Organization(s): University of Papua New Guinea (UoPNG) in collaboration with Astra Solar

Contacts: Darlen Lovi – UoPNG: | Christian Lohberger – Astra Solar (Solar Project Developer/Engineers)

Result Areas:

Mitigation – Reduced Emissions from:	Adaptation – increased resilience of:
<i>Energy Access & Power Gen</i> <input checked="" type="checkbox"/>	<i>Most vulnerable people and communities</i> <input type="checkbox"/>
<i>Low Emission Transport</i> <input type="checkbox"/>	<i>Health and well-being, and food and water security</i> <input type="checkbox"/>
<i>Buildings, Cities, Industries and Appliances</i> <input checked="" type="checkbox"/>	<i>Infrastructure and built environment</i> <input type="checkbox"/>
<i>Forestry & Land Use</i> <input type="checkbox"/>	<i>Ecosystem and ecosystem services</i> <input type="checkbox"/>

Project/Program Background:

The School of Natural and Physical Sciences at the University of PNG and the UoPNG Centre of Renewable Energy (CORE) have been considering options to address energy shortfall issues faced on campus. Currently UoPNG relies on power supply from PNG Power Limited (PPL) with regular back-up provided by diesel generator sets. Currently it is estimated that UoPNG has a power requirement of approximately 5MW and spends USD 1.2 Million (3.5 million Kina) on electricity each year. The overall carbon footprint of the university is estimated at 437 tonnes per annum.

UoPNG and CORE have sought to start the process to develop a 1.5MW off-grid solar farm on the University campus. The project aims to provide the University with cheaper and cleaner energy, increase reliability of power on campus, and provide an avenue to use the solar farm as a training facility for students. As part of a high-level scoping exercise the project team in collaboration with Astra Solar identified numerous benefits, including:⁵⁰

1. Development of land and infrastructure to enhance student exposure, collaborative research in RE technology, energy storage, and solar project sustainability.
2. Reduction in current baseline emission from use of fossil fuel as aligned with existing MTDG 2030 and Vision 2050.
3. Savings on fuel and electricity costs for use of clean energy in the long term.
4. Create expertise, job opportunities and encourage women participation through education and solar technology hands-on training for student/industry/community. This objective is aligned with university plans of offering a BSc in Solar PV Systems, and the FREAGER Project that promotes renewable energy and energy efficiency at the national level.

⁵⁰ UoPNG Astra Solar High-Level project document

5. Enhance RE awareness by using facility as a local/tourist attraction with possibility of income generation.

The project is well aligned with the Government's desire to see increased use of renewable energy, and also provides a platform for upskilling students.

Beneficiaries:

- UoPNG: reliable, renewable energy. A flagship project for the university to attract students.
- PPL: able to divert grid electricity elsewhere, may use the UoPNG as an example of a shared ownership model (depending on approach)
- Students: Provide an on campus solar farm with training facilities to help in their development and employability

Challenges:

- On campus grid is owned by PPL and there are no provisions to wheel energy.
 - o *Action: Astra solar is seeking to engage with PPL on this matter*
- Funding for a detailed feasibility study is lacking
 - o *Action: Float this concept with DFAT and other main donors to see if there is support.*
- Further clarity is required by UoPNG regarding regulatory barriers and ownership (eg. Is there a case for PPL to become part owner in the project), will need to engage Independent Consumer and Competition Commission (ICCC) in the process.

Potential Partners/Stakeholders: (Including potential AEs)

- PNG Power Limited: PPL will be an important stakeholder in the process, and may act as a project partner and may take ownership of the plant
- UoPNG: Project sponsor and also potential owner of the asset (but funding constraints)
- Donor community: initial role to play in funding the feasibility study, and possibly facilitating follow-up funding
- Local banks: could play a role in financing the project
 - o *Update: Astra is in conversation with banks to discuss solar in general. An internal discussion on possible roles to play is taking place at BSP.*
- The neighbouring Nature Park is interested to be an off-taker This would bring in environmental and biodiversity benefits but will require regulatory clarification to be actioned.
- Potential to pitch this project to the Pacific Islands Renewable Energy Program (strong diesel replacement angle).

