



**GREEN
CLIMATE
FUND**

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Consideration of funding proposals – Addendum XXIX

Independent Technical Advisory Panel’s assessment

Summary

This addendum contains the independent Technical Advisory Panel’s assessments of funding proposals (FP059-FP081) submitted for the Board’s consideration at its nineteenth meeting.

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Independent Technical Advisory Panel's review of FP059

Proposal name:	<u>Climate-resilient water sector in Grenada (G-CREWS)</u>
Accredited entity:	<u>Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH</u>
Project/programme size:	<u>Small</u>

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. Grenada is a small island developing State (SIDS), located in the Caribbean region between Saint Vincent and the Grenadines to the north and Trinidad and Tobago to the south. The country is composed of three main islands: (a) Grenada; (b) Carriacou; and (c) Petite Martinique. Grenada is the main island and the largest (34 kilometres long and 18 kilometres wide), and is home to 94.9 per cent of the total population of 107,317. The three islands have a combined landmass of 345 square kilometres and an estimate made in 2017 indicates that 46.41 per cent of the population is women. Grenada ranks 79th in the Human Development Index out of 188 countries ranked, which indicates a high level of human development in the country. The mainstay of the economy is tourism, as in many of the Caribbean islands. Tourism contributes EUR 50 million to the country's economy (2014 figures) and employs directly about 9 per cent of the workforce (2016 estimates). Although the relative share of agriculture in the gross domestic product (GDP) of Grenada is low (roughly 5 per cent of GDP in 2014), the sector employs about 13 per cent of the country's workforce and also fetches foreign exchange from exports. The contribution of industry to GDP is 14.3 per cent. The country suffers in terms of high rates of unemployment (roughly about 30 per cent during 2013-2015), while the highest rate of unemployment was found to be among people aged between 15 and 24. As in the majority of developing countries, Grenada's unemployment rates are higher for women, indicating inequity in the state of development related to women.

2. Despite the fact that the agricultural sector of Grenada has exhibited a great leap in its growth rates in recent years, the country suffers chronically from hurricanes and associated storm surge which affect agriculture. As a result of repeated destruction caused by successive hurricanes, the gains in major economic sectors could not be sustained over a long period, resulting in dwindling progress being made in social and economic subsectors. Moreover, rehabilitation of infrastructures and people's livelihoods removes a significant proportion of Grenada's development financing and forces the country to rely increasingly on national and international debt and subsequent debt-repayment – the latter further arresting progress that could have been triggered in the absence of such disasters. Unfortunately, climate variability and change have been aggravated conditions further as increasing energy in the oceanic system causes the formation of an increasing number of hurricanes, perhaps with greater vigour and destructive power. Climate change has not only wreaked havoc in the Caribbean region (the current year spanning 2017-2018 is no exception) in general and Grenada in particular, but has also negatively contributed to the country's position as one of the most heavily indebted SIDS (with respect to GDP) in the world.

3. Grenada has a humid tropical climate. The average annual temperature is 26°C and average annual rainfall around 1,150 millimetres. There is significant temporal rainfall

variability, with the main rainy season delivering about 75 per cent of annual rainfall. There is also considerable spatial variability in rainfall: the southern parts are the most populous and also the driest in the main island. However, the other two, less populous, islands (a combined population of about 5.1 per cent of the total) are significantly drier than the island of Grenada. Due to high temporal rainfall variability, the drier regions of the country also face drought conditions.

4. The most recent information suggests that the rainfall has been declining, which reduces available water flow in streams. Since streams in the mountains are sources of freshwater, a decline in flow can have adverse effects on water harvesting, which in turn affects the water supply system. Occasional storms result in drainage congestion (flood). However, during severe storms water collection, storage and subsequent treatment operations generally cease – the latter is significantly affected due to much increased turbidity as a consequence of storm surges, which in turn force the water supply operations to shut down for several days. Climate change-induced storms have already caused additional delays in the resumption of water supply, not only to households but also to critical infrastructures such as hospitals and schools. Such vulnerability in the water supply system would not have been so severe in the absence of climate change-induced extreme events. The vulnerability of the water supply system in relation to climate variability and change is therefore adequately justified in the project.

5. As a response to occasional shut down of the system following a storm, the authority in charge of water supply (the National Water and Sewerage Authority, NAWASA) intends to enhance climate-resilient water storage capacities and other associated water supply infrastructures across the main island and also on Carriacou island so that the additional storage volume is still available for use when water collection opportunities temporarily cease following a storm. Moreover, NAWASA intends to raise awareness regarding water saving options, to offer financial incentives for the tourism and agricultural sectors to achieve water efficiency and so reduce the overall demand for water. New tariff-related policies and frameworks will also be introduced to address water use and savings. It is anticipated that Grenada will achieve system-wide climate change resilience in the water and sanitation sectors.

6. The project focuses on the following key targets and areas of action: (a) improved water governance as a pre-requisite for bringing about a paradigm shift towards climate resilience; (b) bringing feasible and reasonable resilience improvements to the water system infrastructure; (c) bringing feasible and necessary reductions in per capita water demand involving houses, agricultural land and businesses; and (d) bringing efficiency to NAWASA's overall system. The project is divided into five overall components, the three specific ones above (a, b and a combination of c+d) and two additional components: (e) additional contributions of the water sector to Grenada's Nationally Determined Contribution (NDC) and (f) regional learning and replication.

7. The project will benefit the entire population indirectly (through improved water governance, ensured supply in hospitals, and through awareness-raising). However, a total of 45,000 people at household level, 350 farmers in their farming operations, and 44 hotels and guesthouses will benefit directly; 46.41 per cent of all beneficiaries are women. The number of direct beneficiaries is very high and constitutes almost 42 per cent of the total population of Grenada. Since the entire water supply system will be renewed, supported by necessary policy frameworks including water tariff rationalization, the impact potential of the project appears high.

8. The project will promote locked-in long-term structures, which will enhance resilience

of the water supply sector. The intention is to build better structures that are climate change resilient, and will simultaneously reduce vulnerability of the sector caused by climate change-induced adverse impacts. Moreover, aspects dealing with improved governance, including rationalizing tariff structures, other policy measures in the sector and a remote monitoring and control system using SCADA¹ will have significant positive impacts by strengthening the country's institutions and improving and safeguarding the overall water delivery system.

9. The consumer awareness programme will help the public to understand the incentives offered for efficient use of water which will reduce the overall demand for water. Moreover, the incentives given for households, agricultural farms, and hotels and guesthouses will make the country's water supply system one of the most efficient in the region. The iTAP finds the impact potential to be high.

1.2 Paradigm shift potential

Scale: High

10. The project has the potential to bring about far-reaching system change in the water sector. It will ensure that the system becomes more climate resilient while simultaneously addressing associated issues through targeted changes which will create options that are increasingly efficient and sustainable in the long term. The improvements in water governance and the business model are likely to have lasting effects in Grenada, while the outreach component and alignment with the NDC for Grenada will facilitate replication in the Caribbean region. The theory of change is adequate and is complemented by activities that are appropriate.

11. Grenada is a developing country with a closely monitored water supply system (for example, about 98 per cent of the household-level connections are metered²). The planned automated monitoring programme involving SCADA will enable NAWASA to closely follow and check if advancements are taking place, especially in view of reducing the current level of non-revenue water (NRW) from 29 per cent to about 19 per cent. This goal is highly ambitious and, if achieved, it will become a case study for the management of NRW in a region where water losses in the order of 40 to 50 per cent are endemic.

12. The project clearly aims at contributing heavily to the creation of an enabling environment in bringing governance to the water sector. The rationalization of tariffs through policy measures will be evidence for achieving this aim. However, other regulatory measures will be put in place as well as the introduction of incentives through the creation of two Challenge Funds³ for efficient irrigation systems, rainwater harvesting systems, shadehouses, greywater recycling facilities and efficient domestic sanitation equipment. These measures will contribute to greater water use efficiency and will also invite green technologies into the market.

13. The new proposed mechanisms for coordination should ensure the broad participation

¹ Supervisory control and data acquisition (SCADA) is a [control system](#) architecture that uses computers, networked data communications and [graphical user interfaces](#) for high-level process supervisory management, but uses other peripheral devices such as [programmable logic controllers](#) and discrete [controllers](#) to interface to the process plant or machinery. The SCADA concept is developed as a universal means of remote access to a variety of local control modules, which could be from different manufacturers allowing access through standard automation protocols.

² As reported by the accredited entity during the interview process with iTAP members.

³ One fund is for Agriculture and the other for Industry, including the hospitality industry (i.e., for four large hotels and 40 smaller guesthouses).

of public actors from various sectors in decision-making on a climate-resilient water supply system. It is anticipated that the project will play an important role in developing and implementing a new and modern regulatory framework, which will (a) improve water governance and water sector policies; and (b) help to mainstream climate resilience into water-related sector policies, plans and regulations. The envisaged climate-responsive water tariff reform will set additional new incentives for water saving and will contribute to the financial sustainability of the water supplier, NAWASA. The iTAP views the paradigm shift potential of the proposed project as high.

1.3 Sustainable development potential *Scale: High*

14. The project promises to contribute to a number of sustainable development goals (SDGs). However, the most direct and profound contribution will be for achieving SDG 6, which calls for clean water and sanitation. The other SDGs that are supported tangentially through the project are listed below:

- SDG-3: By ensuring better and uninterrupted turbidity-free services even during stormy conditions, the project will contribute to the good health and well-being of the consumers (for at least 42 per cent of the population, if not more);
- SDG-5: Since household water management is a gender-differentiated responsibility of women, the emphasis on climate resilience during stormy conditions will reduce uncertainties and difficulties for women by ensuring an adequate supply of household water including for drinking purposes;
- SDG-9: It will address improvement of infrastructures, particularly contributing to targets 9.A, 9.1 and 9.4;
- SDG-12: The project will significantly influence responsible (water) consumption and production, enabling NAWASA to embrace sustainable business practices and will also guide consumer behaviour on responsible consumption of water;
- SDG-13: It will build resilience to climate change in Grenada's water system; and
- SDG-16: The project will contribute to achieve strong institutions by making NAWASA more effective in its role as provider of a sustainable water supply and sanitation in Grenada.

15. In terms of GDP and employment, tourism and agriculture are the two most important economic sectors in Grenada. Shortages in the water supply due to both climate change-related effects and an inability to reduce NRW could potentially harm both the sustainability and growth of such important sectors under business-as-usual conditions. The project will provide incentives which will demonstrate the positive aspects of water efficiency measures, while an outreach campaign and sharing of lessons learned will inform and raise the awareness of the public. Moreover, by ensuring water supply in both the agricultural and tourism sectors, the project will contribute to growth, help creation of jobs and increase foreign exchange earnings for the country, all of which represent excellent potential economic co-benefits.

16. Perhaps the most significant co-benefit will be accrued in terms of sustained and uninterrupted water supply during stormy conditions. Not only will women be relieved from the concerns of dealing with uncertain water supply during frequently occurring storms, but by ensuring the same services in critically important infrastructures such as hospitals, a significant community service will be provided. The project directly contributes to well-being and public health by safeguarding water quality and preventing outbreaks of waterborne diseases during and after a storm.

17. Since water is collected from mountainous streams, efficiency enhancement that reduces the demand for consumption can have positive implications in terms of reducing the volume collected from streams that may also serve forest vegetation and fauna to flourish. Moreover, improved distribution facilities will lead to reduced pumping requirements from groundwater sources, thus reducing electricity consumption and greenhouse gas emissions. However, the project did not attempt to quantify such environmental co-benefits.

18. The iTAP finds the project's potential for sustainable development to be high.

1.4 Needs of the recipient

Scale: High

19. The devastation caused by repeatedly occurring hurricanes in the Caribbean islands has clearly shown that the islands are moderately to highly vulnerable. Grenada is no exception. The observed gradual decrease in rainfall in the dry season⁴, saline intrusion in the aquifer system, agricultural drought leading to crop loss – all such adverse impacts are already being experienced and increasing people's vulnerability. The main impacts include reduced availability of water, increasing heat stress and environmental hazards caused primarily by droughts, heavy rainfall episodes and tropical storms. Grenada and its population must build adaptive capacity and enhance resilience. The adaptation needs of Grenada's population are increasing. This project focuses on urgent resilience-building efforts in the water, and to a much lesser extent, in the sanitation sectors.

20. Grenada's economy is vulnerable, despite the fact that per capita income⁵ is admirable. However, inequitable income distribution results in 38 per cent of the population living below the poverty line. The overall economy has been facing both natural (owing to hurricanes) and fiscal shocks (mostly external), which have forced the Government of Grenada to commit to international as well as national borrowings, leaving the country highly indebted. Consequently, a large proportion of the GDP goes for debt servicing, depriving various development sectors of critical financial assistance. All these factors justify the need of the climate vulnerable water sector to receive financing from GCF.

21. The project considers the needs of Grenada's population in general, however focusing on low-income households, women-led households, women and girls who are particularly vulnerable due to: the gender-differentiated roles of women and unequal access to financial resources; lack of participation in decision-making about use and safeguards related to the exploitation of natural resources; and women's increased burden in managing household activities, especially in times of water shortages, interruptions and disasters (storms).

22. Lack of financing to expand the available reservoir capacities for water is the most pressing barrier. The market for capital in Grenada is not in a position to finance a project related to climate resilience in the country's water sector. NAWASA has limited ability to provide the funding itself and local banks and credit unions in general are small and lack management capacity. For the end users, especially households and farmers, access to finance for efficiency improvement is difficult. Lack of institutional capacity, including advanced monitoring and an enabling policy framework, diminish the overall performance quality of service-oriented institutions such as NAWASA. Improvement of service delivery cannot only be addressed by increasing storage and supply capacity, but must also be addressed by rationalizing the tariff structure through appropriate policy re-formulation. Public awareness-

⁴ According to model outputs, it is likely to decline by about 20 per cent considering annual mean in the 2050s.

⁵ GDP per capita (purchase power parity) is USD13,100.

building is also necessary. This project intends to address all such aspects. The iTAP acknowledges that the need of the recipient for the proposed project is high.

1.5 Country ownership

Scale: High

23. The project is in alignment with the national priorities in relation to climate change adaptation. Exposure to high intensity hurricanes and storms cannot be reduced as such, however the systemic adaptive capacity of the water sector can certainly be enhanced and is the primary objective of the project. The Government of Grenada and the relevant stakeholders all agree to enhance resilience in the water-related sector. The national documents bear evidence of policy alignment. While the vulnerability assessments incorporated in Grenada's National Communications to the United Nations Framework Convention on Climate Change (UNFCCC) highlight the vulnerability of the water sector, the National Climate Change Policy and Action Plan 2007-2011 also clearly calls for priority actions to increase resilience of the water sector by systematically removing the prevailing barriers. Furthermore, Grenada's Intended National Contribution for the Paris Agreement also identifies management of water resources as one of four priorities for considering actions to enhance adaptive capacities. Emphasis has been given to "improved capture, storage, distribution, and conservation of water", which is expected to increase the adaptive capacity of both individuals and communities throughout the island State. The draft National Adaptation Plan (2017) and the National Climate Change policy for Grenada, Carriacou and Petite Martinique 2017-2021 also highlight the need for priority actions in building resilience in the water sector. These all indicate high country ownership of the concept and the activities outlined in the project.

24. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is known worldwide as one of the largest international providers of capacity development and technical assistance on climate change. More than 12 million people around the world have gained access to sustainable and climate-friendly energy through GIZ. In the proposed project, GIZ is the accredited entity (AE). GIZ has been working in the Caribbean for more than 30 years, and its assistance in Grenada has been continuous for the past 20 years. It is proposed that this project be implemented by the Ministry of Finance, Economic Development, Energy and Foreign Trade through the Project Coordination Unit. GIZ has already been working with the executing entity, especially on climate change readiness and other projects.

25. The National Designated Authority and NAWASA have been fully involved in designing the project and sharing its development with stakeholders. The project has been part of the Grenadian Water Programme. Drafts of the project proposal have been presented in meetings of the Sustainable Development Council, which is a nationwide open platform to discuss critical issues concerning climate change, sustainability and environmental management. Private sector, public sector, civil society and schools are among various constituencies forming consensus through the Sustainable Development Council, where the project has been vetted. Therefore, strong country ownership has been achieved during the design phase of the project. The iTAP concludes that country ownership of the proposed project is high.

1.6 Efficiency and effectiveness

Scale: Medium

26. The proposed budget indicates that the overall cost is EUR 42.3 million. A total of EUR 35.533 million is sought from GCF, which accounts for 84 per cent of the budget. There is a co-finance contribution of EUR 6.767 million (i.e. 16 per cent of the total cost), EUR 4.267 million of which is as in-kind contributions from the Government of Grenada and EUR 2.5 million of which is contributed as grant by the Federal Ministry for the Environment, Nature

Conservation, Building and Nuclear Safety of Government of Germany. The entire amount sought from GCF is requested in the form of grant financing. Given Grenada's heavy indebtedness and that under UNFCCC its status as a SIDS deserves special preferential treatment in receiving GCF support, the significant full grant financing is justified.

27. International bodies such as the International Monetary Fund noted a number of outstanding challenges for Grenada after recovering from the hurricanes of 2004 and 2005, and public debt is regarded as a major barrier to the country's development. Therefore, it is important that the country avoids being further indebted thus remaining in the vicious cycle of debt servicing at the cost of development. In this context, GCF grant financing to a deserving SIDS can indeed help Grenada to implement this important project and make the water sector resilient to climate change.

28. The project is expected to leverage EUR 2.9 million through private sector participation. However, such financing is not budgeted and will only be realized following the creation of an enabling policy environment and incentives through the project.

29. The management structure and mechanism proposed in the project document appear adequate for effective implementation. On behalf of the Government of Grenada, NAWASA will be heavily involved in the implementation programme, while the stakeholders targeted are appropriate. It is understood that management of the project is likely to be effective.

30. The economic analysis compares a "with project" and "without project" scenario over a 30-year period to identify the incremental costs and benefits associated with the infrastructure investment elements of the project. Without the project, NAWASA will be unable to provide a safe and reliable water supply in Grenada in the medium to long term. The economic internal rate of return of the project is approximately 11.8 per cent, which indicates the substantial value of the project to Grenada. Approximately EUR 169 million are estimated as the avoided cost of impacts of climate change, which indicates that each unit invested in the project is likely to create three times the benefit, which will be accrued by means of avoided health costs, reduced cost of trucking water during scarcity and interruption, and reduction of drought costs in agricultural production.

31. The financial analysis used a 30-year horizon for the water-resilience investments. The financial model is based on a tariff increase in year three of the project (estimated at +35 per cent, based on the previous tariff increase in 2010), and tariff adjustments by +12 per cent every five years thereafter. Inflation was estimated at 2 per cent annually for the next 30 years, which is reasonable. The financial analysis shows that the water supply investments have a negative financial internal rate of return. The sensitivity analysis of financial efficiency also indicates that the financial internal rate of return will be negative. The iTAP is of the view that the efficiency and effectiveness of the proposed project is medium.

II. Overall remarks from the independent Technical Advisory Panel

32. The iTAP recommends that the Board approve the project, recognizing the urgency of the issues associated with climate change and water sector vulnerability in Grenada. Despite the fact that the efficiency of the project in financial terms is poor, given the needs of the population in the small island state, it is of utmost importance that the finance from GCF helps the country to achieve resilience building of the sector as early as possible.

33. The iTAP recommends that, if land acquisition and occupation appears inevitable for the establishment of the storage reservoirs and pipelines, the AE ensures complete compliance with the GCF Environment and Social Safeguard standards for land acquisition and involuntary resettlement and avoid any negative impacts on land users and land owners from the project activities.
34. The iTAP recommends that, as part of the programme for reduction of non revenue water, a sub-programme to be carried out to reduce water losses inside the households. It is expected that the reduction of losses in the households will dramatically improve the measurement of water by micrometers.

Independent Technical Advisory Panel's review of FP060

Proposal name:	Water Sector Resilience Nexus for Sustainability in Barbados (WSRN S-Barbados)
Accredited Entity:	Caribbean Community Climate Change Centre
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. Barbados is a country in the Caribbean region, with a population of approximately 284,215 (World Development Indicators, 2016) and a land area of 431 km². Barbados is ranked the 16th most densely populated country in the world, with a population density averaging 662.8 persons/km² and a population growth rate of 0.3 per cent as at 2016. In the small island developing State (SIDS) nation of Barbados, freshwater supply is primarily a function of its climatic and physical conditions as the main source of potable water on the island is groundwater.

2. A quantitative indication of the stress on the water supply in Barbados is expressed in the fact that the country is currently ranked among the world's 15th most water-scarce countries. Rainfall is predominately seasonal. The wet season, which coincides with the hurricane season, is from June to November/December and the dry season is from December/January to May. In addition to this natural stress on water resources, the stress has been exacerbated by saline water intrusion and an inefficient water distribution facility in the country. The non-revenue water (NRW) of the Barbados water supply system, which is operated and managed by a government-owned entity, the Barbados Water Authority (BWA), is planned to be reduced by 10 per cent of its pre-project value (i.e. 0.03 millions of gallons per day, or MGD, per km of main replaced).

3. BWA is the country's public sector water utility with the responsibility of sourcing and distributing potable water for the use of customers who are connected to their facility. BWA obtains its water supply from 24 groundwater wells, two spring water sources and one privately owned reverse osmosis desalination plant, augmented by a smaller containerized desalination plant. This water is distributed through a network consisting of approximately 2,500 km of water mains, ranging in size from 1 to 21 inches.

4. These water facilities are old, with some of the distribution pipes dating back to the 1850s. A substantial fraction of these pipes (about 85 per cent) are ductile iron or cast iron with small amounts of polyvinyl chloride and high-density polyethylene. The system experiences a high rate of ruptures, in the range of 29 to 59 per 100 km annually, with 80 per cent of these incidents occurring on 4 inches and smaller diameter pipes. In the last quarter of 2015 and into 2016, some district metered areas in elevated areas of the island experienced prolonged outages, some for more than four months.

5. The expected impacts of climate change on Barbados include coastal inundation and sea level rise, an increase in tidal and storm surge levels, coastal erosion, rising temperatures, changes in rainfall patterns and more frequent and severe weather events, including drought

and tropical storms.¹ A typical impact of extreme events that has been recorded in many SIDs, including Barbados, is the loss of water pumping resulting from the loss of power supply during the severe events.

6. Therefore, key objectives of this intervention as stated in the submission by the accredited entity include:

- (a) Mitigation of the risk of disruption in water supply during and after extreme weather events;
- (b) Reduction in the loss of water due to leakages and faulty mains caused by shifting of land after severe flooding;
- (c) Reduction in the chance of increasing water prices to vulnerable communities;
- (d) Reduction in the impact of climate change on water, sanitation and food security;
- (e) Building the capacity of important stakeholders in the country (BWA, public sector and individuals, etc.) to enable climate-resilient decisions and climate proofing; and
- (f) Development of policy suggestions for Barbados' water sector resilience and public-private partnerships to combat climate change.

7. The proposed project will be implemented along the lines of the following components:

- (a) Component 1: improving/increasing resilience to storm events and reducing the carbon footprint of BWA;
- (b) Component 2: expanding adaptation and mitigation initiatives through the creation of a revolving fund;
- (c) Component 3: building resilience to climate change and disruptions to the water supply; and
- (d) Component 4: capacity-building and public awareness.

8. It is expected that this project intervention will result in a paradigm shift in the approach to promoting climate resilience in the country in the following ways:

- (a) The people of Barbados will be made more aware of the link between the water cycle and climate change and how this will threaten the island's drinking water supply;
- (b) The intervention will also help in creating resilience to severe weather impacts, which are expected to be exacerbated by climate change and variability;
- (c) Reduction in greenhouse gas (GHG) emissions;
- (d) Reduction in consumption;
- (e) Promotion of appropriate uses of diverse water sources; and
- (f) Promotion of legislation to support climate smart development and water sector resilience.

9. It is expected that these resilience promotions will result from the following project actions:

¹ Wellington C. and Moore R. (eds.). 2001. *Barbados' First National Communications to the United Nations Framework Convention on Climate Change (UNFCCC)*. Barbados: Ministry of Physical Development and Environment.

- (a) Implementing renewable energy technologies, which will 'green' energy supplies to the water works and also ensure continuity of the power supply for water pumping even during extreme events, which tend to disrupt grid power supplies;
 - (b) Creating a revolving adaptation funding facility, which will enable the continuation of climate resilience after the end of the current intervention;
 - (c) Decentralization of water storage;
 - (d) Increasing rainwater harvesting to promote diversification of water sourcing;
 - (e) Building the technical capacity needed to do all the above, while also helping to shape policies and legislation related to climate change;
 - (f) Raising greater awareness about climate variability and change; and
 - (g) Providing a platform of knowledge and resources to support further climate change adaptation in the Caribbean.
10. The proposed funding will include the following sources:
- (a) GCF (grant): USD 27.605 million (61.07 per cent);
 - (b) BWA co-financing (grant): USD 17.600 million (38.93 per cent); and
 - (c) Total: USD 45.205 million (100 per cent).
11. Mitigation impacts:
- (a) It has been estimated that the project interventions will yield a direct GHG emission reduction of about 7,339.46 ton of carbon dioxide equivalent (tCO₂eq) per year during each of the project years (2018–2023). This will amount to a reduction in GHG emissions of about 220,184 tCO₂eq during the lifetime of the facility;
 - (b) These direct emissions will come from the shift of energy used in the production and distribution of water in Barbados away from fossil fuel combustion (which is the basis of the current grid supply) to a supply that is greened by the implementation of renewable and cleaner energy, namely photovoltaic (PV) and natural gas systems;
 - (c) The power generation technologies reduce GHG emissions through the following pathways:
 - (i) The grid, which currently is fossil fuel based, will be essentially greened via the implementation of solar power plants at each of the waterworks stations of BWA, which will be connected to the grid; and
 - (ii) Furthermore, the back-up systems at the waterworks fuelled by natural gas, with its lower carbon compared with the fossil fuel used in the current grid, will also deliver GHG emission reductions;
 - (d) According to the information provided in the funding proposal, avoided emissions for the PV systems and gas turbines were calculated using the United Nations Framework Convention on Climate Change (UNFCCC) methodology to estimate the grid emission factor for Barbados. Additionally, it was assumed that the micro-turbines will operate at 20 per cent (73 days per year). CO₂ emissions associated with the micro-turbines were ignored since they will be used only in the case of emergencies;
 - (e) According to the information provided in the funding proposal, emission reductions produced as a result of the development of solar power (and natural gas fired power plants as standby) at each of the three pumping stations (Belle, Hampton and

Bowmanston Pumping Stations) to displace energy supplied at the baseline to these stations were estimated using the following assumptions:

- (i) Baseline information for the grid of Barbados was developed and utilized to set the GHG emission factor of 0.7906 tCO₂eq/MWh;
 - (ii) Expected energy displaced by the solar power system, it was stated, was conservatively estimated by assuming the low and high utilization factors of 0.201 and 0.270 to estimate the hours that the solar power system is available and generating power to the grid. The mean availability factor was utilized in the calculation of energy generated by the solar power system at each water pumping station using the following equation:
$$\text{Energy generated/year} = \text{MW capacity (MW)} * \text{UTF} * 8760 \text{ hours/year}$$
where UTF is the utilization factor and 8760 is the number of hours in a year
 - (iii) The GHG emission reduction was therefore calculated as the product of the energy displaced by the implemented power plant (MWh/year) times the GHG emission factor of Jamaica (tCO₂eq/MWh);
 - (iv) It is assumed that the calculated energy from the solar power plants that are connected to the grid in Barbados as a result of this project intervention will displace the equivalent amount of electricity that would have been supplied from the grid in the absence of this intervention. This principle is based on the fact that the grid in Barbados will dispatch the low-cost must-run solar power system when energy supply to the grid is available from the system;
 - (v) Emission reduction is therefore estimated as a multiplication of the estimated grid emissions factor (tCO₂eq/MWh) and that which will be generated (or displaced from the baseline grid) by the solar power system (MWh/year); and
 - (vi) It has also been assumed that the gas-fired micro-turbines, which will be supplied by this project intervention as a standby system at the waterworks, will operate at 20 per cent (73 days per year). CO₂ emissions associated with the micro-turbines were ignored since they will only be used in the case of emergencies; and
- (f) The independent Technical Advisory Panel (TAP) is of the opinion that the described methodology for the emission reduction calculations has now been transparently calculated. It has also been stated in the funding proposal that energy generated and supplied to the grid from the solar power system will be regularly monitored during the project lifetime.
12. Adaptation impacts – the adaptation impacts as presented in the financial proposal can be summarized as follows:
- (a) The project is expected to make a significant contribution to increased climate-resilience of the three water pumping stations (Belle, Hampton and Bowmanston Pumping Stations), especially as water pumping will still be possible during extreme events, which usually disrupt the grid supply of electricity and water availability to connected consumers;
 - (b) The Belle, Hampton and Bowmanston Pumping Stations serve approximately 152,875 persons, which is approximately 53.6 per cent of the population, who will be served with potable water even when extreme events occur, making them resilient to climate change;

- (c) BWA ability to respond in the case of droughts, storms/hurricanes and other disasters will be enhanced through:
- (i) The component of the intervention that will supply water storage tanks to families. Under this personal tank programme at least 10 per cent (1,300 households) of the total 13,000 households with physically challenged persons or differently abled individuals will benefit from the personal water tanks; and
 - (ii) Under the same programme, Barbados' only hospital will also benefit by having increased water storage from 14 hours to between 72 and 96 hours, which is the recommended emergency needs specified by the Pan American Health Organization;
- (d) The project will also indirectly benefit the agriculture and tourism sectors of the Barbados economy through improved availability of potable water to the public, which will enhance the productivity of the sectors;
- (e) There is also the multiplier effect associated with the injection of capital and the increased employment with its associated labour income. Furthermore, there will be reduced demand for foreign exchange (due to the reduction in fossil fuel imports for grid electricity generation), which will help to create an investor-friendly environment; and
- (f) These benefits coupled with the size of Barbados and the existing integrated economic system cause the indirect benefits to extend to the entire population of Barbados (estimated at 284,996).²
13. Accordingly, the independent TAP has scored the impact potential of this intervention as "high"

1.2 Paradigm shift potential

Scale: Low

14. The technologies and strategies to be employed in this project that will lead to a paradigm shift towards lower GHG emissions and climate-resilient development throughout the Caribbean Community (CARICOM) region will include:
- (a) The implementation of a solar power plant, connected to the country's grid with its standby lower carbon gas power system at the water pumping station, which will ensure that power is available for potable water pumping even after the grid is disrupted after an extreme event has occurred;
 - (b) The implementation of additional sourcing of potable water through carefully planned and implemented rainwater harvesting at the household and other user levels with associated storage facilities;
 - (c) A carefully implemented NRW reduction programme, which will lead to tangible water savings, as a reliable way of stretching supplies; and
 - (d) The technical capacity of BWA and other relevant stakeholders will also be built as a component of this intervention, developing policies and regulations relating to how to operate potable water supply systems with a reduced carbon footprint and increased resilience to extreme events of the future that are likely to be exacerbated by climate change and variability.

Potential for scaling up and replication

² United Nations Population Division, 2017 Revision of World Population Prospects, available at <<https://data.worldbank.org/country/barbados>>, 12th November 2017.

15. This proposed programme has great potential for scaling up and demonstration in Barbados and the wider Caribbean given the similarities between countries in the Caribbean islands in terms of environmental stressors associated with increasing water and energy demand, overdependence on fossil fuels, presence of water scarcity, saline intrusion, ageing infrastructure and the importance of water in implementing strategies to mitigate and adapt to climate change.

16. The potential for scaling up and replication of the interventions included in this programme is inherent in the fact that the Caribbean Community Climate Change Centre (CCCCC) is the executing agency of the programme in Barbados. Since 2005, CCCCC has been coordinating the Caribbean region's response to climate change and has a wealth of information on these issues. The information that will be generated as a result of this intervention in Barbados will also go a long way to strengthening the capacity of CCCCC to scale up and replicate the intervention in Barbados in other countries in the region.

17. The potential for scaling up and replication of the intervention described in this intervention will be enhanced if the components are well thought out and implemented. TAP is of the considered opinion that some of the elements, including the way in which the GHG emission reductions that will be delivered by the intervention has been established and the key NRW interventions, are not transparently presented in this submission. As such, the potential for scaling up and replication may not be fully achieved.

Potential for knowledge-sharing and learning

18. Key potential for knowledge-sharing and learning built into the project can be summarized as follows:

- (a) A knowledge-sharing platform will be developed as part of this intervention among key institutions that have contributed to the development of the water sector of Barbados;
- (b) These institutions, working together, will include: BWA; University of the West Indies, Cave Hill Campus (UWI); and the University of South Florida (USF). The platform is expected to incubate the generation of novel ideas in the effort to combat the impact of climate change and also to propel the discussion on climate change adaptation and mitigation;
- (c) The project's outputs include elements related to the dissemination of best available information, technologies and practices and their integration into policies, standards and norms applicable at the national level, thus providing a good avenue for 'learning by doing', and preparing resource persons for training even beyond the project timeline;
- (d) The project implementation will involve the documentation of all project results, including how barriers were addressed and policy changes made. This will provide a very comprehensive database for knowledge-sharing way beyond the project lifetime;
- (e) The project will produce guidance and training materials and technological information packets that can be disseminated in all areas of Barbados. It is expected that regional linkages established through the regional activities of CCCCC will also contribute to accelerating knowledge dissemination; and
- (f) Lessons learned and results gathered through the project monitoring and evaluation plan will be shared across the region through the capacity that will be built through this project at CCCCC, which will be available across regional linkages.

Contribution to the creation of an enabling environment

19. Some of the key ways the project will create an enabling environment will include:

- (a) The awareness and long-term vision needed by relevant agencies of the Government of Barbados will be developed by this project. This will therefore create the necessary supportive role of governments and/or their derivative champions, which is pivotal to fostering the right framework and enabling environments;
- (b) New knowledge critical to the increased resilience of water sourcing and distribution will be created in Barbados through this intervention. Since Barbados is accessible to other stakeholders in the Caribbean, new knowledge and the associated facilities will be available for training and dissemination of the knowledge generated in this project;
- (c) Tourism is an important economic sector in Barbados, just as in most of the nations in the Caribbean region. The current intervention in Barbados will elevate the importance of the need to pay adequate attention to addressing the impact of climate change on the region's water resources as a critical element of support to the tourism economy of the region as well as social and economic development;
- (d) Developing a climate change adaptation water master plan will contribute to the creation of an enabling environment by providing a suite of actions needed for the water sector of Barbados. This master plan will cover initiatives such as: legislation; regulations; financing of adaptation and mitigation activities; capacity-building; and public awareness. All these will create an enabling environment and know-how in Barbados, which will catalyse the regional enabling environment;
- (e) The creation of a revolving adaptation fund facility in Barbados will serve as a model for other countries to follow. A key lesson that will be learned from the creation of this facility is that funds, which would have otherwise been used to pay for expensive imported fossil fuel, can now be used to further water sector adaptation and mitigation efforts in Barbados, thereby creating an example for other countries in the region; and
- (f) Green financing, and especially the framework built into this intervention in Barbados for making the power supply to water works resilient during extreme events, will create an enabling example that can be adopted in other countries in the Caribbean region.

Contribution to regulatory framework and policies

20. Sub-component 4.3 of this intervention is geared at developing a policy framework for Barbados' water sector resilience and public-private partnerships to combat climate change. The activities here will contribute to the regulatory framework and policies that are aimed at promoting the use of renewable energy and its mainstreaming into climate adaptation and resilience building in Barbados in particular and the Caribbean region in general.

21. However, the following elements of this submission are considered weak and will need to be strengthened for the paradigm shift metrics to be scored high:

- (a) Incorrect GHG emissions calculations of the intervention relative to the status quo operations;
- (b) Weak presentation of the NRW strategy; and
- (c) Lack of an integrated project feasibility analysis.

22. Accordingly, if some of the weak element of this intervention can be addressed – for example better articulation of a strategy to achieve the NRW goals and objectives – then the project submission in terms of its paradigm shift potentials may achieve a “high” ranking. Since the independent TAP is unable to rank this metric at this stage, it has given the submission in its current form as “low”.

1.3 Sustainable development potential

Scale: Low

23. Some of the wider benefits and priorities that this project will engender to support the sustainable development potential of Barbados will include those set out below.

Economic benefits and co-benefits

24. An important outcome of the project as proposed in the funding proposal that was reviewed comes from the fact that when successfully implemented, the project will yield the following key project economic benefits and co-benefits in Barbados:

- (a) The project will lead to a reduction in energy cost to BWA, which will result in savings and greater sustainability in the long run. BWA current expenditure on energy will be reduced because of the implementation of a PV solar power system, which will be connected to the grid. The assumption here is that the PV system will result in a reduction in tariff to BWA. It was reported in the funding proposal that the PV system will reduce BWA expenditure on energy by USD 1.1 million in the first year;
- (b) At the power utility level, there will be a reduction in foreign currency needed to import fossil fuel, which will be displaced by power from the renewable solar power system, resulting in a positive impact on the country's balance of payments;
- (c) The plan to improve on the current performance of NRW of the water distribution system of BWA will also produce economic benefits. The NRW programme, when properly implemented, will help to reduce water losses, which can be considered as a lower cost water supply. It is stated in the funding proposal that the NRW reduction will be achieved via the replacement of 16 km of mains, which will reduce leakage by about 0.03 MGD per km. However, addressing NRW in a water utility goes beyond just fixing leaking pipes. A proper NRW strategy encompasses a comprehensive approach evaluating the operational performance of the network, both technical and commercial functions. Details of this were not included in the submission. The sustainable development potential of the NRW programme can be evaluated only when a comprehensive NRW strategy is presented;
- (d) It has been estimated that a successful NRW programme will result in greater availability of water, which, when valued, at the current cost of water is an avoided cost to society of USD 1.3 million. TAP, however, is unable to ascertain the accuracy of this benefit without a comprehensive elaboration of the NRW strategy, which is not available in the funding proposal or any of the submitted annexes;
- (e) Increased water availability is also expected to be realized from a properly conducted NRW strategy. This will contribute to the reduction of the instances of water outages currently being experienced by many customers, with its attendant social disruption (persons reporting for work late or being absent from work and businesses and institutions closing) with its cumulative negative impact on productivity;
- (f) Given the fact that the existing water supply capacity is at its limit and the lack of an assured supply has curtailed development and investment, actions in this intervention aimed at increasing the supply of water (leakage reduction and mains replacement coupled with the personal tank programme and rainwater harvesting initiatives) will provide greater assurance of supply and contribute to delivering more economic benefits that would not have been realized in the absence of the intervention;
- (g) The intervention will also build climate resilience in the agriculture sector of the Barbados economy. Recent research has indicated that with the expected changes in climate the agriculture sector will have to increase its use of water in order to maintain

food production and that this will entail the greater implementation of irrigation technology.³ Given the rising and competing demands for water across sectors it will be even more imperative to maximize existing sources of supply. Therefore, reducing losses through carefully planned NRW strategy and rainwater harvesting will improve the productivity of the agriculture sector;

- (h) This project will contribute to the stability of Barbados' macroeconomic environment, mitigate its susceptibility to inflationary pressures and external shocks and increase revenue to the government. Barbados will benefit from foreign currency savings resulting from reduced dependence on fossil fuels due to the PV installation; and
- (i) This proposed project will also increase revenue to the government and create jobs. The direct benefit to the Government of Barbados is an additional USD 70,000 in revenue for the licence needed to produce and sell electricity in Barbados. This project is expected to create 30 new jobs. A total of 15 of the 30 new jobs will be created at the Belle Pumping Station. The efforts to reduce NRW and implement rainwater harvesting initiatives will create another 15 new jobs.

Environmental benefits and co-benefits

25. These will come in addition to the reduction in the carbon emissions footprint of the water production and distribution in Barbados when this project is implemented. These will include:

- (a) Improved resilience to climate change and extreme climate events – resilience to climate change and variability will be engendered by the implementation of solar power plants, which will be connected to the grid together with their back-up gas fired power system, which will ensure that if the grid is knocked off as a result of climate-induced extreme events, power for pumping and distribution of water to consumers will still be available;
- (b) Avoided carbon emissions will also be engendered through the introduction of renewable energy in the mix of power supply required in the production and distribution of water in Barbados;
- (c) PV installation and the reduction in NRW will reduce the electricity purchased from the Barbados Light & Power Company by BWA to power its water production and distribution facilities. This means that less fossil fuel will be burned as a result of these components, translating into improved air quality and reduced GHG emissions;
- (d) The harvesting of rainwater and storm-water specifically for the purposes of enhancing resilience will mitigate the adverse effects associated with localized flooding and waterlogging as well as the transport of sediments and nutrients into the near-shore marine environment;
- (e) Reducing leakages has the potential to improve the health and safety of the environment by reducing mosquito breeding sites and generally creating a cleaner environment.

Social benefits

26. Some of the key social benefits identified in the funding proposal can be summarized as follows:

³ Gohar A and Cashman A. 2015. Modelling the impact of climate change and variability on water availability and economic livelihood: an example from the Caribbean. *WIT Transactions on the Built Environment*. 168: pp.1061–1072.

- (a) Given that water is life, the intervention planned for a resilient water supply in Barbados will provide greater water security to the population of Barbados and visitors to the island;
- (b) Experience with prolonged failures in the water supply to urban areas in recent years has highlighted the associated social consequences, which include: loss of productivity and household incomes; increased school absenteeism; and increases in domestic troubles (Barnett, 2011). The intervention, if successfully implemented as proposed, will mitigate these social consequences;
- (c) Diversification of income earning produce (e.g. fish and non-timber forest products, vegetables from crop rotation and additional crops as a result of irrigation), which further enhances the economic benefits of the project;
- (d) The better provision of water and better water management that will result from the successful implementation of the project will also result in overall improved health among target populations, particularly vulnerable groups such as women and children.

Gender-sensitive development impact

27. Gender-sensitive considerations explicitly covered in the presentation in the funding proposal can be summarized as follows:

- (a) This project considers gender-sensitive policies and development impact by pledging to balance and rebalance male and female participation and contribution in the implementation of this project as well as equity in the distribution benefits of the project;
- (b) The water sector resilience nexus for sustainability in Barbados (WSRN S-BARBADOS) programme aims to broaden the participation of underrepresented groups in the various aspects of the programme. The university programmes associated with WSRN S-BARBADOS will be evaluated for their gender diversity and in the cases where imbalances exist, this programme will recruit with an aim to strike a better balance;
- (c) The proportion of men and women recruited for the jobs for WSRN S-BARBADOS will depend on the targeted numbers to bring diversity to each of the programme areas. PV installation at BWA previous sites had 13 per cent female employees and the aim of this project will be to increase the participation of females from 13 to at least 30 per cent; and
- (d) Besides gender policy guided employment, the proposed project will make provision for the sustainable and consistent supply of water, which will greatly benefit women and men alike.

28. Key weaknesses in the present submission that need to be properly resolved and that will not enable the independent TAP to conclude that the sustainable development potential of this intervention is “high” include:

- (a) A key component of the intervention is the reduction in water loss from the distribution system of BWA through a comprehensive programme to reduce NRW of the system. The only NRW reduction programme well articulated in the strategy presented is the replacement of “leaky” pipes. But the NRW strategy goes beyond the replacement of leaky pipes and as such a more articulated NRW strategy covering the full range of the professional strategy usually needed should be included in the funding proposal; and
- (b) The positive evaluation of this funding proposal will also be enhanced if the accredited entity can include the report of an integrated feasibility analysis (which will integrate all

the components of the intervention in a single study), instead of the currently provided stand-alone technical evaluation and cost-benefit analysis.

29. Given the discussion of the coverage of the sub-elements of the sustainable development metric, and the extent to which gender aspects have been mainstreamed into the funding proposal TAP believes that if the weak elements that are elucidated in item 28 above can be strengthened, the potential of the current intervention contributing to the sustainable development of Barbados can be considered as “High”. However, given the weaknesses of the submission on these issues, TAP can only score the current submission as “Low”.

1.4 Needs of the recipient

Scale: High

Vulnerability of the country

30. Barbados is classified as a water scarce country that is currently experiencing a prolonged period of drought. Over the past few years Barbados has also experienced an increase in extreme weather events as well as changes in temperature and precipitation patterns⁴. Observations has also confirmed that there have also been increases in sea levels, groundwater saline intrusion and, coral bleaching events, which are occurring more frequently.⁵ These critical observations provide evidence to support the notion that climate change is seriously affecting Barbados and climate modeling projections by Simpson et al. 2012, based on these past observations, indicate that in the future Barbados will encounter, inter alia, an increase in the frequency and intensity of storms and hurricanes to the area. These effects of climate change will continue to have a negative impact on the water, energy, food and health security of Barbados among others, which ultimately will negatively affect the livelihoods of Barbadians.

31. Key consequences of the climate vulnerability of Barbados described above, which were well articulated in the Intended National Determined Contribution (INDC) of the country submitted in 2015 to the UNFCCC, can be summarized as follows. Climate change impacts will:

- (a) Limit the availability of fresh water;
- (b) Reduce agricultural productivity;
- (c) Increase land degradation; and
- (d) Reduce fish stocks caused by the migration of fish to cooler waters beyond the Caribbean region

32. The combination of reducing precipitation (and hence aquifer recharge) and salt water intrusion from sea level rise will compound the issue of insufficient water availability (through salinization of ground water aquifers), further affecting the productivity of both agriculture and fisheries.

33. Some of the indirect climate-related impacts are expected to include:

- (a) More frequent and intense droughts, flooding, and storms (physical damage);
- (b) Increased pest outbreaks;

⁴Stephenson, T.S., Vincent, L.A., Allen, T., Van Meerbeeck, C.J., McLean, N., Peterson, T.C., Taylor, M.A., Aaron-Morrison, A.P., Auguste, T., Bernard, D. and Boekhoudt, J.R., 2014. Changes in extreme temperature and precipitation in the Caribbean region, 1961–2010. *International Journal of Climatology*, 34(9), pp.2957-2971.

⁵ Taylor, Michael A., Jhordanne J. Jones, and Tannecia S. Stephenson. "2 Climate change and the Caribbean." *Climate Change and Food Security: Africa and the Caribbean* (2016): 31.

- (c) The spread of invasive species;
- (d) The increased probability for the occurrence of vector borne and heat related illnesses; and
- (e) The destruction of key ecosystems which all threaten national productivity and may undermine the potential for real growth.

34. The closeness of Barbados and the Caribbean Region in general, to the Atlantic Ocean makes the countries in the region (including Barbados) vulnerable to Atlantic hurricanes, tropical storms and earthquakes. It is projected that the intensity and frequency of these hurricanes and storms are expected increase owing to a changing climate.⁶

35. Other climate change model results that have been established for Barbados include the following:

- (a) Projections from the regional climate model (RCM) ensemble indicate increases between 2.4 and 3.2 °C in mean annual temperatures by the 2080s in higher emissions scenarios;
- (b) Numerous models by Hall et al. (2012)⁷ have projected that there will be decreases in rainfall ranging between 25 and 50 per cent of the current values by 2018. This work is supported by the general circulation model, RCM using HadCM3 and ECHAM4 boundary conditions;
- (c) The projected decrease in rainfall is expected to result in a decrease in the potential of the internal renewable water resources to replenish the groundwater aquifers, thus increasing the vulnerability of food security in the already water-scarce Barbados;
- (d) This is expected to be further compounded as the projection by Hall et al. (2012) indicates that during the summer rainy season the rainfall will decrease by 30 per cent for Barbados;
- (e) As global temperatures increase it is predicted that sea levels will also rise, hence countries at low elevations like Barbados are at high risk of being adversely affected by the effects of climate change; and
- (f) Since about 50 per cent of the population of Barbados lives on the west and south coasts of the island, thousands of people will become increasingly vulnerable to flooding and these higher sea levels would force them to abandon their homes and relocate.

36. Over the past 30 years the Caribbean has experienced intensified strengths of Atlantic hurricanes and tropical storms. There have been 31 category 5 hurricanes and only five times has more than one category 5 hurricane formed during a single season.⁸ Two of these events occurred recently in 2005 and 2007. In addition, there have been 22 category 4 Atlantic hurricanes since 2001.⁹

⁶ Allison, E.H., Perry, A.L., Badjeck, M.C., Neil Adger, W., Brown, K., Conway, D., Halls, A.S., Pilling, G.M., Reynolds, J.D., Andrew, N.L. and Dulvy, N.K., 2009. Vulnerability of national economies to the impacts of climate change on fisheries. *Fish and fisheries*, 10(2), pp.173-196.

⁷ Hall T, Sealy A, Stephenson T, Kusunoki S, Taylor M, Chen A and Kitoh A. 2012. Future climate of the Caribbean from a super-high-resolution atmospheric general circulation model. *Theoretical and Applied Climatology*. 113.

⁸ National Hurricane Center, Hurricane Research Division (April 11, 2017). Atlantic hurricane best track (HURDAT version 2). United States National Oceanic and Atmospheric Administration.

⁹ Dybas C and Terraso D. 2005. *Number of Category 4 and 5 Hurricanes Has Doubled Over the Past 35 Years*. Press Release. National Science Foundation.

37. These storms severely impact the water security of Barbados and also the capacity to adequately deliver water to the population, thus resulting in decreased levels of sanitation and health security during and after extreme weather events.

Need for alternative source of financing

38. Barbados's Debt to GDP ratio has been put at 130 percent thus making it financially infeasible to incur additional indebtedness to fund the growth of the economy including the implementation and maintenance of necessary social and infrastructure services. Thus, the need to seek grants wherever feasible to implement projects such as this was deemed very necessary and needed for economic development. This caveat was a main pivot in the design of the funding mechanism for this intervention, which is 100% grant funding. The following are key issues governing this grant funding approach:

- (a) Although classified by the World Bank as a High Income country, Barbados economic performance witnessed a downturn due to financial crisis that had adverse effects on Barbados' growth during the period 2008-2014. The average real GDP growth during this period was -0.3% per annum. Although an average growth of the real economy of about 0.8% was recorded in 2015, the trade balance in that year was -US\$1,135 million and was worse in previous years;
- (b) Thus the prevailing economic environment in Barbados does not provide a fiscal space for public spending neither does it provide lend itself to funds from the private sector who remains cautious;
- (c) Although the kinds of projects included in the interventions proposed in this FP has significant benefits to the society, but the investment required to generate these benefits portends a cash flow profile that is beyond the capacity of BWA at least in the short time;
- (d) Therefore, in the absence of the grant funding from GCF to implement 61% of the interventions, this project is unlikely to proceed;

39. The financial resources available of BWA are inadequate to fund the entire project as presented, thus the need for additional sources of funds.

40. To this end, new funding sources such as grant funding from GCF for the implementation of about 61% of this intervention are needed, in order for this adaptation to climate change project to be implemented.

41. Given the discussions above, the independent TAP has rated the need for this project by the recipient as "High".

1.5 Country ownership

Scale: High

Existence of a national climate strategy and coherence with existing plans and policies

42. The alignment of this proposed intervention with priorities in the country's national climate strategy are summarized below:

- (a) This project is aligned with several of the recently agreed Sustainable Development Goals, which CARICOM and by extension Barbados has endorsed. These include climate action, clean water and sanitation, affordable and clean energy, responsible consumption and production and decent work and economic growth;
- (b) The proposed project intervention is also aligned with many of the key objectives of the Barbados Growth and Development Strategy 2013–2020, including: reducing dependence on fossil fuels; ensuring environmental sustainability and combating

- climate change; building human and social capital base; upgrading and modernizing infrastructure; and ensuring more modern and efficient public and private sector institutions;
- (c) The intervention is also in alignment with the Barbados National Climate Change Policy, which was approved by Cabinet in May 2012. The primary goal of the policy is to establish a national process for adapting to climate change effects and minimizing GHG emissions over the short, medium and long term, in a manner that is coordinated and consistent with the broader sustainable development aspiration which was one of the mitigation demonstration measures approved by the Climate Change Committee;
 - (d) Barbados Town and Country Development Planning Office policy mandates that all new developments and refurbishment of existing facilities over a certain size are required to install rainwater harvesting systems, by engaging and retrofitting with existing houses and farms; and
 - (e) The intervention has been designed with proper recognition of the traditional responsibility of the country's water utility, BWA. The responsibilities of BWA, which include monitoring, assessment, control and protection of the water resources in the public interest, are well built into the design of the current intervention. BWA will play a key role in the delivery of almost all aspects of project implementation and as a result, this will enhance the integration of the best practices that will be developed by this intervention, especially the climate resilience activities, into BWA normal operations. BWA will work with the accredited entity for this project as the executing entity.

Capacities of accredited entities and executing entities to deliver

43. The capacity of CCCCC as the GCF accredited entity for this intervention and BWA as the executing entity for this project are discussed in the following subsections:
44. The capacity of CCCCC to successfully serve as the accredited entity for this project can be summarized as follows:
- (a) CCCCC will be the implementing agency and will have overall responsibility for the delivery of the programme;
 - (b) CCCCC is a registered GCF accredited entity under the direct access category. This accredited entity will have overall responsibility for project management and will supervise the activities of a few executing entities who will implement various components of the programme under subcontracts to the accredited entity;
 - (c) Apart from the fact that CCCCC is a GCF accredited entity, some of its capacities point to its readiness, capacity and capabilities to successfully lead and manage the implementation of this intervention and are summarized as follows:
 - (i) Even before its accreditation by GCF, CCCCC has adopted the SMART (specific, measurable, attainable, relevant and time-bound objectives) approach to evaluate specific objectives of projects, which is quantitatively or qualitatively verifiable;
 - (ii) Over the past few years of its existence, CCCCC has applied the SMART approach in several projects that it has implemented in the Caribbean. It is on record that it has applied the SMART approach to manage projects totalling about USD 7 million;
 - (iii) These projects cover a variety similar to some of the interventions included in the funding proposal reviewed, including: reverse osmosis and renewable energy projects in Grenada; strengthening physical infrastructure through the installation of photovoltaic systems, and water harvesting storage and piloting of

- a rainwater harvesting and grey water processing system for the sustainability of water resources and supply in Saint Lucia; and
- (iv) Strengthen community-based fish sanctuaries through the Caribbean Fish Sanctuary Partnership Initiative Ecosystem Adaptation Project by providing resources, training and alternative livelihoods in Grenada, Jamaica, Saint Lucia and Saint Vincent and the Grenadines; and
- (d) These project experiences in the Caribbean region in recent times have prepared CCCCC for the effective management of the current project components in Barbados as a direct access accredited entity.
45. The following will work under sub-contracts as implementing entities with CCCCC on various components of the planned interventions in Barbados:
- (i) BWA (<http://barbadoswaterauthority.com>) will be the main implementing partner and provide the implementation site for some project activities;
- (ii) UWI (<http://www.uwi.edu/index.asp>) is a public university system serving 18 English-speaking countries and territories in the Caribbean. This university will provide additional support for the implementation of activities; and
- (iii) USF (<http://www.usf.edu>) is a public university that serves more than 48,373 students with a USD 1.5 billion annual budget, and an annual economic impact of USD 4.4 billion. This university will provide additional support for the implementation of activities.
46. The ability of BWA to successfully serve as the executing entity for this project can be summarized as follows:
- (a) BWA is a statutory body established by an act of legislature on 8 October 1980 to replace the Waterworks Department of the Government of Barbados. It commenced operations on 1 April 1981;
- (b) Since that inception, BWA has been delivering services in Barbados as the only water utility public company covering responsibilities such as: managing, allocating and monitoring the water resources of the island with a view to ensuring their best development; and the utilization, conservation and protection of the public water supply and distribution infrastructure of Barbados in the public interest;
- (c) BWA today has developed into a well-structured and capable water utility, with a staff strength of over 800 and an annual budget of over USD 90 million. This public water utility operates and maintains assets, including pumping stations, reservoirs and major storage centres at Bowmanston, Saint John, and Belle, Saint Michael;
- (d) BWA supplies 97 per cent of the island with water and obtains its water supply from 24 groundwater wells, two springs, one main privately owned reverse osmosis desalination plant and a small containerized desalination plant. This water is distributed through a network consisting of approximately 2,500 km of water mains, 28 reservoirs located both under and above ground and 17 repumping stations (booster-pumps); and
- (e) Given the over three decades of experience at BWA in designing, construction, acquisition, provision, operation and maintenance of waterworks for the purpose of supplying water for public purposes and the fact that the current intervention is focused on strengthening the water supply and distribution infrastructure in Barbados to be climate resilient, BWA is suitably positioned to lead in the execution of the planned intervention.

47. UWI is adequately equipped with human and capital resources to provide the necessary support for the implementation of this project. Specifically, the university will provide resources as follows:

- (a) Staff members, who will play important roles in the technical working group that will be set up for the project;
- (b) Some of these staff members will play important roles in the implementation of the research, education and outreach components of the project;
- (c) Some of the staff members will work on the design, monitoring and evaluation aspects of the various demonstration technologies that will be utilized in the project; and
- (d) Some others will work on:
 - (i) Business development and entrepreneurship expansion based on the demonstration projects;
 - (ii) The development of economic incentives for RWH;
 - (iii) Climate change impacts, aquifer modelling, RWH and NRW aspects; and
 - (iv) Demonstration technologies and enabling policy environments for mainstreaming demonstration technologies in Barbados and across the Caribbean region.

48. Researchers and scientists from USF (from the Civil and Environmental Engineering Department) currently provide leadership in a United States Environmental Protection Agency funded Center for Reinventing Aging Infrastructure for Nutrient Management, which aims to achieve sustainable and healthy communities in a cost-effective manner by rethinking ageing coastal urban infrastructure systems for nutrient recovery and management.

49. The focus of these international research activities, which is relevant to the objectives of this current intervention in Barbados, will enhance the quality of the NRW activities of this project. This is because faculty members from USF will work on the NRW systems as well as the life cycle assessment and costing for project demonstration technologies and their later expansion to the wider Caribbean region.

Engagement with the national designated authority (NDA), civil society organizations and other relevant stakeholders during the planning and design of this project and planned for the implementation period can be summarized as shown below.

50. **Active engagement of key country stakeholders:**

- (a) As described in the funding proposal, as from the onset of the development of most components of this intervention, the key stakeholders who played significant roles in the identification, design and development of the components of this intervention were:
 - (i) BWA, which is a government-owned public utility;
 - (ii) CCCCC, a regional organization mandated to chart the Caribbean's response to climate change; and
 - (iii) UWI and USF, which are universities that work closely on research needed to inform decision-making; and
- (b) The engagement of these key stakeholders occurred in the form of the following:
 - (i) Several physical and virtual meetings to conceptualize and complete the GCF proposal since September 2015;

- (ii) Presentations of conference papers by BWA, USF, UWI and CCCCC on various topics associated with this proposal, including gender and water, at international conferences such as the regional Caribbean Water and Wastewater Association conference held in Miami in September 2015. These presentations to a wider audience helped to test the intellectual adequacy of the interventions and they were well received;
- (iii) Short meetings to determine the adequacy of the proposed intervention, to ascertain the level of BWA interest in applying for GCF grant funding through CCCCC, and to obtain and incorporate into the project design the views of other important stakeholders such as: the Ministry of Agriculture, Food, Fisheries and Water Resource Management; the Ministry of the Environment and Drainage; the management of the public hospital; the NDA; households; farmers; businesses; and management and staff of BWA;
- (iv) The decision was made that USF would combine its research strengths with graduate education and complete the stakeholder analysis, gender analysis, environmental and social impact assessment, and feasibility studies;
- (v) Although no integrated feasibility studies report was included in the submission, two reports were included, one detailing the results of a cost-benefit analysis and the other providing a technical evaluation of the components of the project. Understanding of the project intervention, and especially the synergies that will be brought on by each component, would have been helped if an integrated feasibility analysis as mentioned above had been prepared by USF and included in this project submission.

51. **Engagement of the NDA:**

- (a) As mentioned in item 51.b above, the NDA was present at some of the short meetings held on this GCF grant funding;
- (b) Although the NDA was not present at many of the subject matter discussions of the key project stakeholders listed in item 51.a above, it was stated in the funding proposal that the NDA was kept abreast of the proposal via email and phone. As a protocol CCCCC informs the NDA and or climate change focal point of its presence in country during each visit to Barbados for the scoping or development of the project;
- (c) The Ministry of Finance and Economic Affairs in its capacity as the GCF national designated authority of Barbados issued a letter of no objection dated 25 August 2017. In this letter, the following points, which indicated that the designated national authority was engaged, were elucidated:
 - (i) That the Government of Barbados has no objection to the project as described in the funding proposal;
 - (ii) That the project as described in the funding proposal is in conformity with the national priorities, strategies and plans of Barbados; and
 - (iii) That the project is in conformity with national laws and regulations of Barbados.

52. **Engagement of other stakeholders – other relevant country stakeholders were engaged as follows:**

- (a) Stakeholder consultations were conducted during the period 23 October to 8 November 2016 using focus groups, interviews and social media overview;
- (b) Focus groups covered included:

- (i) BWA employees (Pipes Replacement Project Manager, Water Quality Technician, Safety and Health Officer, Financial Controller, General Manager of Utility, Customer Service Supervisor, Administrative Assistant, Utility Board members; and
 - (ii) UWI faculty (Gender Studies Unit);
 - (c) Key information dissemination interviews were held with BWA employees (Customer Service Provider, Financial Controller), funding agencies, private enterprises, regulatory agencies, international agencies and various groups of community members;
 - (d) To elicit relevant views of the public, which can be incorporated into the project design, anonymous surveys were conducted covering 229 persons across the country. Social media review was also conducted using commercially available software. Overall there was support for the components proposed in this project and support for renewables and reduction of water leakage; and
 - (e) Qualitative analysis of the data from the survey revealed that some of the proposed mechanisms may be inefficient at addressing individuals' concerns and ineffective at serving vulnerable populations within the BWA customer base. As such, lesson learned from the analyses were carefully developed into intervention actions, which were built into the project design.
53. Given the myriad of information presented in this section 5, the independent TAP has concluded that this submission can be ranked as "high" on the country ownership metrics.

1.6 Efficiency and effectiveness

Scale: Medium

54. **On the cost-effectiveness and efficiency of this project intervention** in Barbados the following can be said:
- (a) The instrument of funding requested for the implementation of this project is a combination of grants from GCF and co-financing from BWA;
 - (b) Although the funds will be used for adaptation and mitigation actions that are revenue generating activities, it serves the purpose of building greater resilience into the water sector of Barbados;
 - (c) The fact that the extent of revenue that will be generated is inadequate coupled with the overexposure to debt of the Government of Barbados will not enable sustainable funding of these intervention through 100 per cent equity funding from BWA, hence the need for grant funding from GCF;
 - (d) The cost-effectiveness of these interventions can be better seen as necessary top-ups to the following previous actions that were taken by BWA to enhance the effectiveness of its water supply functions, especially from its 'business as usual' scenario for Barbados, to maintain its operation, supplying whatever water is available and repairing and maintaining its assets as best as it can:
 - (i) The implementation of energy-efficient and cost-saving measures, which has resulted in a reduction in energy consumption of 9,682 MWh per year. These measures were primarily aimed at updating BWA equipment such as pumps, switchgear and lighting; and
 - (ii) BWA has so far integrated three PV systems into its operations, albeit small ones relative to those proposed under this project;

- (e) It is against this background, coupled with its drive to adequately supply water to the population at a reasonable price, that BWA proposes increasing the share of energy produced from a renewable source used in its production and distribution of water;
- (f) For enhanced cost-effectiveness of its operation, this project presents an opportunity for Barbados to adapt to climate change while mitigating GHG emissions and building greater sustainability into the water authority's operations;
- (g) It is expected that the installation of renewable energy sources into the electric power supply in Barbados, as planned under this intervention, will help to drive down the energy costs for BWA, create price stability over time and savings that could be used to further diversify its energy mix;
- (h) The results of the analysis carried out has also shown that it is possible from the financial perspectives to save about USD 0.75 million of energy cost faced by BWA per year;
- (i) From a broader economic point of view, it has also been concluded that the planned intervention will reduce emissions at a cost of USD 45.87 per tCO₂eq;
- (j) A key cost-effectiveness and efficiency metric of this planned intervention is the programme to reduce NRW, which is currently put at about 49 per cent, with about 36 per cent or more of this said to be a direct result of leakage from the distribution system. Hence the plan (as described in the funding proposal) to reduce NRW via the replacement of leaky distribution pipes;
- (k) BWA recognizes that considerably more mains will need replacement if NRW is to be significantly reduced or eliminated; it has decided that for cost-effectiveness reasons, the replacement of leaky pipes will be carried out incrementally, starting from the 16 km of mains that has been included in this planned intervention;
- (l) It is important to stress at this point that reducing the NRW of a typical waterworks such as the one in Barbados will require more than fixing or replacement of leaky pipes. Internationally best available technology and strategies for dealing with too high an NRW go beyond the replacement of leaky pipes. The NRW programme described in the funding proposal has not been comprehensively presented to give TAP the confidence that the NRW reduction strategy as planned will be successful;
- (m) The Government of Barbados and BWA recognize that BWA operations in their current form and structure are inadequate to cope with the climate change and variability impacts that are expected in the near future, especially with regard to meeting future demand for water;
- (n) Therefore, apart from the intervention that has been described above, other planned interventions to make BWA operations resilient to the negative impacts of climate change and variability will include the need to increase the water available to the public via options other than sourcing via groundwater extraction. Key components of this that have been included in the proposed intervention are rainwater harvesting and decentralization of water storage;
- (o) A cost-benefit analysis carried out on the three components of the project showed that the project is an economically worthwhile investment as the demand for water increases; and
- (p) Economically, the project is desirable whether or not there are increases in demand for water. With benefits attributed to carbon emission reduction and reduction in NRW, the project net benefit to society ranges from USD 43 million to USD 46 million with a

corresponding internal rate of return of 43 to 46 per cent, depending on how much demand for water increases in the future and assuming BWA will be able to meet that demand.

55. The project has significant potential to catalyse long-term investment into emission reduction technologies through the upscaling of solar power generation, especially grid connected, which will reduce the emissions of the power supply system of Barbados.

56. Regarding financial viability beyond programme implementation, the success of this intervention, including the successful development of physical and institutional infrastructure, will enable the commitment of funding from time to time for post-implementation activities;

57. However, a key to viability is the proper enablement of as a result of the project intervention so that the public water institutions can deliver their post-implementation responsibilities, especially regarding the operations and management of waterworks facilities, leaving government responsibilities to minimum funding provision incremental to budgetary allocations.

58. **Application of best practices:** some of the applications of best practices incorporated into the project can be summarized as follows:

- (a) The BWA experience in integrating PV systems puts it in a position to implement such systems using lessons learned and built capacity;
 - (b) The replacement of mains will be guided by research, primarily work done by the Centre for Resource Management and Environmental Studies (CRMES) at UWI. Studies by CRMES have identified the hotspots for leaks in the BWA water distribution system and as such the areas of concern in the distribution systems have been identified that will be replaced with a view to reducing NRW;
 - (c) BWA has carried out significant information technology upgrades to its customer user interfaces, work management systems, financial and data correspondence systems, SCADA, geographic information system mapping and geo-tagging, all with a view to seamlessly integrating its oversight and data analytical and management coverage;
 - (d) The personal tank programme draws on the experience of BWA in implementing water tanks and complementary pumps. Since the programme started BWA has modified the design of the system to make it more efficient. One of the major modifications was implementing a more efficient pump with the water tank;
59. Given the discussions above, the independent TAP has rated the need for this project by the recipient as “medium”.

1.7 Overall remarks from the independent Technical Advisory Panel

60. Overall remarks from the independent Technical Advisory Panel

- (a) The independent TAP would like to recommend this project for approval by the Board;
- (b) However, given the importance of the NRW component of this intervention, especially in the ability for the intervention to achieve a higher evaluation score on the sustainable development potential and the paradigm shift potential (which is currently scored as low by the independent TAP) and to increase the effectiveness and efficiency of the intervention, the strategy to implement a decrease in NRW needs to be revamped;
- (c) It is important to stress that addressing non-revenue water (NRW) in a water utility goes beyond just fixing leaks. A proper NRW strategy encompasses a comprehensive

approach evaluating the operational performance of the network both Technical and Commercial functions. Based on a Validated Water Audit of the system, decisions must be made bearing in mind the financial benefit to the utility for each approach to be adopted, i.e. whether to go for reduction of Physical Losses (reduction of leaks, etc.) or reduction of Commercial Losses (meter and accounting errors, unauthorized consumption, etc.) or both. The optimum option would be the one that yield the highest return to the utility compared to the investment. In many cases this comprehensive approach is not applied and results that may be achieved applying random activities are short lived and without a sustainable impact;

- (d) Unfortunately, without having a document (for example, technical feasibility study) in this funding proposal that describes why, what, how and when actions are going to be done, it is not possible for the independent TAP to assess whether the NRW strategy proposed is correct for this utility;
- (e) It is therefore recommended by the independent TAP that the Board approves the project subject to the following conditions:

To be met prior to the execution of the Funded Activity Agreement (FAA):

- (i) The approval by the GCF Secretariat of a non-revenue water (NRW) reduction strategy document (NRW Strategy Document), compiled and recommended for approval by a water specialist to be hired by the Accredited Entity who shall have demonstrated extensive experience in implementation of water audits and NRW programs in accordance with the American Water Works Association and International Water Association guidelines.
- (ii) The insertion in the FAA of a covenant by which the Accredited Entity shall ensure the implementation of, monitor and report on, the results of the NRW Strategy Document during Project implementation.

Independent Technical Advisory Panel's review of FP061

Proposal name:	Integrated physical adaptation and community resilience through an enhanced direct access pilot in the public, private, and civil society sectors of three Eastern Caribbean small island developing states
Accredited Entity:	Department of Environment, Antigua and Barbuda
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium/High

1. The proposed project aims to improve energy efficiency (EE) in the industrial sector in Paraguay, particularly for small to medium-sized enterprises (SMEs), by providing medium and long-term financing for EE investments. The project's total financing is USD 57.05 million. GCF will fund USD 23 million, of which USD 3 million will be in the form of a grant. Agencia Financiera de Desarrollo de Paraguay (AFD), the executing entity, will fund USD 20 million with a further USD 14.05 million in the form of an equity contribution by SMEs at a sub-project level. The GCF funding will be intermediated by the Inter-American Development Bank, the accredited entity (AE), to AFD against a sovereign guarantee granted by the Republic of Paraguay. The USD 20 million from AFD will be sourced from the AE.
2. The project adopts Energy Savings Insurance (ESI), a financial and guarantee scheme developed and currently being piloted by the AE in Latin American and Caribbean countries, including Colombia and Mexico, for promoting EE investments. The ESI aims to mitigate the financial risk that SMEs assume in case actual energy savings end up being lower than contracted. A similar scheme was presented in the funding proposal for El Salvador titled "Energy Savings Insurance for private energy efficiency investments by small and medium-sized enterprises" (FP009).
3. The ESI is a package of measures to mitigate various risks in EE investments, poor technical capacity, absence of reliable performance validation, and lack of access to capital, among others. Energy service and technology providers (ESTP), local financial institutions (LFIs), validators, and insurers will participate in the project. The validators and insurers provide critical technical and financial assurance to SMEs because payments from SMEs for ESTP services and equipment supplies are subject to the validator's endorsement. The insurers also provide assurance to SMEs and LFIs by guaranteeing a part of LFI loans to SMEs for EE investment if that investment does not yield the expected savings or returns.
4. Approximately 70 per cent of primary energy production in Paraguay comes from two bi-national hydroelectric projects, which the country shares with Brazil and Argentina. Although it is equipped with sufficient power generation capacity from the two hydroelectric projects, the country was unable to tap the available capacity because of the delay in constructing high-voltage transmission lines to transport energy to load centres. The government is implementing an ambitious plan to complete medium-voltage transmission lines and distribution networks together with an additional hydroelectric plant (396 megawatts, or MW). It will be implemented over eight years or until 2025 with a total investment cost of USD 6.9 billion.

5. In Paraguay, 83 per cent of the energy consumed by the industrial sector comes from firewood (39 per cent) and biomass waste (44 per cent) causing deforestation of virgin forests. The government has imposed restrictions on deforestation in the Oriental region, where most industrial sectors are located. As a result, the supply of firewood is declining and the price is increasing (3.5-fold between 2008 and 2013). That trend is expected to continue as a similar restriction will be imposed on the Chaco region in 2018.

6. The project aims to promote EE in the sugar industry and non-metals production with a focus on ceramics and brickmaking, which are the largest consumers of energy in the industrial sector in Paraguay. The project proposes to promote retrofitting and the replacement of obsolete and low-efficient ovens, drying equipment, co-generation, and boilers fuelled by firewood with those of better efficiency, or with those powered by electricity.

7. The AE estimates that the project will lead to greenhouse gas (GHG) emissions reductions of 269,393 tons of carbon dioxide equivalent (tCO₂eq) per annum and 4,004,899 tCO₂eq for its lifetime. The total amount of energy to be saved is estimated to be 2,134 gigawatt hours (GWh) over the lifetime of the project.

8. The estimation was made based on the assumption that 365 SMEs will be supported for retrofitting or replacement of ovens, drying equipment, co-generation and boilers. Because the actual investments are not known ex ante, the assumptions are derived from the market study. The estimation and assumptions appear reasonable. The actual EE performance at a sub-project level will be monitored and verified.

9. The independent Technical Advisory Panel (independent TAP) views the impact potential of the project as "medium/high".

1.2 Paradigm shift potential

Scale: High

Contribution to the creation of an enabling environment

10. The project will introduce to Paraguay a new business model of EE investments based on an innovative insurance scheme and financial/technical assistance. The ESI scheme effectively segregates EE investment risk from that of SMEs to enable LFIs to focus and lend against the former. Therefore, with the ESI scheme, SMEs can receive LFI loans as long as the EE investment is structured as bankable. Standardized methodologies and documents will be developed for effective technical validation and assessment, and financial contracts.

11. As a result of the project, EE investment may be recognized as a feasible and viable investment model and become a standard business practice of LFIs, SMEs and ESTPs in Paraguay. Therefore, the project is demonstrational and contributes to the creation of an enabling environment for EE investments in Paraguay.

Contribution to regulatory framework and policies

12. The project objectives are in alignment with the government strategies and policies related to climate change, which aim to improve EE and reduce deforestation and forest degradation, among others. Both the AE and AFD have committed to enhancing effective dialogue and collaborating with government agencies during the project implementation. Such dialogues and collaboration will contribute, although it might be indirect, to the development and enhancement of the regulatory framework for EE investments in Paraguay.

Potential for scaling up and replication

13. The project has the potential to be scaled up and replicated based on the technical and financial guarantee scheme, standardized financial instruments, and the market capacity to be developed as a result of the project implementation.
14. Although favourable terms and pricing are needed to incentivize LFIs (as well as ESTPs and SMEs) to participate in the ESI scheme promoted by the project in the short run, further expansion can be sustained with commercial financing and without public sector funding once LFIs, ESTPs and SMEs grow with confidence and experience in EE investments.
15. The country's EE potential is estimated to be 1,000 GWh per year. The market expertise and experience generated by the project can be transferred and applied to other industrial sectors in Paraguay where additional efficiency gains can be expected from the replacement of inefficient energy-intensive equipment.

Potential for knowledge and learning

16. During implementation, the project will carry out consultations with LFIs, ESTP, SMEs and insurance companies to develop a package of standardized tools required for the ESI scheme. The tools include, among others, a standard performance contract between SMEs and ESTPs, an insurance policy covering energy savings, and methodologies to monitor and evaluate energy savings at the project level.
17. The consultations will continue to receive feedback and disseminate lessons learned, including the actual performance of each EE sub-project, during the tenor of the project. A communication network and platform, and training facilities operated by the AE and AFD both internationally and locally, will be mobilized. The AE plans to develop learning materials and organize events through banking and energy service providers' networks in the region. Through those consultations and activities, the project will contribute to the creation, enhancement and dissemination of knowledge and experience of effective EE investments and the market.
18. The independent TAP views the project's paradigm shift potential as "high".

1.3 Sustainable development potential

Scale: Medium/High

Economic co-benefits

19. The project will reduce production costs and increase profitability for 365 SMEs by promoting EE and reducing energy costs. It is estimated that an additional 1,000 direct, indirect and induced jobs will be created in the EE sector in Paraguay. Since private sector businesses will be mobilized and the capacity of LFIs enhanced, the project will contribute to both private sector and financial sector development in Paraguay.

Environmental co-benefits

20. By promoting EE in the industrial sector, which relies on firewood and biomass for 83 per cent of its energy consumption, the project will reduce pressure on deforestation and forest degradation. The project will also contribute to the reduction of air pollution caused by the use of obsolete and low-efficient equipment burning firewood or biomass.

Social co-benefits

21. The project will contribute to improving the health and working conditions of workers in the sector due to reduced use of firewood and air contaminants, and a decline in labour accidents.

Gender-sensitive development impact

22. In Paraguay, women have a significant representation in the labour force or in management of SMEs, especially those in the ceramic industry. Accordingly, the project is expected to provide financial and social benefits to women who are in the industrial sector.

23. The independent TAP considers the project's sustainable development potential to be "medium/high".

1.4 Needs of the recipient

Scale: Medium/High

Absence of alternative source of financing

24. Paraguay's financial system is relatively liquid but lacks depth. Bank loans are generally of a short tenor (about 1.55 years) and carry high interest (around 26 per cent). Banks perceive EE investments as risky due to their unfamiliarity with the technical and financial aspects of EE investments. A lack of financial and operational information for SMEs also causes LFI to be hesitant to extend finance to them and their EE investments. The long tenor and competitively priced financing required by SMEs for EE investments (and, more broadly, for capital investments) are not available in Paraguay.

25. The project will offer LFI a financial package with a long tenor and concessionally priced funding, and an ESI scheme will enable LFI to lend and SMEs to invest in EE projects in the long term.

26. The independent TAP rates the project's needs of the recipient as "medium/high".

1.5 Country ownership

Scale: Medium/High

Existence of a national climate strategy and coherence with existing plans and policies

27. The project is fully aligned with the government's strategies and policies, including, among others, the Nationally Determined Contribution (NDC), National Development Plan 2014-2030 (NDP), National Energy Efficiency Plan 2014 (NEEP), and National Climate Change Plan (NCCP).

28. The NDC establishes a unilateral goal of a 10 per cent reduction in national GHG emissions by 2030 and an additional 10 per cent conditional of access to climate finance by 2030.

29. The NDP includes, as its targets, the effective control of deforestation, increasing consumption of renewable energy, increasing efficiency in the agricultural system, and reducing deforestation and forest degradation, among others.

30. The NEEP aims to promote EE measures in the use of steam and heat, cogeneration, technology improvements, technical assistance and capacity-building in EE project implementation, and implementation of energy audits and systems of energy management.

31. The NCCP Phase1: Mitigation Strategy (2014) includes promotion of EE measures and provision of financial incentives and facilitation of access to finance to those that foster renewable energy generation. It further promotes strengthening institutional capacities to coordinate actions towards EE and the sustainable use of energy. Access to and mobilization of financial resources to improve energy systems, including in the industry sector, is also a part of the plan.

Capacity of the accredited and executing entities to deliver

32. Since 1961, the AE has provided almost USD 246 billion for projects in the region. Between 2006 and 2016, the AE approved over 1,751 projects, totalling USD 39.5 billion including technical assistance, relating to climate finance (USD 16.2 billion), financial intermediaries (US 17.8 billion), and SMEs (USD 3.7 billion).

33. In Paraguay, the AE has supported 57 projects for a total amount of USD 684 million in climate finance (USD 162 million), financial intermediation (USD 414 million), and SME development (USD 127 million) in the same timeframe. The AE has executed five successful loan operations for financial intermediation to SMEs and housing with AFD in the past. As of November 2017, the AE has disbursed USD 145 million to AFD operations.

34. The AFD is the only second-tier public development institution, and grant and loan executing entity for financial intermediation to financial institutions in Paraguay. It was created in 2005 through the unification of several credit entities of the Paraguayan State. As of November 2017, the AFD portfolio of USD 593 million represents 4.35 per cent of the current portfolio of all the banks in the country.

35. As a public entity, AFD is part of different governmental consultative committees relating to the country's development. Its unique position enables AFD to engage LFIs and private investors in promoting the government's critical development agenda.

36. The AE has been promoting green finance in a partnership with national development banks in the region, including AFD. Its experience working with AFD and its track record provide the AE with a strong justification to work together for the project to promote EE in SMEs in Paraguay.

Engagement with national designated authorities, civil society organizations and other relevant stakeholders

37. Since 2013, the AE has undertaken consultations with various government ministries and agencies including, inter alia, the Ministry of Planning for Economic and Social Development, (national designated authority, or NDA), Ministry of Environment, Ministry of Industry and Trade, Ministry of Mines and Energy, National Electricity Authority, and National Commission of Energy Efficiency. The consultation further included SMEs operating in the focused industrial sectors, industrial organizations, LFIs, and environmental non-governmental organizations. The project design has taken into consideration the inputs of stakeholders received during the consultations.

38. Further consultations will target national entities and the private sector to disseminate information of the project, including lessons learned, and harmonize efforts to foster EE in the context of mitigation, to combat deforestation, and pursue sustainable development in Paraguay.

39. A letter of non-objection issued by the NDA is attached to the funding proposal.

40. The independent TAP views the project's country ownership as "medium/high".

1.6 Efficiency and effectiveness

Scale: High

Cost-effectiveness and efficiency

41. The AE estimates GHG emissions reductions from the project to be 269,393 tCO₂eq per annum and 4,004,899 tCO₂eq for its lifetime. The estimated cost per tCO₂eq and the GCF cost per tCO₂eq are USD 10.75 and USD 5.75, respectively.

42. As the AE stated, the project has a lower cost per ton of tCO₂eq reduced than similar projects in the region (and possibly outside of the region as well).

43. The concessionality and long tenor (i.e. 15 years) that GCF is requested to provide for its loan to AFD will impact the interest rate and tenor of AFD loans to LFIs, and, in turn, those LFIs provide to SMEs. The AE estimates that the LFI interest rate will be reduced from 8.3 per cent to 6.3 per cent. The final interest rate charged to SMEs by LFIs will include credit spread depending on each SME risk and credit profile. The AE will monitor and report the actual interest rates charged to EE sub-projects and ensures the GCF concessional interest rate is contributing to the intended purpose of enhancing the feasibility and bankability of EE investments.

44. The GCF loan will enable LFIs to extend long-term, attractively priced loans, which are critically needed for EE investments to be viable. Accordingly, the proposed tenor and concessional interest rate for GCF financing are justifiable.

45. The project can be regarded as complementary to the “Poverty, reforestation, energy and climate change (PROEZA) project” in Paraguay being proposed by the Food and Agriculture Organization (FAO). The AE, FAO and AFD have coordinated preparation of the two interventions into the fuel wood market in Paraguay. The PROEZA project aims to promote formalizing production of wood and offering incentives to medium-sized land owners to invest in sustainable forest plantations. On the other hand, the project promotes switching from wood fuel to electricity where possible, or efficient use of wood fuel to be supplied from legal and sustainable sources. The project implementation can be enhanced by continuous coordination among the NDA, AEs, executing entities and government offices.

Co-financing, leveraging and mobilized long-term investments

46. GCF funding of USD 20 million will be matched with another USD 20 million from AFD. In addition, the project will mobilize USD 14.05 million from SMEs in a form of equity contribution when EE investments are made. The co-financing ratio of the GCF funding is therefore estimated to be 1.7x (or 1.5x if a USD 3 million grant from GCF is taken into account).

47. During the life of the project, the GCF funding will be recycled (or reused, 2–3 times) as loan repayments of SMEs take place, and finance new EE investments. Therefore, the project will mobilize additional capital from SMEs for new EE investments.

48. Applying their EE expertise and experience accumulated by participating in the project, LFIs are expected to offer an additional credit line to EE investments. As a result, the co-financing ratio of the GCF funding could increase to 2.5x (or 2.3x if the GCF USD 3 million grant is included).

Financial viability

49. The AE estimates that the project is financially viable across all technologies under various sensitivity scenarios. In the early period of the project implementation, while the price of firewood remains competitive against that of electricity, the financial viability of equipment utilizing electricity remains unsatisfactory.

50. The financial analysis of the project shows the project has an economic rate of return of 136 per cent with a social cost of carbon of USD 62/tCO₂, and a financial return of 74 per cent.

Application of best practices

51. The ESI model contains a comprehensive financial and guarantee structure aiming to address various bottlenecks commonly observed when EE investments are promoted. The ESI model is currently being piloted in Colombia and Mexico, and will be in El Salvador with GCF assistance. The model will reflect on lessons learned and on the best practices developed and established through its implementation in Latin America and Caribbean. This will ensure that AFD is able to access and adopt best practices in implementing the project.

52. The independent TAP considers the efficiency and effectiveness of the project “high”.

II. Overall remarks from the independent Technical Advisory Panel

53. The independent TAP recommends the Board to consider the project as proposed.

54. The independent TAP is aware that the project will allow LFIs to finance EE investments to replace obsolete and low-efficient equipment with those of better efficiency powered by firewood. Taking into account the following, the independent TAP is of the view that the project’s assistance is a reasonable and feasible option to contribute to the reduction of GHG emissions and decrease deforestation and forest degradation in Paraguay.

- (i) The government is promoting ambitious power transmission and distribution network expansions (76,237 kilometres in total) plus hydropower development critical to supply power to load centres, but their completion is not scheduled until 2025. A risk of delay in implementation cannot be eliminated at full given the magnitude of the plan and its USD 6.9 billion cost. Significant transformation from the equipment types presently using firewood to those using electricity could take place only when a reliable supply of electricity is assured, that is, beyond 2025.
 - (ii) The project will aim to promote switching from wood fuel to electricity in the first place. It will support replacement with equipment powered by wood fuel only when electricity supply is unfeasible due to a lack of access to the transmission line, and agriculture residues are unavailable economically.
- (b) The AE confirms that the supply and consumption of wood fuel of the sub-projects will be monitored and reported. The supply is permissible only from legal and sustainable sources, and the SMEs will be requested to certify and proof the origin of the wood fuel annually, and when requested. Failure to probe it will lead to the cancellation of the sub-loan.

Independent Technical Advisory Panel's review of FP062

Proposal name:	Poverty, reforestation, energy and climate change (PROEZA) project
Accredited Entity:	Food and Agriculture Organization of the United Nations (FAO)
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. The concept of the funding proposal is to integrate climate change adaptation and mitigation components into ordinary public social protection programmes implemented by the government of Paraguay. As the title of the funding proposal makes clear, the project targets poor and extremely poor households in 64 municipal districts located in eight *departamentos* (departments) of eastern Paraguay. As a result, the project has to demonstrate how climate change adaptation and mitigation activities contribute to improvement in the income level of local poor households.

2. The poverty, reforestation, energy and climate change (PROEZA) project targets three different groups through three respective components: socially vulnerable populations and their involvement in a programme to reduce deforestation; private farmers and strengthening the sustainability of their involvement in the afforestation process; and the public sector for strengthening the country's capacity to implement climate change related programmes and projects at the local (municipal and department) level.

3. The first and most important component, where 95 per cent of GCF money will be invested, is called "planting the future" and focuses on socially vulnerable households living in poverty. This population receives support through the government's social protection programme "Sembrando Oportunidades" (the national programme to reduce extreme poverty). The project offers technical support and economic incentives to 87,210 poor and extremely poor people (43,605 women, 14,800 indigenous peoples) to establish climate-smart agroforestry production systems and/or multifunctional "close to nature" planted forests on their land (about 0.8 hectares each), totaling approximately 13,940 ha. This initiative, along with the distribution of energy-efficient cooking stoves, should increase the carbon stock and reduce the deforestation caused by inefficient use of wood stoves.

4. The second component, called "sustainable landscapes", is financed by the Government of Paraguay with concessional loans provided through public financial entities. Under this component, the Government of Paraguay will offer some land owners (medium size; around 300 ha each) incentives to increase the production of sustainable forest biomass in an environmentally sustainable way, adopting certified "new generation forest plantations" (NGFP) through which high-yield forest plantations will be combined with natural forests in biodiversity reserves and watershed protection strips. Encouraging a larger proportion of native species compared with fast-growing non-native species is one of the criteria (among others) for qualifying for this concessional loan and the government's incentives. Concessional

credit will be offered for the establishment of 24,000 ha of highly productive NGFPs for bioenergy, timber and silvo-pastoral production in the project zone.

5. The third component, “good governance and law enforcement”, aims at strengthening the capacity of national and local governments for the smooth implementation of climate change related programmes identified in the nationally determined contribution (NDC) action plan and the enforcement of laws through various incentives.

6. It should be noted that, if the project succeeds, its social impact might be higher than the climate change mitigation or adaptation impacts because the results achieved by both of these key GCF areas eventually will contribute to improvement of the social aspect of the project integrated in component 1 and targeting the poor population.

7. The calculated mitigation impact in the first five years of project implementation (with maximum conservativeness ensured) equals 2,251,448 tons of carbon dioxide (tCO₂), which is 2 per cent of the land use, land-use change and forestry (LULUCF) sector emissions of Paraguay. After 30 years, the impact will reach 7,868,033 tCO₂, which will mean a 7 per cent reduction in emissions from the LULUCF sector. Calculations are based on a 30-year cycle, and the harvesting cycles have also been taken into consideration. These figures are based on increased carbon stock and the deforestation avoided because of the distribution of energy-efficient stoves and the substituting oil fuel with sustainable biomass fuel.

8. The adaptation component provides a climate change picture for the country’s territory. However, it lacks information on the current trends of climatic parameters at the local level that may have adverse impacts on agriculture, forestry and so on, which should be the basis for an assessment of the relevance of adaptation measures considered by component 1. The proposal does report anticipated positive changes in the considered ecosystems due to the project implementation and mentions the potential climate change adaptation impact of the funding proposal that could be confirmed based on common worldwide experience. However, the real impact of the project depends on proper diagnosis of climate impact at the local level, which is not available at this stage.

1.2 Paradigm shift potential

Scale: High

9. Increased inclusiveness is a key merit of the project. Based on this, the paradigm shift at the conceptual level and, in particular, for the social component of the project is very high. This approach targets a specific group of population and encourages their participation and voluntary contribution to global process of climate change mitigation and adaptation, equally to other groups.

10. Integrating the climate change element into social aid in such a way that it becomes a source for the generation of additional income and increases the carbon stock (i.e. as a public good) is also innovative. Therefore, it could be replicated in other countries that have a large proportion of the population who are poor or extremely poor, even if deforestation and land degradation are not the main targets in those countries. The replication potential of this concept is high in Paraguay because it has various conditional and non-conditional social programmes and a significant share of the population who are poor or extremely poor.

However, it should be recognized that the mitigation potential quoted in figures for such paradigm shift processes is always limited.

1.3 Sustainable development potential

Scale: High

11. This proposal is a model for sustainable development in rural areas that are fully dependent on their local environment. The proposal has all three elements of sustainable development: environmental, social and economic. The scale of the sustainable model is small and the leading element is social, nevertheless it contributes to environmental aspects (not only to climate change but also to other issues such as maintaining local biodiversity) and to income generation through the production of sustainable biomass and increasing productivity.

1.4 Needs of the recipient

Scale: High

12. The highest need Paraguay has is in development and the eradication of poverty. While per capita income in Paraguay grew by 22 per cent between 2003 and 2011, extreme poverty remained persistently high. By 2013, moderate poverty fell to 24 per cent, extreme poverty reached a historical low of 10 per cent, and the income inequality index dropped below 0.48 for the first time in the last 15 years. However, two main challenges to the sustainability of poverty reduction are: the vulnerability of the poor and near-poor; and inequality of opportunity for the poor. Non-labour income, especially public cash transfers under the social protection programme *Sembrando Oportunidades*, which includes the programmes *Tekoporã*, *Tenonderã* and *Adultos Mayores*, account for one third of the decrease in rural poverty. As of February 2017, the *Tekoporã* database reports on 141,306 households, approximately 10 per cent of the country's population.

13. As reported in the funding proposal, the Development Bank of Latin America study "Index of Vulnerability and Adaptation to Climate Change in the Latin American and Caribbean Region" places Paraguay in the category of "extreme risk", ranking eighth out of 33 countries in the region. These results are partly due to high levels of poverty and inequality in the country as well as the economy's high dependence on the environment (in particular, forests), which make Paraguay extremely vulnerable to climatic variability and extremes.

14. Paraguay's expanding agricultural activity and its heavy dependence on unsustainable fuelwood have contributed to globally high rates of deforestation, reducing native Atlantic forests in Paraguay by 95 per cent. The sustainability of Paraguay's growth model is under threat from environmental degradation. Agricultural expansion and fuelwood harvesting are contributing to one of the highest deforestation rates in the world (over 290,000 ha, or 1.5 per cent per year, between 2005 and 2015) according to the national forest inventory (2015).

15. As reported in the first biennial updated report of Paraguay submitted to the United Nations Framework Convention on Climate Change in December 2015, 71 per cent of the country's greenhouse gas (GHG) emissions are from the LULUCF sector and it is logical that the country is involved in designing a national REDD-plus programme. Government institutions such as the National Forest Institute (INFONA) and the Environment Department (SEAM) are intensively involved in the development of the national REDD-plus process/programme. Indeed, the REDD-plus programme was actively involved and supported development of this proposal, particularly component 1. The proposal has some elements of REDD-plus process (although this approach doesn't include the results-based payment but the ex-ante based payment). This funding proposal could contribute to ensuring the inclusiveness of all stakeholders, including the extremely poor, with the implementation of the REDD-plus programme. In conclusion, the successful implementation of this proposal could contribute to the implementation of the NDC action plan.

16. The most urgent need reported by the proposal is increasing the executing capacity of the Government of Paraguay to manage climate change related projects and programmes requiring the coordination of different governmental institutions. Lack of executing capacity could be a significant impediment to the development and implementation of the NDC action plan. The third component of the proposal aims to increase the management capacity of different governmental and other public institutions.

17. Although there has been increased public attention and effort to reduce deforestation and improve water resources management in recent years, progress has been slow and uneven because of weak enforcement of environmental legislation/regulations and limited institutional capacity, with overlapping and at times conflicting institutional responsibilities and weak governance. Land-use change and forest degradation are the largest contributors to GHG emissions in the country; at the same time, according to the financial proposal, agriculture is highly vulnerable to climate variability and, coupled with land degradation, contributes to increased volatility. The emission reduction potential is large, particularly through improved agricultural practices and reforestation. Carbon trading options are also worth exploring through continued efforts to develop the national REDD-plus programme.

1.5 Country ownership

Scale: High

18. Sembrando Oportunidades surveyed 260,602 households nationwide, of which 215,452 (83 per cent) are located in the eight departments of eastern Paraguay selected by PROEZA for their high social and environmental vulnerability.

19. The project falls in the priority target areas of the intended nationally determined contribution (INDC) of Paraguay. These target areas are:

20. A 10 per cent emission reduction by 2030 below the projected emissions level. This is an unconditional commitment made by the country and planned to be fulfilled through different national programmes, such as the special programme established in 2009 with the original purpose of planting 14 million trees (the actual planting was more than 40 million trees planted throughout the country). The current goal of the programme is to recover 1 million ha of forests; and

21. Sustainable forest management. In both the mitigation and adaptation parts of the INDC the forest sector is the priority. Regarding mitigation, the INDC document says that the sustainable management of forest ecosystems is to be promoted as well as reforestation activities to protect and create income, to ensure a reduction of the native forests loss and degradation process.

1.6 Efficiency and effectiveness

Scale: High

22. As explained in component 3, the effectiveness and efficiency of this proposal very much depends on the proper implementation and monitoring scheme, which is a key component of the proposal. Along with the enforcement of forest sector legislation facilitating the afforestation process and drawing more private sector players to this process through different incentives, the implementation process management scheme is also highlighted in component 3 as crucial for strengthening the executing capacity of the government, where strong coordination is required between different governmental agencies (in this case: the Ministry of Planning for Economic and Social Development, which is the national designated authority; the Ministry of Agriculture and Livestock; INFONA; the Social Action Secretariat; the Vice-Ministry of Mines and Energy; SEAM; and the Paraguayan Institute for indigenous

communities). Based on broad consultations among government institutions and other stakeholders, the proposal implementation management scheme was developed and is submitted in the funding proposal where the executive role of public institutions and local expertise is well demonstrated. This project component will also support enhanced inter-institutional policy implementation and governance in the forest, land-use, environmental and bioenergy through better coordination of regulating entities (INFONA, SEAM, SAS and VVME), which is considered crucial to promote sustainable bioenergy use, control illegal logging and deforestation, and to establish Paraguay's regime of payment for environmental services.

23. The GCF grant allocated for components 1 and 3 should save 2,675,370 tons of carbon dioxide equivalent (tCO₂eq) over 10 years (initial 5 years of PROEZA project intervention and an additional 5 years continuation by the government), which amounts to around USD 9 per tCO₂eq. This price is a little bit higher than that agreed by the Board (USD 5/tCO₂eq for results-based payments in the forest sector), but the high value of the social component of the project should be also taken into consideration. Based on this, the price could be considered as acceptable and efficient.

24. The GCF intervention period is five years, while the Government of Paraguay is pursuing a total intervention period of 10 years. With a USD 25.1 million investment from GCF, the government committed to mobilize in this initial five years USD 15.9 million from the Social Action Secretariat, SEAM and INFONA. Also, for component 2, the National Development Bank and the Development Financial Agency will ensure the availability of USD 49.33 million through national concessional loans for the private sector, focusing mainly on mitigation. The total co-financing will be in the amount of USD 65.2, which corresponds to a 1:2.6 ratio. As the government is pursuing a total intervention period of 10 years, including the PROEZA phase for five years, it is expecting to leverage an additional USD 134.9 million in the second five years, which amounts to USD 200.1 million for the 10 years. This corresponds to a ratio of 1:8 in resource leverage, which is quite effective for a country with a high share of its population in the poor category.

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II. Overall remarks from the independent Technical Advisory Panel

26. The independent TAP recommends the funding proposal for approval by the Board

Independent Technical Advisory Panel’s review of FP063

Proposal name:	Promoting private sector investments in energy efficiency in the industrial sector in Paraguay
Accredited Entity:	Inter-American Development Bank (IDB)
Project/programme size	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium/High

1. The proposed project aims to improve energy efficiency (EE) in the Paraguay industrial sector, particularly that of SMEs, by providing medium and long-term financing for EE investments. The project involves the financing of a total amount of USD 57.05 million, including USD 23 million in GCF fund, of which USD 3 million is in the form of a grant; USD 20 million from Agencia Financiera de Desarrollo de Paraguay (AFD), the executing entity; and USD 14.05 million in the form of equity contributions from SMEs at the sub-project level. The GCF fund will be intermediated by the Inter-American Development Bank, the accredited entity (AE), to AFD, against a sovereign guarantee granted by the Republic of Paraguay. The USD 20 million from AFD will be sourced from the AE.

2. The project adopts Energy Savings Insurance (ESI), a financial and guarantee scheme developed and currently being piloted by the AE in Latin American and Caribbean countries, including Colombia and Mexico, to promote EE investments. The ESI aims to mitigate the financial risk that SMEs assume in case the actual energy savings end up being lower than contracted. A similar scheme was presented in the funding proposal: El Salvador “Energy Savings Insurance for private energy efficiency investments by small and medium-sized enterprises” (FP009).

3. The ESI is a package of measures to mitigate various risks in EE investments, including poor technical capacity, absence of reliable performance validation, and lack of access to capital. Energy service and technology providers (ESTP), local financial institutions (LFIs), validators, and insurers will participate in this project. The validators and insurers provide critical technical and financial assurances to SMEs as their payment to ESTPs for service and equipment supply is subject to the validator’s endorsement. The insurers also provide comfort to SMEs and LFIs by guarantying a part of the LFIs loans to SMEs if the EE investment does not yield the expected savings or returns.

4. Approximately 70 per cent of primary energy production in Paraguay comes from two bi-national hydroelectric projects, which the country shares with Brazil and Argentina. Although these two projects equipped the country with sufficient power generation capacity, it was unable to tap the available capacity because of the delay in constructing high voltage transmission lines to transport energy to load centers. The government is implementing an ambitious plan to complete medium voltage transmission lines and distribution networks together with an additional hydroelectric plant (396MW). It will be implemented in 8 years, by 2025, with a total investment cost of USD 6.9 billion.

5. In Paraguay, 83 per cent of the energy consumed by the industrial sector comes from firewood (39 per cent) and biomass waste (44 per cent), causing the deforestation of virgin forests. The government has imposed a restriction on deforestation in the Oriental region where most of the industrial sector is located. As a result, the supply of firewood is declining, and the

price is increasing (by 3.5 times between 2008 and 2013). That trend is expected to continue as a similar restriction will be imposed on the Chaco region in 2018.

6. The project aims to promote EE in the sugar industry and non-metals production with a focus on ceramics and brickmaking, which are the largest energy consuming businesses in the industrial sector in Paraguay. The project proposes to promote the retrofitting and replacement of obsolete and low efficiency ovens, drying equipment, co-generation, and boilers fueled by firewood with higher efficiency, or electrical powered equipment.

7. The AE estimates the GHG emission reductions caused by project implementation to be 269,393 tCO₂eq per annum and 4,004,899 tCO₂eq over its lifetime. The total amount of energy to be saved is estimated to be 2,134 GWh over the project's lifetime.

8. These estimations were made based on the assumption that 365 SMEs will be supported in retrofitting or replacing ovens, drying equipment, co-generation, and boilers. Because the actual investments are not known ex ante, the assumptions are derived from a market study. The estimations and assumptions appear reasonable. The actual EE performance at a sub-project level will be monitored and verified.

9. The independent technical advisory panel (independent TAP) classifies the impact potential of the project as "Medium/High."

1.2 Paradigm shift potential

Scale: High

Contribution to the creation of an enabling environment

10. The project will introduce Paraguay a new business model for EE investments based on an innovative insurance scheme and financial/technical assistance. The ESI scheme effectively segregates EE investment risk from SMEs to enable LFIs to focus on lending against the former. Therefore, with the ESI scheme, SMEs can avail themselves of LFIs loan as long as their EE investment is bankable. Standardized methodologies and documents will be developed for effective technical validation and assessment and for financial contracts.

11. As a result of the project, EE investment will be recognized as a feasible and viable investment model and become a standard business practice for LFIs, SMEs, and ESTPs in Paraguay. Therefore, the project is demonstrational and contributes to the creation of an enabling environment for EE investment in Paraguay.

Potential for scaling up and replication

12. The project has potential for scaling-up and replication based on its technical and financial guarantee scheme, standardized financial instruments, and the market capacity that will be developed as a result of project implementation.

13. Although favorable terms and pricing are needed to incentivize LFIs (and ESTPs and SMEs) to participate in the ESI scheme promoted by the project in the short run, further expansion can be sustained with commercial financing and without public sector funding once LFIs, ESTPs, and SMEs increase their confidence and experience in EE investments.

14. The country's EE potential is estimated to be 1,000 GWh per year. The market expertise and experience generated by the project can be transferred and applied to other industrial sectors in Paraguay where additional efficiency gains can be expected from the replacement of inefficient, energy-intensive equipment.

Potential for knowledge and learning

15. During implementation, the project will carry out consultations with LFIs, ESTP, SMEs, and insurance companies to develop a package of standardized tools required for an ESI scheme. The tools will include a standard performance contract between SMEs and ESTPs, an insurance policy covering energy savings, and methodologies to monitor and evaluate energy savings at the project level.

16. During the project, the consultations will continue to receive feedback and to disseminate lessons learned, including the actual performance of each EE sub-project. Communication networks and platforms, and training facilities operated by the AE and AFD will be mobilized both internationally and locally. The AE plans to develop learning materials and organize events through banking and energy service providers' networks in the region. Through those consultations and activities, the project will contribute to the creation, enhancement and dissemination of market knowledge and experiences of effective EE investments.

17. Thus, independent TAP scales paradigm shift potential of the project as "High".

Contribution to regulatory framework and policies

18. The ARAF operation will reinforce the government regulatory framework and policies toward climate resilient agribusiness. Nevertheless, being a for-profit private sector investment fund, the ARAF's contribution to regulatory framework and policies will be indirect.

1.3 Sustainable development potential

Scale: Medium/High

Economic co-benefits

19. The project will reduce the production cost and increase the profitability of 365 SMEs by promoting EE and reducing energy costs. Additionally, 1,000 direct, indirect, and induced jobs are estimated to be created in Paraguay's EE sector. Since private sector business will be mobilized and LFI capacity will be enhanced, the project will contribute to both private sector and financial sector development in Paraguay.

Environmental co-benefits

20. By promoting EE in the industrial sector, which relies on firewood and biomass for 83 per cent of its energy consumption, the project will reduce the pressure on deforestation and forest degradation. The project will also contribute to the reduction of air pollution caused using obsolete and low efficiency equipment.

Social co-benefits

21. The project will contribute to the improvement of health and working conditions in the sector as a result of the reduced reliance on firewood, which will decrease air contaminants and labor accidents.

Gender-sensitive development impact

22. In Paraguay, women have notable representation in the labor force or management of SMEs, especially those in the ceramic industry. Accordingly, the project is expected to provide financial and social benefits to women in this sector.

23. The independent TAP assesses the project's sustainable development potential as "Medium/High".

1.4 Needs of the recipient

Scale: Medium/High

Absence of alternative source of financing

24. Paraguay's financial system is relatively liquid but lacks depth. Bank loans are generally short term (about 1.55 years) and carry high interest rates (around 26 per cent). Banks perceive EE investments to be risky due to their unfamiliarity with the technical and financial aspects of the investments. Lack of financial and operational information for SMEs also results in LFI's hesitancy to extend financing to SMEs and their EE investments. The long term and competitively priced financing required by SMEs for EE investments (and, more broadly, for capital investments) is not available in Paraguay.
25. The project will offer LFIs a financial package with a long tenor and concessionally priced funding and an ESI scheme that enables LFIs to lend and SMEs to invest in long term EE projects.
26. The independent TAP views needs of the recipient as "Medium/High".

1.5 Country ownership

Scale: Medium/High

Existence of a national climate strategy and coherence with existing plans and policies

27. The project is fully aligned with government strategies and policies, including the National Determined Contribution, National Development Plan 2014-030, National Energy Efficiency Plan (2014), and National Climate Change Plan.
28. The Nationally Determined Contribution (NDC) establishes a national goal of a 10 per cent reduction of GHG emissions and an additional 10 per cent of conditional of access to climate finance by 2030 .
29. The National Development Plan 2014-2030 includes, as its targets, the effective control of deforestation, increasing consumption of renewable energy, increasing efficiency in the agricultural system, and reducing deforestation and forest degradation.
30. The National Energy Efficiency Plan (2014) aims to promote EE measures in the use of steam and heat, cogeneration, technology improvements, technical assistance and capacity building for EE project implementation, and implementation of energy audits and systems of energy management.
31. National Climate Change Plan Phase1–Mitigation Strategy (2014) includes the promotion of EE measures, the provision of financial incentives, and the facilitation of access to finance to those that foster renewable energy generation. It further promotes strengthening institutional capacity to coordinate actions towards EE and the sustainable use of energy. Providing access to and the mobilization of financial resources to improve energy systems, including in the industrial sector, are also a part of the plan.