Next Steps:

- The vice-chancellor has approved the project to move into a feasibility phase, providing a green light to move forward with the project development.
- Key stakeholders will need to be brought into the process. This will initially be led by UoPNG with the support of Astra solar, this will include PPL but with the support of GGGI should also include DFAT, MFAT and possibly other donors.
- GGGI to possibly share concept note with potential donors to gauge interest and possibly facilitate connections to possibly non-GCF funders.

Additional background information:

- Astra Solar – UoPNG Project Note (Available upon request <https://gggi.org/contact/>)

6.3 Biogas Scale-Up (POME Methane capture and Electricity Generation)

Project or Program: Program

Lead Organization(s): New Britain Palm Oil Limited | Contact: Ian Orrell

Result Areas:

Mitigation - Reduced Emissions from:	Adaptation - increased resilience of:
<i>Energy Access & Power Gen</i> <input checked="" type="checkbox"/>	<i>Most vulnerable people and communities</i> <input type="checkbox"/>
<i>Low Emission Transport</i> <input type="checkbox"/>	<i>Health and well-being, and food and water security</i> <input type="checkbox"/>
<i>Buildings, Cities, Industries and Appliances</i> <input type="checkbox"/>	<i>Infrastructure and built environment</i> <input type="checkbox"/>
<i>Forestry & Land Use</i> <input type="checkbox"/>	<i>Ecosystem and ecosystem services</i> <input type="checkbox"/>
<i>Other: Waste Management</i>	

Project/Program Background:

Company Background:

New Britain Palm Oil Limited (NBPOL) is a large scale integrated, industrial producer of sustainable palm oil in Australasia. NBPOL has over 83,000 hectares of planted oil palm plantations, a further 10,000 hectares under preparation for oil palm, over 5,600 hectares of sugar cane and a further 9,000 hectares of grazing pasture and twelve oil mills. The company also has two refineries, one in the UK and the other in Papua New Guinea. NBPOL is also the largest domestic sugar and beef producer in PNG.

NBPOL is fully vertically integrated, producing its own seed (which it also sells globally), planting, cultivating and harvesting its own land and processing and refining palm oil.⁵¹

NBPOL company headquarters are in Port Moresby, and is a subsidiary of Sime Darby Plantation Sdn Bhd. The company is well established in the PNG market and has been certified against the Roundtable on Sustainable Palm Oil (RSPO) since 2008 when its West New Britain operations became the first to certify both its plantations and associated smallholders.

The Project:

In 2006 NBPOL worked with Carbon Bridge, a Singapore based carbon consultancy, to develop two methane capture projects that were submitted for approval under the Clean Development Mechanism. The projects sought to capture methane produced through wastewater treatment processes and subsequently generate electricity. The projects were initially registered under the CDM and eventually made available under voluntary carbon standard in September 2011, with a crediting period through to September 2019.⁵²

⁵¹ Source: <http://www.nbpol.com.pg/>

⁵² It is understood that CDM processes made changes to the project and methodology difficult so it was decided to place the credits on the voluntary market.

Existing Site 1 – Mosa	5 methane capture projects Combined estimated CO ₂ e saving over the CDM crediting period: 59785 MtCO ₂ e Cost: TBC https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1310693618.63/view
Existing Site 2 - Kumbango	5 methane capture projects Combined estimated CO ₂ e saving over the CDM crediting period 62788 MtCO ₂ e Cost: TBC https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1310633056.02/view

NBPOL is keen to scale-up its efforts to capture methane from its wastewater treatment processes at other plants in PNG. This includes 3 sites in West New Britain (Warastone, Kapiura, Nunrundo); Milne Bay (Hagita), and Higaturu (Sangara). In total NBPOL sees potential for an additional 8-10 biogas plants if the right support is made available.

Project benefits:

- Increases the generation of renewable energy which is in-line with Government objectives
- Avoids release of methane into the atmosphere which has a high CO₂e.
- Avoids the use of diesel generator sets at plant sites which is polluting and costly. In addition, there is substantial diesel theft which is an added cost to NBPOL. *(Note: Would be good to quantify this as it will significantly strengthen the business case – still awaiting information from NBPOL)*
- Can provide additional energy to local communities with the right regulatory and technical settings

Challenges/Barriers:

- *Finance:* Depressed commodity prices mean that funding a feasibility study/business case is a challenge. This has been exacerbated by the shutdown of markets due to COVID19.
- There is an opportunity to engage local financiers using the track record of successful implementation with the other two projects to build confidence in extending a loan.
- *Regulatory:* Consider any regulatory barriers, particularly if there is a desire to also supply local areas from electricity generated on site