Existence of a national climate strategy and coherence with existing plans and policies

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Capacity of accredited entities and executing entities to deliver

37. Since 1961, the AE has provided almost USD 246 billion for projects in the region. Between 2006 and 2016, the AE approved over 1,751 projects, a total amount of USD 39.5 billion, including technical assistance related to climate finance (USD 16.2 billion), financial intermediaries (US 17.8 billion), and SMEs (USD 3.7 billion).

38. In Paraguay during the same time period, the AE has supported 57 projects (a total amount of USD 684 million) in climate finance (USD 162 million), financial intermediation (USD 414 million), SME development (USD 127 million). In the past, the AE has executed 5 successful loan operations for financial intermediation to SMEs and for housing with AFD. As of November 2017, the AE has disbursed USD 145 million for AFD operations.

39. The AFD is the only second tier public development institution and grant and loan executing entity for financial intermediation in Paraguay. It was created in 2005 through the unification of several credit entities of the Paraguay State. As of November 2017, AFD's portfolio of USD 593 million represents 4.35 per cent of the current portfolio of all the banks in the country.

40. As a public entity, AFD is part of several governmental consultative committees related to the country's development. Its unique position enables AFD to engage LFI and private investors to promote the government's critical development agenda.

41. The AE has been promoting green finance in partnership with regional national development banks including AFD. The AE's track record and experience with AFD provide strong justification for these two entities to work together to promote EE among SMEs in Paraguay.

Engagement with NDAs, civil society organizations and other relevant stakeholders

42. Since 2013, the AE has undertaken consultations with various government ministries and agencies, including the Ministry of Planning for Economic and Social Development, (National Designated Authority: NDA), Ministry of Environment, Ministry of Industry and Trade, Ministry of Mines and Energy, National Electricity Authority, and National Commission of Energy Efficiency. The consultations further included SMEs operating in the industrial sector, industrial organizations, LFIs, and environmental non-governmental organizations. The project design has taken into consideration the inputs received from these stakeholders during the consultations.

43. Further consultations will target national entities and the private sector to disseminate information about the project, including lessons learned, and harmonize efforts to foster EE in

the context of mitigation, combatting deforestation, and pursuing sustainable development in Paraguay.

44. The independent TAP scales the project's country ownership as "Medium/High".

1.6 Efficiency and effectiveness

Scale: High

Cost-effectiveness and efficiency

45. The AE estimates that the project's GHG emission reductions will be 269,393 tCO₂eq per annum and 4,004,899 tCO₂eq over its lifetime. The estimated cost per tCO₂eq and GCF cost per tCO₂eq are USD 10.75 and USD 5.75, respectively. As the AE stated, the project has a lower cost per ton of tCO₂eq reduced than similar projects in the region (and possibly outside of the region as well).

46. The concessionality and long tenor (i.e. 15 years) of the loan that GCF is requested to make to AFD will impact the interest rate and tenor of AFD loans to LFIs, and, in turn, on those that the LFIs provide to SMEs. The AE estimates that LFIs interest rates will be reduced from 8.3 per cent to 6.3 per cent. The final interest rates charged to SMEs by LFIs will include credit spread depending on each SME's risk and credit profile. The AE will monitor and report the actual interest rates charged to EE sub-projects and ensure that the GCF concessional interest rate is contributing to the intended purpose of enhancing the feasibility and bankability of EE investments.

47. The GCF loan will enable LFIs to extend long-term loans attractively priced which are critically necessary for EE investments to be viable. Accordingly, the proposed tenor and concessional interest rate for GCF financing are justified.

48. The project can be regarded as complementary to the "Poverty, Reforestation, Energy and Climate Change (PROEZA) project" in Paraguay being proposed by the Food and Agriculture Organization (FAO). The AE, FAO, and AFD have coordinated preparation of two interventions into the wood fuel market in Paraguay. The PROEZA project aims to promote the formalization of the production of wood and offer incentives to medium-sized land owners to invest in sustainable forest plantations. On the other hand, the project promotes switching from wood fuel to electricity, where possible, or the efficient use of wood fuel supplied from legal and sustainable sources. The project implementation can be enhanced through the continuous coordination between the NDA, AEs, executing entities, and government offices.

Co-financing, leveraging and mobilized long-term investments

49. The USD 20 million of GCF funding will be matched with another USD 20 million from AFD. In addition, the project will mobilize USD 14.05 million from SMEs in the form of equity contributions when EE investments are made. The cofinancing ratio of the GCF fund is therefore estimated to be 1.7x (or 1.5x if a USD 3 million grant from GCF is taken into account).

50. During the life of the project, the GCF fund will be recycled (or reused 2-3 times), as loans are repaid by the SMEs, to finance new EE investments. Therefore, the Project will mobilize additional capital from SMEs for new EE investments.

51. Applying the EE expertise that was accumulated by participating in the project, LFIs are expected to offer additional credit lines for EE investments. As a result, the cofinancing ratio of GCF fund could increase up to 2.5x (or 2.3x if GCF USD 3 million grant is included).

Financial viability

52. The AE estimates that the project is financial viable across all technologies under various sensitivity scenarios. However, in the early period of project implementation, while the

price of firewood remains competitive with that of electricity, the financial viability of equipment utilizing electricity remains unsatisfactory.

53. The financial analysis of the project shows that it has an economic rate of return of 136 per cent with the social cost of carbon emissions valued at USD 62/tCO₂ and a financial return of 74 per cent.

Application of best practices

54. The ESI model contains a comprehensive financial and guarantee structure that aims to address various bottlenecks commonly observed when EE investments are promoted. The ESI model is currently being piloted in Colombia and Mexico, and will also be implemented in El Salvador with GCF assistance. The model will evolve reflecting lessons learned and best practices developed and established through its implementation in Latin America and Caribbean. This will ensure that AFD is able to access and adopt best practices when implementing the project.

55. Accordingly the independent TAP considers efficiency and effectiveness of the project “High”.

II. Overall remarks from the independent Technical Advisory Panel

56. The independent TAP recommends the Board support the project as presented.

57. The project will promote EE in the Paraguay industrial sector, particularly SMEs, by providing medium and long-term financing for EE investments. The ESI, a new business model, will be introduced for EE investments based on an innovative insurance scheme and financial/technical assistance. The project will support 365 SMEs and create 1,000 direct, indirect, and induced jobs. It will also reduce the pressure on deforestation and forest degradation. The estimated cost per tCO₂eq and GCF cost per tCO₂eq are USD 10.75 and USD 5.75, respectively, which are considered lower than similar projects in the region. The concessionality and long tenor of GCF loan is justified.

58. The independent TAP notes that the project will allow LFIs to finance EE investments to replace obsolete and low efficiency equipment with those of higher efficiency powered by firewood. Taking into account the following, the TAP understands that the project is a reasonable and feasible option to contribute to the reduction of GHG emissions and ease the pressure of deforestation and forest degradation in Paraguay:

- (a) The government is promoting ambitious power transmission and distribution network expansions (76,237 km in total) and hydro power development critical for supplying power to load centers, but their completion is not scheduled until 2025. Additionally, the risk of delay in implementation cannot be eliminated given the magnitude of the plan and its USD 6.9 billion cost. Significant transformation of the equipment from firewood to electric powered would take place only around the time when the electricity supply is reliably ensured, i.e. beyond 2025.
- (b) The project will aim to promote the switch from wood fuel to electricity. It will support the replacement of equipment powered by fuel wood only when the electricity supply is unfeasible due to the lack of access to a transmission line and agriculture residue is economically unavailable.
- (c) The AE confirms that the supply and consumption of wood fuel of the sub-projects will be monitored and reported. The consumption is permissible only when from legal and sustainable sources, and the SMEs will be requested to certify and prove the origin of



wood fuel annually and upon request. Failure to provide certification will lead to the cancellation of the sub-loan.

Independent Technical Advisory Panel's review of FP064

Proposal name:	Promoting risk mitigation instruments and finance for renewable and energy efficiency investments
Accredited Entity:	Inter-American Development Bank (IDB)
Project/programme size:	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

- The proposed project aims to promote power generation from renewable energy (RE) sources, and to enhance energy efficiency (EE) in Argentina to reduce greenhouse gas (GHG) emissions.
- The energy intensity of Argentina is high relative to countries of similar income levels in South America. The Government of Argentina estimated that 43 per cent of the country's GHG emissions of 429 million tons of carbon dioxide equivalent (MtCO₂eq) comes from the energy sector. Power generation based on fossil fuel represents 66 per cent of the country's total power generation capacity of 33.8 GW. Renewable power generation accounts for 26.5 per cent from large hydropower, 1.4 per cent from small hydropower, and the balance from other sources, including solar, wind and biomass. The share of RE sources in Argentina remains low, if large hydropower generation is excluded, compared to its neighbouring countries.
- The project promotes investments in RE and EE subprojects to be implemented by small and medium-sized enterprises (SMEs) for a total of USD 430.64 million. The GCF loan of USD 100 million is provided through the Inter-American Development Bank (IDB), the accredited entity (AE) to Banco de Inversión y Comercio Exterior S.A. (BICE), the executing entity, against the government sovereign guarantee. BICE blends GCF funds with its own USD 60 million loan resource and, in turn, finances RE and EE subprojects directly (sub loans larger than USD 5 million) or via local financial institutions (LFIs). The GCF and BICE loans fund a revolving account and will provide a USD 298.75 million of debt in total to subprojects. A USD 128.04 million of private SME capital will be contributed at the subproject level during the project tenor of 20 years.
- In addition, as a part of the project, a USD 3.85 million technical assistance (TA) fund will be established with a USD 3 million GCF grant, a USD 0.25 million AE grant and a USD 0.6 million BICE in-kind contribution. The TA will support the implementation of the project by providing technical assistance to develop non-financial mechanisms to mitigate risks for SMEs, energy service and technology providers and LFIs in RE and EE investments.
- The project adopts different approaches in RE and EE. In RE, the project will develop and invest in biomass and biogas projects by providing financial and technical supports for SMEs. With the project, SMEs will receive a financial incentive in the form of a short-term loan from BICE to partially fund a technical and economic feasibility study of their subprojects. Following a satisfactory feasibility study, BICE will consider funding the subprojects directly or through LFIs. In the case the of non-implementation of the subproject, SMEs are not obligated to pay back the short-term loan from BICE.
- On EE, the project adopts energy savings insurance (ESI), a financial and guarantee scheme developed and currently being piloted by the AE in Latin American and Caribbean

countries, including Colombia and Mexico, for promoting EE investments. ESI aims to mitigate the financial risk that SMEs assume should actual energy savings end up being lower than contracted. The ESI scheme was included in the funding proposal “El Salvador: Energy Savings Insurance for private energy efficiency investments by small and medium-sized enterprises” (FP009).

7. The project will assist around 2,600 SMEs in investing in RE and EE. According to the AE estimation, a total of 455,517 tCO₂eq is expected to be avoided or reduced annually if the project is implemented. The aggregate expected reductions are about 9.1 MtCO₂eq over the lifetime of the subprojects, including the reduction in methane emissions. This is interpreted that around 21,300 tCO₂eq per USD 1 million investment over the lifetime of the project.

8. Because the specifics of the actual subprojects are not yet known, the AE estimation is based on an indicative portfolio of subprojects and technologies assumed to be financed by the project during its tenor. A standard conversion factor for each technology is established and used. The methodologies and assumptions are detailed and supported by the feasibility analysis. The AE will update them with real values as the project implementation advances. The assumptions and estimations are considered to be feasible and achievable.

9. The total estimated direct and indirect beneficiaries are based on expected beneficiary SMEs as well as new jobs created. The project will create more than 1,950 additional direct and indirect jobs.

10. Given the large number of SMEs, and RE and EE subprojects to be realized by the project during its tenor, the project can deliver significant impact in GHG emission reduction in Argentina. Accordingly, the independent Technical Advisory Panel (independent TAP) rates the project impact potential as “high”.

1.2 Paradigm shift potential

Scale: High

Contribution to the creation of an enabling environment

11. The project promotes RE and EE investments in Argentina by helping SMEs and LFIs to overcome financial and technical barriers and to increase expertise and confidence in the markets. More specifically, the project supports SMEs to develop RE/EE subprojects and LFIs to assess the technology and credit of RE and EE subprojects. As the project demonstrates the viability and profitability of RE and EE sectors, SMEs and LFIs will actively pursue RE and EE investments. As a result, the project is able to contribute to the creation of an enabling environment that will advance RE and EE investments in Argentina in the long term.

Contribution to regulatory framework and policies

12. The project supports and reinforces public policy priorities related to climate change, efficient energy use, and productivity upgrading set by the government. While it is fully in alignment with the government strategies and policies, the project contribution to regulatory and policy framework will be indirect.

Potential for knowledge and learning

13. As the project advances in its implementation, the AE will generate and aggregate data so as to demonstrate results. Lessons emerging from RE and EE subprojects and activities financed by the project (and other similar programmes in the region) will be shared through regular knowledge exchange platforms and conferences operated and participated by the AE and BICE.

14. Industry associations will be involved during the development of the market instruments and subsequent dissemination of lessons learned. Given similar ongoing programmes generating knowledge and lessons, and the AE's broad network and operation in the region, potential for creation and dissemination of knowledge and learning can be assured.

15. The project will introduce and promote an innovative financial and technical framework for RE and EE investments in Argentina. While its contribution to the regulatory environment will be indirect, the project can generate momentum and create new markets where the private sector can function on its own in the medium to long term. Accordingly, the independent TAP considers the paradigm shift potential of the project to be 'High'.

1.3 Sustainable development potential

Scale: Medium/High

Economic co-benefits

16. The project will support around 1,375 SMEs to develop and finance their RE investments with a technical and financial support for undertaking feasibility study and securing long term financing. With the project's support, 114 MW of renewable power generation will be developed easing the country's reliance on fossil fuel based power generation, and as a result reducing electricity subsidies and fuel imports.

17. Through its EE intervention, the project will help to enhance the competitiveness of around 1,270 SMEs that invest in EE, as their operations will become more cost effective.

18. The project will promote the development of the power sector through the use of sustainable energy sources, and the banking sector by enhancing access to finance, both with private sector participation.

Environmental co-benefits

19. The implementation of RE and EE projects contributes to the improvement of local and regional air quality, as air pollution from energy generation includes Sulphur dioxide (SO₂), nitrogen oxide (NO_x), and mercury (Hg), in addition to GHG emissions. The AE estimates the annual reduction of those pollutants to be expected by the project is 4,752 t of SO₂, 766 t of NO_x, and 14 t of Hg.

Social co-benefits

20. The project will help to create new sources of employment during its tenor, and increase the competitiveness of SMEs in RE and with EE. The project will support more than 2,600 SMEs, as well as create more than 1,950 additional local jobs in Argentina.

Gender-sensitive development impacts

21. The AE will explore methodologies to monitor and promote impacts and awareness with respect to women's participation in RE and EE sectors. A gender-disaggregated baseline setting study of financial services for women-led SMEs will be conducted.

22. Awareness-raising, training and capacity-building campaigns under the project are expected to promote the participation of women through the development and implementation of RE and EE subprojects.

23. The project generates at least 200 additional jobs for women. Training for BICE staff and technical validators in the TA will include at least 20 per cent women.

24. Given the project's broad economic impacts on the power development and SME sectors as well as on the environment, the independent TAP scales the project's sustainable development potential as "medium/high".

1.4 Needs of the recipient

Scale: High

Absence of alternative source of financing

25. Despite the government's strategy to promote RE and EE, sustainable energy financing in Argentina remains in an early developmental stage. There are few local banks offering financial products or actively marketing the benefits of RE or EE investments.

26. The financial market in Argentina is relatively liquid but with short-term financing. As of 2016, loans of up to one year consisted of 92.8 per cent of the banking sector portfolio, while long-term loans (more than four years) represented only 0.5 per cent. This is regarded as a general reflection of bank deposits where loans of less than one year represent 99.3 per cent. The lending interest rate of banks in general is also high (25 per cent in 2016) as well as its intermediation spreads (over 10 per cent in 2016) partially caused by high administration and operational costs.

27. In such an environment, LFIs are unwilling to extend long-term loans especially to SMEs due to their credit profile and high transaction cost. The lack of knowledge and expertise in technology and financing further causes LFIs to perceive the RE and EE investments to be of high risk.

28. High transaction costs lead international financial institutions to prefer large projects and not small- or medium-sized RE/EE subprojects promoted by SMEs.

29. It appears to be clear that the long-term financing that the project aims to provide is currently scarce and critically needed for small- and medium-sized RE/EE subprojects in Argentina. Therefore, the independent TAP considers the needs of the recipient to be 'High'.

1.5 Country ownership

Scale: Medium/High

Existence of a national climate strategy and coherence with existing plans and policies

30. The country's intended nationally determined contributions (INDC) sets the goal to reduce its GHG emissions by 18 per cent by 2030 with respect to projected 'business as usual' emissions for that year and includes actions related to EE and RE. The government further considers it achievable to increase Argentina's GHG reduction goal to 37 per cent, if international financing is made available, and technology transfer and development as well as capacity-building are attained.

31. To meet its INDC targets, the government has initiated a comprehensive plan for improving and developing regulations. The national law enacted in 2016 aims to increase the share of RE capacity in the total generation from 1.8 per cent in 2016 to 8 per cent and 20 per cent in 2018 and 2025, respectively. Regulatory and financial supports were also established to promote private-sector investments in the sector. Under the programme called RenovAr, private-sector proposals for RE projects were solicited. As part of the government supports, a sector-specific trust fund was established to provide guarantees and debt-financing to RE projects for BICE to manage.

32. The government has also taken steps to encourage industries to increase investments in EE initiatives. In particular, SMEs that carry out energy diagnoses or implement EE projects can be financially supported under the government programme.

33. The project is in line with Argentina's government objective to increase RE share in power generation and to promote EE in the industry sector to achieve the targets included in its INDCs.

Capacity of accredited entities and executing entities to deliver

34. Since 1961, the AE has provided almost USD 246 billion for projects in Latin America and the Caribbean. Between 2006 and 2016, the AE approved over 1,751 projects for a total of USD 39.5 billion, including technical assistances, in relation to climate finance (USD 16.2 billion), financial intermediaries (USD 17.8 billion), and SMEs (USD 3.7 billion).

35. In Argentina, 78 projects totaling USD 2.3 billion relating to climate finance, financial intermediation and SME development have been supported by the AE between 2006 and 2016. In addition, the AE has committed or is exploring funding eight large-scale renewable plans through its non-sovereign window totaling USD 300 million in Argentina.

36. BICE is a national development bank owned by the federal government focusing mainly on promoting investments and foreign trade and channelling its transactions through commercial banks as a second-tier banking institution. In Argentina, BICE is a source of long-term financing in the financial system, offering terms that are considerably longer than the average available from the market.

37. The AE has been promoting climate finance in partnership with national development banks in the region. The capacity and track record of both the AE and BICE can contribute to the success of the project.

38. BICE provided its co-financing commitment letter in April 2017.

Engagement with national designated authorities, civil society organizations and other relevant stakeholders

39. During project preparation, the AE undertook various discussions and meetings with the government ministries and agencies, including the Ministry of Environment and Sustainable Development, the Ministry of Energy and Mining, and the Ministry of Agroindustry. LFIs, SME investors, technology providers and industry associations have been consulted as well. The consultations will continue during project implementation.

40. The Argentine national designated authority provided a non-objection to the project in December 2017.

41. The project is in alignment with the government strategies and policies to enhance the country's commitments in its INDC. The RE and EE investments are recognized as a part of the government strategy, while the government regulatory and financial supports in EE remains at an early stage. The independent TAP considers the project's country ownership to be 'Medium/High'.

1.6 Efficiency and effectiveness

Scale: High

Cost-effectiveness and efficiency

42. The AE estimates that the project's GHG emission reductions will be 269,393 tCO₂eq per annum and 4,004,899 tCO₂eq over its lifetime. The estimated cost per tCO₂eq and GCF cost per tCO₂eq are USD 10.75 and USD 5.75, respectively. As the AE stated, the project has a lower cost

per ton of tCO₂eq reduced than similar projects in the region (and possibly outside of the region as well).

43. The concessionality and long tenor (i.e. 15 years) of the loan that GCF is requested to make to AFD will impact the interest rate and tenor of AFD loans to LFIs, and, in turn, on those that the LFIs provide to SMEs. The AE estimates that LFIs interest rates will be reduced from 8.3 per cent to 6.3 per cent. The final interest rates charged to SMEs by LFIs will include credit spread depending on each SME's risk and credit profile. The AE will monitor and report the actual interest rates charged to EE sub-projects and ensure that the GCF concessional interest rate is contributing to the intended purpose of enhancing the feasibility and bankability of EE investments.

44. The GCF loan will enable LFIs to extend long-term loans attractively priced which are critically necessary for EE investments to be viable. Accordingly, the proposed tenor and concessional interest rate for GCF financing are justified.

45. The project can be regarded as complementary to the "Poverty, Reforestation, Energy and Climate Change (PROEZA) project" in Paraguay being proposed by the Food and Agriculture Organization (FAO). The AE, FAO, and AFD have coordinated preparation of two interventions into the wood fuel market in Paraguay. The PROEZA project aims to promote the formalization of the production of wood and offer incentives to medium-sized land owners to invest in sustainable forest plantations. On the other hand, the project promotes switching from wood fuel to electricity, where possible, or the efficient use of wood fuel supplied from legal and sustainable sources. The project implementation can be enhanced through the continuous coordination between the NDA, AEs, executing entities, and government offices.

Co-financing, leveraging and mobilized long-term investments

46. The USD 20 million of GCF funding will be matched with another USD 20 million from AFD. In addition, the project will mobilize USD 14.05 million from SMEs in the form of equity contributions when EE investments are made. The cofinancing ratio of the GCF fund is therefore estimated to be 1.7x (or 1.5x if a USD 3 million grant from GCF is taken into account).

47. During the life of the project, the GCF fund will be recycled (or reused 2-3 times), as loans are repaid by the SMEs, to finance new EE investments. Therefore, the Project will mobilize additional capital from SMEs for new EE investments.

48. Applying the EE expertise that was accumulated by participating in the project, LFIs are expected to offer additional credit lines for EE investments. As a result, the cofinancing ratio of GCF fund could increase up to 2.5x (or 2.3x if GCF USD 3 million grant is included).

Financial viability

49. The AE estimates that the project is financial viable across all technologies under various sensitivity scenarios. However, in the early period of project implementation, while the price of firewood remains competitive with that of electricity, the financial viability of equipment utilizing electricity remains unsatisfactory.

50. The financial analysis of the project shows that it has an economic rate of return of 136 per cent with the social cost of carbon emissions valued at USD 62/tCO₂ and a financial return of 74 per cent.

Application of best practices

51. The ESI model contains a comprehensive financial and guarantee structure that aims to address various bottlenecks commonly observed when EE investments are promoted. The ESI model is currently being piloted in Colombia and Mexico, and will also be implemented in El Salvador with GCF assistance. The model will evolve reflecting lessons learned and best

practices developed and established through its implementation in Latin America and Caribbean. This will ensure that AFD is able to access and adopt best practices when implementing the project.

52. Accordingly the independent TAP considers efficiency and effectiveness of the project “High”.

II. Overall remarks from the independent Technical Advisory Panel

53. The independent TAP recommends that the project be supported by the Board as presented.

54. With a USD 100 million long term GCF loan (plus a USD 3 million grant), the project promotes RE and EE investments to reduce GHG emissions in Argentina. It aligns with the government strategies and policies supporting the country’s commitments in its INDC.

55. The project will introduce an innovative financial and technical framework in which more than 2,600 SMEs will develop RE and EE sub-projects. The total value of RE and EE assets to be financed by the project will be USD 426.79 million (excluding USD 3.85 million GCF grant financing and co-financing from BICE and IDB for TA) during the project’s 20-year tenor. Unavailability of long term finance for SMEs is regarded as a deterrent to developing small- or medium-sized RE and EE projects in Argentina. The success of the project will help RE and EE sectors to mobilize even more funding from LFI and SME investors.

Independent Technical Advisory Panel's review of FP065

Proposal name:	Financial Instruments for Brazil Energy Efficient Cities (FinBRAZEEC)
Accredited Entity:	World Bank (WB)
Project/programme size:	Large

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. The concept of the considered funding proposal is to develop and implement new financial schemes for supporting energy efficient projects in municipal street lighting and urban industrial facilities. The funding proposal falls in the GCF result area “buildings, cities and industries and appliances”. The project lifespan is 15 years.
2. The funding proposal has two components: the establishment of an energy efficiency debt facility (financial instruments for Brazil energy efficient cities, or FinBRAZEEC), with a street lighting window and an industrial energy efficient window, and a grant component for technical assistance (TA) to finance the initial start-up costs of the facility.
3. By bringing in private sector financing through the FinBRAZEEC facilities, the project can overcome one of the key barriers for implementing a light-emitting diode (LED) modernization project: upfront financing costs under a constrained budget and the balance sheet conditions of municipalities.
4. The funding proposal is expected to finance public street lighting in about 36 average-size cities (42,500 points of light and population of 470,000). This modernization is expected to cover 100 per cent of each city over a two-year period, instead of 30 per cent over the 13 years of the technology’s lifetime as proposed in the baseline situation. By replacing mercury and sodium lamps with LEDs, cities can achieve electricity savings ranging from 50 to 80 per cent and operation and maintenance (O&M) savings of about 40 per cent.
5. The industrial energy efficient window plans to finance about 14 portfolios (each with different technologies) of industrial energy efficiency projects. Studies carried out for the assessment of the baseline situation showed that potential savings range from 8 to 40 per cent of current energy consumption in fossil fuel-based thermal processes. For simplification, it was assumed that the implementation of a large industrial energy efficiency (IEE) program would involve the scaling up of a series of notional “project portfolios”. Each project portfolio encompasses 10 different technology/process interventions (e.g. heating, ventilation, and air conditioning; energy efficient motors; heat recovery; variable speed pumps; etc.), based on audited projects among industrial clients. Each project portfolio represents a typical set of interventions in the industrial energy efficiency space, which may be “scaled up” in modules depending on the availability of financial resources. For this analysis, very high-capital intensive projects, such as cogeneration facilities, were not included in the project portfolio. The idea was to start with faster payback projects able to generate sufficient returns to both the Special Purpose Vehicles¹ (SPV) and the host client from industry sector and still generate cash that can be used to reinvest in new projects. The current list of projects identified by the Brazilian

¹ Set up by the private sector, which will be granted concessions by the municipalities to modernize and operate the street lighting system on a Public Private Partnership (PPP) basis.

Association of Large Energy Users & Free Customers (ABRACE) members range from small projects of about USD 6,000 to very large projects, such as a new cogeneration facility for recovery of industrial gases, which would require about USD 14 million. Each portfolio represents an investment of about USD 39 million.

6. It is important to highlight that the industrial part of the project was initiated by the National Confederation of Industries (CNI) and ABRACE together with the World Bank, and it aims to develop a new business model to scale up energy efficiency in Brazil. The involvement of this local association and the preliminary survey they conducted imparts high confidence to the project implementation scheme and ensures the success of the project.

7. There are about 150 ideas, opportunities and projects in different stages of maturity². Among these projects, reduction in electricity and natural gas represents the largest share of the opportunities – about 80 per cent of the total. The remaining share is mostly concentrated on fuel oil, diesel, coal and coke. The ratio between thermal projects and electricity projects is approximately 60:40.

8. Annual emission reduction to the end of the project is anticipated to be 2.1 million tons of carbon dioxide equivalent (tCO₂eq). This is 0.2 per cent of Brazil's voluntary contribution by 2020 (1 gigaton of CO₂eq). The direct impact of the funding proposal on the country's voluntary emission reduction target by 2020 is not high (because the highest emissions that Brazil has is in the land use, land-use change, and forestry sector, and is caused by a high rate of deforestation), but the project is planned to be implemented over 15 years and has the potential to double and triple its impact, contributing to the 2025 target.

9. The impact of this project is more impressive when viewing the annual per capita emissions reductions target by 2025 compared with 2012, which is 0.3 tCO₂eq.³ Taking into consideration that the per capita⁴ reduction for the project will be about 0.01 tCO₂eq and the share of energy sector emissions in total emissions is about 35 per cent,⁵ the contribution of this pilot project to the total per capita emissions reduction will be 3 per cent, and for the energy sector the per capita reduction will be 9 per cent. These results should be considered as high considering the cost of reduction described in section 6 of this assessment.

1.2 Paradigm shift potential

Scale: Medium

10. The funding proposal will perhaps not be a champion in the paradigm shift process, but it can play a significant role in the acceleration of the energy efficiency implementation process in Brazil and significantly contribute to the reduction of greenhouse gases (GHGs). In particular, if in a business-as-usual (BAU) scenario only 30 per cent of municipal street lighting could be modernized over the 13 years of a technology's lifetime for the average city, as used in this analysis, in the project situation the total inventory will be modernized in two years, including smart grid installations increasing the lifetime of LEDs by one year. Regarding IEE, a conservative estimate conducted for the project scenario shows that only eight years (seven years for the project implementation) are considered for accounting GHGs, assuming that all the

² Feasibility Study (annex 2).

³ Per capita emissions decreased from 14.4 tCO₂eq (GWP-100; IPCC AR5) in 2004 to an estimated 6.5 tCO₂eq (GWP-100; IPCC AR5) in 2012. Brazil's per capita emissions will decline further to an estimated 6.2 tCO₂eq (GWP-100; IPCC AR5) in 2025. (NDC).

⁴ The population of Brazil in 2017 was 208 million.

⁵ Second Biennial Updated Report (BUR) of Brazil, 2012.

inefficient industrial technologies considered within the funding proposal would be anyway replaced by energy efficient technologies during this eight years period.

11. Considering the description in the funding proposal, there is a significant market for efficient public street lightening (PSL) and industry in Brazil. Another positive element of the funding proposal for changing the existing situation is the development of a new product: the “off-balance sheet financing mechanism”. This “off sheet leasing” financial mechanism is combined with a very strong TA component provided to municipalities and industrial facilities to create new energy efficient, lower risk products, increasing the replication potential in both sectors (PSL and IEE). This new “off-sheet leasing with TA component” will be offered by the project to the Brazilian technological market for acceleration of the energy efficiency process in the country.

12. In practical terms, the project offers to replace typical energy service companies (ESCO) implementation modality and other intermediaries with new “financial establishments and schemes” (a new type of ESCO⁶).

1.3 Sustainable development potential

Scale: Medium/High

13. Urban energy efficiency is targeted by the project and therefore contributes to the sustainable energy development of cities, which is an important initiative (Covenant of Mayors) launched by the European Union cities in 2008 and which received global acknowledgment and scale in Paris in 2015. At the local level, the funding proposal contributes to the improvement of local air quality and health through implementation of IEE projects in urban areas of Brazil (contributing to Sustainable Development Goals, or SDGs, 3, 9, and 11).

14. Replacing existing high-pressure sodium, mercury vapour, and metal halide luminaires with LEDs will result in a reduction of about 146 kilograms (kg) of mercury equivalent, thus avoiding its disposal in landfills and related consequences (contributing to SDGs 3, 6, and 12).

15. Improved street lighting will contribute to the safety of the population, particularly women and girls, and to the gender equity process (contributing to SDG 5).

1.4 Needs of the recipient

Scale: High

16. Brazil is an urban-industrial country. Despite the evolution of economic and social indicators in recent years, Brazil is still a developing country with a growing population and several challenges related to poverty eradication, education, public health, employment, housing, infrastructure and access to energy.

17. In its NDC, Brazil commits to reduce its GHGs below 2005 levels by 37 per cent in 2025 and by 43 per cent by 2030. Under the implementation means section of the NDC, the country states that, “The implementation of Brazil’s NDC is not contingent upon international support, yet it welcomes support from developed countries with a view to generate global

⁶ This ESCO-like arrangement offered in funding proposal has some unique features. It is not a financial institution, but it will acquire, install and own the assets. It will be repaid via a fixed fee (as much as possible, as accounting rules permit) and will also guarantee savings to the host company. No other institutional model combines all those features that are so relevant to meet the identified market needs to scale up energy efficiency among large industries in Brazil.

benefits". This funding proposal generates significant global benefit and have high potential for large-scale replication as minimum in Brazil.

18. Based on a recommendation from the Intergovernmental Panel on Climate Change (IPCC)⁷ to keep temperatures below 2 °C relative to pre-industrial levels, the Brazilian NDC focuses on three main areas for GHG reduction: increasing the share of sustainable biofuels in the Brazilian energy mix to approximately 18 per cent by 2030 by expanding biofuel consumption; restoring and reforesting 12 million ha of forest by 2030 and enhancing sustainable native forest management systems; achieving 45 per cent renewables in the energy sector by 2030, including 10 per cent efficiency gains in the electricity sector by 2030 among other measures. In addition, the NDC commits to promoting new standards of clean technology and further enhancing energy efficiency measures and low carbon infrastructure in the industry sector.

19. This background explains the country's priorities for GHG mitigation in its NDC. It is logical that IEE has relatively limited government support, as is outlined in the feasibility study. Brazil has different energy efficiency programs, such as PROCEL⁸ (Nationally Appropriate Mitigation Action), which is focused on the public sector and in buildings, and programa de Eficiência Energética (PEE), which is focused on low-income customers and has not been able to finance large-scale projects in the industrial sector.

20. As it was highlighted above the industrial part of the project was initiated by the National Confederation of Industries (CNI) and the Brazilian Association of Large Energy Users & Free Customers (ABRACE) aimed at developing a new business model to accelerate scaling up energy efficiency in Brazil. Brazilian industrial associations have carried out several studies demonstrating the high potential and needs for IEE and GHG emissions reductions.

21. The main needs identified for municipalities along with the TA are financial constraints and very strict limits on borrowing, in particular now that the country is imposing an austerity program to reduce fiscal deficits at federal, state and municipal levels.

1.5 Country ownership

Scale: Medium

22. Country ownership is confirmed in the no-objection letter provided by the national designated authority of Brazil, which is the Secretariat for International Affairs, Ministry of Finance. The no-objection letter confirms that the concept that aims to develop innovative instruments to finance climate change mitigation in Brazil and leverage significant resources from the public and private sectors is in alignment with Brazil's priorities for GCF.

23. The executing entity for the project implementation is Caixa Econômica Federal (CEF), a state-owned bank, which has historically focused on municipality needs, including housing, waste management, water and sanitation, and, more recently, public street lighting. According to the funding proposal, CEF has successfully worked with the World Bank in the past in promoting the development of new financial products in the municipal and energy efficiency spaces.

⁷ IPCC, 2014: Summary for Policymakers. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. SPM 4.1, pp. 10-12.

⁸ The National Energy Conservation Programme

24. Beneficiaries of the project include: municipal authorities and industrial facilities. Associations of industries were closely involved in preparation of this funding proposal from the very beginning, which is well described in the feasibility study along with the results of these consultations. The project team worked with the municipalities involved in the street lighting component, agreeing on the assumption and discussing the findings and recommendations. Regarding IEE, the World Bank was approached by the ABRACE and CNI to discuss alternatives for improving efficiency among large industrial users. As is stated in the funding proposal, significant work has been carried out in the design of the industrial energy efficient window; studying and planning the organization, processes, systems, governance, and pricing criteria; and preparing detailed technical, economic, and financial feasibility analyses.

1.6 Efficiency and effectiveness

Scale: High

25. The total project cost is USD 1,306 million. USD 9 million (0.7 per cent of the total cost and 4.6 per cent of the GCF share) is a grant from GCF. Ninety-five per cent of the total investment from GCF (USD 195 million) is a loan. The total estimated leverage of the GCF investment is about 1:5.7. This means every dollar of GCF funding (loan plus grant) will secure USD 5.7 of additional funding for the project from both the public (35 per cent) and private (65 per cent) sectors. The private sector is necessary to bring scale to investments in energy efficiency in these sectors in Brazil.

26. Total emissions reduction equals 17.4 MtCO₂eq, calculations are very conservative and take into consideration the ongoing processes in EE market. Therefore, the ER calculation considers only eight years of emissions reductions for IEE projects and only 13 years of emissions reductions for PSL projects; only acceleration is taken into consideration in this calculation. Considering that the GCF grant is USD 9 million, the cost per tCO₂eq reduction is USD 0.52⁹. Consequently, it could be said that this would be one of the cheapest projects for GCF if planned figures are really reached.

27. Active involvement of the local industry sector association in the preparatory stage increases confidence that the project will be implemented successfully and effectively, avoiding the unsuccessful results of the other energy efficiency projects analysed in the funding proposal (section E.6) that were planned to be implemented but were finally going to “easy pathway”.

28. Having individual windows and separate implementation processes for PSL and IEE increases the project’s potential to be implemented effectively and reach high efficiency. Measuring, verification and monitoring systems will contribute to reaching the planned results.

II. Overall remarks from the independent Technical Advisory Panel

29. The independent Technical Advisory Panel recommends the funding proposal for approval by the Board.

⁹ Usually technological risks in IEE projects are high. The funding proposal has calculated cost per tCO₂eq reduced by the project for total investment (USD 63.0/ tCO₂eq) and for total GCF money (USD 10.7/tCO₂eq), which is also efficient.

Independent Technical Advisory Panel's review of FP066

Proposal name:	Pacific Resilience Project Phase II for the Marshall Islands
Accredited Entity:	World Bank
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. This funding proposal is for an adaptation approach that is not traditional to this type of shore protection project in the Pacific Islands, and which therefore constitutes a paradigm shift in adaptation for the region. In addition, the proposal presents a well-prepared feasibility study that reveals the high impact and high sustainable development potentials. The needs of the recipient are high, and the project is part of the Joint National Action Plan on Climate Change and Adaptation Disaster Risk Management (JNAP) and the national climate change policy. The accredited entity (the World Bank) has extensive experience of this type of project and specifically in disaster risk management and adaptation projects in the Caribbean and the Pacific region. The executing entities, the Ministry of Finance (MoF) and the Ministry of Public Works (MPW), have limited capacity to implement a project of this kind. However, given that the project is part of the World Bank regional Pacific Resilience Program (PREP), it will receive technical and implementation support from the Secretariat of the Pacific Community (SPC) and the Pacific Islands Forum Secretariat.

Adaptation impact

2. It is estimated that there will be 16,000 direct beneficiaries of the project's activities, comprising 10,000 inhabitants of Ebeye (90 per cent of the population of the Marshall Islands) who will benefit from coastal protection works and 6,000 inhabitants of outer islands who will benefit from the improvement of the early warning system (EWS). The indirect beneficiaries are estimated to be 23,800.¹ It is not clear how the estimation for the indirect beneficiaries was calculated.

3. The early warning component is not appropriately described in the proposal, nor in the feasibility study², which includes only the coastal protection works on Ebeye. The only reference to baseline and targeted coverage for EWS on outer islands (30 per cent and 70 per cent, respectively) is given on a brief description of outcome indicator 7.2.³

4. Although the project will allocate almost USD 7 million to coastal protection works in Majuro, such activities are not described in the proposal.

5. The proposed project includes several activities related to the strengthening of institutional and regulatory systems, including: (i) institutional strengthening of the agencies responsible for implementing the JNAP; (ii) support to the government to integrate climate change adaptation with disaster risk management; (iii) the establishment of working groups at central and local government levels; (iv) extensive training, coaching and support for existing

¹ Funding proposal, page 31.

² Annex 2-Feasibility_study_Coastal_risk_assessment_RMI-WB.pdf

³ Funding proposal, page 58.

and new staff of the National Disaster Management Office (NDMO); (v) modernization of NDMO facilities; and (vi) the establishment of a contingency emergency response component (CERC) to quickly disburse funds in order to meet immediate needs to finance critical imports and emergency recovery or reconstruction works and associated services following the proclamation of a state of emergency.⁴

6. The project does not include activities to increase the generation of climate information. The EWS component is focused only in the dissemination of climate information. The proposal states that detecting, forecasting and warning of natural hazard events is relatively well established in the country, with support from the American scientific agency, National Oceanic and Atmospheric Administration.⁵

7. If adequately implemented, the proposed project activities are expected to reduce significantly the exposure of the benefited population to climate risks.

8. Under component 2.2 of the proposal, activities will be carried out to improve coastal risk information, which will constitute a crucial input for land-use planning, the development of coastal resilience policies and action plans, and the future design of coastal protection works.⁶

9. Maintenance expenses for the coastal protection works are considered to be insignificant. Regarding equipment for the EWS, there are no provisions to cover operation and maintenance expenses beyond the project implementation period. The proposal mentions that the project will provide guidance to the key ministries (MoF, MPW) to ensure sufficient budget allocation for the maintenance of early warning and forecasting systems and for existing coastal protection infrastructure.⁷

1.2 Paradigm shift potential

Scale: High

Potential for knowledge and learning

10. Key indicators used for monitoring and evaluation are correctly described in the proposal.

11. An independent assessment will be performed after two years of project start to evaluate project progress, coherence with other phases of the programme, the role of the different partners, and the possible reorientation of the project to ensure the achievement of its objectives.⁸

12. Implementation agencies will be in charge of the monitoring and evaluation of project activities under their command. NDMO/Chief Secretary Office will oversee activities under component 1, MPW will oversee activities under component 2, MoF will oversee activities under component 3, and the Project Implementation Unit (within MoF) will oversee activities under component 4.⁸

13. Given the substantial amount of money allocated for project management (USD 3.2 million), it is recommended that all monitoring, evaluation and reporting activities are centralized under the command of the Project Implementation Unit, which is in charge of project management.

14. There are no specifications on how reporting will be done.

⁴ Funding proposal, page 15.

⁵ See footnote 3 above.

⁶ Funding proposal, page 20.

⁷ Funding proposal, page 30.

⁸ Funding proposal, page 60.

15. The sharing of knowledge and lessons learned will be facilitated by the involvement of the SPC and the regional platform, which is being developed under the PREP Phase I.

Contribution to the creation of an enabling environment

16. The proposed project will invest in a variety of capacity-building activities, which will ensure that technical capacity does not represent a barrier to project sustainability beyond the project implementation period.

Contribution to the regulatory framework and policies

17. The project activities significantly contribute to the implementation of the JNAP. Contributions to the JNAP objectives are clearly defined on the proposal under the description of each project component. The project will support the development and adoption of procedures to clarify the governance mechanisms of the JNAP.

18. The institutional strengthening activities discussed in paragraph 5 above will contribute to the enhancement of the regulatory framework.

19. Support to the NDMO under component 1.2 will include the preparation of operating procedures, training records, drills and response plans, and the development of best practice guidelines on emergency coordination, preparedness and response for all emergency services.

20. Project activities include the development and implementation of standard operating procedures for early warning observation and communication stations in outer islands.⁹

Potential for scaling up and replication

21. Almost half of the project funding and 89 per cent of the GCF grant will be used for strengthening coastal protection through non-innovative civil engineering works on Ebeye and Majuro. However, this work could be considered moderately innovative because it would be the first of its kind on low-lying atoll islands in the Pacific.

22. There is a potential for scaling up in other areas of the country without equally increasing the costs, because project activities related to institutional strengthening would not be necessary.

23. Replication of the project on other islands in the Pacific will benefit from lessons learned, but would probably involve equally increasing costs.

1.3 Sustainable development potential

Scale: High

Environmental co-benefits

24. The proposal includes provisions for a study to identify and quantify sustainable local sources of aggregates and evaluate methods of extraction. The outcomes of the study have the potential to reduce the negative impacts of this activity.

25. Ecosystem-based solutions, which are evaluated under component 2.2, have great potential for environmental co-benefits. However, the implementation costs for this type of approach are not considered in the budget of the present proposal.

Social co-benefits

⁹ Funding proposal, page 14.

26. Coastal protection works will have a positive impact on safeguarding public infrastructure such as schools, health clinics, water supply and the wastewater treatment plant.

27. The CERC (component 3) will improve preparedness and capacity to immediately respond to low- and medium-scale disasters, thereby reducing the negative impacts of disasters on the most vulnerable population.

Economic co-benefits

28. The most significant economic co-benefits are the reduction of expected annual damage. For the coastal protection alternative chosen by the proponent (options 7 and 8 of the feasibility study) the reduction in expected annual damage was estimated to be USD 700,000. However, the estimation of the expected annual damage is mostly based on theoretical data and, as stated in the feasibility study,¹⁰ it is mainly focused on the relative effect that the different alternatives will have on the expected damage rather than on absolute values. Therefore the use of these values of expected annual damage as absolute values for a cost-benefit analysis may involve a considerable error.

29. Damage inflicted upon exposed property was assessed using depth-damage curves (i.e. vulnerability curves), which describe damage for different inundation depths.¹¹ However, the proposed coastal protection works will act as a barrier for wave impact, rather than as an isolation method to impede water entering the island. For this reason, it is expected that even with efficient coastal protection, water will still enter the island and cause inundation (e.g. through the lagoon side). If drainage-related works are being carried out involving other projects, this project warrants the creation of a greater synergy and coordination with drainage-related project(s) for a comprehensive sustainable development solution.

Gender-sensitive development impact

30. Gender inequalities are adequately evaluated on the gender assessment.¹² However, the proposal fails to define concrete actions to be taken in order to reduce gender inequality. In fact, the Gender and Social Inclusion Plan is just a description of project development indicators, including a disaggregation of male/female as 50/50.

1.4 Needs of the recipient

Scale: High

Vulnerability of the country

31. The country's vulnerability to the effects of climate change is adequately described on the proposal.

32. Being a low-lying island nation with no major points of elevation above two meters, it is highly vulnerable to potential sea level rise.

Vulnerable groups and gender aspects

33. Given the small dimensions of Ebeye Island, coastal protection works will benefit 100 per cent of the population, with no differentiation of vulnerability.

34. Benefits of the CERC will most likely reach the most vulnerable households.

¹⁰ Feasibility study, page 39.

¹¹ Feasibility study, pages 39 and 40.

¹² Annex 5.1-Gender Assessment for the Pacific Resilience Project Phase II for Republic of the Marshall Islands 240317.docx

Economic and social development level of the country and the affected population

35. Due to its small size and remoteness, the development of economic activities is significantly limited. Public administration and social services constitute 40 per cent of gross domestic product (GDP). The current account deficit excluding grants has averaged 47 per cent of GDP since 2007.

36. With a GDP per capita of USD 3,325,¹³ the country is classified as “lower middle-income”, and levels of absolute poverty are relatively low, but data indicate high levels of inequality and evidence of malnutrition in urban areas.

The need for strengthening institutions and implementation capacity

37. The capacity-building activities discussed above demonstrate the significant potential of the project to strengthen institutional and implementation capacity. Inter-institutional coordination is needed in order to get a synergistic effect, which is [needed the most by][very important to?] the climate vulnerable population.

1.5 Country ownership

Scale: High

Alignment with priorities in the country’s national climate strategy

38. Project activities are in line with the objectives of the JNAP and the national climate change policy.

Capacity of accredited or executing entities to deliver

39. The accredited entity is the World Bank, which has extensive experience of this type of project all over the world and specifically in disaster risk management and adaptation projects in the Caribbean and the Pacific region.

40. The executing entities, MoF and MPW, have limited capacity to implement a project of this kind. However, given that the project is part of the World Bank regional PREP, it will receive technical and implementation support from the SPC and the Pacific Islands Forum Secretariat. The involvement of national key agencies is expected to ensure greater country ownership.

Engagement with institutions, civil society organizations and other relevant stakeholders

41. Institutions and organizations at both the national and atoll level (Kwajalein) were involved in consultations during several missions performed during 2016, including MoF, the Chief Secretary’s Office, MPW, the National Disaster Committee, the Environmental Protection Authority, the Coastal Management Advisory Committee, the Office of Environmental Planning and Policy Coordination, NDMO, the National Weather Service, the Kwajalein Atoll Local Government (Ebeye), and the Kwajalein Atoll Development Authority.¹⁴

42. Consultations with the community and landowners were not held during the design of the project, but will be part of the implementation phase of the project.¹⁵

1.6 Efficiency and effectiveness

Scale: High

Cost-effectiveness and efficiency

¹³ In 2015. See Funding Proposal, paragraph 11.

¹⁴ See footnote 9 above.

¹⁵ Funding proposal, page 38.

43. The proposed financial structure is reasonable to allow the achievement of proposed project objectives.

44. Concessionality is granted by the fact that GCF funding will only cover roughly half of total project costs. Moreover, the United Nations Framework Convention on Climate Change calls for preferential treatment to be provided to small-island developing States, which includes small islands such as the Marshall Islands. Therefore, grant financing is fully justified.

45. Displacement of public or private funding is highly unlikely due to the limited resources of the Government of the Marshall Islands and to the nature of the project outputs.

Financial viability

46. The economic internal rate of return for the two alternatives considered for coastal protection works were estimated at 4.1 per cent and 2.6 per cent, respectively.¹⁶

Application of best practices

47. The proposal includes a sound explanation of the two alternatives and reasons why the chosen solution for coastal protection can be considered best practice.¹⁷

II. Overall remarks from the independent Technical Advisory Panel

48. Based on the findings of this assessment, the independent Technical Advisory Panel recommends that the Board approve this project.

49. The independent Technical Advisory Panel recommends that, regarding equipment for the EWS, provisions are made to cover operation and maintenance expenses beyond the project implementation period, providing guidance to the key ministries (MoF, MPW) to ensure budget allocation for the maintenance of early warning and forecasting systems and for the existing coastal protection infrastructure.

¹⁶ Funding proposal, page 44.

¹⁷ Funding proposal, page 42.

Independent Technical Advisory Panel's review of FP067

Proposal name:	Building climate resilience of vulnerable and food insecure communities through capacity strengthening and livelihood diversification in mountainous regions of Tajikistan
Accredited Entity:	United Nations World Food Programme (WFP)
Project/programme size:	Micro

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium

1. Tajikistan is a mountainous country that is faced with a high incidence of poverty. Only 7 per cent of the land is arable, which provides employment for 53 per cent of some 8.3 million people. Agriculture accounts for 20 per cent of gross domestic product (GDP). The per capita income of Tajikistan is only USD 2,567 (on the basis of purchase power parity). Soil degradation has been found in about 97 per cent of the land. Considering the dependence of the majority of the people on agriculture, and only a little landmass is available for cropping, food insecurity in Tajikistan is endemic. Although significant efforts have been made in the recent past to reduce poverty from over 80 per cent in 1997 to 31.3 per cent in 2014, the people of Tajikistan have suffered from high rates of food insecurity and nutritional disorders. Of the total Tajik population, 33.2 per cent is reportedly undernourished. Only 20 per cent of the children receive adequate food, indicating high rates of food insecurity among children. The country is ranked low in the human development index (129 out of 185 countries in the list).

2. The country has experienced increased climate variability and change. Extreme weather events, such as flood, drought, and avalanches, are commonly observed. Rainfall-induced landslides trigger mud flows, causing erosion of top soils and subsequent soil degradation. The latter adversely affects crop yields. It has been identified that the forest soils have been eroding, particularly in undulated terrains, which has also led to a deterioration in water quality and caused a loss of biodiversity. On top of this, climate change has exacerbated the adverse impacts of such extreme weather events. The increase in the diurnal temperature range, due to climate change¹ has aggravated evapotranspirative loss of top soil moisture, leading to drought. Moreover, the rate of snow thawing has increased, resulting in glaciers melting early in the season and the occasional glacier lake outburst floods.² As a consequence of the decrease in snow-fall, there has been insufficient precipitation in spring, which has culminated in decreased flows into the rivers. These phenomena have led to significant adverse effects on agriculture

¹ Temperature rise has been recorded at an average rate of 0.1-0.2°C per decade during the period of 1940–2012, while annual precipitation has increased by 5–10 per cent and the degradation of glacier cover is estimated to be 20 per cent. Available modeling outputs indicate that by 2030, the average temperature is projected to increase by 2.3°C. Average rainfall is likely to increase by 8 per cent in the territories up to 2,500 m above sea level and simultaneously, decrease by 3 per cent in the high elevation mountainous areas.

² The annual glacier melt delivers 10–20 per cent of the water into rivers but during dry and hot years, it can be up to 70 per cent. An entire village in Rasht region was completely destroyed by glacial lake outbursts in 2002, killing 25 people and displacing 450 families.

and on people's livelihoods.³ The sudden increase in loss and damage has been significant. For example, the annual losses from climate-induced extreme weather events in 2010 was estimated at USD 600 million, equivalent to 4.8 per cent of Tajikistan's GDP.

3. Since agriculture is critically important to the livelihoods of the majority of poor people, climate change has inflicted additional pressure on the already-fragile food security situation of poor farming communities. The Rasht Valley Khatlon and Gorno-Badakhshan Autonomous Region are typical areas where the food security of poor farming communities is particularly sensitive to climate variability and change. Therefore, it is imperative to address the prevailing nexus between climate change, crop loss and the resulting food insecurity leading to malnutrition of children, women and men in Tajikistan in a holistic manner. The project tabled by the United Nations World Food Programme (WFP), the accredited entity (AE), aims to address a number of systemic and institutional barriers, strengthen institutional capacities, and build community-level adaptive capacities and resilience. The intention is to tackle growing food insecurity by developing a knowledge-driven, long-term solution that reflects the local community's aspiration and ability. The project is designed to be micro-sized, and implemented in about four years.

4. The project has two major components. Component 1 focuses on climate information services as well as raising awareness and strengthening capacities, which will be crucial in preparing the local communities to better address the risks associated with climate-induced hazards and extreme weather events, and also strengthens institutions delivering climate-related services. Climate services are expected to provide essential information about planting and irrigation requirements, and provide hazard warnings that would allow for preparedness measures to be in place in case of climatic shocks, thereby reducing crop losses and increasing food security at the micro-level. Component 2 activities are related to climate adaptation and resilience-building by means of livelihood diversification and asset creation, improved water management (to complement component-1), and community-level resilience-building through collectively taken activities. Component 2 is by far the major component, utilizing over 70 per cent of the estimated budget. In achieving the component 2 outputs, WFP proposes to apply its Food Assistance for Asset (FAA) programme as the major modality to compensate community members who work towards developing community-level productive assets during food-insecure periods and the nominal⁴ assistance is expected to contribute to their household food security during harsh, food-insecure periods.

5. The project, if approved, will benefit 50,000 of the most vulnerable people directly, while it will also benefit 70,000 people indirectly. The project document, however, vaguely defines how 50–52 per cent of both direct and indirect beneficiaries will be women. Despite this weakness, the project targets the right geographic areas, which will be implemented in 11 districts of the two most vulnerable areas as indicated above. Moreover, most of the interventions, including the FAA, will only target the poor and focus on women and women's groups as key recipients of such supports. The project does not intend to invest in major infrastructure (the size of the budget falls within the micro-sized category), therefore there is no question regarding any potential lock-in of long-lived climate-vulnerable infrastructure.

³ The country is likely to experience considerable additional economic losses, humanitarian stress and environmental degradation if robust measures to reduce vulnerability and enhance adaptation are not put in place. More frequent climate-induced extreme weather events may adversely impact the function and stability of both human and natural systems and further exacerbate climate-induced losses and damages.

⁴ On a per capita basis, less than USD 10.

6. The project will contribute towards institutional strengthening in relation to the development of climate and weather information products and their dissemination through the use of advanced technologies such as mobile cells and internet and computer technologies. Moreover, regional authorities will be assisted through the capacity-building and supported for producing participatory, climate-resilient development plans in the target regions, which will assist in the formulation and implementation of locally-suited adaptation responses. The generation and the use of climate early-warnings and advisories will enable both grassroots stakeholders (mostly farmers) in their decision-making, while it would also assist the higher authorities to plan for various resilience-building activities. The farmers and rural population will be made aware of the risks to their livelihoods which are associated with climate change. Such awareness raising may allow the beneficiaries to devise community-driven, micro-scale adaptations in the future. Overall, the contribution of the project to facilitate the development of adaptive capacity seems significant in the target areas.

7. However, as the project is focused on small areas and the estimated budget is small, the benefits are expected to be thinly spread⁵. The creation of 400 hectares (ha) of orchard and 200 ha of agro-forestry could, at best, inspire non-recipients of the supports to try to emulate these methods. However, it does not offer a great deal of resilience to a large number of poor households who are also vulnerable in the same target districts. The independent Technical Advisory Panel (iTAP), therefore, finds the impact potential to be only medium.

1.2 Paradigm shift potential

Scale: Medium

8. The project offers a mixed bag in terms of paradigm shift potential. The micro-scale examples of climate information dissemination towards informed decision-making at the grassroots and the inclusion of vulnerability assessment into regional/local-level development planning and their implementation may have profound paradigm shift potential in building resilience. However, the FAA for vulnerable Tajik communities appears to be a mere replication of a food assistance approach that yielded negligible lasting results in the country. Therefore, little or no paradigm shift is anticipated from the component 2 activities. Moreover, the inability to significantly demonstrate the creation of the community-level, resilience-building assets (the target, as indicated above, is very low) further weakens the potential to force a discernible shift in the current paradigm involving food insecurity of poor communities.

9. The proposal does not categorize it as a pilot. Rather, it draws its strengths from earlier works in relation to dissemination of early warnings and advisories. Although many sub-components have the potential to be scaled-up in the future, in the absence of international financing, such potentials for involving the non-target vulnerable population may not be achieved. The theory of change does not provide an adequate indication that the outcomes of the component 2 would have enough of an inspirational effect to be self-propagated following the implementation of the project. Therefore, the scalability without further financial support seems low. Again, the necessary changes in the approach towards dissemination of early warnings and advisories (under component 1) could make more lasting impressions, which could be useful for a larger number of people beyond the duration of the project.

10. The project has limited but significant potential for knowledge and learning, if not within Tajikistan, certainly among other Central Asian countries. The proposal anticipates that people's behaviour may be changed in terms of micro-level decision-making following the receipt of early warnings. However, there is no indication how such behavioural changes will be

⁵ Under section E.1.1 of the funding proposal, it is stated that (the spread of) beneficiaries will reach up to 1.5 per cent of the total population at the end of the project.

brought under a monitoring and reporting framework. The project will further strengthen the ongoing capacity-building of weather forecast generation and dissemination system, which will contribute to the creation of an enabling environment for the same service. The possibility for linking markets and the creation of skills (of micro-scale producers) towards responding to value chains will likely develop the ability of farmers to integrate with the market and be rewarded financially. The iTAP views the paradigm shift potential of the proposed project to be medium.

1.3 Sustainable development potential

Scale: Medium

11. The project promises to contribute to a number of sustainable development goals (SDGs), although such positive effects are only localized and limited in scope and scale. The project will:

SDG-1: Reduce food insecurity (if not hunger) of around 50,000 people;

SDG-2: Address poverty issues, contributing to the reduction in poverty of some 50,000 to 120,000 people;

SDG-5: Address gender equity, especially as 50–52 per cent of the beneficiaries will be women;

SDG-6: Contribute to sustainable water management and reduce water-related vulnerabilities in view of extreme weather events and other hazards, that have adversely affected water availability and quality at farmers' fields;

SDG-13: Deliver urgent actions towards reducing vulnerability to drought; and

SDG-15: Counteract degradation of the terrestrial ecosystems and address issues concerning soil conservation.

12. The economic co-benefits are rather obvious. People will enjoy greater climate change adaptive capacity built around their farming systems. This is owed to early warnings and advisories, the creation of community assets, such as the expansion of community-managed orchards, agro-forestry, and the expansion of market linkages and livelihoods diversification. In climate-vulnerable target areas, such interventions are well designed and likely to have significant economic benefits involving the target households. However, the extent of such co-benefits will be small.

13. The social co-benefits also seem to be significant, when considering the current high incidence of malnutrition, especially among children. With enhanced resilience to food insecurity, the nutritional condition is likely to be positively affected, while greater protection against known climate-induced hazards will also have beneficial implications. Since it has been calculated that 50–52 per cent of the beneficiaries will be girls and women, the gender-related social co-benefits are also likely to be significant. Moreover, the project forecasts it will deliver greater gender sensitivity in terms of the inclusion of women in various local-level initiatives and management aspects. These will have demonstrable effects for other women in the vicinity of target areas. Perhaps one of the most important social co-benefits may be accrued by delivering (participatory) regional/local climate-change-mainstreamed development plans, as proposed.

14. Small-scale watershed management, establishment of orchards, agro-forestry and awareness training on safeguarding agriculture-based livelihoods may have environmental co-benefits. However, the small target in this regard might limit their larger applicability

throughout the country. Since mitigation co-benefits are not considered, perhaps due to low targets, the emissions reduction potential will not be quantified.

15. The project will result in significant indications regarding the identification of pathways to achieve sustainable development. However, with the scope and the target being so small, its overall contribution to sustainable development will only be medium.

1.4 Needs of the recipient

Scale: High

16. As indicated earlier, the target population in 11 districts of the two regions in Tajikistan is among the most vulnerable of population groups. Not only are their agriculture-based livelihoods failing, inflicting food insecurity and resulting in malnutrition, but the forced displacement of young men in search of livelihoods outside the country resulted in significant social implications. In order for the overall well-being of the social construct of the vulnerable communities to be restored, an appropriate set of responses is needed under a holistic framework. Similarly, the economic implications of an increase in loss and damage burden have been dampening the recent progresses made towards poverty eradication. The project clearly demonstrates the needs of the recipient and its vulnerable population in the target areas.

17. A majority of Tajikistan's population depend on crop agriculture to earn a living. Such livelihood opportunities are diminishing fast. Moreover, the loss and damage burden have taken an undue toll on the overall economy of the country. In turn, this has increased the country's debt burden. The country is already among the poorest of the Central Asian countries. There is a strong climate change rationale for considering various measures to address the needs of the vulnerable population. Even the needs for strengthening institutions are adequately explained in the proposal. The project indeed exhibits high the needs of the recipients.

18. In the fight against increasing food insecurity and malnutrition in the backdrop of climate change, Tajikistan working alone does not stand a chance, especially when one observes Tajikistan's precarious economic situation. The country cannot afford to invest more on both social security and debt servicing, especially when climate change-induced losses are hampering GDP growth rates. Since the activities are identified as barrier-removing efforts to create public goods, there is hardly any possibility for the private sector to invest in such activities. The Government of the Republic of Tajikistan gradual investments towards institutional capacity-building and provisions of services to the vulnerable people have also been stretched to the limit. Under such a financial situation, it appears imperative that GCF climate financing fill a critical financing gap and is provided to create opportunities for the targeted vulnerable people of Tajikistan. The iTAP acknowledges the needs of the recipient to the proposed project and rates the needs are high.

1.5 Country ownership

Scale: High

19. The proposed project aligns itself with a number of policies and strategies of Tajikistan. It will also support and strengthen the implementation of a few national strategies and programmes, especially those targeting cross-cutting aspects involving agriculture, water and food security sectors. The project is found to be in synergy with climate change-related policies and strategies, which include the National Climate Change Adaptation Strategy 2017-2030, the Third National Communication to the United Nations Framework Convention on Climate Change, and the nationally determined contribution of the country to the Paris Agreement. All such documents highlight the needs for implementing measures which are at the core of the project: (a) protection of crops from hydro-meteorological extreme events and disasters, (b) improved water collection and storage for household needs and for irrigation, (c) enhancement

of opportunities for organic farming, (d) protection of agro-biodiversity and genetic resources, (e) promotion of agroforestry, (f) measures to control soil erosion and promotion of soil fertility, and (g) increased energy efficiency at household appliances (i.e., cooking stoves, the use of solar energy, etc.). The project activities are fully aligned with national policies.

20. The AE for the project, WFP, has been present in Tajikistan since 1993. Although the provision of crisis assistance has been the main strategy for WFP to assist Tajikistan, it shifted to (a) policy advocacy for attaining food security, (b) supporting the Government of Tajikistan to enhance its capacity to implement and monitor hunger solutions through social safety nets for the most vulnerable, and (c) direct support to communities to respond to crises and to improve their long-term food security and resilience to shocks. WFP, having worked with the Government of Tajikistan for a long time, claims that its FAA programme has been successful in Tajikistan. However, the state of rampant malnutrition does not fully corroborate the claims. The project will be executed by the Committee for Environmental Protection (CEP) under the Government of Tajikistan. The national executing entity has a profound understanding of climate change issues and priorities, and of the context in which climate investments will be implemented (e.g. relevant sector development strategies, constraints, stakeholders). In addition, the CEP has solid operational experience with regards to the implementation of internationally funded projects. The implementation modalities explained in the proposal exhibit that the most relevant institutions will be taken on board towards implementing the project within the stipulated four years of its timeline. The national mandates of such institutions also indicate that the proposed activities for implementation are in the right hands. This shows a great deal of ownership by the country.

21. The AE has worked in close coordination with the National Designated Authority (NDA) and with CEP since the conceptualization processes. Once the concept note was developed, the NDA and its technical team had a chance to review it and provide inputs and suggestions to align the project with the national strategies as well as complement existing projects in the region. The proposal is a result of a participatory process involving key stakeholders, which is also manifested in the design of both components of the project, where activities are to be undertaken through complete participation of women and men beneficiaries. Perhaps the participatory nature of the project is its most significant strength.

22. According to the project document, three separate consultations were held by WFP at the regional level, where members of Dehkan farms, representatives of villages, pastoralists, local authorities, women's associations, community-based organizations, representatives from district-level authorities (i.e., *hukumats*) and local administration authorities (including the Ministry of Agriculture, Hydromet, CEP, Agency of Forestry) attended and were engaged. Therefore, the iTAP concludes that country ownership of the proposed project is high.

1.6 Efficiency and effectiveness

Scale: Medium

23. The project cost is estimated at USD 9.973 million, of which a small sum of USD 0.699 million has been committed (a total of 7.0 per cent of the total cost), co-financed by the Government of Tajikistan and WFP (almost equal amounts each). The majority of the financing (72.41 per cent of total cost) will be allocated for implementation of component 2. The entire GCF financing is sought as a grant. Given that Tajikistan is the poorest former Soviet-block, Central Asian country and the overall budget is below the threshold for a micro-scale project,⁶ the grant

⁶ The project could have qualified as a project under a simplified approval process (SAP) window of financing.

support may still be justified. Without GCF grant support, Tajikistan is not in a position to finance the project with its own resources.

24. The budget analysis has not determined it to be a well-designed project. The programme budget has many sub-entries which are earmarked for the involvement of project staff. A greater involvement of national actors and a subsequent reallocation of saved budget (from procurement of project staff) for tangible resilience-building activities could have been more effective. It may have yielded more significant results and impacts in the long run. Moreover, no major allocation is found towards the implementation of the resilience-mainstreamed local/regional development plans. This was perhaps due to the fact that the AE deliberately wanted to design a micro-scale project, having low inputs and low-projected outputs. A more rational budgetary allocation with enhanced ambition could have made the project more interesting in terms of impacts and lessons learned.

25. The net present value (NPV) of benefits of the project is found to be USD15.90 million, which is encouraging. The NPV flow of funds is also positive, estimated at USD11.42 million. This indicates that the benefit cost ratio is in the order of 3.54. The analysis considered a discount rate of 6 per cent, which is agreeable. A complete economic analysis has not been presented, in view of the primary aim of the project towards the creation of public goods. In absence of an analysis of sensitivity for understanding the effectiveness of the project covering certain financial/ economic shocks and uncertainties, it is difficult to assess the likelihood of financial/economic efficiency of the project. However, from the outset one may argue that the issuance of early warnings and the creation of community assets may yield significant public goods and reduce losses and damages as well as malnutrition in the target communities. A careful analysis, taking into consideration these critically important factors, could have provided a better financial rationale for GCF to intervene.

26. Although WFP claims higher social returns from its FAA, especially assisting the food-insecure households, the efficacy of the assistance programme is not fully convincing. Past similar interventions have not left discernable evidence regarding the strengthening of resilience of poor people and/or addressing the prevailing barriers to achieve food security for all. It is to be highlighted here that the investment for food assistance from the proposed project is less than 20 per cent of the entire project cost. However, there remains an element of uncertainty while the financial effectiveness of the proposed modality to eradicate hunger in Tajikistan is examined.

27. The iTAP is of the view that the proposed project is moderate in efficiency and effectiveness.

II. Overall remarks from the independent Technical Advisory Panel

28. The iTAP recommends that the Board approve the project, recognizing the urgency of the issues associated with climate change and food insecurity in Tajikistan, and given that the country is the poorest in Central Asia and is overwhelmed by the high rates of malnutrition (mostly children). The iTAP believes that, despite uncertainties in terms of effectiveness of the financing with grant support, GCF must provide a chance to overcome the barriers which have aggravated the food insecurity of households mostly reliant on favourable climate-dependent agriculture.

29. The iTAP also recommends the following:

- (a) The operation and maintenance (O&M) plan suggested in the funding proposal has not been complemented with a specific (matching) financing plan. The O&M plan should be accompanied by a matching financing plan for O&M equipment, particularly including

- O&M for at least another five years following the completion of the project. This financing plan should be included in the project document;
- (b) Without specificity regarding types of seeds and tree species to be promoted at the community level, the market response, gender response and environmental impacts should be studied for the respective products and incorporated in the project document;
 - (c) Component 2 should be strengthened by committing to community-centric knowledge management and cross-learning activities; and
 - (d) The World Meteorological Organization should be considered as a technical input provider in the project, given the production and dissemination of climate information services through the project.

Independent Technical Advisory Panel's review of FP068

Proposal name: Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia

Accredited entity: United Nations Development Programme (UNDP)

Project/programme size: Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. Georgia has been facing both geological and hydro-meteorological hazards. According to Georgia's various submissions to the United Nations Framework Convention on Climate Change (UNFCCC) processes, the intensity, frequency of occurrence and geographical spread of extreme hydro-meteorological events are likely to increase as a result of climate change. Georgia's (intended) Nationally Determined Contribution suggests that, without adaptation, the cost of adverse impacts of climate-induced hazards will be in the range of USD 10 to 12 billion for the period 2021-2030. According to available documentation, the most cited climate-induced hazards in Georgia include flood, drought, avalanche, wind and occasional hail storms. In 2015, flooding due to cloud burst affected 8,800 people and the functioning of the capital, Tbilisi, was severely affected due to the same flood event, resulting in loss and damage in unprecedented proportions.

2. Georgia has been relying on an old-school hydro-meteorology service, with limited advanced and model-based forecasting capacity. The existing hydro-meteorological service cannot provide warnings and advisories of the different types of hazards being faced in the country. Lack of efficiency in the climate information service has been coupled with limited but expensive structural protection measures (mostly flood protection), relocation of victims, post-hazard compensation for rehabilitation, etc. Although deemed necessary, the country is lacking in terms of risk zoning, vulnerability assessment and physical planning, all of which are based on hydro-geophysical risk assessments. The existing legal and institutional framework appears inadequate to address climate change-induced multi-hazard risk management. Consequently, the climate-induced hazard management system currently available cannot provide a conducive environment for those at risk to prepare for hydro-meteorological hazards and thus reduce their loss burden. As hydro-meteorological hazards become increasingly severe due to climate change, Georgia needs technical and financial assistance to address the gaps and barriers that are hindering a system-wide approach to make the country and its people more resilient to climate change.

3. The aim of the project is to address main barriers to the establishment of an impact-based multi-hazard early warning system (MHEWS) and create the systems and processes to support its implementation. The approach is therefore to strengthen relevant institutions in terms of capacities (both human resources and equipment), policy harmony and operationalization of a coordinated framework in a bid to optimize outputs on a regular basis. An important feature is that not only have all major relevant institutions been included in the project, but they have also already shown their commitment by contributing co-finance from their respective institutional budgets.

4. The project envisages three components, each resulting in a specific output, as highlighted below:

- (a) Output 1: expanded hydro-meteorological observation network and modelling capacities to secure reliable information on climate-induced hazards, vulnerability and risks;
- (b) Output 2: multi-hazard early warning system and new climate information products supported by effective national regulations, coordination mechanisms and institutional capacities; and
- (c) Output 3: improved community resilience through the implementation of the MHEWS and priority risk reduction measures.

The combined outputs have effectively identified and fully address the barriers and gaps in achieving the project's stated goal. Their delivery and implementation will make the country and vulnerable communities more resilient.

5. An estimated 1.7 million people involving 258,841 households (some 40 per cent of the total population in Georgia) will directly benefit from the project (0.89 million beneficiaries are women). Indirectly, the project will help build the adaptive capacity of the country's entire population. The number of beneficiaries is extremely high and therefore the impact potential of the project is considerable. Up to 200 vulnerable communities will be brought into a community-based early warning programme, while 100 target communities will participate in multi-hazard climate risk management practices. In addition, 13 structural measures such as agro-forestry, floodplain restoration and watershed restoration will be considered (as per locational requirements following vulnerability assessment and planning), in order to reduce the impact of hazards such as flood, avalanche and drought.

6. The project made no attempt to lock in large investments in vulnerable areas as they may have been subject to unpredictable adverse climatic conditions. The processes of targeting vulnerable communities followed a simple but effective logic and gender differentiation has been well targeted. The project pro-actively seeks to strengthen institutions, policies and regulatory aspects in relevant fields by involving the key ministries and institutions. Information generation and dissemination are central mechanisms in building the resilience of communities and these elements will be key to achieving the MHEWS. Moreover, exposure to local-level climate change-induced risks will be reduced through community-based efforts, thus emphasizing grassroots involvement and first-hand learning. In addition, efforts will be made to raise awareness of the recipients of multi-hazard early warnings and advisories. These activities are intended to be delivered within a seven-year timeframe.

7. Given the wide range of interventions using technically sound and appropriately scaled modalities, the independent Technical Advisory Panel (iTAP) finds the impact potential to be "high".

1.2 Paradigm shift potential

Scale: High

8. The project aims to make a paradigm shift by turning a weak traditional hazard-response mode into a knowledge-driven and informed disaster risk reduction (DRR) programme at the systems level. Both the relevant institutions and the general beneficiaries (including target communities) will be supported to achieve the intended paradigm shift and adopt the multi-hazard risk management system. All programme activities are mutually complementary and are deemed necessary to bring about a change in the existing and non-

functional paradigm. The direct experiences and lessons learned during the course of the project period will enable adjustments to be made to improve methodology and sustainability of the system.

9. The project embraces tried and tested solutions e.g. adoption of technologies involving computer and data processing systems to generate and disseminate early warnings. The project also builds on available best practices, awareness-raising and knowledge-sharing, and intends to deliver location-specific climate information services. The project has great potential for delivering these services and applying best practices by involving vulnerable communities in small- and micro-scale community-based disaster risk management. Communities will thus directly experience how informed decision-making processes can enhance resilience.

10. These features are captured in a theory of change, as presented. The theory is adequately supported with appropriate actions according to specific circumstances. It is planned to share the lessons learned in order to facilitate the development of similar systems elsewhere. The assurance that equipment and hardware will be maintained beyond the project lifetime is evidence of willingness to invest in operation and maintenance and is a critically important indication of continuation under a changed paradigm.

11. At the community level, the project will address the prevailing barriers to implementation of risk-informed community-based (climate change-induced) disaster risk management (CBDRM) actions. Once such actions are established, the beneficiary communities are likely to be more resilient and more able to safeguard their assets and livelihoods. The project provides for the expansion of policy and regulatory support towards building long-term sustainable resilience. Subject to the delineation of risk zoning and the imposition of regulatory mechanisms, it is anticipated that the insurance industry will develop products enabling communities to pool their risk coverage – another important private sector-led mechanism to build micro-level financial resilience.

12. The iTAP views the paradigm shift potential of the proposed project to be “high”.

1.3 Sustainable development potential

Scale: High

13. The project will contribute to a number of sustainable development goals (SDGs).

SDG-1: It will reduce hunger, especially by offering agricultural advisories to safeguard crops from the vagaries of nature and to improve food production;

SDG-2: It will address poverty issues, by enhancing responses towards effective DRR¹ – thereby safeguarding livelihoods of vulnerable people;

SDG-5: It will address gender equity, especially as women represent 52 per cent of the beneficiary population;

SDG-13: It will deliver urgent climate actions to reduce vulnerability to climate-induced extreme events; and

SDG-15: Although the project does not target restoration of the ecosystem as one of the mainstream activities, it will: provide inputs to communities for restoring, preserving and enhancing ecosystems related to agriculture and forestry; counteract degradation of the terrestrial ecosystem; address issues concerning soil and watershed (i.e. lake) conservation; and promote ecosystem-based approaches to CBDRM.

¹ To help avoid human and economic losses.

14. Since the goal and specific outcomes of the project will be achieved through institutional strengthening processes, benefiting the entire country, the potential contributions to the SDGs appear to be significantly high. Not only will DRR-related services be available, but the target communities will also attain greater food security through improved decision-making, enabling farmers to make best use of climate information and advisories. Although the project will not finance the safeguarding of built infrastructures, the issuance of early warnings and advisories will provide indications for how to improve their resilience. The application of the MHEWS thus has the potential to provide considerable economic co-benefits.

15. Agricultural decision-making can bring considerable economic co-benefits. However, increased food security may be a greater contribution and is a highly important social co-benefit. Dwellings and properties saved from extreme climate events by adequate early warning represent both economic and social co-benefits. Overall, target and non-target communities will potentially gain substantial economic and social co-benefits.

16. While the project also offers environmental co-benefits, these are likely to be localized in small communities. Small-scale afforestation, soil and watershed (lake de-sedimentation) conservation, actions to safeguard forest vegetation from avalanches and landslides, ecosystem-based approaches to DRR at community level, are a few examples of environment-minded activities which will generate environmental co-benefits for participating communities.

17. The process will help the Government of Georgia to leverage more financing for DRR and CBDRM. The opportunity for risk-pooling through insurance will also leverage private sector financing – a mechanism which accelerates reconstruction and rehabilitation among low-income, hazard-affected communities.

18. The iTAP views the project’s potential for sustainable development to be “high”.

1.4 Needs of the recipient

Scale: High

19. Georgia is a vulnerable country with regard to climate change impacts. The target beneficiaries are selected on the basis of their prevailing and projected vulnerabilities to climate change-induced extreme events. The unprecedented floods of 2015 in economically sensitive areas (such as the capital city, Tbilisi) and loss of lives and properties clearly highlight the need for a shift in the country’s current climate-related systems. Since climate change is gradually causing greater variability in water cycles, it is imperative that Georgia places high emphasis on a robust MHEWS, complemented by community-based actions and adjustment in prevailing policy and institutional aspects to better deal with DRR services. This project is therefore considered to be an appropriate response to the growing needs of recipients.

20. The entire population needs enhanced climate information services in relation to DRR. The country has already incurred an estimated economic loss of about USD 1.2 billion in the past two decades, testifying to the paramount need for interventions. Despite such heavy loss burden, the DRR sector could not be serviced adequately due to lack of investment, and the investment gap has been widening. Moreover, both macro- and micro-scale food security through unhindered agricultural production requires reliable climate information, supported by modern computer-aided modelling and dissemination of climate information based on information and communication technologies. Like many other countries in the region, Georgia needs both technical and financial support to address these issues.

21. The institutions of Georgia need enhanced capacities, in terms of human resources and also technologies (i.e. equipment), technical know-how, and an enabling policy and regulatory framework to sustain the proposed MHEWS. These objectives cannot be achieved without extensive renewal of the existing “traditional” hydro-meteorological systems and service

delivery capacities. MHEWS needs an institutional paradigm shift. A host of documentation from Georgia has been forwarded² to the UNFCCC and clearly recognizes the needs of the recipient. The project is entirely in line with the major needs of various recipients and sectors where resilience-building has been prioritized in Georgia. This project therefore represents a critical factor in helping the country achieve both climate resilience and sustainable development.

22. However, Georgia suffers a heavy loss burden driven by climate change as well as an unfavourable export-import balance. Consequently, both internal and external indebtedness has significantly increased over recent years. As a developing country, Georgia needs financial support to overcome the critical investment gaps in its DRR and associated sectors. Through the design of this project, relevant institutions of the country have committed their financial resources to provide 61.51 per cent of the total needed to implement the proposed project. The remaining amount, sought from GCF amounts to only 38.49 per cent of the total (i.e. USD 27.054 million out of a total of USD 70.293 million). The entire amount is requested as grant, primarily to cover additional costs for equipment (operation and maintenance costs being committed by local institutions well beyond the project lifetime), training for capacity building and extension of community-based activities.

23. The iTAP acknowledges that the need of the recipient for the proposed project is “high”..

1.5 Country ownership

Scale: High

24. The core elements of the project (i.e. long-term goals, specific objectives and expected outcomes) are aligned with relevant national policies, strategies and action plans. For example, the National DRR Strategy and Action Plan, the draft concept paper/strategy on an early warning system, and the draft national adaptation plan have created various provisions which are directly in line with the project activities. The project highlighted the need for capacity-building on both DRR and climate change adaptation, which are fully in line with the National Plan of Action for Capacity Development for DRR (2015-2019). Moreover, the project elements are duly reflected in the national communications to UNFCCC and also in the Nationally Determined Contribution document. All these suggest that the country is committed to implementing the project and that adequate ownership is exhibited by the country.

25. The accredited entity (AE) is the United Nations Development Programme (UNDP), while the lead executive entity is the Ministry of Environmental Protection and Agriculture (MOEPA). UNDP will implement the project along with various executing agencies. The Ministry in its former role³ already gained experience in piloting the same concept (administered by UNDP) in the Rioni river basin, with support from the Least Developed Country Fund (LDCF). Therefore the institutional marriage under the leadership of UNDP has demonstrated its capacity to carry out successful projects in Georgia. Moreover, MOEPA will draw rich experience from the World Meteorological Organization (WMO) towards establishment of the advanced information collection and computer-aided climate/weather modelling for generating early warnings and advisories. Since the most relevant national and international organizations are ready to participate, a seamless implementation is anticipated under the leadership of UNDP, and with active support from MOEPA, the latter being the national agency mandated to lead issues related to climate change adaptation.

² For example, the Second and Third National Communication to the UNFCCC, the (Intended) Nationally Determined Contribution to the Paris Agreement under the UNFCCC, etc.

³ As the Ministry of Environment and Natural Resources Protection (MOENRP), which has already been merged with the Ministry of Agriculture (MOA), as communicated in January 2018 during the assessment period.

26. The project is the result of strong public/community consultations. Almost all of the interventions have been identified through a systematic process of engagement with the public, most importantly with the vulnerable communities. Activities related to agro-meteorology were designed following consultation and in close cooperation with representatives of the Food and Agriculture Organization of the United Nations (FAO) and several departments and specialized agencies⁴/units of MOEPA, including the National Food Agency, Consultation and Research Center, and regional departments, as well as in consultation with providers of agro-meteorological stations to the National Food Agency. Institutional consultations were conducted to identify needs at the institutional level. These processes have resulted in strong commitment in terms of the significant co-financing advanced by national institutions. These activities suggest that the proposal is a result of stakeholder consultation and engagement.

27. The National Designated Authority for GCF-related communication has been engaged and this is demonstrated in the signing of a no objection letter. The proposal claims that close contacts have been established with representatives of the State Security and Crisis Management Council and its Crisis Management Center under the Prime Minister's office to exchange background and project-related information.

28. The iTAP concludes that country ownership of the proposed project is evident, and will be further strengthened (subject to project approval) by undertaking community-level activities such as vulnerability assessment and awareness-raising activities.

1.6 Efficiency and effectiveness

Scale: High

29. The proposed financial structure appears adequate, partly because the project budgeting took note of the pilot run of a similar project in the Rioni river basin. The 7-year time-frame is reasonable, as is the allocation of budget for various needs, including human resources. Necessary funds will be channelled to address identified bottlenecks and/or barriers, which makes the financial structure reasonable. The significant co-financing (USD 43.239 million out of an estimated budget of USD 70.293 million) to cover predominantly non-climatic elements of the budget makes the proposal a strong case for receiving GCF financing. The project scores high in all the GCF investment criteria. Considering Georgia's high indebtedness both internally and externally, and its inability to draw more than USD 5.0 million from bilateral sources (that amount being committed as co-financing from the Sustainable Development Council), the grant request for USD 27.054 million (38.49 per cent of the budget) from the GCF for implementation of the project appears to be the only remaining option in reducing climate change-induced vulnerabilities for 40 per cent of the population.

30. All of the financing is for the creation of public goods, which does not attract private sector investment. Therefore, the financing sought is not to the detriment of possible private investment. If the MHEWS becomes operational, supplemented by hazard risk zoning and an enabling policy regime, it is expected that the project might catalyse additional finance from insurance companies to offer insurance products which might further consolidate current efforts to build resilience among the affected communities.

31. As proposed, the project management appears adequately institutionalized, though it may be further strengthened if WMO is invited to contribute at the steering committee level. Since physical resilience-building will be ensured by structures within the Ministry of Regional Development and Infrastructure, the project management and coordination function would be further strengthened if this Ministry was included as an executing entity.

⁴ These were part of the Ministry of Agriculture, now merged with MOENRP to work under MOEPA.

32. The project's economic analysis is found to be adequate and complete. Following the project implementation, the net present value (NPV) appears positive (USD 23.38 million over a period of 20 years, using a discount rate of 10 per cent) and favourable. The internal rate of return (IRR) is also acceptable, found to be in the order of 16.6 per cent (considering climate change and 10 per cent benefits being accrued due to early warning systems). The individual sub-components of the project also show acceptable economic returns. For example, the flood resilience building efforts in 13 selected sites will provide for 24.0 per cent returns following the project period. The flood-related early warning system will result in 46.4 per cent return. These figures clearly show that the economic considerations of the project are highly favourable from a financing point of view.

33. The sensitivity analysis of financial cost benefit analysis is also impressive and favourable, justifying viability of the project. In both cases where the costs are increased by 15 per cent or envisaged benefits are reduced by 15 per cent, the NPV still appears positive and the IRR appears 13.8 and 13.3 per cent, respectively. This indicates that, despite a reduction in possible financial returns from the project, the economic returns remain acceptable even considering potential shocks. In the extreme case of both the decrease in benefits and increase in costs occurring simultaneously, it is found that the NPV is decreased drastically, while in the case of extreme shock, the IRR is 10.7 per cent, which is slightly higher than the discount rate used for the calculations. It shows that, even in the case of extreme unfavourable economic downturn, the project will still be sound in financial terms.

34. The iTAP is of the view that the efficiency and effectiveness of the proposed project is high.

II. Overall remarks from the independent Technical Advisory Panel

35. The iTAP recommends that the Board approve the project, recognizing the vulnerability of the country and its affected population. Moreover, the iTAP recognizes that the project rates high in all the six investment criteria. Based on these findings, and bearing in mind the inability of the country to take on more loans towards building community resilience to extreme weather conditions, the iTAP considers that the request for a full grant is acceptable.

36. The iTAP also recommends the following:

- (i) Strengthen the Steering Committee by inviting WMO to be a member of the committee; and
- (ii) Strengthen the coordination function by accepting the Ministry of Regional Development and Infrastructure as one of the project's executing entities.

Independent Technical Advisory Panel's review of FP069

Proposal name:	Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity
Accredited Entity:	United Nations Development Programme (UNDP)
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium

Adaptation impact

1. The main objective of the proposed project is to enhance the capacity of coastal communities to adapt to the impacts of salinity on their livelihoods and to provide water security. Project activities are divided into three main components which consist of the implementation of climate-resilient livelihoods, the installation of climate-resilient drinking water systems and the strengthening of institutional capacities, knowledge and learning in the management of livelihoods and drinking water systems.
2. To support the implementation of climate-resilient livelihoods, the project will create 1,017 women livelihood groups (WLGs) to establish and manage the activities. The WLGs will be provided with training on climate risks, skills development, technical knowledge, and investments in livelihood assets. The following livelihoods will be promoted by the project: (i) crab farming; (ii) crab nursery; (iii) aqua-geoponics; (iv) hydroponics; (v) plant nursery; (vi) sesame cultivation; (vii) crab and fish feed processing; and (viii) homestead vegetable gardening.
3. The women standing committees (WSCs) will support the WLGs in addressing institutional barriers and enhancing vertical coordination linkages with sub-districts (Upazilas) and districts. WSCs are established structures that operate at the Union level and comprise local extension support staff.¹
4. The livelihoods component will also strengthen value chains and market linkages. This will be achieved by establishing public-private platforms to facilitate linkages between WLG and value-chain actors and by upgrading two existing crab hatcheries to enable them to cover the demand of all the crab farms installed under the project.² Described as a public private initiative (PPI), the platforms will be established through workshops and networking events at Union level, and will consist of eight representatives of WLGs, six value-chain representatives, and six stakeholders representing respectively the Department of Agricultural Extension, Department of Fisheries, Ministry of Women and Children Affairs (MOWCA), bank and financial institutions, relevant local Union-level staff, and facilitating non-governmental organizations (NGOs).³

¹ Funding proposal, page 31.

² Funding proposal, page 31 and 32.

³ Funding proposal, page 32 and 33.

5. The analysis of available options, market and value-chain assessments, and local expert and stakeholder consultations facilitated the identification of existing crab hatcheries and crab feed processing enterprises that require upgrading, and where new ones could be created.

6. Institutional strengthening will be achieved by enhancing the technical and coordination capacities of the MOWCA and of the Department of Public Health and Engineering (DPHE). Capacity-building activities will include development and delivery of training courses based on a training of trainers approach, on issues such as climate risks, design, implementation and management of climate-resilient livelihoods and water solutions, and integration of gender-sensitive climate change adaptation across policies and programmes. The project will allocate USD 2.6 million to these capacity-building activities.⁴

7. Technical training and other capacity-building activities are mentioned but not clearly described in the funding proposal (with the exception of operation and maintenance (O&M) for water systems which is briefly described in annex XIII b, page 6). For this reason, the impact potential of capacity-building activities cannot be assessed correctly.

8. The project will also establish knowledge management, evidence-based learning and monitoring and evaluation mechanisms. These will include: (a) the creation of a regional database for mapping water supply sources and existing/planned water supply infrastructure; (b) the systematization of knowledge, good practices, tools and best practices, and the integration of these into training and informational modules of government and technical institutes; (c) the establishment of a web portal to disseminate information and tools; (d) the design and implementation of an adaptive learning module for young people; and (e) the implementation of a monitoring and evaluation framework.⁵

9. The total direct beneficiaries of the livelihoods and drinking water components were estimated at 180,000 people.⁶ This includes 31,000 households receiving drinking water provision and 25,000 households participating in the implementation of climate-resilient livelihoods.⁷ Selection of beneficiaries for the drinking water component would prioritize the households that benefit from the livelihoods component. The livelihoods component also includes activities aimed at supporting last-mile dissemination of early warnings (EWs), which is expected to reach the entire population of the 101 selected wards, that is, 245,516 people. However, since the existing EW system effectively reaches 20 per cent of the total population,⁸ it can be estimated that, as a whole, project activities will directly benefit approximately 200,000 people, and another 470,000 will be indirectly benefited through the integration of climate risks into planning, and the enhanced capacity of public institutions at Upazila and district level.⁹

10. Project activities have the potential to enhance climate resilience of the benefited population through the implementation of new climate-resilient livelihoods, and through the provision of safe and continuous sources for drinking water. The selected water systems are rainwater harvesting at household, community and institutional levels and pond water treatment with an ultrafiltration (UF) system provided by the firm SkyHydrant.¹⁰ The project

⁴ Activities 3.1 and 3.2, Funding proposal, page 38.

⁵ Activity 3.3, Funding proposal, page 40.

⁶ Assuming an average of 4.4 people per household.

⁷ Beneficiary Methodology and Calculations (Annex XIII h).

⁸ Funding proposal, page 98, footnote 89.

⁹ Funding proposal, page 53.

¹⁰ iTAP does not support nor does it recommend procuring commonly available technologies, such as ultrafiltration (UF), from a sole-sourced vendor like SkyHydrant. Water treatment systems should be designed and developed in a

proposes using existing ponds and constructing embankments to protect them from storm surges. The project expects to install 41 pond-water treatment systems with SkyHydrant, serving approximately 36,000 people, and 13,300 individual rainwater harvesting systems (RWHS), covering 58,000 people. Community and institutional RWHS will serve another 42,000 people.¹¹

11. Since the main objective of this project is to cope with climate change salinity, one of the key criteria used to evaluate the type of treatment process for pond water is “Climate change resilience to increased salinity”. However, the United Nations Development Programme (UNDP) proposes buying from a vendor (SkyHydrant) that uses a technology (UF) that does not remove salinity from water. Moreover, the proposal acknowledges that “The SkyHydrant will not remove salt, ... therefore non-saline ponds need to be selected for this technology to provide suitable drinking water.”¹² Since salinity is likely to be present in ponds, currently or in the near future, removing this salinity is key to increase the impact of this project. Consequently, the selection of UF reduces the impact of the project.

12. Although no activities are aimed at increasing the generation of meteorological or hydrological information, institutional capacity-building for MOWCA and DPHE includes training on integrating climate change aspects into policies and programmes and on climate risks and scenario modelling.

13. The limited awareness of the population on climate risks will be tackled by supporting last-mile dissemination of EWs through the creation of women and girls volunteer groups and providing them with training on community-based dissemination mechanisms.¹³ This activity will include 101 workshops for women’s groups, value-chain actors, and staff from WSCs and local government institutes on the implementation of climate risk reduction strategies, the creation and training of volunteer groups to disseminate EWs, and the training of government institution staff at Union level to enable replication.

1.2 Paradigm shift potential

Scale: High

Innovation

14. Rainwater harvesting systems (RWHS) as a sustainable drinking water system cannot be considered innovative in the region. However, the paradigm shift of the proposed project lies in its scale and its implementation as part of a comprehensive programme that includes supporting the establishment and management of climate-resilient livelihoods together with a strong capacity-building component oriented at multiple stakeholders at private, community and governmental levels. In addition, the level of project development at the community level (e.g. the analysis of livelihoods, rainwater harvesting analysis) does not commonly take place and could be used (with lessons learned adequately recorded) as a model to replicate in future programmes in the region. If successfully implemented, the project could provide a safe and

way that fosters bidding from numerous suppliers. If UF was the selected technology, there are numerous equipment manufacturers and many more equipment suppliers of UF in the region.

¹¹ Drinking Water Assessment Report (FP_UNDP_050917_5724_Annex II_c_(1).pdf), pages 74 to 94.

¹² Drinking Water Assessment Report (FP_UNDP_050917_5724_Annex II_c_(1).pdf), page 62. N.B.: in the selection process, the project proponents assign the same rating to the selection factor “Climate change resilience to increased salinity” to reverse osmosis (which removes salinity) and to SkyHydrant (UF, which does not remove salinity). If SkyHydrant were assigned zero to this factor, reverse osmosis would result the selected criteria.

¹³ Funding proposal, page 33.

continuous source of drinking water to approximately 136,000 people.¹⁴ Previous initiatives that included RWHS exist, but were all implemented on smaller scales.¹⁵

15. The project will support the implementation of some innovative agricultural technologies, such as aqua-geoponics and hydroponics. Aqua-geoponics is a combination of hydroponics and aquaculture that creates a mutually beneficial relationship between fish and plants. Aquaponics was developed in Bangladesh in 2013.

16. The proposal is strongly oriented to benefit women, adolescent girls and most vulnerable groups. The component on climate-resilient livelihoods is focused 100 per cent on women beneficiaries. Altogether 1,017 women's groups were selected as beneficiaries, each comprised of 25 women.¹⁶ The water supply and EW components will benefit men and women alike.

Potential for knowledge and learning

17. The project includes several activities aimed at strengthening knowledge management and learning processes, as described in paragraph 8.

18. Regarding other knowledge products, the livelihoods component will include the development of a Code of Practice for sustainable production and management of small aquaculture projects considering climate change risks, and the knowledge and learning component will establish a web portal, co-hosted by MOWCA, for dissemination of climate and gender-related knowledge, tools, and adaptation practices.

19. The monitoring and reporting plan is described in the funding proposal.¹⁷ The project manager will be responsible for day-to-day monitoring and implementation and will prepare an annual project implementation report describing the state of the indicators included in the project results framework. The involvement of beneficiaries in the project-level monitoring will be supported by delivering training courses to WLGs and through the development of a social audit protocol and toolkits for participatory monitoring and evaluation of resilient livelihoods.¹⁸

20. The design and implementation of an impact monitoring and evaluation framework is included under activity 3.3. Data gathered and lessons learned will serve to create a database that will support evidence-based policy, planning and implementation of climate-resilient livelihoods and water provision programmes. An impact evaluation will be designed and executed to quantify project impacts.

Contribution to the creation of an enabling environment

21. The most important outputs that will support the sustainability of project activities beyond project lifespan are: (a) enhanced management and technical capacities of community groups and governmental institutions (including in O&M and monitoring of livelihoods and water systems); (b) enhanced income generation; and (c) strengthened value-chain and market linkages. However, the funding proposal proposes that the Government of Bangladesh will allocate USD 4 million for 10 years post-project, continuing to pay for O&M (for water systems and technical assistance to livelihoods). This is not a sustainable practice. Numerous examples

¹⁴ However, using a proprietary technology (SkyHydrant UF for ponds) would make the project reliant on a foreign supplier. This is not sustainable for numerous reasons. See *Table 58: O&M cost per year for community based pond treatment with the Sky-Hydrant system*. In: FP_UNDP_050917_5724_Annex II _c_ (1).pdf, page 143.

¹⁵ Drinking Water Assessment Report (Annex IIc), page 35.

¹⁶ Funding proposal, page 55.

¹⁷ Funding proposal, page 109.

¹⁸ Funding proposal, page 34, activity 1.3.4.

exist of rural water services that have stopped providing drinking water due to reliance on imported technologies and on external sources to cover O&M costs..

22. Beneficiaries of the livelihoods component will be responsible for the maintenance of tools and equipment provided by the project and will receive technical assistance from local support staff and from the Bangladesh Fisheries Research Institute (BFRI) for aquaculture activities.

23. The project will create one water management committee for each of the 101 selected wards. Among others, the water management committees will have the responsibility of developing a fee-based model and financial management system.¹⁹ The results of the consultations on willingness to pay are in line with the expected O&M costs of the proposed technologies.²⁰

24. According to the funding proposal, the establishment of water user groups would enable participatory and sustainable planning and management of water systems. There will be approximately one water user group for every 50 households, and at least one per ward. The responsibilities of these groups include daily and/or monthly monitoring, minor maintenance tasks and distribution of water to the households from the community-scale and institution-scale RWHS and pond treatment systems. It is important to note that the distribution method is not specified in the funding proposal. This is a delicate issue because a deficient control of water withdrawal in community systems could result in water shortages during the dry season. A caretaker should be allocated to each community and institutional RWHS to ensure control over withdrawal.²¹

25. The project includes a three-tiered O&M system comprised of:²²

- (a) Tier 1: Beneficiary households and Water User Groups;
- (b) Tier 2: Union Parishad (council) and ward-level Water Management Committees; and
- (c) Tier 3: DPHE.

Contribution to the regulatory framework and policies

26. The institutional capacity-building component aimed at the MOWCA and the DPHE and other activities related to impact monitoring and data gathering will promote the integration of climate change and gender issues into sectoral policies and planning. A caretaker should be allocated to each community and institutional RWHS to ensure control over withdrawal.

Potential for scaling up and replication

27. The present proposal, implemented in two of the six coastal districts of Bangladesh (Khulna and Satkhira), is the first phase of a larger programme that seeks to encompass the remaining four coastal districts in a subsequent planned request for GCF funding.²³

28. The proposal contains several activities aimed at facilitating replication and scale-up: (a) learning exchange activities for women volunteer groups, at Union level, to support the

¹⁹ Drinking Water Assessment Report (Annex II c), page 97 and 98.

²⁰ Stakeholder Consultation Report (Annex XIII c).

²¹ The O&M costs of community and institutional RWHS do not include the salary of a "caretaker", as opposed to the O&M costs of the SkyHydrant systems which do include the salary of a caretaker. See Annex II c, pages 141, 142 and 143.

²² Funding proposal, page 37.

²³ Funding proposal, page 28.

replication of EW last-mile dissemination to other wards and Unions;²⁴ (b) capacity-building programmes for governmental institutions;²⁵ (c) generation and institutionalization of knowledge products and lessons learned; and (d) development of a replication roadmap for replication and scaling up of climate-resilient livelihoods and water supply systems, using the knowledge base created under this project.²⁶

29. Representatives of local financial institutions stated that microfinance would be viable if beneficiaries could demonstrate that the new livelihoods have been successful over at least a few production cycles and their economic gain has also been ensured. This access to finance would be vital for the scale-up of climate-resilient livelihoods.²⁷

30. The project proponent has made efforts to enable replication and scaling up, which are in line with the potential for replication in the coastal regions.

1.3 Sustainable development potential

Scale: Medium

Environmental co-benefits

31. Project activities will replace baseline shrimp farming with sustainable and climate-resilient practices that do not exacerbate saline intrusion.

32. Under activity 1.2.2, project funds will be used to upgrade two existing crab hatcheries to enable them to cover the demand of all the crab farms installed under the project and phase out the current dependence on wild crab stock, which can have a serious impact on biodiversity and overall ecosystem balance of the mangroves.

33. The BFRI is the official fisheries, aquatic resources and aquaculture research agency, with experience in operating hatcheries for the aqua-culture sector. Its primary aim is to assist fisheries' development by conducting and coordinating nationwide research efforts, standardizing techniques to maximize production and improve resource management, identifying and cultivating new production opportunities, and providing training and disseminating important skills and technologies to relevant actors within the fisheries sector. As part of the project, BFRI will be working with the procured NGOs and beneficiaries and will be engaged as follows: (i) BFRI would be providing in-kind support through their staff time to support effective backstopping and implementation support for the aquaculture livelihoods. They will provide quality control and technical support and training for the livelihood groups (together with the technical staff of the implementing NGO partners and project staff), necessary to promote sustainable production and resource management for saline-resistant crab cultivation, including through disease monitoring and control; and (ii) BFRI will be providing a secured, prioritized (on a "first-customer" basis) supply of crablets to the project's women beneficiaries throughout the project's lifetime. The crab hatchery currently operated by BFRI will be upgraded (with Government of Bangladesh co-financing) to ensure biosecurity and environmental risk management of the facilities, and will be expanded to support the crab-farming livelihoods under the project.²⁸

²⁴ Funding proposal, page 33.

²⁵ Funding proposal, page 39.

²⁶ Funding proposal, page 40.

²⁷ Stakeholder Consultation Report (Annex XIII c), page 27.

²⁸ Based on responses provided by the AE in responses to iTAP: "UNDP-20180111-5724-Response to ITAP comment.docx".

34. The environmental, social and management framework states that all project personnel will attend an induction covering health, safety, environment and cultural requirements and that all workers engaged in any activity with the potential to cause serious environmental harm would receive task-specific environmental training. However, the framework does not describe these training activities in detail.

35. The technical training to the beneficiaries of the implementation of climate-resilient livelihoods will include environmental awareness and environmental protection measures at the implementation level.²⁹

36. Other environmental co-benefits will come from the establishment of aqua-geoponic systems and hydroponic systems, low-input homestead gardens, plantations and sesame cultivation, as they will reduce community reliance on pesticides and fertilizers by including training in sustainable cultivation techniques and integrated pest control.

37. There is a contradiction with respect to the use of chemical fertilizers in homestead gardening. The livelihoods assessment report states that, "There are no negative environmental impacts to be expected from this livelihood option as no chemical fertilisers or other harmful agricultural practices will be introduced."³⁰ However, on the same page, under costs, the cost-benefit analysis table includes diammonium phosphate and triple superphosphate fertilizers, boron and gypsum, all chemical fertilizers.

38. The environmental risks associated with the proposed livelihoods are relatively small and are identified and addressed in the implementation conditions, as described in the livelihoods assessment report, annex II b.

39. The selected water supply solutions have no negative environmental impacts.

Social co-benefits

40. Seventy-three per cent of the population living in the rural areas of Bangladesh rely on saline groundwater as their source of drinking water,³¹ which substantially increases the risks of cardiovascular disease. The main social benefit of the project resides in the health improvement of beneficiaries. As people will be provided with a continuous and safe source of drinking water, it is expected that the incidence of cardiovascular and water-borne diseases will decrease and the continuous availability of better-quality drinking water will enhance health conditions in general.

Economic co-benefits

41. The main economic benefit of the project is the increased income of beneficiaries of the livelihoods component. Other co-benefits include reduction of public health expenses, and the indirect creation of jobs through the strengthened value chains and jobs related to drinking water provision, operation and maintenance.

42. While the O&M costs of drinking water systems based on rainwater at household, community and institutional levels are covered by the communities benefited, the O&M costs of SkyHydrant (major repairs and infrastructure renewal) are covered by the Government of Bangladesh through the DPHE. In many countries, this approach has proven not to be sustainable for water and sanitation systems.³² However, during the interview with the

²⁹ Funding proposal, page 64.

³⁰ Livelihoods Assessment Report (Annex II b), page 62.

³¹ Funding proposal, page 15.

³² FP_UNDP_050917_5724_Annex XIII_b_(1).pdf

independent Technical Advisory Panel (TAP), the accredited entity indicated that this approach has proven to work in Bangladesh.

Gender-sensitive development impact

43. The responsibility of collecting drinking water resides mainly with women and girls, who often have to walk long distances, spending an average of 2.5 hours a day on this activity.³³ The locations of the community water supply systems proposed were identified, taking into account a walking distance of 1 kilometre (km) for the households served.

44. The climate-resilient livelihoods component is completely focused on women, by creating WLGs as beneficiary groups. The establishment of women-headed livelihoods is expected to increase women's autonomy and empowerment.

1.4 Needs of the recipient

Scale: High

Vulnerability of the country

45. The main vulnerability of Bangladesh regarding climate change is the fact that two-thirds of the country is less than five metres (m) above sea level,³⁴ making the coastal regions particularly susceptible to the effects of storm surges and sea level rise, such as saline intrusion, flooding, erosion and property damage.

46. Freshwater resources in the coastal area of Bangladesh are being compromised by the intrusion of saltwater, a process which is expected to worsen with climate change, as a result of sea level rise, an increased number of intense cyclones and increased temperatures. Observations of sea level rise along the coast of Bangladesh in the period 1980-2012 showed increases of 6-21 millimetres/year.³⁵

47. While the World Health Organization recommends a maximum daily intake of 2 grams (g)/day of sodium (Na), studies in Bangladesh show average intake levels ranging between 3.4-16 gNa/day.³⁶

48. Rain patterns are expected to change, possibly causing severe droughts during the dry season, worsening drinking water insecurity.³⁷

49. The shift from agricultural land to aqua-cultural land (mainly shrimp farms) being experienced in targeted districts was partially triggered by the increase in soil salinity levels caused by the inundation following cyclonic events in 2007 and 2009.³⁸

50. Due to pressures such as scarcity of drinking water, land erosion, waterlogging, soil salinity and pollution, in 2005 the Government of Bangladesh categorized the coastal zone as an "agro-ecologically disadvantaged region".

51. The vulnerable coastal communities targeted by the project lack awareness of climate risks and impacts and have limited access to markets, technical capacity and financial resources to implement climate-resilient livelihoods on their own. The target Unions and wards were

³³ Funding proposal, page 22.

³⁴ Feasibility Study (Annex II a), page 2.

³⁵ Feasibility Study (Annex II a), page 31.

³⁶ Feasibility Study (Annex II a), page 46.

³⁷ Funding proposal, page 16.

³⁸ Funding proposal, page 14.

selected based on the level of exposure to salinity, including projected salinization, and the percentage of extreme and ultra-poor populations most vulnerable to negative climate change impacts.³⁹

Vulnerable groups and gender aspects

52. The project is specifically oriented to target the most vulnerable households. This can be seen in the description of the selection criteria in the funding proposal.⁴⁰ The beneficiary selection criteria prioritize female-headed households, households where an adolescent girl is solely responsible for household income, households of indigenous people and households with people with disabilities. The percentage of ethnic and religious minority households will be proportionally reflected in the selected beneficiaries. Indigenous people (*Adivasi*) targeted by the project are often subjected to severe discrimination, repression, and exclusion.