Potential Partners/Stakeholders: (Including potential AEs)

- DFIs: Connect with other donors to see if there is potential to support the feasibility stage. There may be funds for development of the concept through GCF.
- For implementation larger funders will be required or AEs with on-lending or finance approval. UNDP has spoken with NBPOL about biogas plants in the past.⁵³
- Commercial banks in PNG: Need to collate performance indicators from the existing plant and present them to local financiers.
- Local Communities: NBPOL has substantive reach and influence within local communities. These communities can be brought into the process, particularly if there are opportunities to expand electricity access.

⁵³ Phone-call with UNDP in February, was mentioned that they had spoken about the biogas plants. To note - UNDP is not accredited for on-lending/blending finance.

Next Steps:

- Collate information on the effectiveness of the first two sites
 - o Action: NBPOL to provide additional relevant project information
- Seek additional information on potential funding sources
 - o Once we have more detailed information, we can share this with GGGI counterparts who have worked on similar projects and may have thoughts on potential funding sources
 - o Consider socialising the project concept with local financiers
- Seek grant funding for a feasibility/scoping study
 - o Consider PNG stakeholders that may co-fund a feasibility study to scale-up this initiative

Additional Information:

- CDM Project Documentation (Mosa, Kumbango):
 - o Mosa - <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1310693618.63/history>
 - o Kumbango - <https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1310633056.02/history>
- GGGI Colombia – Waste to Energy Project:
 - o <https://gggi.org/catalyzing-private-investment-in-waste-to-energy-projects-in-colombia/>
 - o <https://gggi.org/catalyzing-private-investment-in-waste-to-energy-projects-in-colombia-2/>
 - o Innovative business models and financing mechanisms to catalyze private investment for waste to energy projects in Colombia - project document on GGGI OneDrive (GGGI Report)

6.4 Morobe Agriculture Hub Project

Project: Morobe Agriculture Hub (originally referred to as the Erap Integrated Agri-Business Development Hub)

Lead Organization(s): Morobe Farm Producers Ltd, on behalf of the people of Nawae and Kabwum District Administration. Contact: Bernard Maladina

Result Areas:

Mitigation - Reduced Emissions from:	Adaptation – increased resilience of:
<i>Energy Access & Power Gen</i> <input checked="" type="checkbox"/>	<i>Most vulnerable people and communities</i> <input checked="" type="checkbox"/>
<i>Low Emission Transport</i> <input type="checkbox"/>	<i>Health and well-being, and food and water security</i> <input checked="" type="checkbox"/>
<i>Buildings, Cities, Industries and Appliances</i> <input type="checkbox"/>	<i>Infrastructure and built environment</i> <input checked="" type="checkbox"/>
<i>Forestry & Land Use</i> <input checked="" type="checkbox"/>	<i>Ecosystem and ecosystem services</i> <input type="checkbox"/>

Project/Program Background:

Morobe Province is an important agricultural area. The capital Lae is connected by road to the Highlands and has the country's largest cargo port and is considered PNG's industrial hub. The province produces a number of cash crops including coffee, cocoa, sweet potato, cassava, and rice. 85 percent of the produce is grown by smallholder farmers.

Farmers are exposed to changing climates and cropping patterns, prone to poor yields and lack access to information on climate resilient farming practices (including land use and land use changes). Due to PNG's terrain farmers also face high costs and logistics challenges reaching markets for their products. A number of these issues are being worked on by program such as DFAT supported PHAMA and the World Bank's PPAP program.

The Morobe Agriculture Hub aims to create a central point for processing and storage of crops; best in class training, and access to resources for farmer groups. It is intended to bring together several stakeholders to alleviate challenges faced by smaller farm holder groups and continue to expand and build on Morobe's strengths in agriculture. Climate resilience will be at the centre of design principles for the hub. The hub is planned on a 50 Acre land allotment set aside by Trukai Industries (the land has been given to Trukai on free lease and will be sub-leased).