Economic and social development level

53. In Bangladesh, 31.5 per cent of the total population lives below the national poverty line, and the proportion of employed population below USD 1.90 purchasing power parity a day was 73.5 per cent in 2010.⁴¹ Average GDP growth rate was 7.05 per cent in 2016.

Absence of alternative source of financing

54. The fiscal constraints of government institutions responsible for addressing water insecurity and unsustainable livelihoods hinder their ability to fund the additional costs associated with climate change resiliency.

55. Private sector investment in drinking water systems for the targeted population is limited because their affordability and willingness to pay is extremely low.

56. Alternative climate-resilient livelihoods are not well known and are consequently perceived as risky by investors.

The need for strengthening institutions and implementation capacity

57. The lack of technical, financial, institutional and organizational capacities of the government agencies responsible for drinking water provision and women's empowerment is clearly identified in the proposal and correctly addressed by the project activities through a series of capacity-building programmes.

1.5 Country ownership

Scale: High

Alignment with priorities in the country's national climate strategy

58. As described in the funding proposal, the project is in line with the country's nationally determined contributions and its climate change strategies, including the Bangladesh climate change strategy and action plan, which supports awareness-raising, capacity-building, and project implementation in vulnerable regions, with special focus on agriculture and water resources.

Capacity of accredited or executing entities to deliver

³⁹ Funding proposal, page 28.

⁴⁰ Funding proposal, page 29.

⁴¹ <https://www.adb.org/countries/bangladesh/poverty>

59. UNDP has four decades of experience in working with the Government of Bangladesh in supporting its development efforts. UNDP and the Government of Bangladesh had co-implemented various programmes and projects in the areas of disaster risk management, climate change, poverty reduction, better governance and environmental management, focusing on capacity-building, policy and community interventions, and targeting the most vulnerable groups.

60. Although the MOWCA and the DHPE have experience in implementing projects related to supporting livelihoods and water provision, their limited technical and coordination capacities are clearly identified in the funding proposal.⁴² However, these deficiencies are addressed in the capacity-building component of the project.⁴³

Engagement with civil society organizations and other relevant stakeholders

61. Information-gathering at the design phase involved consultations with government agencies, NGOs, community-based organizations, donor and partner agencies, and local communities. These consultations were complemented by household surveys, focus group discussions, key informant interviews, transect walks and participatory rapid appraisals.⁴⁴

62. The consultation process is described in the stakeholder consultation report (annex XIII c), which indicates strong participation by all stakeholders during the project design. However, it should be noted that WSCs, which play a key role in the project activities, are not mentioned in the stakeholder consultation report.

1.6 Efficiency and effectiveness

Scale: Medium

Cost-effectiveness and efficiency

63. The cost of implementation of the water provision infrastructure is USD 103 per person, including mapping, beneficiary selection, mobilization of community-based management structures, implementation of drinking water solutions and capacity-building in O&M (the entire component 2). Compared to other water provision projects,⁴⁵ the water component cost is high.⁴⁶

64. The cost of the livelihoods component is USD 64 per beneficiary, accounting for entire households, even though only one person per household will participate in the implementation of the new livelihood. Considering this, the cost-effectiveness of the livelihoods component is relatively high.

65. Given that the affordability of the target population is very low and that alternative climate-resilient livelihoods are not well known and are consequently perceived as risky, grant financing is not likely to crowd out private investment.

⁴² Funding proposal, page 22.

⁴³ Funding proposal, page 38.

⁴⁴ Funding proposal, page 50.

⁴⁵ USD 20-80 for water (Funding proposal, page 74).

⁴⁶ USD 48 per capita for rainwater-based systems. Source: World Health Organization. 2004. *Water, Sanitation and Health Protection of the Human Environment*. Geneva: Geneva.. (doc. # WHO/SDE/WSH/04.04): "Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level". N.B.: the actual initial investment cost per capita for Asia is reported to be USD 34. This figure has been brought to present value (2008) assuming 2.5 per cent annual inflation rate.

66. The selection of each climate-resilient livelihood included a cost-benefit analysis, where the total cost and benefits of each production cycle were identified, including potential total revenues, profit margins and cost-benefit ratios.⁴⁷

67. The criteria for drinking water solutions included preferences to rehabilitate and use existing ponds. However, the technologies selected for treatment (UF) are expensive (both capital expenditure and operational expenditure) and the Government of Bangladesh will have to pay for replacements or parts and maintenance for 10 years, which is not a sustainable practice and may lead to discontinuation of drinking water services. In addition, the UF systems selected over more commonly-used filtration systems (sand, multiple-stage systems) and disinfection (chlorine), belong to a private firm (SkyHydrant), although there are numerous suppliers of this type of technology.

Financial viability

68. The livelihoods component will support small-scale income generation for the targeted beneficiaries, but there will be no revenue generation for project financiers for cost recovery.

69. As per the economic analysis presented in the proposal, the project net present value is USD 16 million and has an economic internal rate of return of 20 per cent, considering a project lifespan of 25 years for the livelihoods component and 16 years for the water component.⁴⁸

70. The selection process for climate-resilient livelihoods included the development of a cost-benefit analysis for each option considered.⁴⁹

Amount of co-financing

71. The total project cost is USD 33 million and will be jointly financed by GCF and the Government of Bangladesh; the latter will provide USD 8 million, including USD 1 million in kind. The leverage ratio for Government of Bangladesh/GCF financing is 0.32, which represents an increase over the co-financing ratio proposed in a previous funding proposal for this project at B15 (0.12).

Application of best practices

72. The sizing of water storage tanks in RWHS was made in a conservative manner, considering a dry season of 180 days with zero rainfall, which is less than the 5 per cent decrease projected for the dry season by 2050 due to climate change.

73. Tank size and rooftop surface were assessed for each proposed size of RWHS, based on a worst case scenario, using the average monthly rainfall for each district,⁵⁰ but considering zero rainfall between October and March. The results show that tank size and rooftop surfaces are correctly designed to withstand a severe six-month drought.⁵¹

74. The existence and condition of roof structures for community and institutional RWHS have been individually assessed through site surveys and are presented in the drinking water assessment report (annex II c). In the budget, all cases of individual household RWHS are considered as needing new roof sheets.

⁴⁷ Funding proposal, page 74.

⁴⁸ Funding proposal, page 78.

⁴⁹ Funding proposal, page 75.

⁵⁰ Drinking Water Assessment Report (Annex II c), page 69.

⁵¹ "RWHS - Khulna - Drought scenario.xlsx" and "RWHS - Satkhira - Drought scenario.xlsx".

75. While the drinking water assessment report (annex II c) recommends the use of some technique of disinfection, such as chlorination, solar disinfection or ceramic filters,⁵² the funding proposal refers only to “simple filtration and/or disinfection methods”, without giving any details regarding the selected post-storage disinfection technology.⁵³ Concerning health risks, it would be preferable to rely on an on-site disinfection system, rather than passing this responsibility on to the households (for example, UV disinfection in plastic resin/polyester bottles is an effective solution if six hours are allocated to the process. However, it is hard to guarantee that each household will adhere to the entire six hours).⁵⁴ It may be simpler and more effective/secure to use chlorine as a disinfectant on site. As indicated above, the selected method of disinfection (UF) is expensive (both capital and operational expenditures) and requires continuous funding from the Government of Bangladesh.

76. The selection of a specific, single vendor (SkyHydrant) of UF technology for pond water treatment is inadequate.

77. The technical analysis presented for selection of treatment technologies (biased towards the technology provided by SkyHydrant), invalidates this analysis. For example, UF receives high rating under the assessment factor “Climate Change Resilience to Increased Salinity” when, in fact, it is well known that UF does not remove salt from water.

78. Relying on technologies that depend on a supplier located outside Bangladesh (SkyHydrant is located in Australia), ties the sustainability of the system to the availability of parts from this supplier (i.e. the system would be vulnerable to the supplier introducing changes in the system, raising the price, or becoming bankrupt) and to the conditions for importation of the parts to Bangladesh, which may change over the life expectancy of the system (10 years).

79. The technical analysis for the selection of a particular (generic) technology for treatment of pond water must be revised. This analysis must take into account geographic conditions (e.g. the southwest is more likely to be affected by salt intrusion than the north-east, thereby needing different types of technologies), in addition to other factors already included in the funding proposal.

II. Overall remarks from the independent Technical Advisory Panel

80. This project has potential to have high impact with a paradigm shift in the region. Thorough studies have been carried out in the field and extensive data are presented in the annexes. The climate change background is adequately presented and the country needs are high.

81. However, as highlighted in the preceding paragraphs, iTAP has found several issues related to water supply that impact negatively on the sustainability potential of the project, as well as on its efficiency and effectiveness.

82. The technology selection process for treatment of pond water is biased towards a specific vendor of ultrafiltration (UF) technology, SkyHydrant. First, this project concerns the reduction of salinity in areas of Bangladesh, yet UF (from any vendor, including SkyHydrant) does not remove salinity from water. Second, reliance on one specific supplier located outside Bangladesh for the supply of parts would imply that: a) parts would always have to be available from this particular supplier (i.e. the supplier cannot modify the system, raise the price, or

⁵² Drinking Water Assessment Report (Annex IIc), page 51.

⁵³ Funding proposal, page 36.

⁵⁴ Drinking Water Assessment Report (Annex IIc), page 106.

become bankrupt); and b) the conditions for importation of the parts to Bangladesh cannot change over the life expectancy of the system (10 years). This selection of the technology negatively impacts the sustainability of the system.

83. To increase the sustainability potential of the project, iTAP recommends to approve this proposal subject to the following:

- (a) Prior to the execution of the FAA, the selection and procurement of the appropriate technology to be used for pond water treatment shall be concluded to the satisfaction of the GCF and incorporated by the Accredited Entity into the project design and implementation arrangements. In particular, and for such purposes, the Accredited Entity shall:
 - (i) Procure an independent consultant with extensive experience in water treatment systems in rural areas and specific knowledge in the treatment of brackish water, with the procurement and selection of such consultant to be consulted with and agreed by the GCF. The terms of reference for such independent consultant shall require her/him:
 - (A) To visit an adequate number of sites distributed in the areas of intervention;
 - (B) To consider and impartially identify the most sustainable technology solutions based on:
 - (1) the different geographical conditions (for example, the north-east area of intervention is less likely to be impacted by high salinity than the south-west, thereby permitting the use of different water treatment technologies in different areas of intervention);
 - (2) the technical, environmental, social and climate conditions existing in each area of intervention;
 - (3) the need to avoid the use of proprietary technologies or name brands;
 - (4) the capabilities of the recipients to operate and maintain the proposed systems / technologies and cover the relevant costs;
 - (5) the availability of spare and replacement parts within Bangladesh; and
 - (6) the ability of Department of Public Health Engineering to cover the costs of major repairs and infrastructure renewals.
 - (7) to describe the needs and appropriate solutions for each relevant area in sufficient detail so as to facilitate their procurement in an open and competitive process; and
 - (ii) Submit the report prepared by such independent consultant to the GCF for its approval; and
- (b) The inclusion of a covenant in the FAA to ensure that the procurement process for the identified technologies (as approved by the GCF):
 - (i) is clearly described and extensively supported by evidence and data collected from the independent consultant's site visits, literature and other reliable sources; and



- (ii) describes the needs and appropriate technology solutions for each relevant area in sufficient detail so as to facilitate their open and competitive procurement.

Independent Technical Advisory Panel's review of FP070

Proposal name:	Global Clean Cooking Program
Accredited Entity:	World Bank
Project/programme size	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium/Low

1. The Government of Bangladesh has a goal to achieve 100 per cent coverage of improved cookstoves (ICSs) by 2030 as per the Country Action Plan for Clean Cookstoves (CAP). The target of this CAP is to disseminate ICS to over 30 million households in Bangladesh by 2030.

2. Bangladesh is an agricultural country with approximately 66 per cent of the population living in rural areas. Most of the rural population depends on traditional stoves using fuelwood. The project builds on the first phase of the project implemented by Infrastructure Development Company Limited (IDCOL), with financial support from the World Bank, that achieved 1 million ICS installations.

3. The proposed second phase of the program aims to install an additional 4 million ICSs for very poor and vulnerable households by 2021, reducing 3.763 metric tons of carbon dioxide equivalent (MtCO₂eq). The project estimates total lifetime emissions reductions could continue after project closure, reaching 9.94 MtCO₂eq avoided emissions over 10 years, assuming 1 per cent annual growth of improved cookstoves sold. Therefore, the total estimated lifetime emissions reductions will add up to 13.703 MtCO₂eq.

4. However, these estimates are based on the consumption of biomass fuelwood rather than biomass residue, which could change the figures of the estimated emission reductions. In Bangladesh, poor rural households are using any type of fuel they can find to cook, including the residues from rice plantations. Therefore, the potential to reduce greenhouse gas (GHG) emissions (and impact climate change mitigation) could be marginal, making it difficult to justify the investment by GCF.

5. The total number of direct beneficiaries is expected to be 17.4 million. In terms of adaptation, the project will help very vulnerable households reduce the amount of renewable and nonrenewable fuel currently being used in their inefficient cookstoves, which emit household air pollutants (HAP). This will improve livelihoods and have significant health benefits for the targeted group.

6. The project does not address the development of firewood lots by the communities or take a closer look at the ecosystem services in the areas where the communities are currently living and how they extract fuelwood there. In terms of adaptation, the reduction in the use of firewood could help reduce pressure on forests and ecosystems. One of the main factors in climate change adaptation is teaching communities to understand that adaptation relies on healthier ecosystem services, and, therefore, the need to plant trees and restore ecosystems is essential.

1.2 Paradigm shift potential

Scale: Medium

7. The project promotes the use of efficient cookstoves that have been used throughout the world to reduce the impact on forest fuel extraction and to guarantee better health conditions for communities. Therefore, there is no paradigm shift as such. As stated above, in the case of Bangladesh, this is a health driven project rather than a climate change driven project due to the biofuel currently being used by the vulnerable rural communities.

8. In Bangladesh, there have already been several organizations introducing cleaner and more efficient cooking solutions since 1980. However, according to the project proposal only 3-5 per cent of households have access to an ICS. This project is different in that the resources will be mostly used for market penetration, awareness and campaigns, and not for subsidizing efficient cookstoves for the communities.

9. The total project size is USD 82.17 million, including USD 20 million from the International Development Association (IDA) and USD 20 million proposed from GCF. The project expects co-financing to come from all the very poor households buying new models of efficient cookstoves with their own resources, totalling USD 42.17 million.

10. The project has two main components. Component 1 will support scaling up investments in ICSs by giving grant support to the partner organizations (POs) for conducting promotion and awareness campaigns as well as for capacity-building. Payments to POs will be based on the number of stoves sold.

11. Component 2 includes technical assistance and aims to enhance supplier capacity and increase demand. It also includes research and development activities for institutional stove development and activities to encourage enterprise development. It will involve awareness raising and community outreach to enhance demand.

12. GCF and World Bank resources will be disbursed as performance-based incentive grants to POs, mostly non-governmental organizations and some private sector companies, under component 1 to improve their supply chain (building up their distribution, retailing, and after-sale service networks), increase their management capacity, and conduct marketing and promotional activities.

13. However, it is difficult to justify GCF money going to POs in the form of performance-based payments for every installed cookstove rather than to vulnerable communities that could use incentives, for example, to plant woodlots that could improve their lives in terms of finding adequate biofuels for their cookstoves.

Potential for knowledge and learning

14. The project has the potential for knowledge-sharing as an important part of the resources will be used to educate and communicate the targeted households on the benefits of using ICSs. The project will also have the potential for scaling up. During the first phase of the program, IDCOL covered only 282 clusters (sub-districts) against 490 clusters. The project emphasizes the need to develop more extensive awareness-raising campaigns, widespread field-level promotional activities and capacity development of POs in those clusters.

15. However, the project is only focusing on a campaign for ICS market penetration, it is not focusing on analysing the cultural and religious factors related to the use of cookstoves by communities. The project also fails to consider pressure on the forest and therefore the need to educate communities on the impact of wood extraction, as the latter affects ecosystem services and water provision, while at the same time facing increasing climate change risks.

Contribution to the creation of an enabling environment

16. The project will support a menu of options for consumers that includes locally manufactured stoves as well as imported factory-produced stoves. The Bangladesh Standards

and Testing Institute is developing national standards for cookstoves and IDCOL has funded a National Cookstove Testing Center. The project will also focus on creating in-country capacity with relevant partner organizations to support cookstove penetration.

17. The project builds on global experiences and knowledge for the penetration of efficient cookstoves. However, in Bangladesh the situation could be different for cultural and religious reasons. For example, the monsoon season makes it very difficult for communities to use indoor cooking stoves particularly if they are chimney-based stoves that get wet. In this context, women are the ones taking care of the kitchen, however, they are unable to go to their roofs to clean the chimneys due to cultural reasons. Therefore, some of the cookstoves end up not being used. The project will support non-chimney-based stoves that are currently being tested to make them as smoke-free as possible.

18. The theory of change is not presented, but the government has a well-focused target to reach the 30 million households with ICSs and has therefore created the necessary regulatory framework to reach the goal. However, the motivation is again health driven rather than climate change driven, and the climate component as presented is marginal

1.3 Sustainable development potential

Scale: Medium

Environmental co-benefits

19. The project will have environmental benefits as the pressure on forest ecosystems will be reduced. However, other projects have shown that even though efficient cookstoves use less wood, the increasing population will continue to exploit forests. Therefore, there is an evident need to develop firewood lots where communities learn to plant their own forest resources and regenerate their own ecosystems in order to continue using fuelwood to cook. This is not only relevant for the emission equation but also to adapt to pressures on forest ecosystem services.

Social co-benefits

20. The co-benefits of the project are related mostly to health benefits for the communities. According to the project proposal, the World Health Organization estimates that 46,000 women and children die each year in Bangladesh as a direct result of exposure to HAP, while millions more suffer from respiratory diseases, tuberculosis, asthma, cardiovascular disease, eye problems and lung cancer. Seventy per cent of the victims of HAP are children under 5 years old.

21. The project proposal will also relieve the burden, especially for woman, of having to find biofuel resources to cook, including the time spent walking far distances to find biofuel and cooking with inefficient cookstoves.

22. The project focuses on market penetration rather than including a sociocultural component to address cultural and religious factors. Supporting community-driven schemes that favour the incomes and livelihoods of communities could be an added advantage. One example would be creating a scheme with incentives for women to become market forces within their own communities by selling and sharing the benefits of efficient cookstoves including enhancing awareness about developing woodlots and maintaining healthy ecosystems.

Economic co-benefits

23. The economic co-benefits are mostly related to the decrease in health expenditure by the government and the communities due to improved air quality. The price on human life

(mortality) savings is not quantifiable but improving health could be the most important co-benefit of the project.

24. The project will have an economic burden on poor families that must use their scarce resources to buy a new ICS. Even though the benefits are evident for them, there is a onetime economic stress on the family income. The families will also benefit because they will either spend less resources to buy fuel and/or spend less time collecting biomass.

Gender-sensitive development impact

25. Women are the ones who cook in the targeted households, and with efficient cookstoves they will reduce the time spent in buying or collecting wood as well as the time spent cooking.

26. More evidently, the ICSs will improve the health condition of women as well as that of their children and therefore enhance their quality of life and lifespan.

27. However, the project could have a more gender approach to deliver better incentives and benefits to women and poor communities in a more integral way. For example, if the project spends USD 40 million just on market penetration, it must also use some resources to create more integral schemes involving the participation of women and communities.

1.4 Needs of the recipient

Scale: High

Economic and social development level of the country and vulnerability

28. The current population of Bangladesh is 163 million and it is expected to increase to 265 million by 2050, according to the Government of Bangladesh, putting pressure on already scarce resources. Around 65 per cent of the population live in rural areas and 31 per cent live below the poverty line of USD 2 per day.

29. More than 89 per cent of the population of Bangladesh still uses fuel for cooking, and therefore around 138 million people have been exposed to HAP, which takes 78,000 lives every year in Bangladesh. For Bangladesh, increasing the use of efficient wood stoves is a matter of health and human security.

The need for strengthening institutions and implementation capacity

30. Bangladesh began implementing programs to spread the use of efficient cookstoves in the 1970s. However, changing the business as usual model has been difficult. The Government of Bangladesh has declared its goal to make the country's kitchens smoke-free by 2030. Bangladesh's intended nationally determined contribution (INDC) sets a target of 70 per cent market share, or 20 million households, for improved biomass cookstoves by 2030; 40 per cent market share for improved gas cookstoves; and 10 per cent market switch from biomass to liquefied petroleum gas for cooking compared to business as usual. To support the market, the Government of Bangladesh reduced by 10 per cent its import duty on ICSs, making cooking technologies more affordable to consumers.

31. The country goal of reaching 30 million households with efficient cookstoves will demand a strong effort to educate the communities on the need to change their normal cookstoves and make them understand that the investment pays off in terms of health and efficiency. To do this, the country needs to raise awareness and educate people with the help of partner institutions able to support local communities in the country to make the shift.

32. The project is mostly driven by the World Bank and IDCOL providing a financial scheme for market penetration, but it does not include any other relevant institutions that could

improve the project in terms of sociocultural intake by communities or by relevant institutions that could improve the project in terms of climate change and overall environmental intake.

1.5 Country ownership

Scale: High

Alignment with priorities in the country's national climate strategy

33. The project proposal is not very descriptive in terms of climate change; the documents only mention Bangladesh' political manifesto "Vision 2021" from 2008 that aims to transform Bangladesh from a low-income economy to an early-stage, middle-income nation by 2021. "Vision 2021" was included in the Perspective Plan of Bangladesh 2010-2021, which includes mitigating the impacts of climate change as one of its nine priorities. The Vision 2021 also speaks about the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) of 2009, which guides nationwide climate change adaptation and disaster risk management.

34. The country has signed the Paris Agreement. In its INDC, the country specifies its mitigation targets and highlights adaptation priorities, including the promotion of climate resilient livelihoods. Improving cookstoves will therefore need to be aligned both with the country priority to reduce emissions and to help communities adapt to climate change. In order to achieve its INDC, the country needs to improve its emission estimates from efficient cookstoves as the rationale presented in this project as stated in the impact section is not at all evident.

Capacity of accredited or executing entities to deliver

35. The World Bank has strong experience in climate change, managing several projects across the globe. Through its private sector arms – the International Finance Corporation and IDA – the World Bank has implemented diverse behaviour change and market transformation programs in the energy, health and water and sanitation sectors, which have provided valuable lessons for project design and implementation. However, this project doesn't make any clear reference to other experiences the World Bank has had with cookstove projects around the world. This project also does not reflect that the climate change or environmental departments of the World Bank and International Finance Corporation have been involved in the project design, as the climate change and environmental rationale in the proposal is very weak. In addition, the social aspects, including gender considerations are not well addressed in the proposal.

36. In Bangladesh, the World Bank has led support of the Bangladesh Rural Electrification and Renewable Energy Development (RERED) I and II projects, acquiring deep understanding of the energy sector with a special emphasis in solar energy. However, transferring the knowledge from solar market penetration schemes to efficient cookstoves is very different due to the cultural, social and economic situation of the end users.

37. IDCOL is a government-owned infrastructure finance company, that will act as the implementing partner for this project. The company started in 1997, along with the World Bank's RERED program, with the role of bridging the financing gap for developing medium- and large-scale infrastructure and renewable energy projects in Bangladesh. IDCOL is the market leader in private sector energy and infrastructure financing in Bangladesh.

38. Under the World Bank RERED program, IDCOL has focused on solar home systems, domestic biogas plants and improved cooking stoves. The project relies on partner organizations that are in charge of facilitating the penetration of the ICSs in the selected regions of the program.

39. For monitoring and quality control under the ICS program, IDCOL established an inspection team, a call center and web-based software to keep track of each ICS installed under the program. After receiving disbursement requests from the POs, IDCOL inspects at least 10 per cent of ICSs submitted for each disbursement request.

40. In the first phase of the project, the goal to achieve the 1 million ICS installation target was met in January 2017, almost two years ahead of the project completion period. However, the project estimates that between 10 to 12 per cent of the cookstoves are not being used. There is a need to understand sociocultural behaviour rather than only providing inspection mechanisms to ensure the use of cookstoves by communities. In other words, instead of putting the pressure on the POs through inspection mechanisms, it is suggested that the project study cultural behaviors and use, for example, to see if women's organizations could influence cookstove use and sustainable wood provision mechanisms.

Engagement with civil society organizations and other relevant stakeholders

41. Phase one of the project relied on the partner organizations to address the rural households and improve market penetration and awareness with communities in order to reach the goal of 1 million ICS installations. In this respect, the project has not really organized consultations with communities but focused on a market approach to sell the cookstoves. Since POs are paid on the basis of the number of ICSs installed, it is in their interest to sell as many cookstoves as possible and not necessarily to assist the communities by showing the positive impacts of the cookstoves for their livelihoods, including the impacts on their surrounding environment.

42. The project organized some consultations with other organizations and projects that are in the same cookstoves market, including Global Alliance for Clean Cookstoves (GACC), United States Agency for International Development (USAID), Catalyzing Clean Energy in Bangladesh project (CCEB), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and other stakeholders, to ensure sector coordination and avoid duplication of efforts. The project states that several programs have tried to address the problems of inefficient cookstoves in Bangladesh with limited results. The project does not include an analysis of the failures of these programs or build on lessons learned from others, including lessons related to the climate lens factor.

43. Further consultations could be developed with the communities, understanding where they are supplying the fuel for cookstoves and how the project could support a more integral design that takes into consideration the need to conserve forests and ecosystems and the possibility of establishing woodlots to supply woody biofuel for a growing population.

44. It is worth noting that the proposal states that the national designated authority (NDA) is still in the process of reviewing the project to give an endorsement to the proposal. Therefore, it is important for GCF to understand their vision to commit to financing the project.

1.6 Efficiency and effectiveness

Scale: Medium

Cost-effectiveness and efficiency

45. As stated above, the total cost of the project is USD 82.17 million, including USD 20 million from IDA and USD 20 million proposed from GCF. The project expects co-financing to come from all the very poor households buying new models of efficient cookstoves with their own resources, for an expected amount of USD 42.17 million.

46. In order of magnitude, with the USD 40 million investment from the World Bank and GCF, and as per the below table reference of grants and selling prices, the project could easily provide better incentives even in the form of financing the installation of woodlots to the communities rather than spending the resources by giving result-based-payments to the POs. Out of the USD 40 million in support from GCF and IDA, USD 28 million will be disbursed as performance-based incentives grants to the POs to improve their supply chain (building up their distribution, retailing, and after-sale service networks), increase their own management capacity, and conduct marketing and promotional activities.

47. The remaining USD 12 million will be used for a number of activities that are managed by IDCOL and can be broadly categorized into the following: (i) to conduct national level promotions such as television commercials, billboards, leaflets, manuals, calendars, etc.; (ii) capacity-building activities for POs and IDCOL (e.g. management training, technician training, information technology training, promotional training, etc.); and (iii) monitoring and operational expenses for IDCOL. This amount seems large and rather cost-inefficient; it could be better used to integrate the integral climate change component of the project, including the supply of efficient woody biofuels.

Table 3: Grants and Selling Prices

Category	Proposed grant in USD	Expected price in USD
A: Double mouth concrete stoves	6.32	12.95
B: Double mouth stoves with metallic lining and insulation	13.75	19.51
C: Single mouth stoves with metallic lining and insulation	11.25	18.04
D: Single mouth portable stoves with metallic lining and insulation	4.38	5.71
E: Manufactured metallic stoves	12.50	24.60
F: Commercial stoves	31.25	80.82

48. The project has no market analysis in terms of the willingness of customers to pay for more expensive ICSs. Such a market analysis will be conducted as part of phase 2 implementation. Again, the project has failed to include market research and therefore doesn't explain why the stoves haven't been used. One of the possible solutions would be to provide incentives to communities so they organize themselves for better understanding and buy-in into the program, with possible economic and/or financial incentives that could be used for developing woodlots.

49. In terms of efficiency, the total project cost would be USD 21.8 per tCO₂e avoided, while the project states that the GCF portion is around USD 5.3 per tCO₂e reduction. However, because of the question on emission estimates due to the use of biomass residues (renewable biomass), these estimates would need to be revised.

50. Financial and economic analyses were conducted from the perspectives of the households. For the purpose of calculating the financial rate of return, the savings in fuel costs were considered as the benefit to the ICS households, while the economic rate of return is based on the fuel savings, health benefits of reduced HAP and the global benefits of reduction in GHG emissions due to use of ICSs. The internal rate of return for the households resulted in 88 per cent, which is high. However, the project hypothesis is that households are not using efficient cookstoves because they do not account for this benefit and therefore the project should concentrate on holding awareness campaigns to change household behaviours.

51. There is a question on the amount of resources that need to be used for market penetration in terms of scaling up the project. If the country wants to reach the goal of 30 million cookstoves, economies of scale could include more efficient market and incentive mechanisms, including alternatives where, for example, the same families will earn from having their neighbours using efficient cookstoves. In general, the project would benefit from using the resources to help the very poor households instead of leaving half of the resources in the hands of the POs and the central IDCOL office.

II. Overall remarks from the independent Technical Advisory Panel

52. The independent Technical Advisory Panel (TAP) recognizes the need for an efficient program to introduce 30 million ICSs in Bangladesh by 2030 in terms of creating health benefits.

53. However, there is a need to revise the climate impacts of the proposal and the estimated emission reduction as it does not account for the difference between fuelwood and residue biomass (renewable versus non-renewable sources of biomass) consumed by the end users. The project also does not address the development of woodlots and community awareness of the pressure to the ecosystem services caused by the extraction of biomass as well as the impacts this pressure might have on their livelihoods in light of climate change.

54. The independent TAP would also like to see the USD 20 million investment of GCF resources for market penetration that will end up in the hands of POs revised so that some of the resources are used to help the communities developing woodlots, including knowledge-sharing on their understanding of the relation of climate change aggregated effects to their livelihoods and the planet.

55. In this regard, the independent TAP recommends approving the project with the following conditions:

56. Prior to effectiveness of the Funded Activity Agreement (FAA) of the project;
- (a) Present a revised GHG emission reduction analysis, considering the different regions and different seasons in Bangladesh, based on real use by the communities of different fuels, including from renewable (e.g. biomass residues) and non-renewable sources;
 - (b) Present a monitoring program that establishes the percentage of households that use woody biomass (from renewable and non-renewable sources) and other fuels, including biomass residues; and
 - (c) Present a sociocultural program that provides incentives to the vulnerable communities to develop sustainable woodlots that could serve to supply biomass.

57. **Prior to first disbursement:**

- (a) Present and disseminate a study on access to finance and incentive options that considers community-driven market penetration mechanisms that will look into more equitable distribution strategies for ICSs.

Independent Technical Advisory Panel’s review of FP071

Proposal name:	Scaling Up Energy Efficiency for Industrial Enterprises in Viet Nam
Accredited Entity:	World Bank
Project/programme size	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium/High

1. The proposed project aims to offer an integrated package of credit risk mitigation, technical assistance (TA) and a capacity-building programme for the Government, local banks and private sector entities to expand energy efficiency in the industrial sector in Viet Nam.
2. Impressive economic development has contributed to the fact that the gross domestic product (GDP) of Viet Nam ranks as one of the highest in East Asia, in terms of carbon intensity. The energy elasticity of the country’s GDP is estimated at 2, compared to less than 1 for most countries.¹ Between 2010 and 2030, Viet Nam’s overall greenhouse gas (GHG) emissions are estimated to increase fivefold, per capita emissions fourfold and the carbon intensity of GDP by 20 per cent.²
3. Among all sectors, the industrial sector is one of the key contributors to increasing energy intensity, accounting for 48 per cent of the final energy use in Viet Nam. For example, the energy consumption of iron and steel plants in Viet Nam is twice as high as that of their counterparts around the world to produce the same amount of steel. Energy efficiency investment in those plants is estimated to be able to achieve a reduction in energy consumption of 45,000 gigawatt-hours (electricity) between 2015 and 2030. The accredited entity (AE) estimates that effective energy efficiency intervention could realize a 19.3 per cent reduction in power demand from the iron and steel, fertilizer, and pulp and paper industries.
4. Improving energy efficiency is viewed as the most cost-effective option to reduce GHG emissions. In its intended nationally determined contribution (INDC), the Government of Viet Nam has made a commitment to an 8 per cent reduction in the country’s GHG emissions by 2030 compared with the business-as-usual scenario. It proposes a further 25 per cent reduction, with support from the international community. To achieve the commitment, the Government of Viet Nam intends to improve the effectiveness and efficiency of energy use and to reduce energy consumption in manufacturing industries where energy consumption is high.
5. In the Viet Nam Green Growth Strategy for the period 2011–2020 with vision to 2050 (2012) prepared by the Government, GHG reductions of 8–10 per cent in the 10 years from 2010 is targeted by improving energy efficiency compared with the business-as-usual scenario. The country has passed a Law on Energy Efficiency and Conservation, and a series of decrees to promote energy efficiency have been issued.
6. The proposed project consists of two components. In component 1 (GCF Risk Sharing Facility (GCF-RSF)), GCF provides a USD 75-million partial credit guarantee without sovereign guarantee, plus a grant of USD 3 million. The partial credit guarantee will be offered to participating financial institutions (PFIs) to be selected by the AE to mitigate credit risk of

¹ World Bank. 2016. *Exploring a Low-Carbon Development Path of Vietnam*.

² World Bank. 2016. *Exploring a Low-Carbon Development Path of Vietnam*.

industrial enterprises (IEs) and energy services companies (ESCOs) that borrow loans from PFIs to implement energy efficiency measures. The proposed guarantee coverage is expected to be 50 per cent on average of the loss incurred by PFIs. The GCF-RSF will be managed by a programme implementing entity (PIE), an entity to be appointed by the Government of Viet Nam. The proposed USD 3 million grant in component 1 will be used to fund the administrative and operating expenses of PIE for the first two years, and to pay out guarantee claims during the early stage of the operation while sub-guarantee fees received by PIE could be insufficient.

7. Component 2 is a USD 11.9 technical assistance facility to be funded by GCF (USD 8.3 million), AE (USD 1.7 million) and Korea International Cooperation Agency (USD 1.9 million) to assist the stakeholders (Government, PFIs, IEs and ESCOs) to enhance the policy and regulatory framework, to improve institutional capacity, to expand and disseminate knowledge and to develop bankable energy efficiency projects. Dissemination of energy efficiency knowledge will be undertaken through various means, including policy dialogue, training, workshops, reports and conferences during the tenure of the project. The energy efficiency knowledge covers energy efficiency equipment/technologies/processes, energy efficiency policies/regulations, financing mechanism and incentives, energy efficiency standards, ESCO models and contracts, investment risk identification and mitigation, project preparation/implementation/monitoring. At the end of each capacity-building activity, evaluation will be conducted by the AE to measure the increased knowledge and skills, and the quality of the activities via participation questionnaires, pre- and post-event tests. Traced evaluation will be conducted after 6 months to measure the application of knowledge achieved through the interventions resulting from the TA.

8. In parallel, the AE will provide a USD 100 million sovereign-guaranteed loan to be on-lent by the Government to PFIs for the purpose of financing energy efficiency subprojects. The independent Technical Advisory Panel (iTAP) considers that, although the USD 75 million GCF-RSF and USD 100 million AE's sovereign-guaranteed loan together mobilize a sizeable amount of financing for PFIs to increase their lending to energy efficiency subprojects, the complementarity between them appears to be limited because they are not structured as a package to develop loan modalities to fit different demands of various energy efficiency subprojects financed by PFIs.

9. The AE estimates that 12 Mt CO₂ eq of GHG emissions can be reduced annually, and 120 Mt CO₂ eq of GHG emissions in total can be avoided in the 10-year lifetime of the investment. Total energy savings are estimated to be 2.36 Mtoe, equivalent to the saving of 2,100 MW power generation with a 95 per cent capacity factor. The estimation is prepared by the AE based on its study on energy efficiency investment opportunities in key energy intensive industries in Viet Nam.³ The iTAP noted that the estimation could not be accurate, given the nature of the proposed project to support a large number of energy efficiency subprojects through PFIs, which cannot be identified ex ante. Nevertheless, the estimation provides a reasonable basis to project the amount of GHG emission reductions that the proposed project would achieve.

10. The iTAP considers that the impact potential of GCF assistance is "Medium/High".

1.2 Paradigm shift potential

Scale: Medium/High

³ World Bank. 2015. *Report on Methodology and Estimation of Energy Efficiency and GHG Emission Reduction*.

11. The proposed project aims to develop a sustainable energy efficiency financing market in Viet Nam by addressing market barriers including lack of access to finance and the lack of capacity of the stakeholders. With the risk sharing, TA and capacity-building offered by GCF, the capacity and experience of the PFIs is expected to be enhanced so that they can play a critical role in energy efficiency financing in the future. The project will also contribute to expanding the business capacity of IEs and ESCOs in developing and implementing bankable energy efficiency subprojects as per sustainable and international practices and standards. The project is expandable with the participation of new financial institutions that are supportive to industrial energy efficiency throughout the implementation.

12. The TA is expected to contribute to strengthen the capacity of the Government and to enhance the policy and regulatory framework to promote energy efficiency in Viet Nam. Workshops will be offered to raise awareness and share good practices across the sector. In addition, energy audits and training of auditors/energy managers will be provided for pipeline development. As a result, local capacity will be developed to effectively design and monitor the impacts of energy efficiency in the industry sector in Viet Nam. The number of financial institutions and corporates promoting energy efficiency is expected to continuously increase after the proposed project is closed.

13. The iTAP assesses paradigm shift potential of the proposed project to be “Medium/High”.

1.3 Sustainable development potential

Scale: Medium

14. The proposed project will contribute to economic development through private sector participation in Viet Nam. Investments in energy efficiency will increase productivity, profitability and competitiveness of the industrial sector as a result of lower energy costs. The project will also help to develop a new market of industrial energy efficiency for the private sector. In the industrial sector, increased employment can be expected to bring positive economic co-benefits to society.

15. The proposed project and the AE sovereign-guaranteed loan together will contribute to reducing electricity demand by about 4.7 TWh every year, equivalent to energy generated by a new coal fired power plant of about 2,100 MW with a 95 per cent capacity factor according to the AE’s estimation. By reducing demand for electricity generated from fossil fuel, the proposed project will avoid the emission of local pollutants.

16. The AE will carry out a gender analysis of the proposed project. Specific action plans will be established to address the identified gender gaps around the industrial sector that the project will support. The details will be further developed during the preparation and implementation of the project.

17. The iTAP assesses sustainable development potential of the proposed project to be “Medium”.

1.4 Needs of the recipient

Scale: Medium

18. Despite the impressive economic expansion associated with rapid industrialization, development of the energy efficiency market in Viet Nam is proving to be slow due to various market barriers, including limited access to finance, insufficient capacity of financial institutions, IEs, ESCOs and government entities. Local banks remain reluctant to allocate capital to new lines of business such as energy efficiency given their capital constraints, suboptimal resource allocation and lack of expertise.

19. The proposed project is structured to deliver a comprehensive package to tackle the barriers by mobilizing long-term capital and enhancing the capacity of the Government, financial institutions and private sector (PFIs, IEs and ESCOs) in promoting energy efficiency in Viet Nam. The AE is further providing assistance to address other issues critical to accelerate the development of the energy efficiency sector in Viet Nam. Such issues include electricity tariffs, carbon monitoring and verification infrastructure.

20. The iTAP considers that the needs of the recipient for the proposed project are “Medium”.

1.5 Country ownership

Scale: High

21. The proposed project is in line with Government strategies and commitments to promote energy efficiency as prescribed in the Viet Nam Green Growth Strategy for the period 2011–2020 with vision to 2050, the NDC under the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC), and the Viet Nam Energy Efficiency Program (VNEEP) for the period 2016–2020 (2015).

22. The Viet Nam Green Growth Strategy for the period 2011–2020 with vision to 2050 identified energy efficiency as an effective modality, and aimed to reduce the intensity of GHG emissions by 8–10 per cent compared with the 2010 level and to reduce emissions from energy activities from 10–20 per cent compared with a business-as-usual case.

23. In its INDC, the Government also listed energy efficiency as one of the measures to reduce 8 per cent of the GHG emissions by 2030 compared with the business-as-usual scenario and to further aim at a 25 per cent reduction with support from the international community.

24. The VNEEP is a national target programme and a comprehensive plan that institutes measures for improving energy efficiency and conservation in all sectors of the economy in Viet Nam for the period 2016–2020. The TA in the proposed project will support and contribute to the achievement of the VNEEP.

25. The AE has experience and sufficient capacity to undertake the proposed project as presented. It has been engaged in the energy sector of Viet Nam for a long time in terms of financial investment, policy dialogue and knowledge management. The AE has supported other countries, including China and India, for scaling up energy efficiency.

26. Throughout project preparation, the AE has undertaken multiple rounds of stakeholder consultation with government entities, local banks and non-bank financial institutions, industrial associations and companies, ESCOs and development partners. Further consultations are envisaged to ensure the proposed project is able to deliver the expected impacts, if implemented.

27. The iTAP considers that country ownership of the proposed project is “High”.

1.6 Efficiency and effectiveness

Scale: Medium/High

28. The USD 75 million GCF-RSF together with USD 11.3 million TA is expected to catalyse an additional USD 410.9 million of financing: USD 101.7 million (AE); USD 226 million (PFIs); USD 81.3 million (IEs/ESCOs); and USD 1.9 million (KOICA) for parallel implementation of TA and capacity-building. The leverage ratio is about 4.8 times. The PFIs are expected to mainstream energy efficiency lending by leveraging expertise and experience gained during the project implementation. Accordingly, the funding to be delivered to the energy efficiency sector and business in Viet Nam will continuously increase.

29. The GCF-RSF is financially sustainable. All expenses, including guarantee claims incurred by PIE, would be funded first by its revenue from sub-guarantee fees, and USD 3 million grant to be provided as a seed capital during the initial stage. The GCF guarantee would be called only if PIE financial requirements could exceed its sub-guarantee fee revenue. The AE estimates the losses of 5 per cent of the loan portfolio, which is believed to be conservative. A TA in Component 2 will contribute to minimize that risk by enhancing the credit assessment capacity of PFIs and the financial and operational sustainability of IEs/ESCOs. According to the projection by the AE, the risk that the GCF guarantee is called is low.

30. With the proposed project, it is expected that 12 Mt CO₂ eq of GHG emissions can be reduced annually, and 120 Mt CO₂ eq of GHG emissions in total can be avoided in the 10-year lifetime of the investment. According to the estimation by the AE, the total investment to avoid GHG emissions of 1 t CO₂ eq is USD 4.1. The figure becomes down further to USD 0.7 if the estimation is limited to GCF financing only. These estimations show the efficiency of the proposed project.

31. The iTAP assesses the efficiency and effectiveness of the proposed project to be “Medium/High”.

II. Overall remarks from the independent Technical Advisory Panel

32. The iTAP recommends that the proposal be approved as presented.

33. The proposed project aims to develop a sustainable energy efficiency financing market in Viet Nam by addressing market barriers by offering an integrated package of credit risk mitigation, TA and a capacity-building programme for the Government, local banks and private sector entities. The AE estimates that 12 Mt CO₂ eq of GHG emissions can be reduced annually, and 120 Mt CO₂ eq of GHG emissions in total can be avoided in the 10-year lifetime of the investment. With the proposed project, the financial and operational capacity of the stakeholders is expected to be enhanced, which will lead to a continuous increase in energy efficiency investments after the proposed project is closed. Investments in energy efficiency will contribute to economic and private sector development in Viet Nam.

34. The proposed project is in line with the Government strategies and commitments to promote energy efficiency. It will catalyse additional financing of USD 410.9 million at a leverage ratio of about 4.8 times. The total investment to avoid GHG emissions of 1 t CO₂ eq is calculated to be USD 4.1, which is efficient. The GCF-RSF is financially sustainable and the risk that GCF guarantee is called appears to be limited.

35. The iTAP noted that PIE will be selected by the Government, and will operate in accordance with an operation manual and risk management framework to be developed by the AE. The operational performance of PIE will be monitored by the AE. Since the proposed GCF assistance is non-sovereign guaranteed assistance, it is critical that GCF elevates its level of involvement in the selection and monitoring of PIE and its operation to manage operational and financial risk of the proposed programme. In this context, the TAP draws comfort from the Secretariat approach to introduce necessary risk mitigants including phased disbursements, right to suspend new guarantees, among others, in the agreement with the AE.

Independent Technical Advisory Panel's review of FP072

Proposal name:	Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia
Accredited Entity:	United Nations Development Programme (UNDP)
Project/programme size	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. Zambia is an African least developed country (LDC) with a high incidence of poverty. According to data sources from 2013, 48 per cent of the Zambian population is undernourished or food-deprived, with food access shortages lasting an average of 3.2 months. About 50 per cent of the calorific intake is derived from maize and 14 per cent from cassava, which indicates very high food insecurity among the poor people. Since Zambia's production system (predominantly cereals) is highly dependent on natural rainfall, the increasing climate variability with pervasive seasonal drought and frequent crop loss is found to contribute to both high incidences of poverty and food insecurity in the poor farming communities.
2. Rain-fed farming faces enormous difficulties resulting from increased climate change-induced moisture loss from the top soils, which is compounded by the lack of climate information and early warning systems. Moreover, the poor smallholder farmers have little access to value chains (in terms of planning, inputs, production and post-harvest management including marketing), which puts them in a high-risk production regime, restricting them to continue agriculture-based livelihoods. The project is designed to address these issues.
3. The aim of the project is to strengthen the resilience of vulnerable smallholder farmers in Zambia, particularly in Agro-Ecological Regions I and II, with a view to addressing the vulnerability of the agricultural system to climate variability and change. While emphasis has been placed on climate information and early warning services, improved agricultural inputs and practices, including water management (for addressing drought), adoption of alternative livelihoods less affected by climate change, and facilitation of access to markets and commercialization, a value chain approach has been considered to optimize financial gains from the above-mentioned measures.
4. The project has three components:
 - a) C1 – Smallholder farmers are able to plan for and manage water resources to support resilient agricultural production;
 - b) C2 – Resilient agricultural livelihoods in the face of changing rainfall, increasing drought and occasional floods; and
 - c) C3 – Farmers have increased access to markets and the commercialization of resilient products.
5. These components exhibit complementarity, with each component reinforcing the outputs of the other components to offer holistic solutions to address the prevailing climate change-induced vulnerabilities of smallholder farmers and also to prepare them for the paradigm shift from subsistence agriculture to the commercialization of agriculture. The project therefore appears quite ambitious in its scope.

6. The project aims to achieve climate change adaptation benefits. It targets 946,153 direct beneficiaries spread over 157,000 households in 16 districts in the 2 target regions, representing 54 per cent of total land area of the country. The beneficiary households include all women-headed households (about 22.5 per cent of all households), and male-headed households under extreme poverty. The improved weather and climate information and new markets for resilient crops are estimated to benefit about 5 million people (some 34 per cent of total population in Zambia). Therefore, the impact potential is substantial and the targeting seems to be in line with the GCF objectives and result areas. The locational targeting is also justified: the two target agro-ecological regions (AER) represent areas with high poverty incidence and are also subject to pronounced rainfall variability under climate change.

7. The activities highlighted in the funding proposal follow simple logic, and the intended outputs can be brought under a measurement-reporting-verification framework. The cause-effect relationships for various activities are well-justified, which highlights the need for financing. Output 1 helps strengthen key national institutions such as the Zambia Meteorological Department (ZMD) and the Water Resources Management Authority (WARMA) for the future sustenance of various relevant activities. Key elements of the project include the generation of climate information generation and the issuance of early warnings. The efforts towards raising awareness among rain-fed smallholder farmers will be key in building grassroots resilience.

8. The project is expected to deliver results in its seven-year timeline. However, given the low absorption capacity of key institutions such as ZMD, it appears that it might be somewhat overambitious in terms of certain deliverables. Emphasis must be placed on project management, coordination (the proposal contains a coordination framework) and close monitoring in an attempt to overcome the institutional weaknesses.

9. Output 3 contains elements which may not have direct linkages to climate change. GCF finance for this output is intended to support activities which demonstrate clear climate change additionality (for example, climate-proof market-places, flood-resilient storage capacities and the provision of solar dryers), while the rest is covered through significant co-financing from the Government of Zambia. The full concessionality (i.e. grant financing) appears justified given the non-commercial, non-revenue-generating activities that are predominantly targeted to benefit poor and food-insecure smallholder farmers. The grant financing will neither displace private investment, nor will it force economic distortion. Overall, the project is likely to have significant impact potential, provided that institutional stimulation is properly approached under a coordination framework.

1.2 Paradigm shift potential

Scale: Medium to high

10. The project is neither completely new nor totally innovative as such. However, it demonstrates a paradigm shift in at least two ways: (a) Farmers who generally rely on available rainfall will be able to make informed decisions in crop agriculture, which will be supplemented with better input support and will transform traditional subsistence agriculture into climate-resilient commercial value-chain-based agriculture; and (b) The institutions will build capacity to fulfill their respective mandate; however it will do this under a common and coordinated framework that promotes a common vision to better serve climate-vulnerable people. In both of these areas, the project appears both resourceful and ambitious.

11. The project presents a theory of change. There are elements in the project which offer high replication potential, given the country's widespread drought proneness resulting from climate change. The project builds on previous pilot-scale initiatives financed through the Least Developed Countries Fund and the Pilot Program for Climate Resilience. Therefore, the project

guarantees a certain degree of replication. However, the project must resist any potential duplication of activities in target areas.

12. The project has attached due importance to knowledge-sharing through farmers' field schools and centres of excellence. In many LDCs, similar approaches have been found to be quite successful. The facilitation of access to value chains and the commercialization of agriculture will enable smallholder farmers to be integrated in new markets, which is a desired result. However, in order to be responsive to farmers' preferences towards certain products, the project seems to promote high water-consuming crops (such as paddies) in areas suffering from low rainfall and much aggravated evapotranspirative losses. The promotion of such products might have irreversible adverse effects on dwindling water resources, making the production system unsustainable in the long term. Such activities need to be eliminated as part of environmental safeguarding, and the budgetary allocation for such activities should be re-allocated to other successful and non-controversial activities.

13. The proposal states that the project will address a few identified barriers. If successful, such efforts will inspire many communities to overcome barriers and sustain livelihoods despite the adverse implications of climate change.

14. The independent Technical Advisory Panel (iTAP) views the paradigm shift potential of the proposed project to be "medium to high".

1.3 Sustainable development potential

Scale: High

15. The project promises to contribute to a number of the Sustainable Development Goals (SDGs).

SDG-1: It will reduce food insecurity for about 0.94 million people;

SDG-2: The project will address poverty issues by directly contributing to reducing poverty for around 0.94 million people and indirectly for around 5.00 million people;

SDG-5: It will address gender equity, especially for the 22.5 per cent of the beneficiary households where the head of the household is a woman (Output 1);

SDG-13: It will deliver urgent climate action towards reducing vulnerability to drought (and, to a lesser extent, to flood); and

SDG-15: It will counteract the degradation of terrestrial ecosystems and indirectly address issues concerning soil and water conservation.

16. The project aims at climate-resilient agriculture which promotes both soil and water conservation. However, such aims will most likely be unattainable if paddy is cropped under any drought-prone conditions, requiring groundwater irrigation. There are various climate-smart cultivation techniques which may be applied in an attempt to ensure environmentally safe and sustainable production systems in an arid environment. Similarly, greater access to value chains and the market means greater emphasis on post-harvesting and post-processing of agricultural commodities. If not chosen carefully, the hasty replication of post-production value chain activities might lead to environmental contamination and the subsequent degradation of resources. The project needs to be mindful about this.

17. Although the project has not made any explicit attempt to claim achieving mitigation potentials from various activities, there is potential for reducing savanna burning and deforestation, along with slight gains from reducing carbon emissions by promoting solar irrigators. However, it is yet to be seen how significant these slight gains will be when compared

with the greater transportation-related emissions from the commercialization of agriculture. The environmental safeguards need to be in place to ensure no harm as a result of potential GCF financing.

18. Perhaps the most impressive co-benefits that may be derived from the project lie in the social sector, where hundreds of thousands of people will be brought out of chronic food insecurity. Improved nutrition alone can counteract health issues such as stunting, anemia and many other diseases. Moreover, the economic co-benefits resulting from access to value chains and the commercialization of resilient agriculture can be substantial, both at the micro and macro levels.

19. The project is responsive to gender concerns. During the selection of project beneficiaries, the project rightfully considered women-headed households as priority beneficiaries. Women will benefit through households taking note of weather advisories and taking appropriate response measures.

20. Given the pros and cons, the iTAP finds the sustainable development potential of the project to be “high”.

1.4 Needs of the recipient

Scale: High

21. The economy of Zambia and the employment of the majority of its population depends on agriculture. Most of the crop agriculture is dependent on available rainfall, which indicates that the country’s economy and food security is significantly influenced by climate variability and change. It has been indicated in various documents that a combination of an increase in temperature and changing rainfall variability (and patterns) has been causing frequent droughts, occasional localized flooding in the floodplains of major rivers, and a shortening of the growing season in Zambia. The adverse impacts have been particularly experienced in the Agro-Ecological Regions I and II (AER). Women and children are among the worst victims of climate change-induced crop loss and the resulting food insecurity. Given such climate change-induced adverse effects on people’s livelihoods in the 16 target districts and the economy of Zambia, the needs of the recipient appear significant.

22. The needs of the recipient are also assessed in terms of the inadequate capacity of national and local institutions to address adverse impacts. The limited support for agricultural extension as well as for information and improved inputs from national/local institutions indicates inadequate adaptive capacity of the system as well as of the farmers, which is further exacerbated by poor agricultural infrastructure and marketing facilities. The above-mentioned issues need to be addressed systematically in order to create a viable opportunity to build the resilience of farming systems and farmers.

23. Zambia is an LDC. As a consequence of economic decline since late 1990s, the Government of Zambia has become highly indebted. Rain-fed smallholder farmers are becoming poorer and more undernourished as a result of frequent droughts and subsequent crop losses. Against this backdrop of inadequate financing for the services required by the Government of Zambia, it is feared that such vulnerabilities of poor farmers throughout Zambia, particularly in the 16 target districts of AERs I and II, will most likely be exacerbated. In the proposed project, the Government of Zambia has committed 75.7 per cent of the required finance, and the country is unable to leverage any more financing. In the absence of alternative sources of financing, GCF support appears to be the only modality to proceed with the critically important project. In an attempt to create public goods to enhance adaptive capacities, it is of paramount importance that GCF recognizes the needs of the recipient women and men in the target areas.

24. The project will not only build the resilience of the farmers facing climate change-induced extreme weather events that result in frequent loss of crops and livelihoods and the intensified associated problems; it will also help strengthen institutions through capacity-building in terms of equipment, human resources, policy and regulatory frameworks, etc. An extensive upgrade of the prevailing institutional capacity, as is planned, is the only way to secure the necessary services to enhance resilience. Therefore, this project is on the right path.

25. The iTAP acknowledges that the needs of the recipient with respect to the proposed project is “high”.

1.5 Country ownership

Scale: High

26. The proposed project is aligned with Zambia’s national strategies related to climate change and agriculture. The Sixth Revised National Development Plan and the Vision 2030 Strategy for Zambia and associated policies identify the agriculture sector as critical for Zambia to achieve middle-income country status by 2030. However, climate change has been a stumbling block in achieving the objectives in this sector. In order to achieve both the agriculture and climate change objectives, the National Climate Change Response Strategy (2010) and the National Climate Change Policy (2016) have duly recognized the nexus between climate change and agriculture. The current project is found to be fully aligned with these key national policies and strategies.

27. In addition to the two above-mentioned documents on climate change, Zambia has submitted various documents under the United Nations Framework Convention to Climate Change (UNFCCC), in the form of the national adaptation programme of action, national adaptation plan and the nationally determined contributions (NDC) as part the implementation of the Paris Agreement. These documents clearly define climate change objectives in relation to safeguarding agriculture. The various project elements are fully aligned with these clearly defined objectives. This shows that the country has been completely supportive of the project elements.

28. The accredited entity (AE), the United Nations Development Programme (UNDP), has been active in Zambia, working closely with the Ministry of Agriculture (MOA), which serves as the major executing entity (EE). The EEs have clear mandates, which indicate that the right institutions have been chosen to lead the project in the recipient country. The EEs have the capacity to implement the project, which has been demonstrated through the implementation of past projects. However, with the exception of Ministry of Agriculture, the project implementation capacity (in other words, finance burning capacity) is low, which may be a concern. Yet the capacity-building efforts over the project duration of seven years might be useful in enhancing the internal capacities of the institutions involved and enable them to take on greater responsibilities.

29. The project documents bear evidence that a consultation process has been carried out, ensuring the involvement/engagement of various stakeholders, including beneficiaries. The project document claims that civil society organizations have been involved in the consultations to enhance awareness regarding the project and have it vetted by stakeholders. It is also mentioned in the proposal that additional bilateral consultations were undertaken to substantiate the proposal further and gather necessary background information for inclusion in the supporting documentation. The national designated authority (NDA) has been informed¹ of

¹ Through the NDA-chaired technical committee meetings convened for the development of the project.

the outcomes of the consultations and engagements, which has resulted in the signing of the no-objection letter.

30. The iTAP concludes that country ownership of the proposed project is “high”.

1.6 Efficiency and effectiveness

Scale: Medium to high

31. The total estimated cost for the project is USD 137.267 million. This includes cost elements for programme, personnel, and a modest but important cost for operation and maintenance of USD 1.4 million. A total of USD 103.869 million (75.67 per cent of the budget) will be co-financed by the Government of Zambia, over 99 per cent of which will be contributed by the Ministry of Agriculture. The AE also offers a modest USD 1.4 million (1.02 per cent of the budget) as co-financing. An estimated amount of USD 32.0 million (i.e., 23.31 per cent of the budget) is sought from GCF as grant. As an African LDC, Zambia deserves preferential treatment under the UNFCCC to receive GCF support in an attempt to remove barriers to build resilience among a large pool of farming communities. Therefore, the significant grant financing is justified.

32. Since three fourths of the estimated budget is co-financed by the Government of Zambia, the financial risk for GCF is minimal. Most of the outputs and the overall outcome of the proposed project are aimed at creating public goods and services, so the financial scheme is not going to crowd out private financing. Rather, the establishment of a robust hydro-meteorological service might entice private sector entities, such as insurance businesses, to offer products that could promote the further development of adaptive capacities of farmers and agro-businesses. Of course, a lot will depend on how ZMD organizes itself to offer reliable agro-meteorological advisories relating to climate change.

33. The project is designed to be implemented with the involvement of the right partners. The management structure seems sufficient to deliver the outputs in the stipulated seven year lifetime of the project. The efforts for building synergies with other projects will enhance the effective delivery of the project elements. The lessons learned through the implementation of earlier community-driven projects funded by the Least Developed Countries Fund need to be taken on board to ensure effective application of community-based best practices.

34. The project considers a 10 per cent discount rate for its estimation of economic effectiveness. Such rates are acceptable in the case of an LDC. Given the increasing number of droughts in Zambia in recent years, the economic analysis provides lower band on the return to agriculture. The cost-benefit analysis shows that the discounted net present value is negative (USD -8.7 million) with an economic internal rate of return (EIRR) of 7.5 per cent, which considers the pass-on of productive assets² (such as seeds and goats). While the results are discouraging from a financing point-of-view, the programme on pass-on of productive assets will increase the propagation and accumulation of assets among farmers with minimal or no productive assets; this means its unaccounted-for social benefits must also be recognized. However, if such pass-on of productive assets was disregarded in the economic analysis, the net present value becomes positive (USD 2.27 million) and the EIRR becomes 10.4 per cent. The economic sensitivity analysis is also encouraging, even if the project faces shocking economic conditions such as a decrease in benefits by 20 per cent with a simultaneous increase in costs by

² The proposed project considers to support poor farming households with productive assets such as resilient seeds and livestock, with a provision to support secondary beneficiary households once the primary beneficiary households attain economic resilience and are ready to pass-on a part of the productive assets to the secondary beneficiary households. Such pass-on of productive assets have been proved to be successful in previous pilot project.

20 per cent. Given the project's creation of public goods, the financial effectiveness analysis indicates that the project has medium economic potential.

35. The iTAP is of the view that the proposed project's overall efficiency and effectiveness is "medium" to "high".

II. Overall remarks from the independent Technical Advisory Panel

36. The iTAP recommends that the Board approve the project, recognizing the urgency of the issues associated with climate change and drought in Zambia.

37. The iTAP also recommends the following:

- (a) Strengthen Component 2 by committing to increased efforts towards community-centric knowledge management and cross-learning activities; and
- (b) Ensure that the activities related to paddy production are within the river bank so as to avoid the need to exploit other sources of water (such as the groundwater).

Independent Technical Advisory Panel's review of FP073

Proposal name:	Strengthening Climate Resilience of Rural Communities in Northern Rwanda
Accredited Entity:	Ministry of Environment of Rwanda (MoE)
Project/programme size	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium

1. The project will help the most vulnerable inhabitants of the Gicumbi district in northern Rwanda through adaptation and mitigation measures, including water management, the use of resilient agriculture techniques, the sustainable management of forest resources, the employment of biomass and solar energy options, the relocation of vulnerable households to new adapted green settlements and knowledge-sharing.
2. The project is predominantly an adaptation project that targets the most vulnerable population of Gicumbi, which lives on steep slopes and is at risk of landslides and flooding, where the landscape already presents high levels of soil erosion. The project will enable the transition of marginal lands to diversified and climate-resilient lands, supporting 75,000 people. Specifically, the project will reach 1,800 smallholder farmers, 4,900 tea farmers and 2,500 coffee farmers in Gicumbi. The number of beneficiaries is small, mainly due to the fact that the diverse streams of work end up with pilot interventions that need to be scaled-up in order to justify climate change adaptation impacts. Many of the interventions reach only a marginal number of the beneficiaries.
3. In terms of mitigation, the project emission reductions were recalculated due to queries raised by the independent Technical Advisory Panel (independent TAP) on the following estimates:
 - (a) Avoiding deforestation, and supporting forestry and agroforestry programmes, with expected reductions of 69,986 tonnes of carbon dioxide equivalent (tCO₂eq) from forestry and 70,060 tCO₂eq from agroforestry activities;
 - (b) Supporting efficient cooking technologies, with expected reductions of 59,261 tCO₂eq over the six-year period in Gicumbi;
 - (c) Improving the operating systems of tea factories across Rwanda, with an estimated reduction of 70,105 tCO₂eq during the lifetime of the project; and
 - (d) Development of the IDP village biogas with expected reductions of 4.308 tCO₂eq.
4. The total emissions for the six years of the project life cycle is estimated at 273,720 tCO₂eq.
5. According to the project proposal, mitigation benefits will continue during the 20-year economic lifetime of the project, adding to 864,244 tCO₂eq in avoided emissions. Part of these estimates will depend on the willingness of the tea factories in Rwanda to improve their operating systems, to upscale the use of cookstoves and on the final emission balance from afforestation versus deforestation rates. It is well noted that tea factories are the largest industrial source of greenhouse gas (GHG) emissions in Rwanda, and its nationally appropriate

mitigation action (NAMA) analysis identified the reduction of GHG emissions from the tea sector as a national priority.

6. In general, adaptation benefits will depend on the level of success in managing the restoration of the Muvumba watershed ecosystem, proving an effective and sustainable landscape approach and upscaling the results to more communities and districts.
7. The climate change impacts of the proposal are small in relation to the investment in terms of the number of beneficiaries per working stream, number of hectares regenerated and amount of aggregated emission reductions. The ability to upscale interventions and increase the climate change impacts will depend on mainstreaming climate change in the development plan of the Gucumbi District, including ensuring stable financial mechanisms that are less dependent upon grant resources.

1.2 Paradigm shift potential

Scale: Medium

8. Districts in many parts of the world are facing climate threats, especially in low-income countries where provincial governments phase in financial and technical capacity to tackle climate change. The Rwandan proposal targets a very vulnerable district as Gicumbi, in an integral manner, trying to improve sustainable livelihoods and at the same time regenerates the ecosystem in a climate-adaptive manner.
9. What is innovative in the proposal is that it uses proven approaches for which knowledge, systems and skills are already present in the country and therefore has a higher probability of success. The Country is also using its institutional and national capacity to deliver the project. The project is trying to pilot some of the country's programmatic approaches of its green growth strategy in sectors like agroforestry, forestry, energy and housing, with an integral approach in Gicumbi. However, the project is trying to achieve too many interventions and could end up in disparate results and could be difficult to upscale due to the lack of resources.
10. The activities proposed in component 1 to restore the Muvumba watershed addressing landslides and floods are not new but are proven effective integrated measures. The component will have 10 different interventions, including:
 - (i) Strengthening community-based adaptation;
 - (ii) Introducing measures to reduce erosion from slopes;
 - (iii) Establishing protective forestry on rivers, roadsides and steep slopes;
 - (iv) Integrating agroforestry into farming systems;
 - (v) Supporting 1,800 smallholder crop-livestock farmers to adopt agroecological practices;
 - (vi) Supporting the climate resilience of the biggest tea-farming cooperatives in Mulindi;
 - (vii) Developing field schools to strengthen the capacity of tea and coffee farmers;
 - (viii) Improving weather and climate services;
 - (ix) Increasing the capacity for pest-monitoring; and
 - (x) Improving climate resilience for 1,000 coffee farmers, including providing suitable higher areas for coffee expansion.
11. All these interventions will support slope stability, water retention and increase the productivity of the land improving the livelihoods of 1,800 smallholder farmers that will improve their adaptive capacity to phase in climate change increasing challenges. Moreover,

12. the interventions will ensure that coffee and tea plantations will be adapted to climate change and will continue to generate income for these communities.
13. Component 2 will address sustainable forest management mainly with fast-growing species (Pinus and Eucalyptus species) through increased forest productivity and sustainable forest management, improving nurseries and strengthening communities' capacity to manage their forests. However, the project should revise the emphasis on reforestation with just two species that are known to be water intensive.
14. At the same time, the project aims to introduce 60,000 efficient cookstoves, and biogas facilities for 1,500 households and 100 public buildings, reducing the pressure on the forest resources and five woodchip-producing facilities in operation. The project presents an annex on energy analysis for Gicumbi district that explains the SE4ALL (Sustainable Energy for all) programme in the country that have set the targets for cookstoves and biogas. The improved cookstove program has been implemented in few pilot cases in the country due to the lack of resources., Rwanda needs creative solutions to solve the existing dependency on biomass for cooking and for its tea factories. However, the pilot intervention in Gicumbi will be limited, and will need to provide technical support to develop efficient cook stoves, market penetration strategies, effective value chain mechanisms, and financial awareness and educational schemes to ensure uptake by communities and scalability at the national level.
15. The project also takes into account the growing risks that landslides can cause to unstable households, relocating 200 vulnerable families living in high risk areas to two villages: Kabeza and Kaniga. The new settlements will include "green infrastructure", including energy, water and waste management alternatives. Other smaller investments will support 2,120 houses to install rainwater harvesting and storage systems, and water run-off control measures. Rwanda has a Housing Integrated Development Programme that provides housing to the population affected by slope destabilization, but funds to relocate people are very limited. Therefore, the interventions in Gicumbi will be difficult to upscale.
16. The knowledge management platform for cross learning and sharing of information is crucial for upscaling lessons learned to other relevant stakeholders. The project has communication and awareness mechanisms to mainstream climate-resilient approaches.
17. The theory of change is well presented, with interrelated project interventions to address two expected outcomes:
18. (i) Improved management of land or forest areas contributing to emission reductions; and (ii) Strengthened adaptive capacity and reduced exposure to climate risks.
19. In general, the project could influence a paradigm shift if the District of Gicumbi is able to use the project to mainstream climate change in its development and land use plans and if the different proposed interventions end up presenting a landscape model that could be scaled up at the regional and country level with sustainable financial mechanisms.

1.3 Sustainable development potential

Scale: High

20. The proposed project will have strong environmental benefits by restoring the functions and services of the Muvumba watershed ensuring vegetation cover and biodiversity conservation, reducing soil erosion, managing the flows of water and allowing the ecosystem to restore its natural functions.
21. The reforestation activities will be developed with Eucalyptus and Pinus species, that are fast growing but at the same time are known to absorb water. The current forest estate comprise

22. 94–97 per cent Eucalyptus and Pinus species. It is therefore urgent to select other types of native species that will support the ecosystem regeneration and improve biodiversity and relevant ecosystem services as well as ensuring the provision of biofuel.
23. On the other hand, the project is also aiming to extend the coffee plantations into higher elevations as a measure to adapt to climate change. Even though sites will be carefully selected according to the project proposal, there could be a potential risk of impacting new areas of the watershed important for water production and forest conservation.
24. Social co-benefits will include improving the living conditions of selected families in Gicumbi province, inclusive of:
- (a) Those that will be reallocated to a new eco-friendly settlement;
 - (b) Families that will have access to water services and healthier environments;
 - (c) Farmers that will experience improvements in farm production and therefore better nutrition and income generation;
 - (d) Some households improving health conditions to the families that will improve their woodstoves; and
 - (e) In general, communities more aware and knowledgeable of the agroecological approaches that will help them to be more resilient to climate change.
25. In terms of economic co-benefits, the project will increase the generation of income by improving farm production and opportunities. It will also generate employment opportunities in forestry activities as well as in the different activities to restore landscapes.
26. Taking into account that different activities such as terracing works, tree plantations and infrastructure works will be carried out using community labour, an estimated 2,500–3,000 beneficiaries will be hired during the peak period of works. The modality of hiring labourer's is based on the community-participation approach established by ministerial procedures for public procurement.
27. There will be a reduction of loss and damage costs associates with weather events, especially for the 200 families that will be reallocated. However, economic co-benefits are targeting a small number of the population that will end up receiving grant resources to improve their living conditions.
28. Revenues from the exports of the climate-resilient tea and coffee sectors will potentially increase improving the economic condition of the Gicumbi region in general.
29. The project gives special attention to gender equality (through a gender analysis) so that women and men can participate in the project and benefit from proposed interventions. Rwanda is well known for having closed 80 per cent of its gender gap with a comprehensive list of policies, strategies and interventions. The increased water and energy security will improve the life of woman as they are generally responsible for collecting water and wood for cooking. Women could also benefit from improved livelihoods and agroforestry options that could potentially give them business opportunities and improved skills to sustain their livelihoods. It would also improve their health conditions as they will have access to improved water and air quality.

1.4 Needs of the recipient

Scale: High

30. Rwanda is one of the poorest countries in Africa, depending on official development assistance (ODA) that accounts for approximately 40 per cent of the country's finance. The

country is small, hilly and landlocked and has the highest population density in Africa. According to the 2012 Rwanda census, the population was estimated at 10,515,973 with a density (inhabitants per sq2 kilometer) of 415. At the same time, Rwanda has entered a period of economic growth since 2006, turning it into one of the fastest-growing economies in Africa.

31. The country is divided into five provinces and 33 districts. The project specifically targets Gicumbi district, one of Rwanda's poorest and most vulnerable districts, with a population above 400,000 where 55.3 per cent of the inhabitants live below the poverty line and 24.7 per cent live in extreme poverty (Integrated Household Living Conditions Survey-EICV4). According to the funding proposal, 72 per cent of the population depend on small-scale farming, with limited employment opportunities. There are also high levels of mortality and morbidity among young children, with 44 per cent of the district's children under chronic malnutrition.

32. Due to the topography and the climate conditions, Gicumbi region phases in increasing risks of flooding and soil erosion, impacting the most vulnerable population. The project investments will benefit more than 86,000 people living in climate vulnerable areas that currently depend on rain-fed farms with low soil fertility. There is a need to support their livelihoods, and to generate employment opportunities as well as alternatives to improve household incomes.

33. Public and private sources of finance for climate change are limited. There is a finance gap to transition the country into a climate compatible development pathway. Specifically, the Ministry of Natural Resources and Gicumbi district receive relatively low levels of budget support for the growing needs of vulnerable communities and coffee and tea industries to adapt to climate change.

34. Public agencies and regional governments require additional funding, technical and capacity development to adjust to a low-carbon and resilient economy. A coordinated systematic approach is needed at the district level from the national institutions and programmes. In addition, communities need to adapt to climate change and at the same time to increase income opportunities. The project is benefiting less than 25 per cent of the population of Gicumbi with direct interventions, addressing in a partial manner the needs of the resilient communities.

35. Rwanda still depends on aid with ODA financing of approximately 40 per cent of the country's annual budget. However, the proposed project should avoid dependency on aid money and should create schemes of work that are effective to promote economic-productive models for the vulnerable communities, and scalable streams of work that prove financial viability to upscale them to the rest of the districts.

1.5 Country ownership

Scale: High

36. Rwanda has made climate change one of its top priorities, understanding that the fragile ecosystems and the pressure on the resources by the increasing population will be exacerbated by climate change. The country has developed a Green Growth and Climate Resilience Strategy (GGCRS, 2011) that provides the country's roadmap for becoming a climate resilient, low-carbon economy by 2050. The Government of Rwanda has successfully mainstreamed climate change into its national strategies and many of its sectoral strategies, but further coordination between entities is still needed. Rwanda's intended nationally determined contribution includes a number of actions in the food and land use sector that will be addressed by this project and could potentially be upscalable to other regions in the country.

37. The Government of Rwanda established an institutional, legal and policy framework for nationally appropriate mitigation actions, including the three sectors addressed in the proposal: (1) land use, land-use change and forestry, (2) industry (including tea and coffee), and (3) buildings.
38. The project is closely aligned with the national adaptation plan of action, including four of the six priority adaptation options: (1) integrated water resource management via watershed protection and sustainable forest management; (2) the development of alternative sources of energy to firewood; the promotion of “non-agricultural” income-generating activities; and the introduction of species tolerant to climate change.
39. At the regional level, the project is the first one to develop a climate change integral landscape project proposing a considerable amount of resources. It is advisable to ensure that the development plan for 2018–2022 of the district of Gicumbi mainstreams climate change as an example for the rest of the districts in Rwanda, including relevant land-use planning schemes, the implementation of national sectoral policies at the regional level and relevant appropriation of the different schemes of work within the district development plan, including budgetary arrangements.
40. The Ministry of Environment is the project sponsor and accredited entity, and FONERWA is the executing entity. FONERWA was established by the Government of Rwanda in 2012 as a national basket fund for climate and the environment, and since its inception it has financed projects valued at USD 40 million and has played a key role in attracting climate finance, demonstrating experience in managing climate change projects in the country.
41. FONERWA will establish a project management unit which will be housed internally. The unit will comprise a number of technical specialists that will oversee project activities and be responsible for monitoring and evaluation.
42. The project will also have an inter-ministerial project steering committee chaired by the permanent secretary of Ministry of Environment. The design of the proposed project was guided by a stakeholder dialogue led by the Ministers of Natural Resources and Agriculture and Animal Husbandry along with Directors General of the Rwanda Environment Management Authority, the National Industrial Research Development Agency, the Rwanda Housing Authority and representatives of the Ministry of Local Government, the Rwanda Water and Forests Authority and some private-sector stakeholders. These same actors will be part of the steering committee, including the Gicumbi district representation.
43. Rwanda has invested in training technical personnel in the relevant ministries and relevant institutions, for continuous development of the different sectors. The project builds on the internal capacity, but still needs to work in better coordination schemes to be able to deliver an integral coordination approach at the district level.
44. The project presents relevant annexes that explain country-driven strategies for forests, housing and energy. However, most of the national programmes, like the housing or SE4ALL programmes have not been effective due to the lack of resources to implement them. Therefore, even though the project aims to develop pilot approaches at the district level, they could end up being isolated interventions with negligible impact. The possibility of replicating and upscaling them will depend on the availability of additional concessional resources.
45. The project was designed by an interdisciplinary team, with site visits that included consultations with the Governor of the Northern Province and the Mayor of Gicumbi District and their team. Other relevant meetings were held with tea plantations and community leaders.

46. Further engagement has been undertaken as part of the development of the new 2018–2024 District Development Plan for Gicumbi. The plan was not presented as part of the project proposal annexes. However, as the main implementing entity at the regional level will be the Gicumbi district, the independent TAP expects that the district will mainstream climate change in its planning strategies and development plan for 2018–2024, including the allocation of sufficient resources to be able to co-finance and upscale interventions. It is also expected that the climate-change personnel that will be based in the offices of the district government as part of the project, will be retained after project completion.

47. The project proposal allocates resources for further consultations with communities and to involve relevant stakeholders during project implementation.

1.6 Efficiency and effectiveness

Scale: Medium to low

48. The total project financing (not including accredited entity management fees) over six years is USD 33,154,432. Ministry of Environment is requesting USD 32,794,442.

49. FONERWA, Gicumbi district and the Wood Foundation will co-finance USD 359,990 which is only 1.08 per cent of the projects cost. The communities are investing with in-kind resources at a level of USD 973,387. The level of co-financing seems too low, specially because the wide variety of activities are presented as proof-of-concept for national scale up.

50. The sustainability of the project depends mainly of ensuring additional resources to upscale the different interventions. The fact that the Government of Rwanda is giving so little co-financing also demonstrates the inability to upscale workstreams in the different sectors and the dependency of external granting for climate change intake.

51. The project is trying to use the large proposed investment to deliver a long list of outcomes that could end up being isolated one-time interventions to benefit few beneficiaries, demonstrating low cost-effectiveness and efficiency.

52. In component one USD 12.9 million will be invested in the Muvumba water basin, impacting the livelihoods of people living in the region. In the detailed budget, this component will be used to hire technicians and experts, including their travel and per diem time, extension services, for training modules, seedling activities, to buy 240 cows, for the maintenance of drainage systems, the implementation of 100 solar irrigation systems and water ponds, planting grass strips, introducing trees for shading and fencing, planting new tea clones, providing weather and climate services, activities for pest management control, establishing plantations and nurseries on new coffee varieties, among other activities.

53. Component 2 will invest USD 7 million in sustainable forest management with forest renewal of 2,261 hectares (ha) linked to the watershed mainly with Pinus and Eucalyptus species and will restore an additional 297 ha with alternative species. It will also support the promotion

54. and supply of 343 modern beehives. This component will also include investments in 60,000 improved cookstoves for households; five digesters for schools; subsidies for 1,500 household digesters; the production of woodchip and pellet facilities; and energy efficiency measures for the Mulindi Tea Factory. However, the intervention will be demonstrative in nature and will only achieve cost-benefit returns if they are effectively scaled-up to involve further beneficiaries at the regional and national levels.

55. The third component will invest USD 12 million in climate-resilient settlements by constructing green social housing and relocating 200 families. Some resources will be invested in interventions to manage water run-off and 3240 water tanks will be subsidized to increase

rainwater capture and storage. Again, this component will eventually benefit selected beneficiaries, without really upscaling the interventions due to the lack of resources.

56. Finally, the project will invest USD 2.9 million in knowledge transfer and mainstreaming, devoting a relatively high amount of resources to developing community meetings, cross visits, etc., to demonstrate the benefits of the interventions, but will not have the resources to support additional farmers or families to undertake climate-resilient best practices.

57. In general, the amount of resources seems also big in comparison to the funds that have been managed both by FONERWA since its inception, estimated in USD 40 million and the annual funds managed by Gicumbi district estimated at an average of USD 17 million annually.

58. The interventions will be delivered at the local level, with the recruitment of a team based in Gicumbi district headquarters. However, there is a big question on the retention of the field experts and the team in general as well as in the sustainability of the interventions and the monitoring and maintenance arrangements, for example of the established irrigation systems, drainage systems, nurseries, etc.

59. The project proponents present effectiveness and efficiency of the adaptation interventions based on economic assessments presenting a net present value of investments and the benefit-to-cost ratio (BCR) of individual interventions (using a 10 per cent discount rate with sensitivity analysis) showing that all interventions have a BCR above 1. An internal rate of return has been estimated for the components that involve market sectors, including energy, forestry, tea and coffee climate-resilient agriculture, proving that they are financially viable. In terms of mitigation, the new estimates for GCF cost per tCO₂eq total project – mitigation only (lifetime) is 7.6.

60. The independent TAP believes that the project integral programmatic approach could be valuable if each of the different schemes of work end up being “bankable” in nature. In other words, if a more systemic approach is undertaken to ensure value for money, economies of scale, scalability and sustainability of the interventions.

61. For example, the project will provide housing for 200 families that will be reallocated. The allocation to poor and vulnerable people will be performed by FONERWA and the Gicumbi district under the criteria described in their cooperation agreement. At the same time, the subcomponent activity is comprised within the Governmental Housing Integrated Development Programme (IDP). The cost per unit of housing is USD 11,562 in Kabeza and USD 12,104 in Kaniga. These figures are slightly higher than for IDP houses which is USD 9,300 but they will have efficient bio designs. The question is if the pilot housing programmes could be replicated in Gicumbi and other regions with “bankable financial schemes”, for example building a semi-flexible microlending scheme for the housing programme giving a concessional portion for the climate-resilient adaptation costs.

62. The project will need to avoid being paternalistic with selected families that end up receiving a water tank, a bee-hive, a house, a cow, or a cookstove; therefore, additional analysis would determine if the project could have a better programmatic approach, prioritizing

II. Overall remarks from the independent Technical Advisory Panel

63. The independent TAP recognizes the importance attached by the Board of having more engagement and participation by direct access entities such as the Ministry of Environment in GCF activities. The recommendations and conditions in this report have therefore been carefully prepared with the goal of effective development and enhancement of Ministry of Environment as a direct access entity and to prove integral landscape regional approaches prioritizing cost-

effective interventions, including the ability of regional governments such as Gicumbi district to mainstream climate change.

64. The independent TAP therefore recommends that the Board approves the project subject to the following conditions:

To be met prior to the first disbursement:

- a) Delivery by the Accredited Entity of a plan of action developed together and agreed with the Gicumbi district, in form and substance satisfactory to the GCF Secretariat, demonstrating that climate change has been mainstreamed in the Gicumbi district development plan 2018-2024, which plan shall include a long-term vision of change, and a strategy for climate change and green growth at the district level, relevant institutional coordination arrangements at the national and district level, provisions for human resources and budget allocation necessary for the implementation of the plan.
- b) Delivery by the Accredited Entity, in form and substance satisfactory to the GCF Secretariat, a detailed plan of action and economic and financial options to deliver, upscale and sustain the schemes of work for forestry, housing, energy including cookstoves and biogas facilities for schools and tea plantations financed by the Project.

Covenant to be included in the funded activity agreement:

- (a) Together with the interim evaluation report submitted to the GCF, the Accredited Entity shall deliver to the GCF, in form and substance satisfactory to the GCF Secretariat, a detailed analysis of the effectiveness of the different schemes of work financed under the Project, challenges and ways to ensure scalability and sustainability. Such analysis shall give special attention to the diversification of forest species and relevant ecosystem services and the emissions monitoring system for sustainable regenerative forest management and energy consumption for cooking.

Independent Technical Advisory Panel's review of FP074

Proposal name:	Africa Hydromet Program – Strengthening Climate Resilience in Sub-Saharan Africa: Burkina Faso Country Project
Accredited Entity:	World Bank
Project/programme size:	Small

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium

1. The proposed USD 22.5 million grant from GCF will be used to develop the capacity of national hydro-meteorological (hydromet) and early warning services, which will in turn support adaptation planning for public and private sector users in Burkina Faso. The project has four main components: capacity-building; improvement of the hydro-meteorological and early warning infrastructure; enhancement of service delivery and warnings to communities; and project management.

Adaptation impact

2. The funding proposal states that project activities will directly benefit 3.5 million people and indirectly benefit another 3.5 million people. Direct beneficiaries represent 20 per cent of the total national population of Burkina Faso and 50 per cent of the vulnerable population; indirect beneficiaries represent 20 per cent of the total population and 50 per cent of the vulnerable population.¹ This means that project activities would directly or indirectly benefit 100 per cent of the vulnerable population of the country, which seems unrealistic. The methodology used for these preliminary calculations is not described in the proposal. For this reason, the number of expected beneficiaries is deemed uncertain.

3. Regarding institutional strengthening, component 1 of the project, with a total budget of USD 5.92 million, is focused on: training and capacity-building to strengthen the five involved agencies; the enhancement of institutional and regulatory frameworks; and the provision of support for the integration of project activities. Technical training will include: basic meteorology; severe weather forecasting; hydrology and information and communication technology; operation and maintenance of equipment; information and communication technology; data processing, analysis and management; and geographical information systems and remote sensing.² However, there is a lack of a clear strategy to select in-country personnel for training including a plan to retain their services to operate and maintain the system after project completion.

4. Although twinning arrangements with more experienced institutions of other countries with similar climatic conditions are recognized as essential for the training and capacity-building component of the project, they are not properly identified or described on the proposal.

5. The proposed project specifically focuses on increasing the generation and use of climate information for decision-making by private firms, government agencies and the general population. Given the current state of hydro-meteorological information in the country, it is expected that the improvements accomplished by project activities, including the enhancement

¹ Funding proposal, page 40.

² Funding proposal, page 28.

of the early warning system, will substantially reduce the exposure of the population to climate risks and strengthen awareness of these risks. However, the project needs to present better information on the types of activities and innovative strategies envisaged, to ensure that the local population is aware of the enhanced system and able to use the information appropriately to adapt to climate change.

1.2 Paradigm shift potential

Scale: Low

6. The project proposes to strengthen the hydro-meteorological services in Burkina Faso in a conventional manner, with few elements to justify a real paradigm shift. The project will depend mostly on external services to deliver the information facilities for the country and will invest around USD 9 million in equipment to upgrade the existing hydro-meteorological facilities. The real impacts of the project will depend on the level of capacity-building, technological transfer and coordination enhancement, which will be further elaborated in the project implementation manual.

Potential for knowledge and learning

7. The executing entity will be the permanent secretariat of the transport sector programme (PS/PST), appointed as the project implementation unit that will manage project coordination on a day-to-day basis, coordinating activities with five governmental entities. The project emphasizes the coordinating role, but does not present a factual knowledge sharing strategy. There is also a lack of evidence of a learning strategy which would ensure that the general population will be able to understand the information provided by the system to be able to take adaptation measures in their daily lives.

8. The project will need to tackle the different obstacles already envisaged by the World Bank such as: (1) the small amount of data and information available; (2) the timing of delivery; (3) access, content and interpretation of the information; (4) adaptation of the information to the real needs and local context; (5) the degree of understanding of the relevance of information by different groups; and (6) the ability of users to use the data as an advocacy tool in decision-making and the development of local, national, regional and global initiatives. These obstacles should be addressed in a knowledge sharing, learning and information strategy that should clearly present the elements of innovation that are not currently evident in the project proposal.

9. The sharing of lessons learned during the implementation of the present project will be facilitated by the fact that the project is part of the Africa Hydromet Framework Program, and it constitutes one of the first investments of the programme. However, because of its early stage it is not possible to understand its future replicability and potential to exchange knowledge with other African countries. Moreover, there is no evidence that, by being part of the Africa Hydromet Framework Program, this project will ensure economies of scale and benefit from knowledge-sharing from others. At the thirteenth meeting of the Board, GCF approved a similar project for Malawi (United Nations Development Programme proposal) under the same framework facility. However, the proposal does not provide evidence that lessons learned from that or other similar projects are acknowledged.

10. The theory of change is absent, and therefore a vision of change and long-, medium- and short-term changes and relationships are not at all evident.

Contribution to the creation of an enabling environment

11. To generate revenues to ensure financial sustainability of project activities beyond the project implementation period, the benefiting agencies are expected to create business models

to commercialize hydro-meteorological products and services to profit-making sectors. However, the proposal does not clearly describe how the five agencies involved will accomplish this or how the private sector will be involved in using the hydro-meteorological services.

Contribution to the regulatory framework and policies

12. The proposed project will advance the implementation of the proposed national programme for social and economic development (focused on development priorities), the Sustainable Development Strategy, the National Civil Protection policy, the National Water Resources Strategy, and law no. 012-2014/AN from 2014 (aimed at the prevention and management of risks, humanitarian crisis and disasters).³

13. Project activities include the development of standard operating procedures to ensure prompt action in relation with early warnings, and the development or improvement of medium-term and long-term institutional business models and strategic planning frameworks.⁴

14. The improvement of climate information availability and warning services, and the development of an information exchange platform between key government agencies will facilitate climate-responsive planning and development, and enhance coordination for disaster risk assessment, preparedness and crisis management.⁵

Potential for scaling up and replication

15. Given that project activities include capacity-building and strengthening of the key national agencies involved on climate information and warning systems, the potential scaling up of activities on the country would need to focus on reaching private sector actors, regions and the general population to be able to understand and use the information services. On the other hand, although similar projects in other African countries will benefit from lessons learned on the proposed project, the investments needed to replicate the project would probably be proportional to their scale.

1.3 Sustainable development potential

Scale: High

Environmental co-benefits

16. The availability of meteorological data will enable the future development of watershed management in the country, with the potential of improving erosion control and riverbank protection.

17. Through the provision of weather forecasts, farmers will be better informed to decide the ideal moment for adding fertilizers and agrochemicals, thus reducing nutrient loss and contamination of watercourses.⁶

Social co-benefits

18. Social co-benefits include the improvement of health and safety of the benefited population. The improvement of early warning systems will certainly reduce fatalities related to extreme climate events. The availability of seasonal weather forecasts and agro-meteorological data is expected to substantially improve the productivity of local farmers, contributing to food

³ Funding proposal, page 44.

⁴ Funding proposal, page 76.

⁵ See footnote 3 above.

⁶ Funding proposal, page 48.

security.⁷ However, this will only be feasible if the information services are provided in an open format that is accessible and easy to understand and use.

Economic co-benefits

19. The main economic co-benefits include: (1) a reduction of economic losses caused by floods, estimated at USD3.6 million per year once the project is completely implemented; (2) an increase in agricultural productivity, estimated at USD22.7 million per year once the project is completely implemented; and (3) an increase in the efficiency of humanitarian food relief interventions, estimated at USD0.5 million per year once the project is completely implemented. However, these estimations are quite uncertain, due to the limited data used to estimate these benefits.

20. Other economic co-benefits, which are more difficult to quantify, include improved efficiency on hydropower generation, water resources management, infrastructure design, and aviation operations.⁸

Gender-sensitive development impact

21. On the design and implementation process, women beneficiaries will be specifically targeted for their engagement and ownership of the community-based early warning systems. The project will ensure the provision of hydro-meteorological services and forecasting for women farmers' communities and small women-owned business, as well as involving schools in hydro-meteorological monitoring.⁶

22. Gender actions will be constantly monitored and informed by the existing World Bank gender assessments in Burkina Faso.

23. Details of considerations related to gender-sensitive development are extensively described in the gender action plan.

1.4 Needs of the recipient

Scale: High

Vulnerability of the country and vulnerable groups

24. Burkina Faso ranks one hundred and eighty-five out of 188 countries in the Human Development Index (2015), with approximately 55 per cent of its 18.1 million people living on less than USD1.90 per day and with a life expectancy of 58.6 years.

25. The country is very vulnerable to climate change. The high variability of Sahelian and sub-Saharan climate can be illustrated by the floods of 1994 which affected 650,000 people, followed in 1995 by a drought which affected about 75,500 people and destroyed initial maize production in the Haut Plateau and northern districts. The severe floods of September 2009 affected more than 150,000 people in Ouagadougou, with damages exceeding USD 130 million.

26. Nearly 90 per cent of poor people live in rural areas and depend on rain-fed agriculture and agro-pastoralism to make a living, making them extremely vulnerable to droughts and floods.

27. In 2014, estimates suggested that moderate and severe food insecurity affected 3.7 million people, with 1.5 million in immediate need of food assistance. Under-nutrition is the

⁷ Funding proposal, page 47.

⁸ Funding proposal, page 45.

main risk factor for children under five years of age, being responsible for the deaths of more than 40,000 children each year.⁹

Economic and social development level of the country and the affected population

28. Agriculture contributes to approximately one third of the country's gross domestic product, and almost 80 per cent of employment is linked to subsistence farming.¹⁰

29. Burkina Faso had an average annual growth of 6 per cent over 2003-2013, which slowed to a rate of 4 per cent in 2014, attributed to the fall in the prices of gold and cotton, the decline in cereal production and the political crisis of 2014.

30. Recent slight improvements on human development include reduced infant and maternal mortality, and higher life expectancy at birth.

The need for strengthening institutions and implementation capacity

31. A number of institutions are involved in the monitoring, elaboration and forecasting of weather and climate information, products and services, including the Directorate General of Meteorology, the Directorate General of Water Resources, the Directorate General for Civil Protection, the early warning system of the National Food Security Commissariat and the National Council for Emergency Relief and Rehabilitation. The project targets all five institutions to strengthen their institutional and implementation capacity to be able to use hydro-meteorological services in their decision-making.

32. The project relies on training people to be able to use and maintain the information facility after the consulting service delivers the hydro-meteorological services. The project proposal states that different modalities of training would include in-situ training, education at universities, study tours, distance learning programmes and training in World Meteorological Organization regional and other relevant training centres. However, there is insufficient evidence in the proposal to confirm the ability to select and retain the personnel in the country to ensure lasting benefits of the investment in training and thus to ensure sufficient local capacity to manage and maintain the information system.

1.5 Country ownership

Scale: High

Alignment with priorities in the country's national climate strategy

33. In 2007, the country developed a national adaptation programme of action (NAPA) with eleven priorities. The proposed project is clearly aligned with the country's priorities as described in the NAPA and the country's national adaptation plan, where support for early warning mechanisms have been defined as the most urgent and cost-effective adaptation method. Also, the country's intended nationally determined contribution gives great importance to strengthening the national hydro-meteorological services and to increase research activities in this field.¹¹

Capacity of accredited or executing entities to deliver

34. The executing entity for the proposed project is the permanent secretariat of the transport sector program (PS/PST) for the Government of Burkina Faso. Although the agency has considerable experience in implementing programmes financed by the World Bank, the proposal states that some additional capacity support will be required to manage the proposed

⁹ WHO Countdown to 2015, Burkina Faso

¹⁰ Funding proposal, page 9.

¹¹ Funding proposal, pages 51 and 52.

project.¹² Moreover, since the project will involve five institutions within the Government of Burkina Faso, it relies on the ability of the PS/PST to coordinate actions within the government.

35. The project does not have a clear role for the Ministry of Environment, Green Economy and Climate Change, which authored the National Adaptation Plan of Action (NAPA), and therefore should analyse and monitor the impacts of the project towards the adaptation goals.

36. The accredited entity is the World Bank, which has already participated on similar projects and has sufficient experience in project management and delivery.

Engagement with civil society organizations and other relevant stakeholders

37. Consultation with stakeholders was undertaken by the World Bank in its mission of January 2014. A forum was undertaken during that month with suppliers of information and private sector actors to understand expectations of the project. A national consultation network meeting took place in 2016 with implementing agencies to validate the final proposal. However, there is not a clear indication in the project proposal that consultations with the regions and other possible users of the information facility were undertaken, including the civil society.

1.6 Efficiency and effectiveness

Scale: High

Cost-effectiveness and efficiency

38. The USD 22.5 million grant is a reasonable amount for the proposed project interventions. The project also involves an additional grant from the World Bank Global Facility for Disaster Reduction and Recovery of USD 2.5 million and additional co-financing of USD 2 million by the Government of Burkina Faso for salaries and overheads of the people involved in the project during the five-year period of implementation.

39. The effective use of the investment will depend on the quality of the specialized consulting services that will assist the country in delivering the information services, because more than 70 per cent of the budget will go to outsourced goods and services.

40. The investment in capacity-building will only be efficient if the personnel that will be trained are retained by the country.

41. The project has a provision for operation and maintenance (O&M) provided in the funding proposal for the five years of the duration of the project and there is an O&M plan in annex 18 of the proposal that refers to a period of 10 years. The economic model identifies O&M costs from the end of the implementation (year 6) to year 15 amounting to USD 17.84 million. However, there is no budget foreseen or allocated to O&M after the project completion. There is also an apparent mismatch between the O&M figures projected in the economic analysis and the O&M plan, because of their being based upon different assumptions. It is crucial to ensure that the Government of Burkina Faso is committed to maintaining the levels of investment in O&M after the five years of project implementation.

42. The GCF grant is not likely to displace private or public investment due to the public good nature of hydro-meteorological services and to the fact that Burkina Faso is categorized as a least developed country, with significant financial needs.

Financial viability

43. The generation of sound business models to commercialize climate services to meet a significant share of the costs of O&M of the new hydro-meteorological equipment and warning

¹² Funding proposal, page 52.

systems is deemed unlikely. Consultations with the private sector took place only once, in 2014, and there is no evidence that they will be able to demand accurate information services or the conditions of payment for such services.

44. The benefit–cost ratio was estimated at 6 to 1, which is in line with similar projects. The internal rate of return was calculated to be 73 per cent.¹³

II. Overall remarks from the independent Technical Advisory Panel

45. The independent Technical Advisory Panel will recommend that the Board approve the project subject to the following conditions:

Condition to be met prior to the execution of the funded activity agreement:

- (a) A clear O&M budgetary provision agreement to ensure the sustainability of the project after its completion.

Covenant:

- (a) The accredited entity shall submit to the Secretariat the following strategies within one year of the effectiveness of the funded activity agreement, and shall implement such strategies throughout the implementation of the project to further ensure the country's ability to make the system operational:
 - (i) A detailed strategy to train in-house country personnel and the conditions to be able to retain their services after they finish their technical and education programs that have been supported by the project;
 - (ii) A detailed strategy of possible climate information products and services to be provided to farmers, insurance companies, private companies and other possible users to ensure additional sustainable income to maintain the project. The strategy should be informed by further participatory processes with different stakeholders; and
 - (iii) A strategy for knowledge-sharing, communication and dissemination of information to ensure that the information services reach all concerned, including regions and civil society, to enable stakeholders to cope with the impacts of climate change.

¹³ Funding proposal, page 60.

Independent Technical Advisory Panel's review of FP075

Proposal name:	Institutional Development of the State Agency for Hydrometeorology of Tajikistan
Accredited Entity:	Asian Development Bank (ADB)
Project/programme size:	Micro

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. This project intervention is in Tajikistan, which has been described in the submission as one of the wellsprings of Central Asia because the Syr and Amu Rivers originate in Tajikistan and the Kyrgyz Republic and flow into Turkmenistan, Uzbekistan and Kazakhstan and comprise 90 per cent of the water resources in the region.
2. Roughly 70 per cent of the population of Tajikistan lives in rural areas and relies on agriculture as a primary source of income. As such, livelihoods are directly dependent on the country's water resources and are exposed to the prevailing climatic conditions and weather events.
3. Tajikistan is also Central Asia's poorest country and is one of the most vulnerable in the region to climate change, as ranked by the Notre Dame Global Adaptation Initiative vulnerability index. Tajikistan is highly prone to climate-related extreme weather events, notably flooding, which has caused roughly 80 per cent of disaster mortalities in the country in the period 1990-2016.
4. Climate vulnerability is particularly acute in the districts along the Pyanj River Basin (PRB), the primary tributary to the Amu River in the south of the country, which comprise a wide range of geographical and climatic conditions. As the largest river basin in the country (114,500 kilometres squared, or km²) the PRB spans 18 administrative districts across two administrative regions (Khatlon and Gorno Badakhshan provinces), with a population of approximately 1.3 million.
5. The basin not only provides a home to that population, but it is also important for agriculture in the country and increases in agricultural production, food security, and water supply and use efficiency are linked to good water resource management (WRM) in the basin.
6. WRM in the PRB is critical to the country's economy and development and, as the basin is already known to be vulnerable to climate change and variability, addressing the current and future climate-related extreme weather risks is a concern and priority at high levels of government.
7. This is reflected in Tajikistan's intended nationally determined contribution (INDC) submitted for the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, which prioritizes reducing vulnerability to climate change in key sectors such as agriculture and water resources through, among others:
 - Improvement and modernization of hydrometeorological services;
 - Disaster risk reduction; and
 - Improved knowledge-sharing.

8. As part of the need to strengthen climate change resilience in the country, it has been recognized that comprehensive WRM in the PRB must be implemented. In line with this thinking, the project “Water Resources Management in the Pyanj River Basin” (WRMPRB) was approved by the Asian Development Bank (ADB) Board in November 2016. The project funded by ADB addresses WRM issues of the river basin.

9. The weak in-country capacity for forecasting weather, hydrometeorological, and climatic conditions was identified early in the implementation of the WRMPRB project. Although a government agency for hydrometeorology (Hydromet) was in place in the country, its capacity had been crippled by many of the common problems faced by post-Soviet institutions, including limited budget, decaying infrastructure, and poor staff retention. This situation has hampered disaster risk mitigation and response in vulnerable communities, as well as broader climate change adaptation efforts, which usually derive strength from prompt data and information availability from a functional hydrometeorology agency.

10. Unless the underlying weaknesses of Hydromet are addressed, it is clear that the success of the WRMPRB project will be jeopardized. Therefore, additional financing, targeted at addressing these weaknesses, is being sought from GCF to support development of Hydromet’s capacity to become a sustainable and well-resourced institution that can produce timely and accurate forecasting of extreme weather events, particularly in the PRB.

11. The proposed project will be implemented to strengthen the WRMPRB project and the intervention related to Hydromet will be implemented along the lines of the following components:

- (a) Component A: Modernization of the Hydromet campus and associated facilities, which will include: engagement of design and supervision services; modernization of core Hydromet operational system; construction of mixed-use buildings.
- (b) Component B: Legal and organizational transformation of Hydromet as an institution, which will include: implementation of legal reforms; enhancement of institutional framework and quality management system; implementation of capacity-building and knowledge-sharing programmes;
- (c) Component C: Development of forecasting and warning systems for extreme weather events, which will include: development of flood forecasting systems; building capacity of Hydromet staff, and; enhancement of community awareness and preparedness; and
- (d) Component D: Marketing of fee-based services, covering: enhancement of community awareness; weather product accessibility; development a of subscription platform; new weather products.

12. The proposed funding will include the following sources:

- (a) GCF (Grant): USD 5 million (50 per cent);
- (b) ADB (Grant): USD 5 million (50 per cent);
- (c) Total: USD 10 million (100 per cent).

1.1.1. Mitigation impacts

13. The project to establish a functional Hydromet will have no mitigation impacts as the intervention will contribute to the building of climate adaptive capacity in Tajikistan directly and indirectly.

1.1.2. Adaptation impacts

14. The project will support adaptation to climate change in Tajikistan in the following ways:
- (a) Directly through improvements in flood forecasting and weather products for approximately 1.3 million residents (of which 50 per cent are women) of the PRB; and
 - (b) Indirectly through a strengthened Hydromet agency providing improved and widely disseminated forecasting services that will eventually benefit the adaptive capacity of the approximately 8.7 million¹ residents across the entire country.
15. Benefits of this intervention that also represent positive impacts can be summarized as follows:
- (a) Avoidance of adverse effects of climate change to infrastructure and livelihoods due to the availability of timely warnings;
 - (b) Improved climate-related data and analysis to support broader adaptation efforts including operation and maintenance, planning and investments; and
 - (c) Leveraging and enhancing the sustainability of other donor investments in Hydromet, including ongoing projects by the World Bank (to support weather monitoring and forecasting) and the ADB (long-term climate forecasting), which are currently at risk due to institutional barriers and weaknesses.
16. Accordingly, the independent Technical Advisory Panel (TAP) has rated the impact potential of this intervention as “high”.

1.2 Paradigm shift potential

Scale: High

17. In the absence of this intervention, the existing Hydromet agency will continue to deteriorate since it has long been exposed to funding neglect, and even with ongoing donor-supported interventions for training and equipment purchase, it has become evident that without any GCF/ADB intervention, opportunities for significant improvement in the medium term are limited.
18. The financing requested will support activities that will generate paradigm shift potentials in the current status quo and functioning of Hydromet in Tajikistan. Key support engendered by this intervention will include:
- (a) The modernization of the new Hydromet campus to ensure safe and secure facilities, which will enhance functionality of the existing structures and which cannot take place under the current status quo;
 - (b) The transformation of the legal framework of Hydromet into an entity that can seek and retain additional entrepreneurial income to supplement core government funding and flexibly set staff salaries, thus enabling it to retain well-trained staff.
 - (c) Development of key sources of income is planned and will include:
 - Sale of fee-based information and forecasting products;
 - Rental of facilities such as conference rooms and office space;
 - Consulting services;

¹ 2016 estimate. Source: World Bank.

- (d) The project will support the development and implementation of a viable business and marketing strategy for Hydromet and the development of at least one new weather product targeted at customers in the PRB; and
- (e) Modernization of core operational systems is equally important and the intervention will lead to the retooling of Hydromet through.

1.2.1. Potential for scaling up and replication

- 19. This institutional transformation of Hydromet will represent a significant paradigm shift in the funding and provision of hydrometeorological services in Tajikistan and Central Asia.
- 20. The model will be replicable in other hydrometeorological agencies in other countries in Central Asia. The success of this project will enable the scaling-up of Hydromet's products and services, for example into agrometeorology.

1.2.2. Potential for knowledge-sharing and learning

- 21. Key potentials for developing knowledge-sharing and learning as an integral part of the project can be summarized as follows:
 - (a) Capacity-building for Hydromet staff members and the programme to enhance community awareness and preparedness in component B of the intervention are key platforms for knowledge-sharing and learning by key stakeholders in Tajikistan.
 - (b) Strengthening the institutional capacity of Hydromet through a revamped legal framework will provide flexibility for Hydromet to be able to carry out knowledge dissemination both within the institution, to other related agencies in Tajikistan, and to neighbouring countries. This process will provide a platform for knowledge-sharing and learning;
 - (c) The project will support improved monitoring and forecasting outputs, their dissemination to the general public, and their use in disaster preparedness. This will provide an additional platform for knowledge-sharing and learning;
 - (d) The project implementation will involve the documentation of all project results, including how barriers were addressed, policy changes made and the regulatory and legal frameworks were modified. This will provide a very comprehensive database for knowledge-sharing beyond the project lifetime; and
 - (e) Lessons learnt and results gathered through the project monitoring and evaluation plan will be shared across the region as a result of the renewed capacity created by the Hydromet project, and will be available via regional linkages.

1.2.3. Contribution to the creation of an enabling environment

- 22. Some of the key ways in which the project will create an enabling environment will include:
 - (a) Under the previous status quo, Hydromet did not have the capacity to perform even its simplest duties of gathering hydrometeorology information in Tajikistan. Hydromet is inadequately equipped with both human and capital resources to carry out these duties. With the intervention, not only will the facilities needed be made available, but the problem of poor retention of staff due to low salaries and the discouraging work environment will also be resolved;

- (b) The project will support improved forecasting services from Hydromet, which will improve the disaster preparedness and response of the most vulnerable communities in Tajikistan. This will empower communities to make decisions that will reduce their own vulnerabilities and exposure to climate-related risks; and
- (c) The project will support the development and implementation of a viable business model and marketing strategy for Hydromet to seek additional entrepreneurial revenue. This will be a departure from the previous situation and will create a new functional environment that will enhance the sustainability of Hydromet.