The project intends to:

- Build and maintain a coffee processing mill, cocoa depot, and rice mill
- Operate a fresh produce depot including cool storage
- Potentially develop a solar plant to support energy requirements for the hub, but also neighbouring companies (eg. Wafi mines)
- Develop and maintain training facilities, including an information hub, administration building and staff accommodation

In the medium term the project aims to:

- Value-add for coffee and cocoa producers
- Establish and export to niche markets

- Create employment for local populations and increase income of small farm holders (villages farmers)
- Introduce and expand climate resilient farming practices, helping to support and leverage ongoing initiatives as well as
- Increase the quality of crops

The project is well aligned to PNG's development and climate change priorities, including:

- Increasing resilience of agriculture (including climate resilience)
- Improving the economic well-being of farming communities
- Improve quality and linkages to international markets for PNG products

Potential Barriers/Risks:

- *Stakeholder Engagement:* Initiating this project will require substantial buy-in from several stakeholders (government and private sector). There has been some prior work done to garner in principle support from key stakeholders, as well as concrete support in the form of land allocation by Trukai industries. It will be important to ensure that existing indications of support for the concept are formalised.
- *Commercial Sustainability:* The project will require the establishment of a new entity to oversee and manage the agri hub. This will need to be done in a clear and transparent manner.
- *Other risks identified in the project note include:*
 - o Costs of maintenance – mitigated by ensuring this runs as a commercial operation (see above), backed by possible donor funding at an early stage to establish activities
 - o Lack of government support – mitigated by strong relationship management
 - o Environmental impact of construction – to be considered as part of the feasibility
 - o Lack of women participation – women are already playing a key role in subsistence agriculture activities; this will enhance that role but a strong plan will be required to ensure engagement.
 - o Lack of youth participation – will require a structured program to engage youth

Potential Partners/Stakeholders:

- *Management Company Stakeholders:* Trukai Industries, Morobe Mining Joint Venture. Provincial Administrations? Nambawan Supa Fund?
- *Ecosystem Stakeholders:* Water PNG, Australian Agriculture Colleges Corporation, Australian DFAT, Fair Trade Australia, Coffee Industry Corporation, Fresh Produce Development Agency (and Market for Village Farmer Project), PNG Cocoa Board
- International Donors and Funders: DFAT, IFC, World Bank, GCF
- CSO and other: There are opportunities to engage CSO stakeholders as part of training initiatives; NARI (National Agricultural Research Institute) – based in Lae.

Next Steps:

- Stakeholder meeting –
 - o Arrange a meeting of key stakeholders to discuss the proposal and potential next steps.
- Scope Terms of Reference for Climate Resilient Agri Hub Feasibility Study
 - o By August 2020?
 - o Seek funding for a feasibility study

- Socialise concept note with potential funders
 - o Initially IFC, WB, DFAT
 - o DFIs could potentially be a source of co-funding for feasibility study, Bernard has also introduced this idea to DFAT in Canberra and spoken with Trukai about potentially part funding a feasibility study.

Additional Information and related projects:

- Project Note provided by Bernard Maladina – on GGGI OneDrive
- GCF Agri Value Chain Project:
<https://www.greenclimate.fund/project/fp076#overview>
- Climate-Smart Agriculture Hub for Central and Eastern Europe: <https://www.climate-kic.org/areas-of-focus/sustainable-land-use/our-initiatives/>
- Accumen Resilient Agriculture Fund:
<https://www.greenclimate.fund/project/fp078#details>
- Program on Affirmative Finance Action for Women in Africa (AFAWA): Financing Climate Resilient Agricultural Practices in Ghana
<https://www.greenclimate.fund/project/fp114>

6.5 Clean Cooking Market Development⁵⁴

Project or Program: Program

Lead Organization(s): [TBC]

Result Areas:

Mitigation - Reduced Emissions from:	Adaptation - increased resilience of:
<i>Energy Access & Power Gen</i> <input checked="" type="checkbox"/>	<i>Most vulnerable people and communities</i> <input type="checkbox"/>
<i>Low Emission Transport</i> <input type="checkbox"/>	<i>Health and well-being, and food and water security</i> <input type="checkbox"/>
<i>Buildings, Cities, Industries and Appliances</i> <input type="checkbox"/>	<i>Infrastructure and built environment</i> <input type="checkbox"/>
<i>Forestry & Land Use</i> <input type="checkbox"/>	<i>Ecosystem and ecosystem services</i> <input checked="" type="checkbox"/>
<i>Other: Waste Management</i>	