1.2.4. Contribution to regulatory framework and policies

23. The project will strengthen the national legal framework for improved climate-responsive planning and development through the legal transition of Hydromet by providing increased flexibility to seek additional income, improving forecasting services, and offering new products to the most vulnerable through outreach, consultation, and marketing.

24. This will assist Tajikistan to be able to align with the policies elaborated in Tajikistan's INDC, which stressed the need for a strengthened Hydromet as a key priority for the country's adaptation and resilience goals in national planning and development.

25. Accordingly, the independent TAP has rated the paradigm shift potentials of this intervention as "high".

1.3 Sustainable development potential

Scale: Medium

26. According to the funding proposal, some of the benefits and co-benefits that successful implementation of this project will engender to support the sustainable development potentials of Tajikistan will include economic, environmental and social factors.

1.3.1 Economic benefits and co-benefits

27. As estimated and presented in the funding proposal, the economic benefit of a strengthened Hydromet can be expected to total approximately USD 55 million in present value terms (at 9 per cent discount rate), comprising avoided losses from disaster impacts. It has also been reported that the project is expected to have second- or third-order indirect effects on the wider economy, as a strengthened and more sustainable Hydromet will more effectively achieve its mandate for the country and support more climate-resilient planning and development.

1.3.2. Environmental benefits and co-benefits

28. The project is not expected to have direct environmental co-benefits, but can result in indirect environmental benefits as Hydromet's work for environmental monitoring and testing will indirectly benefit from institutional strengthening.

1.3.3. Social benefits

29. The project will support improved resilience of vulnerable communities in the PRB through improved flood forecasting and weather services. This improved resilience will be reflected in the livelihoods of the vulnerable communities in terms of comfort, convenience, health and safety, among other things.

1.3.4. Gender-sensitive development impact

30. Of the 1.3 million people that will be positively impacted by the success of the intervention, 50 per cent will be women. A gender action plan (GAP) was also submitted with the funding proposal as attachment 6.
31. Key issues included in the GAP are summarized as follows:
- (a) Hydromet currently employs 251 female staff (just under 40 per cent) out of a total of 708 staff;
 - (b) Of these 251, the following are senior management staff: 1 Chief of Department (out of 3), 1 Deputy Chief (out of 3), 1 Chief of Centre (out of 8) and 1 Deputy Chief of Centre (out of 3);
 - (c) The rest are at various professional and technical levels, including support personnel and workshop/technical managers;
 - (d) At the senior management level (Director and Deputy Director) all three directors are male;
 - (e) According to the document submitted with the funding proposal, the GAP is still in draft form and will be completed later; and
 - (f) It was categorically stated that the project will ensure that among the beneficiaries in the project areas, women are trained and consulted in an equitable manner to support gender-sensitive design and provision of forecasting and warning services.
32. Gender mainstreaming into this project intervention is a necessary activity that will improve the sustainable development characteristics of this submission. Given the importance of gender issues, the independent TAP cannot rate this intervention as “high” given that the GAP plan is still in the preparation stage.
33. The independent TAP has therefore given this submission a “medium” score as far as the sustainable development potential of the project is concerned.

1.4 Needs of the recipient

Scale: High

1.4.1. Vulnerability of the country

34. Tajikistan is Central Asia’s poorest country and is one of the most vulnerable in the region. Tajikistan is highly prone to climate-related extreme weather events, notably flooding, which has caused roughly 80 per cent of disaster mortalities in the country in the period from 1990-2016.²
35. Climate change is expected to exacerbate these adverse events and their impacts. Higher temperatures and changes in precipitation patterns are expected to cause earlier and faster snowmelt and recession of glaciers, and a decline in overall water availability. Water stress conditions are likely to become more common, and flooding and landslides are likely to become more frequent and damaging.³
36. Climate vulnerability is particularly acute in the districts along the PRB, the primary tributary to the Amu River in the south of the country.

² The [Office of Foreign Disaster Assistance/ \(OFDA/CRED\)](http://emdat.be/emdat_db/). International Disaster Database, http://emdat.be/emdat_db/

³ Punkari, M., et al. 2014. Climate Change and Sustainable Water Management in Central Asia. *ADB Central and West Asia Working Paper Series* No. 5. Asian Development Bank. Manila.

37. The PRB includes the province with the largest population (2.7 million) and agricultural production (e.g. 774,000 tons of cereal production) in the country. It also includes the most food-insecure zone in the country's irrigated area.⁴

38. The PRB also covers an area which, between 1998 and 2016, experienced annually roughly 30 natural disaster events with four lives lost and damage exceeding USD 3 million per year.

39. Women dominate lower paid jobs in the agricultural sector, thereby bearing a disproportionate burden and vulnerability to climate-related extreme weather events. However, women have less access to resources (land, credit) and fewer are in leadership roles in water user associations and other community organizations.

40. Annual river flows are likely to increase in the glacial sub-basins between 2015 and 2065 or 2075 due to increased melt caused by higher air temperatures. The expected change in monthly flow rates due to increased rainfall and decreased snowfall may entail an increase in the magnitude and frequency of extreme flood events. A gradual shift in the river flow's seasonal distribution and an increase of irrigation water requirements are predicted.⁵

41. Given the issues described above it can be concluded that Tajikistan is highly vulnerable to climate change and will need a functional Hydromet to plan sound and reactive adaptation strategies into the future, hence the appropriateness of this intervention.

1.4.2. Need for an alternative source of financing

42. Tajikistan is a high-debt country with no ability to raise funds for projects of this nature either from local or international sources. Over the years, the government's budgetary support for Hydromet has been so heavily constrained that the institution is on the brink of collapse.

43. Without this support, Hydromet would collapse due to lack of adequate funding from the government. The government, as the sponsor of Hydromet, also lacks the ability to access funds from common sources due to its weak financial standing. Therefore, funding support cannot be sustainable unless in the form of grants, such as those provided by ADB and GCF intervention.

44. Overall, the institutional capacity of Hydromet is low, and its ability to operate at optimal levels is constrained by institutional barriers and weaknesses that prevent it from achieving its mandate and hinder sustainable improvements in institutional capacity.

45. Without the grant funding to support this project, Hydromet is unlikely to develop and grow its capacity beyond its current situation, and recent and ongoing donor interventions are likely to prove unsustainable. Therefore, in the absence of grant funding from GCF to implement 50 per cent of the intervention cost, this project is unlikely to proceed.

46. The financial resources available to the government of Tajikistan, which is the sole funder of Hydromet operations, are inadequate to fund the entire project as presented, thus additional sources of funds are necessary.

47. To this end, new funding sources such as grant funding from the GCF for the implementation of about 50 per cent of this intervention are needed for implementation of this climate change adaptation project.

⁴ World Food Programme. 2013. *Food Security Classification Overview–June 2013*. Dushanbe.

⁵ See footnote **Error! Bookmark not defined.**

48. Given the discussion above, the independent TAP has rated the need for this project by the recipient as “high”.

1.5 Country ownership

Scale: High

1.5.1 Existence of a national climate strategy and coherence with existing plans and policies

49. The alignment of this proposed intervention with priorities in the country’s national climate strategy are summarized below:

- (a) This project is aligned to the INDC Tajikistan submitted to the UNFCCC Paris Agreement, which prioritizes reducing vulnerability to climate change in key sectors such as agriculture and water resources through, among others, improvement and modernization of hydrometeorological services, disaster risk reduction, and improved knowledge-sharing;
- (b) These adaptation priorities were likewise reflected in investments proposed during consultation among government and civil society stakeholders for improvements in WRM, including flood risk reduction in the PRB and improved knowledge-sharing⁶ as well as the Tajikistan National Climate Change Adaptation Strategy that was approved in October 2017;⁷
- (c) The project will contribute to the outcome and targets of the Sendai Framework for Disaster Risk Reduction,⁸ particularly through improving understanding of disaster risk (priority 1) and enhancing disaster preparedness (priority 4); and
- (d) The project will contribute to the Sustainable Development Goals (SDG), particularly goal 13, “take urgent action to combat climate change and its impacts”, by improving awareness and capacity on adaptation and early warning, among others. The project will contribute to the implementation of the Global Framework for Climate Services by improving provision of climate information (goals 1 and 2) and strengthening engagement of providers and users of climate services (goal 4).

1.5.2 Capacities of accredited entities and executing entities to deliver

50. The capacity of the ADB as the GCF accredited entity for this intervention and Hydromet as the executing entity for this project are discussed in the sub-sections below.

51. The capacity of ADB to successfully serve as the accredited entity for this project, can be summarized as follows:

- (a) ADB is a multilateral development finance institution providing loans, grants and technical assistance to its member nations. The ADB has 67 member nations, 48 of which are in the Asia Pacific region, including Tajikistan, which became a member in 1998;
- (b) In addition, ADB provides direct assistance to private enterprises of development member countries through equity investments and loans;

⁶ Asian Development Bank (ADB). 2016. *Economics of Climate Change in Central and West Asia. Adaptation Component*. TA Consultant’s Report. Manila.

⁷ Asian Development Bank (ADB). 2017. *Draft National Climate Change Adaptation Strategy* (in preparation). TA Consultant’s Report. Manila.

⁸ United Nations. 2015. *Sendai Framework for Disaster Risk Reduction 2015-2030*. Third UN World Conference. Sendai.

- (c) In 2015, ADB loan and grant approvals to developing member countries amounted to USD 16.29 billion. Private sector operations amounted to an additional USD 2.63 billion;
 - (d) Furthermore, with donor support ADB mobilized more than USD 10.74 billion in co-financing, to bring total operations for 2015 to USD 27.17 billion;
 - (e) In 2016, loan, grant and technical assistance approvals to ADB developing member countries amounted to USD 17.8 billion, and, with donor support, the total co-financing mobilized amounted to USD 13.9 billion, bringing total sovereign operations to USD 31.7 billion in 2016;
 - (f) Since 1998, when Tajikistan became a member country of the ADB, cumulative amount of lending, grant, and technical assistance to the country for agriculture, natural resources, and rural development totaled approximately USD 170 million; the cumulative amount for public sector management totaled approximately USD 200 million;
 - (g) The ADB has longstanding experience in Tajikistan in supporting climate change and disaster resilience, notably in the PRB. Under the Tajikistan Pilot Program for Climate Resilience funded by the Climate Investment Funds, the ADB is currently administering one technical assistance project (“Building Capacity for Climate Resilience”) and one investment project (“Building Climate Resilience in the Pyanj River Basin”); and
 - (h) The ADB therefore has an adequate track record and the experience to mobilize the USD 5 million grant required of it for this intervention.
52. The executing entity for this intervention is the Ministry of Finance, which will implement the project through Hydromet.
53. The capability of the Ministry of Finance and especially Hydromet to successfully serve as the executing entity for this project can be summarized as follows:
- (a) Hydromet is the executing entity (“executing agency” in ADB terminology) for the technical assistance, which involves development of Hydromet’s capacity for modelling climate change and impacts in the country, including development of a climate information and data system;
 - (b) The Ministry of Finance will implement the project through Hydromet. A project management office will be established within Hydromet to be responsible for project implementation. The project will also recruit consultants to support project implementation including capacity-building, procurement, construction supervision, and safeguards;
 - (c) Hydromet is a state agency with approximately 800 staff, including approximately 300 professional staff. In addition to the above-mentioned ADB technical assistance, Hydromet is implementing the World Bank Central Asian Hydromet Modernization Project to improve Hydromet’s monitoring and weather forecasting capacity;
 - (d) The ADB’s financial management and internal control policies and procedures will be followed, including but not limited to those described in the ADB’s *Loan Disbursement Handbook* (2017, and amendments); and
 - (e) The combination of the capacity existing within Hydromet coupled with the support of the Federal Ministry of Finance and the use of ADB tools and support for the project management unit will ensure that Hydromet is able to implement this project.

1.5.3 Engagement with key country stakeholders

54. As described in the funding proposal, the key stakeholders who played significant roles in the identification, design and development of the components of this intervention were:

- (a) The Center of Environmental Protection (COEP), the GCF national designated authority (NDA) for Tajikistan is the Chairman of COEP; and
- (b) Hydromet.

55. COEP and Hydromet requested ADB support in modernizing the Hydromet campus. The engagement of these key stakeholders took the form of:

- (a) An ADB consultation mission that took place in March 2016. This mission involved high-level consultations with the First Deputy Prime Ministers and representatives of COEP and Hydromet;
- (b) As a follow-up to this mission, the Government of Tajikistan requested ADB to develop the institutional transformation project for Hydromet, including campus modernization;
- (c) Since then, the ADB project team and project preparation consultants have worked closely with Hydromet management and staff to develop the project; and
- (d) A detailed market research survey was conducted covering government and civil society stakeholders (including ALRI and MEWR) on their use, opinion, and interest in Hydromet products and services.

1.5.4. Engagement of the NDA

56. As mentioned above, the GCF NDA for Tajikistan is the Chairman of COEP, who was present at the initial planning and design meetings held regarding this GCF grant funding.

57. The Ministry of Finance in its capacity as GCF NDA of Tajikistan issued a letter of no objection dated 10 December 2017. In this letter, the following points indicating engagement of the NDA were elucidated:

- (a) That the Government of Tajikistan has no objection to the project as described in the funding proposal;
- (b) That the project as described in the funding proposal is in conformity with the national priorities, strategies and plans of Tajikistan, and;
- (c) That the project is in conformity with national laws and regulations of Tajikistan.

55. The independent TAP has concluded that this submission can be rated as “high” on the country ownership metrics.

1.6 Efficiency and effectiveness

Scale: Medium

1.6.1. Cost-effectiveness and efficiency

58. In light of the broad and public-service nature of Hydromet, the beneficiaries of improved services will be both direct and indirect.

59. Assuming that 8.7 million inhabitants can benefit from improved Hydromet services, the cost per beneficiary of the project is USD 1.2.

60. The economic net present value of this project, at 9 per cent discount rate of the financing, is USD 47 million over 30 years, against a project cost of USD 11.0 million and an expected internal rate of return of 29 per cent.

61. The GCF co-financing ratio for the financing of this project is 45 per cent.

62. Regarding financial viability beyond programme implementation, after legal transformation it is envisaged that Hydromet will remain primarily funded by core government budget in light of its public service mandate rather than on a standalone basis as a profit-making entity.

63. Even with privatized income-generating activities, Hydromet will not be able to make adequate revenues. It will therefore continue to rely on government budgetary allocations for some time to come. This poses a risk to post-project viability. Government undertaking and commitment will be needed if the situation that led to deterioration of Hydromet infrastructure is to be avoided.

1.6.2. Application of best practices

64. The application of best practices incorporated into the project can be summarized as follows:

- (a) During project preparation, the institutional assessment of Hydromet included a comparison against the World Meteorological Organization Strategic Support Division and Global Framework for Climate Services⁹ as an indicator of best practices for climate and weather service entities;
- (b) A market research survey was undertaken to understand and incorporate the needs and expectations of key stakeholders and potential clients of fee-based services. The project will support organizational and legal transformation within Hydromet to allow increased flexibility in setting staff salaries and seeking and retaining additional revenue; and
- (c) The sustainability of Hydromet will be dependent on how fast it can develop its entrepreneurial activity to ensure a decent income base, which will make it independent of budgetary allocation from government over time.

56. Given the issues described above, especially the uncertainty relating to the availability of government budgetary allocation to support the developing revenue-generating activities of Hydromet, especially at the end of the intervention period, the independent TAP has rated the efficiency and effectiveness of this project as “medium”.

II. Overall remarks from the independent Technical Advisory Panel

65. It is hereby recommended by iTAP that the Board should approve this project for GCF funding as requested. However, to ensure a high quality of the project considering all the GCF metrics, the following condition to be fulfilled by the AE prior to the first disbursement:

- (a) Submission by the Accredited Entity of a letter of commitment from the Government of Tajikistan, in form and substance satisfactory to the GCF Secretariat, where the Government of Tajikistan commits to fund Hydromet’s Operations & Maintenance costs beyond internally generated revenues, during and after the end of the project implementation;

66. The iTAP also recommends the Accredited Entity to submit to the fund a finalized Gender Action Plan upon project fact-finding.

⁹ World Meteorological Organization (WMO). 2014. The WMO Strategy for Service Delivery and its Implementation Plan. Geneva. Available at < https://library.wmo.int/pmb_ged/wmo_1129_en.pdf>

Independent Technical Advisory Panel's review of FP076

Proposal name:	Climate-friendly agribusiness value chains sector project
Accredited Entity:	Asian Development Bank (ADB)
Project/programme size:	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. Cambodia is an agrarian country, with its economic growth largely reliant on the agriculture sector. Over 80 per cent of the population lives in rural areas and most of them depend on rain-fed agriculture. Climate variability, especially water availability due to erratic precipitation patterns, has placed constraints on agricultural productivity, and these impacts are expected to significantly increase due to projected climate change. Further increases in agricultural production, if undertaken without paying due regard to climate change, are likely to lead to increased greenhouse gas (GHG) emissions from unsustainable land use and land-use changes.

2. Cambodia's agriculture sector is not competitive for various reasons, the most important of which include: critical infrastructure gaps, which together with a range of capacity constraints hinder sector productivity; production and distribution costs, which are consequently very high and made even higher due to high energy and transport costs; profits, which are hampered by excessive rates of post-harvest losses (approximately 15–20 per cent), thus constituting a barrier to the flow of investment funds into the sector; farming techniques, which remain mostly subsistence-based and rain-fed, with low productivity. Most of the people who live in rural Cambodia are farmers who depend on rain-fed agriculture for subsistence.

3. It has been very strongly stated in the funding proposal that if further growth in agricultural production as is being planned in Cambodia is to be successful, due regard must be placed on climate change in planning this growth if increased GHG emissions from unsustainable land use and land-use changes is to be avoided;

4. Even apart from the negative impacts of climate change and variability in the productivity of the Cambodian agriculture sector, the Government of Cambodia recognized other key prevalent barriers to the productivity of the sector when it set up an agriculture sector strategic development plan (2014–2018), which aims to enhance the competitiveness of the sector through improvements in productivity (intensification), diversification and commercialization.

5. The interventions proposed in the FP considered the following to be key baseline scenarios that must be altered in order for the Cambodian agriculture sector to thrive and contribute its quota to national development:

- (a) Cambodia's increasing climate change vulnerability and in its efforts to increase production, which are bound to increase GHG emissions from the agriculture sector;
- (b) The sector's low capacity and insufficient access to technologies, compounded by an inadequate policy on the environment, which has consistently caused producers in the sector to be highly vulnerable to climate risks and leads to a gradual decline in agricultural livelihoods;

- (c) Climate vulnerability, which includes:
 - (i) High risks of flood and drought; and
 - (ii) Poverty and low adaptive capacity;
 - (d) Observed impacts of climate change trends in recent years, which include:
 - (i) Longer dry seasons and more intense El Nino related droughts; and
 - (ii) Delayed onset of the rainy season (preventing any early wet season crops);
 - (e) More intense rain over shorter periods leading to floods; and
 - (f) Unexpected dry periods during the raining season, spoiling ready-to-harvest or drying crops, such as rice and maize.
6. The aim and objectives of this intervention can be summarized as follows:
- (a) The reduction of climate change vulnerability and GHG emissions of four agricultural value chains in Cambodia;
 - (b) The enhancement of resilience and productivity of target crops, with the goal of achieving increased agricultural competitiveness and household incomes in the project areas; and
 - (c) The enhancement of infrastructural resilience to climate change and “last mile” connectivity, enabling the transformation of transport corridors into economic corridors.
7. The proposed project will be made up of the following output components:
- (a) Output 1: critical agribusiness value chain infrastructure improved and made climate resilient;
 - (b) Output 2: climate friendly agriculture and agribusiness promoted for target value chains; and
 - (c) Output 3: enabling environment for climate friendly agribusiness enhanced.
8. The project will improve climate resilience and reduce the climate footprint of each stage of the agricultural value chain by:
- (a) Investing in resilient agricultural production and post-harvest infrastructure;
 - (b) Supporting production intensification and the commercialisation of rice, maize, cassava and mango; and
 - (c) Promoting the use of low-carbon technologies at various stages in the value chain.
9. The proposed funding will include the following sources:
- (a) GCF (grant): USD 30 million (21 per cent);
 - (b) GCF (loan): USD 10 million (7 per cent);
 - (c) Asian Development Bank (ADB) (loan): USD 90 million (64 per cent);
 - (d) Government of Cambodia (in-kind payment): USD 7.61 million (5 per cent);
 - (e) Project beneficiaries (in-kind payments): USD 3.78 million (3 per cent);
 - (f) Total: USD 141.39 million.
10. The total GCF contribution to financing this intervention amounts to USD 40 million, which is about 28 per cent of the total funds required for the project with 75 per cent of the request as a grant and 25 per cent as a concessional senior loan with a tenure of 32 years and an annual interest rate of 0.0 per cent.

Mitigation impacts

11. It has been estimated that project interventions will yield a direct GHG emission reduction (ER) of about 240,000 tons of carbon dioxide equivalent (tCO₂eq) by 2024. This amounts to a GHG ER of about 40,000 tCO₂eq per year during the project period of 2018–2024;
12. These direct emissions will come from the 12,000 biodigesters and 6,000 compost huts that will be developed as part of this project intervention;
13. The biodigester technology reduces GHG emissions through three pathways:
 - (a) The displacement of non-renewable cooking and lighting fuel by a renewable fuel biogas;
 - (b) The avoidance of methane emissions from the animal waste management system by capturing and destroying methane in an energy service device; and
 - (c) The displacement of chemical fertilizers by bioslurry. The production of chemical fertilizers is energy intensive and the application of chemical fertilizers to the soil result in GHG emissions such as nitrous oxide.
14. GHG ER calculations utilized in this submission employed assumptions, which are based on the project design document developed by the National Biodigester Programme available on the United Nations Framework Convention on Climate Change website. The assumptions were, however, slightly modified based on recent experience;
 - (a) In this methodology, GHG ER per digester was estimated as follows: the average ER per unit of biodigester of 5 tCO₂eq – project emissions of 0.3 tCO₂eq = 4.7 tCO₂eq;
 - (b) Based on the assumption that 90 per cent of the biodigesters distributed will operate during each of the seven years of the project, it has been estimated that GHG ER for the seven years will total about 219,436 tCO₂eq;
 - (c) The second direct source of GHG ER from this intervention will come from the plan to equip 80 cooperatives with a photovoltaic (PV) power system, including an array of solar batteries as a back-up power source, to store excess power and for night-time consumption of electricity. Where possible, these systems would be grid connected. A grid connection is advantageous because the power output of a solar system is otherwise limited by the capacity of the inverter. Seasonal high demand for electricity would in that case be complemented by the grid (i.e. for the blowers used in the rice husk furnaces);
 - (d) The following key assumptions were used in the estimation of GHG emissions from the solar system component of the project:
 - (i) Number of agricultural cooperatives: 80;
 - (ii) Average solar PV installable area per cooperative: 200 metres squared (m²);
 - (iii) Conservative estimate of global horizontal irradiance in target provinces: 4.5 kilowatt-hours kWh) per m² per day (Cambodia's daily average is 5.2 kWh per m² per day);
 - (iv) Conservative estimate of shade-free roof area per kilowatt (kW) of capacity: 12 m²;
 - (v) Conservative estimate of sunshine in target provinces: 300 days;
 - (vi) Conservative estimate of solar panel efficiency: 50 per cent; and
 - (vii) Avoided CO₂ for every kWh of solar power produced: 0.88 kilograms (kg);

- (e) Based on the above assumptions, the total estimated GHG emissions avoided over a seven-year credit period for the solar component of the project will be 42,174 tCO₂eq;
 - (f) Therefore, the total emissions reduced from biodigesters (219,436 tCO₂eq) and avoided emissions from solar technologies (42,174 tCO₂eq) would be about 261,610 tCO₂eq. However, due to additional uncertainties regarding operational efficiency of biodigesters and cooperatives, a conservative estimate of 240,000 tCO₂eq was reported in the submission;
 - (g) The indirect GHG mitigation benefits are from the adoption of climate-smart agriculture (CSA) in project areas. The indirect emission calculation was based on an estimate of carbon sequestration potential from improved agricultural practices in the project areas, based on a United Nations Food and Agriculture Organization Ex-Ante Carbon Assessment Tool simulation; and
 - (h) Using this tool, it has been estimated that this project intervention will result in an indirect GHG ER of at least 3.25 tCO₂eq over the project implementation period of seven years.
15. The adaptation impacts as presented in the funding proposal can be summarized as follows:
- (a) The project is expected to make a significant contribution to increased climate-resilient sustainable development for 390,000 direct project beneficiaries and 975,000 indirect beneficiaries, who are among the most vulnerable segments of society: smallholding, agriculture-dependent farmers;
 - (b) The project will lead to reduced exposure of the value chain to climate change by ensuring that key productive assets are adequately protected against increased variability and extremes. This includes infrastructure rehabilitation and upgrade, protection of crops after harvest, and dissemination of timely agro-meteorological advice;
 - (c) The project will also help to reduce the sensitivity of the sector by promoting climate-smart agricultural practices, as well as through using improved crop varieties that are more tolerant to anticipated climate conditions;
 - (d) The provision of irrigation infrastructure will also reduce the rate of crop loss due to drought or irregular rainfall patterns. This will play a key role in making the entire crop subsector less sensitive to climate change;
 - (e) Finally, the project will increase adaptive capacity by improving the skills of key value chain stakeholders, including governments, local communities and farmers, agri-business operators, agro-processors, finance institutions and the private sector through a gender-sensitive approach.
16. Accordingly, the impact potential of the proposed framework is assessed to be “high”.

1.2 Paradigm shift potential

Scale: High

17. Some of the key paradigm shift issues are summarized below:
- (a) Climate-smart agricultural techniques, policies, norms and standards will be introduced as part of this intervention, which will engender a conducive environment for the replication of such in the country’s agriculture sector and will strengthen future investment;

- (b) The capacity development that will be undertaken as part of this intervention will help to develop and public and private institutions (including financing institutions) that will play important roles in supporting climate-resilient agriculture and that will build and operate climate-resilient infrastructure;
- (c) Modern and up-to-date technologies (e.g. mechanisation, CSA and elements of precision farming, laser land-levelling and the use of information technology, etc.) will be introduced as a result of this proposed intervention. This will have a transformative effect on upscaling the delivery of climate and market information services, which would not have happened in the absence of the project; and
- (d) The introduction of new financial and risk-sharing mechanisms, such as green financing or crop insurance, as well as awareness raising that will be part of this intervention, have been identified as a possible source of stakeholders' behavioural changes (communities and private-sector participants), which would not happen without the implementation of the project intervention.

18. Potential for scaling up and replication: This project intervention will be tied to transboundary transport corridors and, because the project will engender sound enabling policy settings and a regulatory framework, it will be possible to replicate these project outcomes to reach the entire population of the four provinces covered by the project as well as other provinces in Cambodia and neighbouring countries connected with the transport corridors. To quantify the potential of the scaling possible, direct benefits from the current intervention is expected to reach 390,000 people (about 2 per cent of the population of Cambodia and 12 per cent of the provincial population) and an additional 950,000 indirect beneficiaries throughout the four provinces (or 42 per cent of the population of the four provinces). In the longer term, benefits of the replicated project can reach the entire population in the province and the entire country, and, because of the presence of transboundary transport corridors, benefits can reach other connected neighbouring countries.

19. Potential for knowledge sharing and learning: Key potential areas for knowledge sharing and learning that are built into the project can be summarized as follows:

- (a) The project design and implementation is based on an approach that integrates research into the development process;
- (b) The project implementation includes targeted training for stakeholders on issues, including climate-smart agribusiness skills and climate-smart agriculture practices, operations and maintenance (O&M) of the infrastructure or using energy-efficient technologies to reduce the carbon footprint along the value chain;
- (c) The project's outputs include elements related to the dissemination of best available information, technologies and practices and their integration into policies, standards and norms applicable at the national level, thus providing a good avenue for "learning by doing", and creating resource persons for training even beyond the project timeline;
- (d) The project implementation will involve the documentation of all project results, including how barriers were addressed and policy changes were made. This will provide a comprehensive database for knowledge-sharing way beyond the project lifetime;
- (e) The project will produce guidance and training materials and technological information packets that can be disseminated in all areas of Cambodia. It is expected that regional linkages established through trade will also contribute to accelerating knowledge dissemination; and

- (f) Lessons learned and results gathered through the project monitoring and evaluation plan will be shared across projects and with project partners and across regional linkages.

Contribution to the creation of an enabling environment

20. Some of the key ways in which the project will create an enabling environment include:

- (a) The creation of an enabling policy and operational environment for climate friendly agribusiness;
- (b) The development of climate-smart agribusiness policy to enable public-private partnerships, which will lead agricultural cooperatives to not only reach regional but also international markets with their processed products;
- (c) The project will create an enabling environment through the strengthening of the capacity of the Government of Cambodia on climate friendly agribusiness policy and climate-conscious standards;
- (d) Climate services will also be created by the project that will in turn create an enabling environment for the deployment of low-carbon technologies, resilient agricultural practices as well as for the establishment of public-private partnerships, green financing and climate risk sharing mechanisms;
- (e) The development of standards and certification for climate-resilient seeds, as well as the deployment of training on CSA, will help to create an enabling environment at the local and provincial levels; and
- (f) The green financing and crop insurance schemes that will be engendered by this project intervention shall provide de-risking schemes that are essential for the success of these new business ventures in Cambodia, thus providing an enabling environment platform for investment in the country's agriculture sector.

21. Contribution to regulatory framework and policies: The development of a regulatory framework and policies for improved and climate-resilient agricultural productivity in Cambodia is one of the key aims of output 3 of this intervention. Specifically, activity 3.1 and of this output is geared towards the development of climate friendly agribusiness policies and standards. The success of the activities that will be carried out here will contribute to the strengthening of existing agriculture sector policies, and the development of new ones will further enhance the productivity of the sector while also making it more climate resilient. Activity 3.2, which is focused on developing necessary elements of green financing and the associated risk-sharing mechanism, will further contribute to robust sector policy and regulatory framework delivery.

22. Accordingly, the overall paradigm shift of the proposed framework given the state of the project proposal, reviewed in paragraphs 14–18 above, has been assessed to be “high”.

1.3 Sustainable development potential

Scale: High

23. Some of the wider benefits and priorities that this project will engender to support Cambodia's sustainable development goals (SDGs) will include:

Environmental benefits and co-benefits

24. These will be achieved in addition to the reduction of the carbon footprint of agricultural production in Cambodia when this project is implemented, and will include:

- (a) The restoration of irrigation schemes and of the immediate surrounding landscapes around project-supported infrastructure, which will help to combat soil erosion and land degradation, and create natural buffers against floods and run-off;
- (b) Forestland will also be protected as a result of the expected decrease in demand for fuelwood that will be occasioned by a shift to biogas for cooking;
- (c) The introduction of climate-smart agricultural practices will contribute to soil improvement and soil carbon sequestration through more effective rotation and the use of nitrogen-fixing cash crops, as well as the use of cash crops that extract nutrients from different soil depths;
- (d) This last co-benefit will promote the biodiversity that thrives in the landscape adjacent to farmlands thus allowing for the maintenance of key ecological services crucial for agricultural production; and
- (e) The collection of animal waste, which in the absence of the project would have been left haphazardly scattered on the landscape, for the production of biogas and compost will also help to reduce the local source of pollution and reduce the use of agrochemicals on farms.

Economic benefits and co-benefits

25. An important outcome of the project proposed in the funding proposal is that when successfully implemented, the project will assist Cambodia in achieving significant aspects of its millennium development goals (MDGs) and SDGs. Specifically, successful outcomes of the project will contribute to Cambodia's MDGs (1,3,7 and 8) and SDGs (1, 2, 3, 5, 7, 8, 9 and 13). Key project economic benefits and co-benefits are summarized as follows:

- (a) Apart from the improvement in revenue for farmers and cooperatives, who will be directly participating in the project, employment opportunities will be created for landless and poor farmers who will have access to off-farm and on-farm employment related to support services such as farm mechanisation, drying, milling, grading and storage of produce. This will improve their quality of life and enhance their adaptive capacity while reducing their exposure to climate risks;
- (b) The rehabilitation of the otherwise barely operational irrigation infrastructure in the project coverage area will result in a significant increase in both yield and cropping intensities, with an economic benefit of net incremental income per hectare of about USD 1,030 at full development and about USD 556 per year for an average holding;
- (c) The combination of:
 - (i) Better and more efficient irrigation services for farm crop production;
 - (ii) More effective provision of farm and other value chain technical services; and
 - (iii) Increased cropping intensity for the command area for most of the agricultural products covered;

This will result in increased yields per hectare and, when this is coupled with a reduction in water-pumping costs as a result of the substitution of baseline energy by renewable power (in locations where pumping is required) will result in increased revenue for farmers and farm cooperatives, an important direct economic benefit of the project;

- (d) The financial analysis carried out, the report of which was provided in an annex to the funding proposal, pointed to the following direct and indirect benefits for rural households in the project areas:

- (i) Direct benefits of increased earnings from the improved farming operations;
 - (ii) Indirect benefits of enhanced quality of life; and
 - (iii) Members of cooperatives with drying and storage facilities will benefit from the improved quality of their production, both directly from the cooperative activities and through incentives to improve on-farm practices;
- (e) Increased household incomes will lead to a reduction in household debt levels, and a subsequent decrease in the incidence of domestic violence in farming households.

Social benefits

26. Some of the key social benefits identified in the funding proposal can be summarized as follows:

- (a) Higher food and nutrition security through improved produce quality;
- (b) Increased incomes, which are expected to engender stronger sanitary standards;
- (c) Diversification of income-earning produce (e.g. fish and non-timber forest products, vegetables from crop rotation and additional crops due to irrigation), which further enhances the economic benefits of the project; and
- (d) Improved provision of water and better water management will also result in overall improved health among target populations, particularly among vulnerable groups such as women and children.

Gender-sensitive development impact

27. Gender-sensitive considerations explicitly covered in the presentation in the funding proposal can be summarized as follows:

- (a) A project gender action plan has been developed recognising the importance of women's roles in crop production and with the aim of addressing some of the issues related to their limited access to technology, information and extension services for agricultural production. Some of the specific gender-sensitive actions built into the plan include:
 - (i) At least 40 per cent of farmers benefiting from capacity-building activities and technical support must be women farmers;
 - (ii) Women farmers must have access to training on how to operate and maintain agricultural machinery (this is important given the increased mechanisation of planting and harvesting, which are activities in which women are primarily involved);
 - (iii) Women must receive information on green finance and climate risk sharing instruments; and
 - (iv) Women must be actively involved in the selection and multiplication of climate-resilient crop varieties;
- (b) It is estimated that 50,000 women will benefit from the project's rehabilitated climate-resilient water management systems;
- (c) The provision of alternatives for cooking and training in the responsible use of agrochemicals, which are expected to improve household health are expected to have a particularly significant impact on women;

- (d) As a result of the out-migration of males from the project area, it is expected that the majority of the subproject beneficiaries will be women. As a result, special attention has been paid in the project design to women's access to extension services and technical information. Women are therefore expected to be empowered through receiving training in agricultural techniques and mechanisation;
 - (e) A detailed gender analysis and gender action plan (GAP) have been prepared (included as annex 6 to the funding proposal), which includes gender-related actions, performance indicators and targets to promote women's voices and active participation in all project activities;
 - (f) It has been stated in the funding proposal, especially in its gender analysis that the project is expected to promote gender equality and women's empowerment through enhancing women's capacity in climate-smart agricultural production and processing, management and business, agricultural machinery use and maintenance, access to and using financing, and through strengthening linkages between women-led enterprises and the agribusiness industry; and
 - (g) A gender analysis of the four selected agricultural value chains that will inform further refinement of the GAP at the start of the project and the development of a gender-responsive Ministry of Agriculture, Forestry and Fisheries (MAFF) agribusiness policy have also been prepared.
28. Given the discussion of the coverage of the subelements of the sustainable development metric, and the extent to which gender aspects have been mainstreamed into the funding proposal, the independent Technical Advisory Panel (TAP) assesses the sustainable development metric of this submission as "High".

1.4 Needs of the recipient

Scale: High

Vulnerability of the country

29. Cambodia, a least developed and agrarian country, is said to be one of the world's most climate-vulnerable countries due to its geographical location and topography. It is also climate vulnerable because of its heavy reliance on rain-fed agriculture, and low levels of technical capacity to apply adaptive approaches and technologies among smallholder farmers and rural institutions. The geographical incidence of extreme weather events such as droughts and floods varies, and while floods affect lowlands areas, the distribution of droughts is independent of geography. Storms occur more frequently, with significant impacts on infrastructure and livelihoods.
30. The key consequences of the trends and characteristics described above can be summarised as follows:
- (a) Increased socioeconomic costs, in terms of livelihood loss;
 - (b) Infrastructure degradation;
 - (c) Increased costs of maintenance; and
 - (d) The maintenance of a high level of risk for vulnerable communities and the private sector.
31. Poverty, which remains a problem in Cambodia despite the remarkable MDG progress in recent years, is further exacerbated by the dependence of Cambodia's agriculture on rain-fed

techniques. This means that Cambodia's agriculture is characterized by low input and moderate or low fertility land, thus making it dependent on weather conditions and changing climate.

32. Of the harvested land in Cambodia, 83 per cent is occupied by rice, which is the staple food of the country's population, and 13 per cent of harvested land is occupied by corn, cassava, soybean and mung bean. The 4 per cent balance is used for growing vegetables, sesame, peanut, sugar cane, potato, tobacco and jute.

33. Low yields of these crops, exacerbated by climate variability and climate extremes therefore contribute to recurring food shortages.

34. In addition to the low productivity of food crops, which is exacerbated by climate variability and change in Cambodia, the tropical monsoon climate with its distinct rainy and dry seasons also comes with significant climate impacts on the health of the population. Malaria and dengue fever are the most prevalent mosquito-borne diseases. Thus, climate change, apart from exacerbating poverty in the country via food scarcity, deepens poverty via its impact on people's health.

35. Energy utilization is another gate by which climate change vulnerability enters into the poverty equation in Cambodia. Although the country is richly endowed with energy resources, they remain untapped, leaving the populace highly dependent on non-commercial fuels. Biomass, the main cooking fuel for households, accounts for more than 80 per cent of total national energy consumption, thus making the people of Cambodia heavily dependent on forest land. This dependence is made even more serious as apart from the heavy dependence on forestry for energy for cooking, rural livelihoods depend on forest land for construction wood, food and medicine, as well as on the need to ensure ecosystem functions such as watersheds, and storm and coastline protection. These functions are expected to be highly impacted by climate change, hence the need to improve the adaptive capacity of various segments of the community in Cambodia.

36. It has been reported that under future climate change in Cambodia (2025 and 2050), most of the agricultural areas in Cambodia will be exposed to drought with the growing period reduced to less than five months in the year, making the need for an effective irrigation system a key climate change adaptation necessity.

37. Flooding has also been pinpointed as a major cause of losses in agricultural production accounting for 62 per cent of losses historically. Results from climate change and variability studies carried out for Cambodia have shown that this case may worsen in the future. For example, under the high emission scenario (SRES-A2), wet season rice yield (rain-fed) will continuously decrease until 2080, and could fall by up to 70 per cent of current yield levels – which are already below regional averages.

38. Given these elaborations, it is not surprising that various plans and recent climate change studies in Cambodia have emphasized the need to focus on increasing its capacity to cope with current climate risks by improving climate risk management and community livelihoods. These needs are highlighted in the conclusions of Cambodia's second national communication as well as its climate change strategic plan 2014–2023.

39. The project preparation design team undertook a participatory assessment of socioeconomic and climate-change vulnerability in the four target provinces and four target commodity value chains (annex 7). The participatory assessment validated the fact that all the targeted provinces are highly vulnerable to climate change to different degrees and will need this adaptive capacity intervention for future coping mechanisms to be enhanced.

Need for alternative source of financing

40. Although improved macroeconomic stability and public financial management reforms have helped Cambodia's economy to grow during 2004–2014, over 40 per cent of the population is still said to be very vulnerable to the impacts of climate change. Despite the impressive macroeconomic leap of the Cambodian economy in recent times, it has been observed that levels of investment into rural infrastructure remain insufficient to meet the country's needs, and significant losses have been incurred due to extreme climate events over the past few years. Infrastructure decay in almost all the provinces targeted is said to be causing immense productivity losses. This is exacerbated by the fact that agricultural production is still rain-fed in many of these areas, constraining intensive and high-value crop production and intensification.

41. It was concluded in the funding proposal that for the rural sector of Cambodia, and, by extension, Cambodia's agriculture sector, not to remain in a perpetual state of vulnerability to climate and economic fluctuations, there will be a need to source funds outside of the public funding system to address the problem. Participation of the private sector as well as sourcing funding from international financing institutions were options considered.

42. For the private sector to participate, and for funding from other sources to flow, it is apparent that the following must happen:

- (a) The agricultural value chain must become more profitable;
- (b) All components of the value chain (producers, buyers, etc.) must form closer linkages with the raw material supply base;
- (c) For this to happen, farmers' groups must produce quality products to the standard demanded by the markets and by good agricultural practice;
- (d) The shortages of labour at the farm level, which has been exacerbated by rural–urban migration, must be addressed; and
- (e) Other constraints must be ameliorated, including: a lack of financial resources to invest in farming; a lack of bargaining power to purchase inputs; difficulties in marketing agricultural products; low farm incomes; high energy costs, which reduce the competitiveness of agribusinesses; and a lack of access and the high cost of finance, among other factors, that contribute to suboptimal investments in agribusiness.

43. The financial resources of the Government of Cambodia are inadequate to fund the entire project as presented, thus the need for additional sources of funds.

44. To this end, new funding sources such as that from GCF, about 28.3 per cent of the project funding needed, and ADB, about 63.7 per cent fund contribution, are needed in order for this adaptation project to be implemented. It should also be pointed out that the Government of Cambodia and participating stakeholders in the country are providing the 8 per cent balance in kind.

Institutional strengthening

45. Cambodian institutions will have to be strengthened and in some cases new ones will need to be developed to support the success of this intervention. For example, the existing agricultural extension system is facing numerous problems, such as a limited support system and regulations, and a lack of human resources, funding, techniques and new technology, agricultural extension materials, and facilitation skills.

46. It is expected that the new extension services that will emerge as a result of this intervention will be expected to interact with a diverse set of partners and stakeholders, including for example development partners, non-governmental organisations, research and educational institutions, input suppliers, private companies, community-based organizations, or

expert farmers, and financial institutions. Retraining of current staff, and the provision of new skill sets focusing on the most up-to-date practices and technologies – adapted to the needs of the market in terms of production, quality, standards and climate resilience – is urgently needed.

47. A detailed institutional capacity-building and training plan has therefore been prepared to assist the government in project implementation.

48. Given the discussions above, the TAP has rated the need for this project by the recipient as “high”.

1.5 Country ownership

Scale: High

49. Existence of a national climate strategy and coherence with existing plans and policies: The alignment of this proposed intervention with priorities in the country’s national climate strategy are summarised below:

- (a) The Government of Cambodia developed a national strategic development plan for 2014 to 2018 (NSDP 2014–2018) some years ago. The key objective of the plan is to increase the Cambodian economy by 7 per cent and reduce the poverty rate by 1 per cent annually;
- (b) At about the same time, Cambodia developed a climate change strategic plan for 2014 to 2023. The associated action plans were developed by each line ministry, taking into account the plans in the NSDP. These plans are Cambodia’s first ever comprehensive national policy documents that illustrate not only the country’s priority adaptation needs, but they also provide road maps for the decarbonization of key economic sectors and the enhancement of carbon sinks;
- (c) Cambodia has further developed a green growth policy and road map that sets a path towards stimulating the economy through low-carbon options, savings and creating jobs, protecting vulnerable groups, and improving environmental sustainability;
- (d) Cambodia has developed an agriculture sector strategic development plan (2014–2018), which aims to enhance competitiveness of the agriculture sector through an increase in agricultural growth by approximately 5 per cent, by enhancing agricultural productivity (intensification), diversification and commercialization, through an emphasis on the implementation of the strategy and action plan for climate change adaptation and mitigation;
- (e) The proposed project is also in alignment with Cambodia’s intended nationally determined contributions (INDCs) and sectoral climate change action plans. The focus of the proposed intervention on climate friendly agriculture value chains is expected to significantly contribute towards achieving climate change policy objectives outlined in the national adaptation programme of action of 2006, the INDC of 2015, and the individual climate change action plans for MAFF, the Ministry of Rural Development and the Ministry of Water Resources and Meteorology.
- (f) The project is also in line with Cambodia’s industrial development policy and the ADB country partnership strategy for 2014–2018, which focuses on agricultural commercialization, rural infrastructure and climate change; and
- (g) The key objectives of the project, such as the promotion of resource-use efficiency; renewable energy supply and biogas and bioenergy consumption; the linkage of supply of alternative energy to poverty reduction in the rural areas of Cambodia, are in sync

with many of the objectives of Cambodia's INDC, the NSDP, the rural electrification masterplan and the Policy on Biogas (2016–2025).

50. It can therefore be concluded that the Climate-friendly agribusiness value chains sector project is in alignment with the national climate strategy of Cambodia. A no-objection letter for this project has been issued by the Government of Cambodia.

51. The capacity of ADB to successfully serve as the accredited entity (AE) for this project can be summarized as follows:

- (a) ADB is a multilateral development finance institution providing loans, grants and technical assistance to its member nations. Of these 67 member nations, 48 are from the Asia-Pacific region (one of which is Cambodia);
- (b) In addition, ADB provides direct assistance to private enterprises of development member countries through equity investments and loans;
- (c) In 2015, ADB's loan and grant approvals to developing member nations amounted to USD 16.29 billion. Private sector operations amounted to an additional USD 2.63 billion;
- (d) Furthermore, ADB mobilized, with donor support, more than USD 10.74 billion in co-financing, to bring total operations for 2015 to USD 27.17 billion; and
- (e) ADB therefore has an adequate track record and experience to mobilize the USD 90 million senior loan component of this intervention.

52. The ability of MAFF to successfully serve as the executing entity (EE) for this project can be summarized as follows:

- (a) MAFF has extensive experience in implementing projects and programmes funded by multilateral organizations and development partners, including ADB;
- (b) MAFF's experience includes programme loans, investment loans and various technical assistance projects;
- (c) Over the years, MAFF has developed internal control systems and financial reporting arrangements and protocols not only to manage its own activities but also those of the kind of intervention proposed in the funding proposal; and
- (d) Additional capacity development support particularly on financial management and procurement to properly implement and comply with ADB procedures that has been built into the proposed project capacity-building plan, will further improve the capacity of MAFF in these areas.

53. Engagement with the national designated authority (NDA), the civil society organizations and other relevant stakeholders during the planning and design of this project and planned for during the implementation period can be summarized as follows:

- (a) Engagement of the NDA:
 - (i) During the preparation phase of the project, the Cambodian Ministry of Environment, the country's NDA for the GCF process, was briefed on the various goals, objectives and approaches of the project;
 - (ii) Thereafter, the NDA expressed support for the project because its objective, goals and plans are in sync with Cambodia's strategic priorities for climate-resilient and low-carbon development and is aligned with Cambodia's intended nationally determined contribution;

- (iii) The Ministry gave the no-objection letter for the project proposal after conducting a review by the Secretariat of the National Council on Sustainable Development (NCSA);
- (iv) The Ministry of Environment and NCSA will continue to be engaged during project implementation, especially in:
 - Monitoring and evaluation of climate change actions in the project;
 - Building capacity and supporting policies and measures for mainstreaming climate-change concerns in development planning in line ministries;
 - Upgrading the infrastructure and capacity of the genetically modified organism testing facility of the National Analysis Laboratory; and
 - Conserving watersheds in proposed irrigation and water management subproject areas;
- (b) Engagement of other stakeholders:
 - (i) Starting in July 2014, extensive consultations were held with diverse stakeholders;
 - (ii) The stakeholders consulted include: national ministries, provincial departments, civil society organizations, development partners, and the private sector;
 - (iii) The project prepared a detailed stakeholder consultation and participation plan, which included a stakeholder analysis that identifies the key actors, their interests, and strategies to maximize their participation in the project;
 - (iv) Information gathered included:
 - The national institutions to be involved in project implementation;
 - Public and private actors in the agribusiness sector; and
 - Community members living in the target areas;
 - (v) During project design, members of the project preparatory technical assistance team comprising international and national social development specialists conducted broad consultations to solicit stakeholder input on the design of the project;
- (c) The information and recommendations gathered from the various stakeholder consultations have been incorporated into the design of the project; and
- (d) Coordination with relevant related initiatives was also sought during the preparation of this proposal. Such initiatives include:
 - (i) The Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE), supported by the International Fund for Agricultural Development (IFAD) until 2021;
 - (ii) The Scaling-up of Renewable Energy Technologies in Rural Cambodia Project, financed by the Global Environment Facility and IFAD (under the ASPIRE project above) in Kampong Speu, Kampong Chhnang, Prey Veng Svay Rieng provinces and Takeo, which will be supported by IFAD until 2021; and
 - (iii) The Accelerating Inclusive Markets for Smallholders Project, supported by IFAD until 2022.

54. Given the myriad of information presented in this section, the TAP has concluded that this submission can be ranked as “high” on the country ownership metrics.

1.6 Efficiency and effectiveness

Scale: Medium

55. The economic and financial soundness of the project are considered along the following metrics:

56. Cost-effectiveness and efficiency: the results of the cost efficiency and effectiveness analysis can be summarized as follows:

- (a) A cost–benefit analysis carried out on the three components of the project showed that the project is economically viable;
- (b) The economic internal rate of return (EIRR) obtained by the analysis ranged between 14 per cent and 33.7 per cent. The EIRR for the biodigester programme was 26 per cent;
- (c) The analysis also showed that the viability of the sample irrigation subproject may be vulnerable to the average long-term cropping intensity that farmers are able to achieve;
- (d) The study also showed that the highest risk of the project may be the lack of necessary skills to operate, maintain and manage the infrastructure and facilities properly;
- (e) It was however stated that this risk will be ameliorated by the provincial level training programme that is a core component of this intervention;
- (f) As part of the effort to mitigate this major project risk, the Government of Cambodia has promised to ensure that funds are made available promptly when due for the operation and maintenance of the infrastructure to further reduce the associated risks. Given the scarcity of funds in developing economies, the availability of funds when needed for the operations and maintenance of infrastructure could be a project risk that must be continuously looked at during the implementation of the project; and
- (g) A sensitivity analysis carried out on the economic analysis showed that the results and conclusions discussed above are robust and therefore reliable.

57. Financial viability: a financial and sustainability analysis was conducted from the perspectives of the government and farmers. The results of these analyses are summarized as follows:

- (a) The project is financially viable because MAFF can cover the incremental recurrent cost of the project (which is estimated at 2 per cent of the capital cost). This conclusion was reached when this incremental recurrent cost was compared to the budget allocation available to cover these costs;
- (b) Financial sustainability will be partially guaranteed by the fact that regulations, which secure payments for laboratory testing services to partially cover the recurrent costs of laboratory equipment and associated infrastructure are in place;
- (c) It is expected that agricultural cooperatives may be able to raise additional revenue, which will be channelled towards the O&M of the cooperative infrastructure, to further support financial sustainability of the intervention;
- (d) Some of the key results of the financial analysis carried out from the perspectives of the farmers can be summarized as follows:
 - (i) The financial analyses of the representative subprojects show that the project will have significant benefits for rural households in the project areas;

- (ii) For the representative irrigation subproject, estimated net incremental income for households with an average holding of 0.54 hectares in the command area is expected to reach USD 550 per year;
- (iii) At current prices, members of cooperatives with drying and storage facilities who process all or part of their crop into chips will receive USD 62 per ton for chips instead of about SD 17 per ton for fresh cassava as well as increased dividends from the trading operations of the storage unit;
- (iv) For average households with a new biodigester, annual cash benefits are about USD 230 from savings on fuel and fertilizers and the impact of bioslurry on crop yields;
- (v) Owners of mango orchards in the project areas who adopt drip irrigation after seeing one of the project's demonstration orchards can expect an annual benefit, once full production is reached, of around USD 2,000 per hectare; and
- (vi) Other benefits at this level that cannot be easily monetized will include: the establishment of a sound cooperative model for agribusiness operations; strengthened institutional and human capacity for climate-smart agribusiness; and increased ownership and involvement of farmer groups in the O&M of agribusiness infrastructure.

58. The project has significant potential to catalyse long-term investment into ER technologies through the upscaling of biogas and waste-to-energy technologies from household to small town levels, or the application of climate-smart agricultural practices and precision farming practices that improve productivity and resilience, and reduce emissions.

59. Regarding financial viability beyond programme implementation, the success of this intervention, including the successful development of physical and institutional infrastructure, will enable funding to be committed from time to time to post-implementation activities.

60. However, the key to viability is the proper enablement of the farmer water user communities, farmers, orchard owners and cooperatives as a result to the project intervention so that they can deliver their post-implementation responsibilities, especially regarding the O&M for irrigation, ponds, drip irrigation and storage units, thus leaving the government responsible to cover only costs, incremental to budgetary allocations.

Application of best practices

61. Some of the applications of best practices incorporated into the project can be summarised as follows:

- (a) The project has been designed and is expected to be implemented with the option to overcome the risk aversion of financial institutions in the country for risk financing;
- (b) The project has also been designed and is planned to be implemented to address and understand strategic, policy and regulatory issues related to the selected value chain in the agribusiness;
- (c) The project has been designed and is planned to be implemented to promote and strengthened private-sector participation and investment in the agribusiness value chain so that the government can concentrate on public-good initiatives;
- (d) The project will promote the inclusion of small farmers, who are critical to transforming traditional production and supply practices into commercial demand-driven processes, in the value chain development processes planned by this intervention;

- (e) The project is expected to promote on- and off-farm businesses to improve rural incomes; and
- (f) The project has been designed to strengthen sector and producer associations and organizations for value chain coordination and policy dialogue, enabling them to play important roles.