Project/Program Background:

It is estimated that around the world approximately 3 billion people have no access to clean fuels or technologies for cooking.⁵⁵ These people often use harmful and polluting fuels such as firewood, biomass, and kerosene for their stoves. As with the general lack of energy access, the burden of poor quality cooking solutions falls on women and children. Use of fuelwood in PNG is high – both foraged wood, as well as fuelwood purchased at peri urban or rural markets (although it is noted that there is a fair degree of kerosene use in urban areas). GGGI's Green Growth Assessment for PNG notes a substantial opportunity to 'Support sustainable fuelwood production and the use of improved cookstoves'.⁵⁶

Building on the Senegal & Kenya clean cooking market development example, as well as experiences of developing a market for quality verified solar lighting in PNG, there is an opportunity to build a similar market development activity in PNG led by key companies, such as Origin Energy and Oil Search, and other distributors such as Solar Solutions.

In parallel, there is a medium-term research project that has been developed by the University of Queensland (UoQ) focusing on the roll-out of LPG cookstoves in PNG that, if approved, can feed into the development of a clean cookstove program.

Components of the clean cookstove program would include:⁵⁷

Market Research: Understanding the potential market and the best fit stoves for particular markets in PNG (leveraging UoQ findings where possible)

Business Development: Working with manufacturers of stoves, distributors of LPG, and distributors of clean cookstoves to develop their business models and markets.

⁵⁴ This concept is yet to be fully fleshed out but there does appear to be an opportunity to engage several companies in a program to strengthen the market for clean cookstoves. The figure of 8 Million is a ballpark estimate, including experience with other energy programs focused on solar lighting. The UoQ project note is available on request and clearance from the researchers.

⁵⁵ <https://www.seforall.org/news/lack-of-clean-cooking-access-the-other-public-health-crisis-we-cannot-ignore>

⁵⁶ Climate Change & Development Authority and Global Green Growth Institute, 2019. Green Growth Potential Assessment of Papua New Guinea.

⁵⁷ Activities are drawn from successful off-grid market building activities such as Lighting Global, as well as the Niger program example.

Awareness: Create awareness of options among rural communities.

There is scope to develop a commercial market, with a significant grant element to support market building activities. It will also be important to ensure minimum quality levels are adhered to, which again can form part of the program activities.

Potential Partners/Stakeholders: (Including potential AEs)

Development Partners: World Bank Group, EU – also potential accredited entities. GiZ internationally also has substantial clean cooking program experience

Implementation Leads: Origin Energy, Oil Search, with the support of other smaller distributors. Further engagement with Origin Energy and Oil Search is required.

Research Partner: University of Queensland – currently awaiting feedback on a proposed grant with DFAT.

Next Steps:

- Consider PNG stakeholders that may co-fund a scoping project.
- Re-start contact with UoQ
- Re-start engagement with Origin Energy and Oil Search (gauging interest in being a lead organization).
- Timeline: This project will only start towards the end of the UoQ research project.

Additional Information:

- Energizing Finance, SE4ALL - <https://www.seforall.org/publications/energizing-finance-understanding-the-landscape-2019>
- UoQ Research Note - Confidential (available upon request - <https://gggi.org/contact/>)

6.6 Other projects ideas

In addition to the concepts introduced in the previous section, there are several other project and program ideas that have been shared with the project team through the course of consultations. Some of these ideas have been received by the GCF Focal point at CCDA (and are recorded in the private sector database accompanying this report) and one has been in contact with GGGIs CRGG project.

Ideas include:

- Improved economic and social outcomes for smallholder coffee growers in PNG. (Village coffee). Village Coffee is an aggregator and marketer of organic green coffee and seeks to work with smallholder farmers to increase supply of ethically and sustainably grown coffee to overseas markets, particularly Australia. Village Coffee is looking for start-up support of approximately USD 7-8 million.
- A decentralized solar grid in Finschafen, near Lae. (Gensrv) The project idea is being developed by GenSrv, a Lae based generation services company with headquarters in Australia. The broad proposal involves two self-contained mini-grids, with capacity of 200Kw. Conversations with PPL on supporting this initiative are ongoing. Estimated funding requirement is USD 1-1.5 Million.
- Several hydro and solar projects, varying in size from large, to smaller off-grid projects. (Volt-tech). Volt-tech is a project management consultancy and has reached out to CCDA to update MD Mr. Ruel Yamuna on projects they are working on. Project cost estimates vary, but a base requirement is funds for feasibility studies.
- Commercial rooftop solar developments are being supported through a small pilot by PPL. Companies such as Green Limited and Astra Solar are keen to scale up roof-top solar opportunities once the pilot stage is cleared. There are opportunities to provide finance and credit guarantees (as one stakeholder mentions they may be able to raise commercial finance if there is an associate credit guarantee).

7. Private sector mobilization: Increased and sustained engagement

The private sector mobilization and engagement work sought to understand the climate change policy enabling environment, identify companies playing a role in climate change activity in key sub-sectors, highlight potential for increased private sector action (potential projects and platforms for engagement) and consider sources of finance.

There is an appreciation by CCDA of the important role private sector can play in reaching climate commitments and interest from private sector players to explore climate change related projects. What should come next to ensure that private sector players are engaged, informed and proactive participants in climate change related activities?

Continue strengthening the policy enabling environment by ensuring private sector participation in the process

PNG has been an active participant in international climate negotiations and continues to proactively fulfil its international reporting requirements. Domestically, there are overarching policies in place and the Climate Change and Development Authority continues to build traction in its efforts to create an evidence-based enabling policy environment conducive to climate change action. CCDA also recognizes the important role private sector can play in supporting its work and meeting climate commitments. Being able to effectively draw on robust information from various sources, including business, will be important to continue strengthening the policy enabling environment. Possible activities should:

- **Continue to build an environment where regular, open communications help foster private sector engagement and collaboration with policy makers.** This should be done in close collaboration with business associations – particularly the PNG Chambers of Commerce (and regional Chambers), and Business Council of PNG - to strengthen and streamline private sector engagement inputs into the policy making process.
- **Continue to strengthen positive policy and regulatory changes that increase ‘ease of doing business’**, such as the tax regime enhancements, and PPL’s solar rooftop pilot. This should be led by the responsible departments with appropriate input from CCDA (including any relevant private sectors inputs via technical working groups).
- **Ensure private sectors voice in CCDA led policy making processes, in particular through strengthened technical working groups.** Currently there are technical working groups with some private sector involvement. This representation should continue and expand. Some technical working groups currently face challenges with private sector participation. Further work is required to gauge the effectiveness of technical working groups and understand ways to increase prioritization and support from private to ensure timely inputs into the policy making process.

Establish or enhance focused and broad based platforms for engagement between private sector and government

Private sector stakeholders engaged through the course of the project expressed keenness to increase engagement to understand opportunities and develop capacity to develop project ideas. CCDA activities to enhance and develop platforms for engagement should:

- **Establish a digital platform to facilitate and enhance engagement**, enabling greater interaction between policy makers, funders and financiers with interested private sector organizations. Such a platform will help increase awareness (through information dissemination, and targeted training opportunities), foster collaboration, and possibly help facilitate 'crowding in' on potential opportunities. The platform can grow out of existing CCDA website pages, for example a Private Sector Engagement tab under the 'Our work' section. This avoids the resource required to create and maintain a new site. Much of the initial information is in existing resources, as well as the database accompanying this report.
- **Establish a private sector advisory group comprising high-level private sector stakeholders and the CEOs of PNG's business associations and CCDA GMs.** The advisory group should be able to aggregate private sector inputs from association members, as well as private sector members of technical working groups, and also channel communications back out to businesses. The advisory group should act as a conduit for improved information flows out to the business community. If possible, a member of the advisory group should also be the representative from private sector on the climate change board.
- **Establish an annual climate change update forum** that enables: policy updates, private sector information sharing, and matchmaking with potential donors and financiers. The private sector advisory group, as well as key CCDA staff members and donor partners will be central to shaping the agenda and executing the event. The annual forum can build from the smaller private sector forum held in March 2020.

Create momentum and interest in climate change related projects and opportunities through accelerated on-ground implementation of a variety of projects (scale, technology, and financing route)

Energy and Agriculture are areas under the spotlight in part due to the country's population relying heavily on agriculture for livelihoods purposes, and low energy access rates. As private sector involvement in the engagement platforms and climate change activities expands there will be an opportunity to quickly increase engagement with other sectors, including the built environment, transport, and maritime related industries.

The concept notes developed as part of this report provide an opportunity to create momentum by developing bankable projects that can be supported through GCF funding; commercial finance or donor support – or a mix of these sources. Activities to build momentum should:

- **Support further work on the concept notes outlined in this document.** This could possibly happen in several ways: a) subsumed into other program activities such as GGGI's CRGG work; b) implemented as activities under a larger program of work identified through the GCF Country Program Pipeline (or pitched as a standalone GCF project) and c) pitched to donors to enable them to carry forward the concepts.
- **Ensure a mix of project sizes, technologies and funding sources to garner interest from a broad set of private sector stakeholders.** Projects can be targeted towards the GCF, but may also be suited to local and regional sources of finance, particularly through donor partners. In parallel, other private sector led project ideas that can be strengthened and turned into project concepts should be encouraged. This can happen with the support of development partners,
- **Investigate potential for a grant fund to support the development of feasibility studies.** This will help those companies with ideas well aligned to PNG's climate aspirations, but lacking resources to create detailed proposals and that may not be suitable for concept

funding through other sources such as the GCF. This may be established with a small pool of donor funding and managed by a development partner.

The key is to build traction and develop case studies of private sector action that are relevant to a broad set of private sector stakeholders. The case studies can be highlighted through various channels and forums, including an annual climate change forum in PNG, and via the CCDA website.

Increase communication of opportunities, successes and challenges using multiple channels and partners

Numerous websites and databases covering regional and international projects and programs and illustrating current opportunities are available. These are important sources of information, though sometimes maintaining such sites can be challenging and require ongoing funding and support and can lead to information becoming dispersed, or out of date. CCDA should look to increase direct communication of its climate change successes, challenges and emerging opportunities, and seek to:

- **Establish the CCDA website as the go-to point for PNG companies seeking climate change related information and support.** The site can also provide links to other regional and international resources (some of which is already available on the CCDA website), and as described above, act as the 'digital platform' for increased engagement.
- **Present local and international examples of action.** Several companies have initiatives underway as part of CSR activities, or proactive business strategies. This includes Oil Search with clean cooking activities in the Markham Valley, Origin Energy promoting quality solar product bundled with smaller LPG cookstoves, New Britain Palm Oil have had experience with climate finance mechanisms. Several international project examples were presented in this report and can be published on the CCDA website, further examples bringing in other sectors can also be created.
- **Create a regular update focused on private sector climate action and related funding and project opportunities.** This information can be collated by CCDA's support partners and communicated on the CCDA website as well as through regular newsletters from business support entities such as the Chambers of Commerce and Business Council of PNG. Further, these updates can be communicated as part of an annual private sector focused climate change forum (as noted above).

List of stakeholders

The following is a list of organizations engaged with through the course of the project. Names of individuals are available in the accompanying database.

Organization	
Astra Solar	Pacific Horticultural and Agricultural Market Access Program (PHAMA)
Australian Centre for International Agriculture Research (AICAR)	Pacific Islands Forum Secretariat
Business Council PNG	Port Moresby Chamber of Commerce
Climate Change and Development Authority	Queen Elizabeth Chocolate
Department of Agriculture and Livestock	Richard McArthur
Department of Foreign Affairs and Trade	Secretariat of the Pacific Region Environment Program
Facilitating Renewable Energy & Energy Efficiency Applications for GHG Emissions Reductions (FREAGER)	Solar Energy Association of PNG
Gensrv	Sumitomo Corporation
Green Limited	Trukai/Morobe Agriculture Hub
Innovative Agro	United Nations Development Program
International Finance Corporation	United States Agency for International Development
Kokanas Industri Koporesen	University of PNG
Ministry of Foreign Affairs and Trade	University of Queensland
National Agriculture Research Institute	Volt-Tech
New Britain Palm Oil	Workers Shelter
Origin Energy	Participants at the Private Sector Forum on held on 22 March 2020 -

Additional information

The following information is available upon request at: <https://gggi.org/contact/>

- **Project Database:** Outlines private sector players, funds available in the region and key entities operating in PNG (multilateral and bilateral institutions)
- **Private Sector Forum Summary:** A private sector forum was held in March 2020 and is referenced in this report.
- **Concept Note background:** There may be shareable background information related to concept notes outlined in this report.



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