62. Many of the best practices listed above would not have happened in the absence of this project intervention.

63. Given the discussions above, the TAP has rated the efficiency and effectiveness metrics of this project as "medium".

II. Overall remarks from the independent Technical Advisory Panel

64. iTAP recommends that the Board to approve this project funding proposal with the following condition:

65. To include in the FAA the following covenant: the AE shall ensure that the EE monitors and reports on (i) the operations & maintenance (O&M) budget allocated by the GoC, and (ii) the O&M plan for each sub-project, and the AE shall report these annually to the Fund as part of the APRs (annual performance reports).

Independent Technical Advisory Panel's review of FP077

Proposal name:	Ulaanbaatar green affordable housing and resilient urban renewal project (AHURP)
Accredited Entity:	Asian Development Bank (ADB)
Project/programme size:	Large

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: High

1. The funding proposal is for a large-scale, cross-cutting project which falls within four GCF results areas: low-emission transport; resilient cities and buildings; most vulnerable people and communities; and infrastructure and built environment.

2. The primary target of the project is to increase the resiliency of ger areas¹ (suburb districts) of the city of Ulaanbaatar, which are the most vulnerable to climate change (CC) territories in the city, through planned redevelopment and provision of basic urban services. The ger areas were home to about 774,000 residents in 2016,² which is 60 per cent of Ulaanbaatar's population and 30 per cent of the country's population. Ulaanbaatar's population rose from 773,000 in 2000 to 1,380,792 in 2016, representing an annual average increase of 3.1 per cent. This growth was due to large in-migration from rural areas³ due to (1) a series of climate change related extreme events, including harsh winter storms (known as *dzuds*) that have killed more than 16 million heads of livestock between 2000 and 2010; (2) the transition to a market economy and economic opportunities developing much more rapidly in the cities than in the countryside; and (3) the right of Mongolian citizens to decide where to live that was reinforced first in Mongolian Law in 1992 and then in the Land Law in 2002, which secured land rights and social benefits. In Ulaanbaatar, it ensured each resident lived on a plot of land of 700 metres squared (m²) on average. Household incomes are generally low to medium⁴ in the population accounting for the 25 per cent of Mongolia's poor. Unlike the residents of many in-migration settlements in urban areas of developing countries, ger-area residents have land entitlement and recognized property rights.

3. The ger areas have developed with very little planning or regulation. They have unpaved roads, unsanitary conditions, and other infrastructural elements are also lacking, for example, access to basic urban services is very poor and districts are highly exposed to the consequences of climate change.

4. To better understand the funding proposal's potential impact, technology transfer process and transformational changes on one of the fast-growing sources of greenhouse gases

¹ These are unplanned, low-density areas in the city which are poorly connected to urban infrastructure (drinking water, waste management, wastewater treatment and heating) and vulnerable to climate change. Dwellings are mostly in the form of traditional Mongolian tents (gers) and wooden houses, with poor insulation and inefficient heating through coal and biomass-fired stoves. Ger areas represent about 60 per cent of the population of the capital city, estimated to be about 774,000 people, and 27 per cent of the country's population.

² The Municipal Housing Organization (NOSK) Report. 2016. In 2010, net in-migration to Ulaanbaatar was 40,600 people. Between 2000 and 2016, net in-migration is on average three times higher than natural growth rate (see www.ubstat.mn).

³ In 2010, net in-migration to Ulaanbaatar was 40,600 people. Between 2000 and 2016, net in-migration was on average three times higher than natural growth rate www.ubstat.mn.

⁴ ADB country partnership strategy for Mongolia, 2012–2016.

(cities and services that should be provided in climate resilient cities), the baseline situation should be well defined. The baseline facts are addressed in the project, as well as the current situation and problems in the ger areas of Ulaanbaatar, which are to a significant extent the result of rural–urban migration caused by climate change, such as:

- (a) Due to low affordability ger residents do not have access to newly built housing units and remain highly vulnerable to climate change, living in areas prone to flooding; they also lack access to piped drinking water, sanitation services and waste management services;
- (b) Ger residents remain unconnected to modern heating infrastructure, causing reduced energy efficiency (50 per cent conversion efficiency) and the use of polluting fossil fuels (50 per cent coal and 50 per cent lignite);
- (c) No investment has taken place in additional building insulation where energy consumption is 395 kilowatt hours (kWh) (thermal) per meter squared (m²) per year;
- (d) High pollution loads exist, especially local air pollution, affecting the health of all residents of Ulaanbaatar, especially during winter. The concentration of pollutants in the air is also exacerbated by the topography of the city;
- (e) There has been 0 megawatt (MW) installation of solar photovoltaics (PVs);
- (f) Inefficient street lighting is the norm; and
- (g) With its aging and poorly maintained drainage facilities, and low-quality housing, Ulaanbaatar is highly vulnerable to intense flooding and storms. Floods often occur due to degradation of the land-water retention capacity owing to the urbanization process in hilly, steep-sloped areas as well as deforestation in the watershed area. In addition, there is a lack of early warning systems and emergency management services, and of awareness among the citizens and public servants, increasing climate risk.⁵

5. The Ulaanbaatar green affordable housing and resilient urban renewal project (AHURP) is a sector programmatic project providing the credit line from the accredited entity, Asian Development Bank (ADB), to the Government of Mongolia and Municipality of Ulaanbaatar (MUB) for the development and improved resilience of underdeveloped urban areas through providing necessary services to improve the climate change resilience of urban housing. The sectoral programmatic approach ensures that disbursements are contingent on the agreement and implementation of specific policy recommendations. This provides a clear pathway through which the recommendations and policy suggestions resulting from AHURP can be realized. The project plans the implementation of about 20 subprojects from which two (in Bayankhoshuu West and Selbe East) are already designed and assessed in the project preparatory technical assistance study on financial feasibility and greenhouse gas (GHG) reduction potential for the establishment of standards and criteria for the selection of other subprojects during the implementation period of 40 years.

6. As an outcome of the project's implementation, the following results are anticipated: 100 hectares of ger areas will be transformed into eco-districts with low energy consumption and well-insulated buildings, with solar energy following the principles of low-carbon and climate-resilient sustainable urban planning. It is expected that 10,000 units of such buildings will be constructed in eco-districts of which 15 per cent will be social housing units, 50 per cent are affordable housing units, and 35 per cent are market housing units. In all new buildings (residential, public, commercial, entertainment, etc.) in the areas in which the project is implemented the following will be installed: meters for water and heating supplies; heating

⁵ United Nations Human Settlements Programme. 2010. *Cities and climate change initiative – Ulaanbaatar Factsheet*.

regulation systems; and energy efficiency monitoring systems. Several regulatory measures will be implemented, such as: a new tariff system based on actual consumption and taking into account direct cost recovery of operations and maintenance; a revised performance contract between MUB and service providers; an organizational agreement for building and utilities operation and maintenance within project areas; policies and regulations for decentralized renewable energy and energy efficiency in buildings; efficient supply chains for renewable energy systems; and energy efficient construction technics and material in place. The urban redevelopment process and standards will be in accordance with sustainable development requirements, and high community participation will be particularly emphasized, in the land-swapping process. Local institutions will be strengthened through the establishment of a project management office and the training of its staff, which will include participation by 30 per cent women at MUB and a project implementation unit with participation by 30 per cent women at the Development Bank of Mongolia.

7. Within the core subprojects (Bayankhoshuu West and Selbe East), a net area of 55,630 m² of town houses and low-rise buildings with an average building annual heat load of around 150 kW/m² will be constructed; 7,500 m² of PV solar panels will be installed; 9,100 m² of greenhouses will be built; and secondary and tertiary roads and urban service networks will be expanded as follows: 630 metres (m) of the water supply network, 700 m of the sewer network, 630 m of the heating network, 275 m of electricity lines; 1,980 m of tertiary roads; 7,600 m² of pedestrian and cycling paths; 50,000 m² of public green parks and 5,700 m² of public parking in targeted areas; 15,800 m² of public facilities such as but not limited to kindergartens, community/sport/commercial/ entertainment centres; 16,500 m² of private garages; and 4,000 m² of shops and offices.

8. The highly concessional financing from GCF will ultimately be passed on to the poorer, lower income households in the ger areas of Ulaanbaatar to address their current inability to access affordable green housing and green mortgage financing. In order to maximize affordability for potential residents of the new development, households will have access to a range of housing finance options based on their income level, including compensation coupons (for land owners), mortgage support, and affordable loans (see appendix 8 to the funding proposal). Another concessional loan line through local private banks will be established for the developers and other players in the construction market.

9. The programme will provide 10,000 households (35,000 people, 4.5 per cent of the ger population) with climate-resilient housing solutions, piped water, sanitation flood protection, waste management services and protection against seismic risks. There will be a total of 100,000 direct beneficiaries, including those that benefit from spending significant amounts of time in improved, climate-resilient districts and reduced flooding. Pollution loads from heating for covered residents is expected to be reduced by more than 70 per cent relative to the baseline.

10. The anticipated results listed above, which are well analysed in the funding proposal, imply that the adaptation impact of the project will be very high. The funding proposal also has a mitigation impact on the “business as usual” (BAU) scenario. Mitigation measures planned by the project will reduce GHG emissions by 215,311 tons of carbon dioxide equivalent (tCO₂eq) annually as the result of investments in solar PV (17,261 tCO₂eq per year), insulation of buildings (187,149 tCO₂eq per year), street lightening (1,350 tCO₂e/y) and transport sector (430 tCO₂e/y).

1.2 Paradigm shift potential

Scale: High

11. As mentioned in the impact section, the primary objective of the funding proposal and the reason for the initiation of this programme by the Government of Mongolia is the adaptation needs of ger suburban settlements in Ulaanbaatar, which are populated by migrants from rural Mongolia fleeing severe adverse climate change impacts on their livelihood activities. The adaptation measure appropriate for the existing situation in ger areas is to increase the city's resilience to climate change by providing better services, but it is accompanied by an increase in GHG emissions. Examples of such services are: an increase in energy consumption (related to "available comfort": hot water supply, air conditioners, etc.), an increase in the amount of waste and landfill capacity, the establishment of sewage systems and a wastewater treatment plant, improving street lighting, etc.
12. For this BAU situation, climate-responsive urban planning and the implementation of capacity development, including: the development and enforcement policies and regulation promoting energy efficiency in buildings; the development and enforcement of efficient supply chains for renewable energy systems and energy-efficient construction techniques and materials; and the development of green banking policies and sector capacity to encourage behavioural change, which leads to a high paradigm shift. With the support of GCF, this approach should be broader implemented in developing cities.
13. Behavioural change at the international level is also important and should be one of the focus areas for GCF activities when it intervenes in the adaptation process (financed by private and public money), which has potential to increase GHG emissions and support activities to minimize the negative side effects of adaptation measures. This process is accompanied by technology and knowledge transfer in almost all sectors considered as GHG emission sources.
14. The replicability and scalability of the project approach should be high for the following reasons:
 - (a) The urbanization process in the developing world is growing fast, the resilience of big cities and their underdeveloped districts to climate change is very low, energy consumption and other services are improving without taking into consideration the global warming process;
 - (b) GCF is available for intervention in this process for reduction of GHG emissions;
 - (c) The accredited entity submitting this funding proposal could act as one of the facilitators of the considered approach, having already implemented programmes in developing countries for the implementation of sectoral approaches for the building sector; and
 - (d) Mongolia itself has replicability potential when key barriers (absence of policy, standards, regulations, etc.) are overcome by GCF support.

1.3 Sustainable development potential

Scale: High

15. The funding proposal directly contributes to at least 12 Sustainable Development Goals (SDGs), particularly: SDG 11, affordable and clean cities; SDG 3, good health and well-being; SDG 6, clean water and sanitation; SDG7, affordable and clean energy; SDG 10, reduced inequality; and SDG 13, climate change.
16. As highlighted in previous funding proposals submitted by Mongolia, air pollution in urban areas is the biggest concern for the country, and solving this problem is included as key to achieving sustainable development (SDG 3). Air pollution in Ulaanbaatar has reached a critical level, having annual average concentrations of fine particulate matter (PM) more than seven times higher than the World Health Organization international guidelines (10 µg/m³). In Ulaanbaatar, 10 per cent of mortality is attributable to local air pollution. Sixty per cent of the

population of the city live in ger areas and use individual coal stoves which use coal and lignite for heat production; this causes 80 per cent of air pollution. Other pollution comes into the city from transport, power plants and industry.

17. The move to eco-districts will reduce indoor and outdoor PM production to zero due to the shift to central hot water heating, and electric stoves and hot water heaters supported by renewal sources of electricity (helping to achieve SDGs 7 and 11).

18. A total of 35,000 people (4.5 per cent of the ger population) will obtain high-quality affordable housing with adequate provision of clean water, waste and wastewater management services, and heating. An additional 25,000 people will benefit from an improved urban environment, and from lighting and road conditions that will contribute to their safety (helping to achieve SDGs 6, 7, 10, 11 and 13).

19. The project plans to create around 60,000 person-months of jobs in the construction, building materials and renewable energy equipment suppliers, repair, and service sectors. Improved access to infrastructure will also create jobs through business incubators in the eco-districts' commercial spaces and enterprises (helping to achieve SDGs 1, 2, 9 and 12).

20. In addition, the project contributes to the construction of greenhouses for food production (helping to achieve SDGs 8 and 12).

1.4 Needs of the recipient

Scale: High

21. Mongolia's nationally determined contribution (NDC) clearly states that the country will seek international funding, capacity-building and technology support to complement its domestic resource allocations and efforts to implement the NDC. Mongolia will articulate its specific needs and communicate the potential supporting role of the international community in this main document.

22. Mongolia's NDC highlights the country's needs and plans in adaptation and mitigation, and area where the funding proposal directly contributes. In particular, the country plans an increase in renewable electricity capacity from 7.62 per cent in 2014 to 20 per cent by 2020 and to 30 per cent by 2030 as a share of total electricity generation capacity⁶ (which means the installation of 145 MW of solar PV power facilities), the AHURP will achieve the installation of a total of 11 MW PVs (7.6 per cent of which are planned by the country by 2030 and will be reached by the project by 2027); the country plans a reduction in building heat loss by 20 per cent by 2020 and by 40 per cent by 2030 compared to 2014⁷ (18,184 households), the AHURP will reduce heat losses for 10,000 households (55 per cent of which are planned by the country by 2030 and will be reached through project implementation by 2027); the country also plans to improve Ulaanbaatar's road network to decrease all traffic by 30–40 per cent by 2023.⁸ Improvement of city roads efficiency is also a part of the AHURP project.

23. Under the section on additional actions for the NDC, the development of a bus rapid transit system and improvement of the public transport system in Ulaanbaatar is planned, as well as the development of a waste management plan, including recycling, waste-to-energy, and best management practices.

24. The second national communication of Mongolia to the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, submitted in 2010, provides GHG mitigation policies and measures covering: a 100,000 solar ger programme; implementation

⁶ State Policy on Energy (Parliament Resolution, No 63, 2015); Green Development Policy, 2014.

⁷ See note 6.

⁸ National Action Programme on Climate Change, 2011; Urban public transport investment programme, 2015.

improvements for district heating systems and installation; insulation improvements for existing buildings and implementing new energy efficiency standards for new buildings; and energy efficient transport as well as waste management. The national communication has also prioritized strategies that the country is interested to develop: the strategy of increased urban food supply; the strategy of increased urban water supply; and the strategy of improved water quality. The development of strategies is not the direct purpose of the AHURP proposal, but regulations developed and enforced at the city level will contribute to the process of strategy preparation. From the climate change adaptation perspective, increased urban food supply could be considered as an area where the project significantly contributes through its urban greenhouses programme.

1.5 Country ownership

Scale: High

25. Country ownership should be treated as high because all activities planned by the project at different levels are included and highlighted in the country's strategic documents related to climate change. In addition, the country has the Affordable Housing Strategy (AHS) for Ulaanbaatar and the Ulaanbaatar City Master Plan.

26. Mongolia's NDC has its conceptual roots in the Green Development Policy of Mongolia, approved by parliament in 2014, to which key sectoral action plans at the national level, including the energy sector, are being adjusted. In this document, the country has outlined a series of policies and measures that it commits to implement up to 2030 in the energy, industry, agriculture and waste sectors. The expected mitigation impact of these policies and measures will be a 14 per cent reduction in total national GHG emissions, excluding land use, land-use change and forestry by 2030, compared to the projected emissions under a BAU scenario. Those and other potentially more ambitious commitments are contingent upon gaining access to new technologies and sources of finance through internationally agreed mechanisms and instruments under the auspices of the UNFCCC secretariat.

1.6 Efficiency and effectiveness

Scale: High

27. From the total project cost of USD 544.0 million, the GCF share is 26.7 per cent (including grants), leveraging 3.5 times more investment from public (MUB) and private sectors (commercial banks, developers, beneficiaries and ADB).

28. Financial mechanisms set up within the project seem quite efficient. Grants will be provided for the demonstration of low-carbon equipment and climate-resilient investments and their economic viability under proper incentives, for the formulation of appropriate policy shifts to allow replication on a commercial basis, for the formulation of innovative solutions. Grants in combination with concessional loans will be available for piloting the most promising climate technologies. In particular: USD 50.0 million of GCF grants planned for the mobilization of public and private capital for investing in efficient street lightening, building insulation to reduce heat consumption losses, the installation of solar panels, the establishment of greenhouses for vegetable production and adaptation measures (infrastructure). The capacity-building will also be financed by the GCF grant. The same activities are supported by the GCF concessional loan.

29. Concessional loans will be provided to developers to address financing constraints, while keeping financial costs of eco-district development under control, and to households so as to address financing constraints and to make the shift to a non-polluting mode of life affordable.

30. The financial internal rate of return calculations provided in the funding proposal made within the feasibility studies prepared for pilot proposals show that without the GCF grant and

concessional lending, both subprojects will not be financially viable. On the other hand, with the GCF grant and concessional lending, both subprojects become financially viable.

31. Assessment of the BAU (“no measures”) scenario shows that after development, emissions, due to the increase in resilience, will be 328,567 tCO₂eq annually⁹ (a 0.4 % higher relative to baseline (ger) situation), while that of the “with measures” scenario implemented with the GCF contribution will be 215,311 tCO_{2e} (65.5%) tCO₂eq less annually. For the 40-year lifespan of the project (25 years for PVs), the reduction achieved in absolute terms will be about 8 million tCO₂eq. The cost per tCO₂eq reduced by the project calculated for the GCF grant part only (USD 50 million) totals about USD 6.3 per tCO₂eq. The cost is quite efficient for a country where energy-efficient measures will not have a significant effect without insulation activities, which significantly increases the cost of the measure. Improved comfort, resilient houses, and developed infrastructure and services are additional benefits generated by the project.

II. Overall remarks from the independent Technical Advisory Panel

32. The independent TAP recommends the funding proposal for approval by the Board

⁹ The BAU scenario takes into consideration all potential emission sources existing before and after (new sources) AHURP implementation. This information is attached to the submission package as annex 19.

Independent Technical Advisory Panel's review of FP078

Proposal name:	Acumen Resilient Agriculture Fund (ARAF)
Accredited Entity:	Acumen Fund, Inc.
Project/programme size:	Micro

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: N/A

1. The Acumen Resilient Agriculture Fund (ARAF), a USD 50 million investment fund, aims to support pioneering and early-growth stage innovative small and medium-sized enterprises (SMEs) agribusinesses that enhance the climate resilience of smallholder farmers in East and West Africa: Ghana, Nigeria and Uganda. These two regions are selected because of large populations engaged in primitive agriculture and their vulnerability to the climate change. Large investment potential also exists for private investors as development in the sector can be aligned with climate resilience objectives without the costs of unwinding existing developments and relearning.

2. The GCF is requested to invest USD 23 million together with a USD 2 million from Acumen Fund, Inc., the accredited entity (AE) in ARAF. In addition, a USD 25 million will be mobilized from private sector investors. The AE also targets establishing a USD 6 million technical assistance facility (TAF) with the USD 3 million grant from GCF. The ARAF will be managed by Acumen Capital Partners LLC (ACP), a wholly owned subsidiary of the AE.

3. The USD 25 million investment of GCF and AE forms Catalytic First Loss Capital (CFLC), which is to provide down side risk protection to private sector investors. The CFLC and private sector investors will share up-side return pro rata. However in case ARAF incurs losses, CFLC covers the first loss of up to USD 25 million. This two-tier investment structure is proposed by the AE to attract private sector capital for investing in early state climate adaptive agribusiness, which is perceived as high risk by private sector investors. The ARAF has a tenor of 12 years extendable twice by one year each.

4. The TAF will be used to assist ARAF:

- (a) To provide supports for the SME investees, and their suppliers and customers, primarily smallholders farmers, in applying techniques to respond to climate change;
- (b) To assist the SME investees to develop and manage business and train employees as well as smallholders farmers; and
- (c) To develop an approach and corresponding tools to understand climate adaptability of smallholder farmers (Lean Data Toolkit for Climate Adaptability).

5. The ARAF aims to impact on 2.1 million lives directly plus 7.9 million lives indirectly, over 12 years by supporting approximately 18 (to 20) SMEs that align with climate adaptation objectives in the two targeted regions. The estimation was made based on the assumption that the impacts vary depending on performance of respective ARAF investments. The number of lives can be impacted by successful (1.6 million) or steady investments (0.5 million) is derived from the AE's own portfolio and experience in the sector. Failed investment generates no impact. The actual impacts will be monitored and reported during the ARAF's tenor. The

estimation and assumptions appear reasonable based on the AE's experience therefore can be considered feasible.

1.2 Paradigm shift potential

Scale: N/A

Contribution to the creation of an enabling environment

6. The ARAF will be one of the first climate change adaptation focused funds targeting investments in early growth stage SMEs in East and West Africa to promote smallholder farmers' resilience to climate change. The ARAF investment will promote and focus on a "platform businesses" model through which multiple services can be delivered to farmers. It is because the model can provide more holistic supports to enhance impacts on farmers compared to single product/service businesses. It can be financially more sustainable as well.

7. The platform businesses that ARAF will focus on are "aggregator platforms", "digital platforms", and "innovative financial services". Based on its experience, the AE believes that the three businesses are effective in addressing the structural socio-economic challenges that smallholder farmers face in adapting responses to climate change.

8. The ARAF's investment focus and approach is unique, and distinguishes itself from peer funds operating in Africa, whose domain is principally the provision of short term working capital finance or later stage agribusiness corporates.

Potential for scaling up and replication

9. The ARAF and its investments have potential for scaling up. The ARAF will support financially sustainable SMEs that continue to operate and grow through internal profits and follow-on investment capital after ARAF investments are divested. The AE also plans to mobilize funding for a second fund to invest in more companies if the ARAF is implemented successfully.

10. The success of ARAF will be demonstrational and further help mobilize private sector capital to climate resilient agribusiness, particularly in Africa, which have been perceived to be of high risk by private sector investors.

Potential for knowledge and learning

11. The AE operates various communication networks and platforms, through which lessons learned of ARAF can be efficiently disseminated.

12. The Lean Data Toolkit for Climate Adaptability to be developed with TAF will be made available for external parties to use for the assessment of climate adaptability of smallholder farmers including challenges that they face.

Contribution to regulatory framework and policies

13. The ARAF operation will reinforce the government regulatory framework and policies toward climate resilient agribusiness. Nevertheless, being a for-profit private sector investment fund, the ARAF's contribution to regulatory framework and policies will be indirect.

1.3 Sustainable development potential

Scale: N/A

Economic co-benefits

14. During its fund life, ARAF expects to invest in approximately 18 to 20 SMEs, which are carrying out platform agribusiness that align with climate adaptation objectives in the two regions. The ARAF investments will promote new skills and technology and as a result contribute to more stable and resilient income generation of smallholder farmers.

Environmental co-benefits:

15. The ARAF will support efficient and sustainable agricultural practices. It will not invest in business that support the use of hazardous agrochemicals, or activities that lead to deforestation or negatively impact on the environment.

Social co-benefits:

16. Among the smallholder farmers to be benefited by ARAF investments, 25 to 50 per cent of them are estimated to be living below the World Bank median poverty line of USD 3.1 per person per day. The ARAF will help the farmers to increase earnings by developing knowledge and expertise in farming and improve access to market and information.

Gender-sensitive development impact.

17. The ARAF investments are expected to deliver positive impacts to smallholder farmers and families, of which 50 per cent are women. The TA includes a target to have 25 per cent more women benefiting from financial and mobile communication services, and 20 per cent more women participating in agricultural extension programs than the assessed national/regional average.

1.4 Needs of the recipient

Scale: N/A

Vulnerability of the countries and groups

18. The ARAF will support pioneering and early-growth stage innovative SME agribusinesses that enhance the climate resilience of smallholder farmers in East and West Africa. The two regions are chosen for their large populations engaged in primitive agriculture and vulnerability to the impact of climate change.

19. Climate fluctuations ranging from drought to severe flooding are frequently observed causing serious economic and social impacts on the regions. As smallholder farmers in Sub-Saharan Africa manage 80 per cent of farmland, a package of comprehensive supports to improve their resilience to climate change is therefore needed. The support package is expected to enable the farmers:

- (a) To improve productivity;
- (b) To avail to affordable credit to reduce costs;
- (c) To tap extension and training to improve yield, reduce waste use, and improve climate resilience; and
- (d) To access off-take markets to enhance profitability. In order to respond to such comprehensive needs, ARAF will promote platform businesses to deliver holistic solutions to smallholder farmers.

Absence of alternative source of financing

20. The ARAF will invest in early-growth stage SME agribusinesses targeting to support smallholder farmers. The perceived risks associated with the early stage nature of the SMEs, innovative business model, and targeted regions understandably stall participation of private sector investors in the region in general and ARAF in particular. The GCF participation in ARAF two-tier capital structure can be well justified as risk mitigation or comfort critical for the private sector investors to commit capital to ARAF.

1.5 Country ownership

Scale: Medium/High

Overall contribution to climate resilient development pathways consistent with a country's climate change adaptation strategies and plans

21. The countries that ARAF aims to operate have national adaptation strategies and plans, which confirm the agriculture sector is critical to promote countries resilience to climate change.

22. The ARAF investment and country strategies are prepared based on the AE operational experience in the sector and the region taking into account the government strategies and plans.

Capacity of accredited entities and executing entities to deliver

23. The AE has invested over USD 33 million in 23 agriculture companies in Latin America, Africa and South Asia that have collectively impacted approximately 13.9 million lives to date. In Africa specifically, the AE's investment has exceeded USD 20 million in 10 companies impacting the lives of approximately 10 million smallholder farmers. The AE operates offices in Ghana and Kenya that function as regional hubs in West and East Africa.

24. The AE is presently implementing Kawisafi Ventures, a fund promoting sustainable energy access in East Africa, to which the GCF committed to invest USD 20 million in 2016 (FP05).

25. In order to ensure climate resilience to be centered, the AE has developed Agriculture Resilience Investment Screen (ARIS), a specialized climate resilience screening tool, in partnership with Winrock International. The ARIS integrates assessments of the climate resilient aspects of potential investment opportunities prepared by an investment team during due diligence, and in coordination with Climate Adaptation Expert. All investment opportunities will be scored with ARIS for ARAF investment decision.

26. The ARAF will be equipped with an independent Panel of Climate Experts (PCE) that will review ARIS results of each transaction. The PCE will be formed by two to three climate experts in individual capacity or from an organization with relevant background and expertise. After independently validating the transaction, the PCE could endorse or propose an alternative option to the Investment Committee for consideration.

27. The AE has sufficient capacity to promote and implement ARAF.

Engagement with NDAs, civil society organizations and other relevant stakeholders

28. The AE has undertaken dialogues with relevant government offices including designated national authorities (NDAs), farmers associations, and NGOs in the seven countries to promote their understanding and supports for ARAF strategies and investments. Regular dialogues with various stakeholders will continue during ARAF implementation.

29. No-Objection Letters from Ghana, Nigeria and Uganda are attached to the funding proposal.

1.6 Efficiency and effectiveness

Scale: N/A

30. In addition to GCF and AE investment of USD 25 million in total, the ARAF intends to mobilize another USD 25 million investment from private sector investors. Although the prospective investors share the value it pursues and aims to deliver, ARAF, being one of the first climate change adaptation focused funds targeting SMEs in East and West Africa, is perceived to be of high investment risk by private sector investors. Therefore a USD 25 million CFLC to be contributed by GCF and AE can be justified to attract another USD 25 million investment from private sector investors.

31. The targeted fund size of USD 50 million appears on high side. Given the number of possible investments aiming to be around 18-20 (USD 1.8-2.0 million per transaction in average), the proposed fund size can be considered aggressive.

32. The GCF investment of USD 23 million will catalyze USD 27 million from the AE and private sector investors at a ratio of 1.17. It can be reasonably expected that ARAF investment will mobilize further capital from other sources to agribusiness SMEs that ARAF invested, therefore the ratio might become higher in the long run.

33. The ARAF being a for-profit climate change adaptation focused fund, will pursue both financial and social achievements through its investments. The ACP fee revenue will be tagged to ARAF performance in both achievements. In case the ARAF performance falls short in relation to the financial hurdle rate or impact hurdle rate, the fee payment to ACP will be reduced in accordance with the preagreed formula. This arrangement can further enhance the commitment of AE and ACP to ARAF and its climate adaptation focus.

II. Overall remarks from the independent Technical Advisory Panel

34. The TAP recommends the Board support the proposed project as presented.

35. The ARAF is one the first climate change adaptation focused fund targeting investments in early growth stage SMEs to enhance smallholder farmers' resilience to climate change in East and West Africa. During its tenor, the ARAF expects to impact on 10 million lives by investing in 18-20 SMEs carrying out "platform businesses".

36. The ARAF country and operational strategies are prepared based on the respective countries' policy and AE's experience in the region. The AE has established operation in the region including Kawisafi Ventures invested by the GCF (FP05). A dedicated climate resilience screening tool and approval process has been developed for ARAF to ensure climate resilience aspects of prospective investment proposals are properly assessed and reported to investment committee.

37. During assessment, the TAP was advised by the Secretariat that the GCF, as a member of Advisory Committee of ARAF/ACP, would participate in the selection of PCE members. Furthermore, agribusiness promoting genetically modified organisms will not be supported by ARAF.

Independent Technical Advisory Panel's review of FP079

Proposal name:	Biomass Energy Programme in the South Pacific
Accredited Entity:	Korea Development Bank
Project/programme size:	Medium

1. This funding proposal has been withdrawn by the accredited entity, on the ground that further due diligence is required, with a possibility of resubmission for consideration of the Board at a subsequent Board meeting.

Independent Technical Advisory Panel's review of FP080

Proposal name:	Zambia Renewable Energy Financing Framework
Accredited Entity:	African Development Bank
Project/programme size:	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential *Scale: High*

1. Zambia's power generation system has been mainly hydro powered. However, because of climate change induced changes, the country has experienced shortages in water in its main basins, impacting energy generation. Since 2015 the country suffered severe water decline in its reservoirs resulting in increased water outages, impacting the economy of the country. The country responded to the electric crisis by procuring power from South Africa and Mozambique and in 2016 the country accelerated the decision to include 300MW of the Maamba coal plant to the matrix.

2. Shifting from hydro-power, a low emission but unreliable source of electric generation, to another low emission source such as solar energy is relevant for Zambia, because water shortages will increase with climate change and therefore the whole power sector could be at risk. It is also relevant on the electric mix matrix, because it could avoid an increased reliance on fossil fuel-based power generation resources which may contribute significantly to emissions.

3. The project will enable the financing of 100MW solar PV projects that will feed renewable energy to the Zambian grid, increasing the share of renewables in the energy mix. The program targets small-scale energy projects, that will contribute to the electricity generation gap in the country and replace hydro or carbon intensive fossil-fuel projects with reliable renewable energy sources.

4. The program will result in the reduction of carbon emission of 159,677.28 tCO₂ eq/year in Zambia, adding up to 3,991,932 tCO₂ equivalent over its 25 years' lifetime. The estimate is based on 100MW for 24 hours for 365 days multiplied by a capacity factor of 0,186 (benchmark of South Africa solar 20 MW solar park developer), accounting for a renewable generation of the project of 162,936 MWh/year. This number is multiplied by a grid emission factor of 0.98tCO₂/MWh.

5. The expected number of beneficiaries is calculated based on the per capita electricity consumption in Zambia, estimated at 547 kWh per capita in 2016. Therefore, 162,936 MWh/year multiplied by an emission factor of 0.98tCO₂/MWh will result in an emission reduction per year of 159,677.28 tCO₂. Divided by the per capita consumption this results in 297,872 potential beneficiaries.

6. The project will need to build the country's capacity to manage solar projects. The country has sound technical capacities to manage hydroelectricity, which is a good start to build the necessary ecosystem for solar capacity.

7. To project will also devote some resources to supporting the regulatory framework to develop off-grid and mini-grid solutions for rural electrification. The long-term vision of the country is providing solutions to rural communities by introducing solar off-grid technologies. The climate change impact of rural electrification could be potentially big, as only 4 per cent of

the rural population has access to electricity options and therefore most of the population has been relying on other sources to light their houses including using biomass resources. However, at this stage the impacts of the rural electrification program are not yet quantified.

1.2 Paradigm shift potential

Scale: High

8. The project proposes an innovative financing mechanism to support the Renewable Energy intake for Zambia up to 100MW of solar projects. The appetite of local commercial and institutional investors will be tested through a reverse auction-based modality. The winners of the bids will enter into offtake agreements with the national utility ZESCO. The GCF investment will bridge the financial gap in terms of volume and tenor and enable long term and competitively priced financing through a standby loan for tenor extension. The project will enable the commercial banks in Zambia to experience RE project financing and get their hands on capacity and an accumulated performance track record to upscale RE in the country. The flexible financial structure will also allow national pension funds to undertake long-term investments in the RE sector, gaining experience and confidence.

9. The proposed structure will be built under the recently launched Renewable Energy Feed in Tariff (REFIT) policy that seeks to promote small scale renewables (up to a maximum of 20MW per project) as they are increasingly becoming cost-competitive. The Government of Zambia (GoZ) has a target of developing 200MW of RE in two phases including the proposed first phase solar development and a second 100 MW phase that could include other modalities including small hydro.

10. Zambia is also undertaking a program to accelerate rural electrification which currently stands at four per cent with the co-benefits to reduce the use of charcoal and firewood, reducing also the levels of emissions. In this context, the current project proposes to invest USD 4 million in providing a technical assistance component that aims to strengthen the country's regulatory frameworks and policies to enable private sector participation in the deployment of off- and mini-grids in Zambia. The technical assistance portion will also build the capacity of local banks and the national pension fund in assessing and monitoring renewable energy projects.

Potential for knowledge and learning

11. The project will provide an example for other countries in the ability to design and implement RE programs including knowledge of the necessary regulatory and financial framework needed for its implementation. The project will also ensure that financial institutions, commercial banks and even pension funds learn more about RE projects and be willing to fund future projects. The structure will also give confidence to the international investors that will potentially invest in the current and future RE projects.

12. The project will build on the REFIT model, adding to the lessons learned from the Uganda experience. The AfDB will play a crucial role in developing a knowledge sharing platform for other countries that are willing to develop RE IPP projects, sharing lessons learned and involving relevant stakeholders in the energy, financial and climate sector to join forces to upscale the model to fulfil the ambitious target of the New Deal on Energy for Africa.

13. The technical assistance component will provide the resources to create the regulatory and enabling environment to include solar options in the rural electrification program.

Contribution to the creation of an enabling environment

14. Zambia's energy sector is well developed and has created the relevant policies to ensure energy access and efficiency. However, there is a need to create the enabling environment to

ensure new investments in RE, including building trustful operational schemes for investors to be able to operate the solar facilities in the country.

15. The recently approved REFIT policy will enable rolling-out of the feed-in tariff schemes at scale using a competitive auction mechanism. The financial structure will allow commercial banks to fund solar investments backed by the tenor extension standby loan, creating the capacity of all the relevant stakeholders to learn and replicate the scheme in future.

16. The technical assistance portion will allow commercial banks to learn and have the capacity to manage RE financial mechanisms, including the capacity for credit policy and risk management, credit assessment, project management and execution.

17. Building an enabling environment also requires building the national capacity to manage and operate solar facilities, including developing training schemes for RE technicians and investors, promoting value chains that involve the creation of SMEs to provide services for solar facilities, and awareness and educational programs to facilitate the penetration of solar energy. This could be a great opportunity for job creation and a new source of income for SMEs.

Contribution to the regulatory framework and policies

18. The National Energy Policy (2008) seeks to expand generation and transmission capacity in the grid, promote private sector participation, and increase access to electricity. The Seventh National Development Plan (SNDP) (2017-2021) directly promotes the development and use of renewable and alternative energy sources, including solar, as a way of diversifying the energy mix and improving supply.

19. The project will contribute to building the regulatory framework for projects below 20MW and for the rural electrification program that requires different studies to build the necessary capacity, incentives and policies to allow private sector participation in off-grid and mini-grid based projects.

1.3 Sustainable development potential

Scale: High

Environmental co-benefits

20. The project will contribute to balancing the energy mix in the country, putting less pressure to hydro electrics, and therefore to the reservoirs and the river basins in general.

21. The project will also favor the penetration of mini-grid solar systems that will reduce the dependency on forest wood for lightning.

Social co-benefits

22. Social co-benefits include the creation of technical jobs as one of the potential rapid growing opportunities for people within Zambia, and other countries in the region. The demand for skilled solar technicians will increase with market penetration.

23. With the rural electrification program, there will be enormous benefits to the communities of having renewable, low cost sources of energy for their daily lives and to improve the options to generate productive livelihoods.

24. Cleaner sources of energy will increase the health benefits for the population, especially for the rural communities that currently dependent of wood fuel to cook and light their houses.

25. The proposal will increase the knowledge of the general population on solar energy alternatives, making it possible to transition to a low carbon economy.

Economic co-benefits

26. The economic co-benefits are directly related to the costs of electricity in Zambia and the need to ensure reliable sources of energy that will directly impact the sustainable growth of the country.

27. With this project the country will also allow job creation and development of SMEs able to provide solar energy services with potential to provide export services.

Gender-sensitive development impact

28. The project will equally benefit men and woman. The technical assistance component will support women's livelihoods as they are mostly in charge of searching for the biofuels for cooking and lightning.

1.4 Needs of the recipient

Scale: High

Economic and social development level of the country and vulnerability

29. Zambia is one of the fastest growing economies in Africa, that has made significant socio-economic progress achieving average annual growth rates above 7 per cent between 2004-2014. The country has a population of over 17 million, mostly located in urban areas. Cities like Lusaka are growing at a faster pace than other cities in Africa, demanding electricity for the growing population. Approximately 500.000 urban households and 1.8 million rural households currently do not have access to electricity. The GoZ maintains an official target of achieving 51 per cent rural electricity access by 2030.

30. The installed generation capacity is about 2,827 MW and the main source of electricity generation is hydropower, which represents nearly 90 percent of electricity production. However, there is a need to rely on other sources of energy due to the decrease in water levels in the main river basins. The government needs to improve the electricity access with on-grid options and off grid and mini grid options and at the same time ensure firm sources of clean energy.

31. Zambia is facing an economic challenge with an elevated level of public debt including a balance of payment gap, impacting the health of the public utility ZESCO. Under this context and the limited sources of financing in Zambia it could be difficult to crowd-in commercial financing for RE projects.

The need for strengthening institutions and implementation capacity

32. The Ministry of Energy oversees providing energy policy guidance in Zambia. The independent Energy Regulation Board (ERB) is responsible for licensing, tariff setting, and quality of supply and service standards for all segments of the energy sector (including fuel and electricity). The Rural Electrification Authority (REA) is responsible for electrification in rural areas and manages the Rural Electrification Fund (REF).

33. Zesco owns and operates over 90 percent of the electricity supply industry in Zambia. On the demand side, the mining industry accounts for over 50 percent of total electricity consumption, and urban areas are also demanding increasing levels of electricity. Therefore, the country's economy depends on the supply of reliable electric alternatives.

34. There is a need to strengthen the institutional capacity to ensure a reliable and efficient mix of electricity generation alternatives. The sector faces diverse challenges, including the need to ensure reliable energy, make a cost-efficient energy-mix to reduce the fiscal burden, and supply energy to urban and rural consumers in an efficient and reliable manner. There is also a

need to prepare the country for the penetration of solar energy alternatives, ensuring that there is human capacity in place to provide services that will end up opening opportunities for green jobs and the creation of SMEs specialized in RE. From the demand side there is a need to educate and make awareness actions of the value and effectiveness of solar energy.

1.5 Country ownership

Scale: High

Alignment with priorities in the country's national climate strategy

35. Zambia's NDC includes both mitigation and adaptation components. On the mitigation component, Zambia intends to reduce by 47 per cent its emissions against the business-as-usual by 2030. This emission reduction is conditional and subject to the availability of international support in form of finance, technology and capacity building. The total budget for implementing both components is estimated at USD 50 billion by the year 2030, out of this USD 35 billion is expected to come from external sources while USD 15 billion will be mobilized from domestic sources (UNFCCC).

36. The GoZ has developed the National Policy on Climate Change to provide a framework for a coordinated response to climate change. It gives guidance on how the Zambian economy can grow in a sustainable manner and foster a smooth implementation of the Revised Sixth National Development Plan and its successor plans including the achievement of the Vision 2030.

37. Zambia current electric mix is mostly hydro, and therefore this sector has very low emissions. However, introducing solar alternatives will avoid the possible transition to coal energy generation and could also support the reduction in using fuelwood for house lighting, especially in the rural communities, reducing emissions from deforestation.

Capacity of accredited or executing entities to deliver

38. The African Development Bank (AfDB) was established in 1964 as the premier pan-African development institution, promoting economic growth and social progress across the continent. The Bank's development agenda is delivering the financial and technical support for transformative projects that will significantly reduce poverty through inclusive and sustainable economic growth in 5 priority areas, namely: energy, agro-business, industrialization, integration and improving the quality of life for the people of Africa.

39. The AfDB launched the "New Deal on Energy for Africa" strategy which is built on five inter-related and mutually reinforcing principles:

- (a) Raising aspirations to solve Africa's energy challenges;
- (b) Establishing a transformative partnership on energy for Africa;
- (c) Mobilizing domestic and international capital for innovative financing in Africa's energy sector;
- (d) Supporting African governments in strengthening energy policy, regulation and sector governance; and
- (e) Increasing African Development Bank's investments in energy and climate financing¹.

40. The AfDB has committed to allocating about 40 per cent of its project approvals across all sectors as climate finance by 2020. Over the last 7 years (2011-2017), the AfDB has invested around 1.25 billion from its own resources in support of renewable energy (in addition to ~UA

¹ AfDB, New Deal on Energy for Africa strategy.

390 M in co-financing channeled by the Bank). Bank's investment in RE (excluding early stage project preparation support) will contribute towards ~3.4 GW in additional RE generation capacity (of which ~1.4 GW from hydro, ~900 MW from wind, ~900 MW from solar, ~100 MW from geothermal and ~70 MW from biomass). Examples in solar investments include the Ouarzazate Solar Complex in Morocco, one of the largest solar complex in the World that expects to produce 500 MW, the 33 MW Segou Solar IPP in Mali, the 100 MW Xina concentrated solar IPP in South Africa and three Solar PV IPPs in Egypt with a total installed capacity of 50 MW.

Engagement with civil society organizations and other relevant stakeholders

41. The proposal has been developed with extensive consultation with the government (Ministry of National Development Planning – National Designated Authority (NDA), Ministry of Energy and Ministry of Finance, ZESCO, Rural Electrification Authority), project developers, investors, commercial banks and other relevant partners in the country over the past months.

42. Three project preparation missions were undertaken in May, June, and November 2017 which included discussions with a wide range of experts and stakeholders. The engagement has been continued by the AfDB field office in Lusaka with support from the team in Headquarters.

43. The KfW led more consultations to design the Global Energy Transfer Feed-in Tariff (GETFiT) program including consultations with relevant stakeholders for the IPP project development. The AfDB expects to undertake further consultations in order to finalize implementation arrangements.

44. The project aims to have full participation of the Zambian local institutions, ensuring that they play a key role in the RE IPP development, including knowledge sharing and capacity building at all levels. The project will make sure that local commercial banks step up to be the leading players in the RE market. Technical assistance will be oriented toward the development of local capacity for RE and climate project financing.

45. The ITAP is also suggesting that the country starts preparing the enabling environment for solar energy intake, by assessing opportunities for training of technicians, promoting the development of specialized SMEs in RE and starting to create the knowledge and raise awareness on the advantages of solar energy for market penetration, especially in rural electrification. This will enable Zambia to promote green jobs and support the creation of SMEs, enhancing solar intake and with the potential to export services to other countries.

1.6 Efficiency and effectiveness

Scale: Medium

Cost-effectiveness and efficiency

46. The total project financing is USD 150 million from which GCF is asked to contribute with USD 50 million. The AfDB will contribute up to 33 per cent of the total project cost in the form of senior debt and standby loans (up to USD 50 million). The GCF will also contribute up to 33 per cent of the total project cost by senior debt and standby loans (variable depending on the structure of individual sub-projects selected). A tenor extension standby loan by the AfDB and GCF offered for the commercial banks debt tranche, or provision of liquidity to project companies at reasonable prices, will have a strong catalyzing impact for the entire pipeline projects under the GETFiT program.

47. The program has been effectively designed to enable the development of a scaled-up and viable RE market in Zambia by demonstrating the commercial viability of the RE projects. The scheme will encourage commercial lending to the sector and showcases the opportunities of

solar investment attracting developers and investors. The availability of effective solar technologies at increasingly competitive prices should also ensure financial viability of the investments made under this program.

48. However, the effectiveness and efficiency of the proposed financial structure will be assessed when the five expected underlying projects are developed and provide the expected MW to the Grid.

49. For the RE infrastructure to be effective, the country will need to be very proactive in developing the policies for renewable energy in the country, and show effective alignment to allow effective on-grid energy mix.

50. The tenor extension standby loan is effective to extend the tenor of commercial banks, but it does not help to increase the amount of commercial financing. There is a potential risk that the GCF will end up providing a long-term loan instead and that commercial refinancing could end up being zero (no crowd-in). However, AfDB has taken some provisions by developing a market sounding, identifying some commercial banks that have expressed strong interest in participating in the framework, considering this as an opportunity to establish their portfolio in the renewable energy (RE) sector and gain project finance experience. AfDB have confirmed the liquidity of some banks and is also providing USD liquidity to local banks, ZESCO and the Development Bank of Zambia through a line of credit. Local subsidiaries of international banks also do not have an issue of liquidity, but they are constrained to provide a long-term loan. This gap can be addressed by the tenor extension standby loan under this framework.

51. The effectiveness will also depend on the ability of ZESCO to honor the tariff structure. For the solar projects, a bidding process will ensure that the most competitive projects with the lowest tariffs are selected. This will effectively enhance financial viability of the projects supported by this framework. In parallel to this framework, AfDB is assisting the GoZ's ongoing efforts to improve efficiency, transparency and competition in the power sector. A Cost of Service Study, currently undergoing with financial support from AfDB, will set the basis for the introduction of cost-reflective tariffs by the utility (ZESCO). In addition, USD 250 million sector budget support from AfDB is under preparation. Aiming to support the overall utility reform, the budget support program is expected to be approved by the AfDB Board in 2018. Therefore, the success of the proposed project depends on aligning in a timely and effective manner the implementation of policies, the financial structure and the utility reform including tariff schemes.

52. The solar program will be able to produce 162,936 MWh/year of renewable electricity and is estimated to contribute to approximately 159,677.28 tCO₂eq of annual avoided emissions, which results in around 3,991,932 tCO₂eq of total emission reduction over the 25 years' expected lifetime of the projects. The expected cost-efficiency per ton of Co₂ eq of this program is high, as the analysis on the emission reduction potentials of the financing of the project shows that 1 tonne of tCO₂eq is USD 37.58/ tCO₂eq. The estimated GCF cost will be USD 12.53 per tCO₂eq removed, showing efficiency in the investment.

53. The technical assistance portion up to USD 4 million grant to be jointly financed by AfDB (USD 1.5 million) and GCF (USD 2.5 million) will include two components: the first component aims to accelerate the development of rural electrification while the second component is to enhance local banks RE and project financing capabilities. It is essential not only to enhance the capacity of the local banks, but also to promote the installed capacity of technicians and enterprises willing to service the solar energy market and to build awareness and knowledge on solar energy by the potential users of the rural electrification program. Therefore, expanding the scope of the technical assistance component to start creating the solar ecosystem in the country could benefit and accelerate its effective implementation. This could be delivered in

coordination with other partners that are currently supporting the promotion of solar energy in rural electrification.

II. Overall remarks from the independent Technical Advisory Panel

54. The independent TAP recommends the approval of the project subject to the following condition:

55. Develop and submit to the Government of Zambia (with a copy to the secretariat), within the first two years after signing the financial agreement, a Plan to enhance the Zambian enabling environment for solar energy penetration, including promoting training facilities for technicians and promoters, value chain schemes that promote SMEs capable of selling, maintaining and repairing systems, market and awareness schemes to promote the use of solar systems by communities, and knowledge sharing schemes within the financial community to increase the knowledge of investment analysts on solar energy. The Plan will be developed through a consultative process with the Government of Zambia taking the lead and the AfDB supporting through its policy dialogue, in order to ensure full buy-in for its adoption and implementation.

Independent Technical Advisory Panel's review of FP081

Proposal name:	Line of credit for solar rooftop segment for commercial, industrial and residential
Accredited Entity:	FP081
Project/programme size:	Medium

I. Assessment of the independent Technical Advisory Panel

1.1 Impact potential

Scale: Medium/High

1. The proposed programme is one of the first private sector-driven rooftop solar initiatives in India. The programme will finance 250 MW solar rooftop installations in total for residential, commercial and industrial users over 2018-2023 to create a sustainable bankable model in the sector. It will support the Government's effort to achieve its rooftop solar power generation target in its national determined contributions (NDC).
2. India is the world's fourth largest carbon emitter, responsible for 6 per cent of global GHG emissions. As a major economy and the second most populous nation in the world, India's GHG emissions from fossil fuel combustion rank high. With an aim to accelerate the country's development with sustainable energy resources, the government has been promoting clean energy generation. During the last two and half years 14.30GW of renewable energy capacity has been installed including 5.8 GW from solar power, 7.04GW from wind power, 0.53GW from small hydro power, and 0.93 GW from biomass power.
3. Being a tropical country, India is solar rich having 250-300 clear sunny days in a year. The country has higher solar irradiance compared to many other countries. Accordingly, the government aims to develop 100GW of solar power generation under the National Action Plan on Climate Change (NAPCC), an ambitious target to develop 175 GW of renewable energy capacity by 2022. Out of this target, 40GW is expected to be through deployment of decentralized rooftop solar projects. The cost to achieve that target is estimated to be around USD 34 billion.
4. The rooftop solar generation capacity potential is estimated to be 124GW in India. However the uptake of the rooftop solar power generation has been limited so far with only 1.4GW installed as of March 2017. Industrial experts estimate that whilst government support will accelerate rooftop solar installation to grow at about 70 per cent during the next five years, the total capacity implemented may remain around 12-13 GW - far below the government target of 40 GW.
5. The programme consists of USD 200 million senior loans, and USD 50 million in equity. Of the total funding, a USD 100 million senior loan is proposed from GCF to be on lent by National Bank for Agriculture and Rural Development (NABARD), the accredited entity (AE) to Tata Cleantech Capital Limited (TCCL), the executing entity. TCCL will blend GCF funds with its own fund of USD 100 million and, in turn, will finance solar rooftop installation projects in commercial, industrial and residential housing sectors. The remaining portion of USD 50 million will be raised from private sector developers in a form of equity contribution at a project level. The GCF and TCCL together will finance around 80 per cent of the project.

6. The tenor of TCCL loans to rooftop solar projects will be 12-15 years. The duration of this programme is 20 years and the tenor of GCF senior loans will match that of TCCL loans.
7. The AE estimates the amount of carbon dioxide equivalent to be reduced or avoided by the programme to be 260,610 tCO₂eq per annum and 5,212,200 tCO₂eq during the programme's life of 20 years.
8. The assumptions include gradual implementation of the programme over five years, and a grid emission factor of 0.8 tCO₂eq conservatively adapted based on those prepared and published by Central Electricity Authority of India as per CDM methodology. The estimation and assumptions are feasible and acceptable.
9. TAP rates the programme impact potential as "Medium/High".

1.2 Paradigm shift potential

Scale: Medium/High

Potential for scaling up and replication

10. The programme will encourage and advance public and private sector participation in rooftop solar power generation in India. By providing technical, legal and financial supports, the programme will enhance technical knowledge and financial expertise of local private sector developers and investors in rooftop solar power generations. Successful implementation of the programme will provide validation to the viability and bankability of the sector in general. As the programme is a private sector driven initiative, the framework established by the programme has potential for scaling up and replication.
11. The AE estimates that the programme's success can lead to another 125MW of rooftop solar power generation capacity to be installed (a replication multiple of 1.5). Although such indirect multiple effect can not be reasonably quantified as the AE states, the programme's demonstrational impact has the potential to generate positive effects in the private sector driven market.

Contribution to the creation of an enabling environment

12. The programme will accelerate the installation of rooftop solar power generation capacity in India. It will create a new business model, and confirm rooftop solar power generation as a viable and sustainable option for the country to meet its future power demands.
13. Successful implementation of the programme will demonstrate that rooftop solar projects are technically feasible and commercially bankable credits for commercial financiers, who have been hesitant to offer competitively priced long term financing to the sector. The programme will contribute to the creation of a new market and enabling environment for rooftop solar power generation in India.

Contribution to regulatory framework and policies

14. Through the implementation, the programme will present the government opportunities to monitor and validate the suitability and impacts of its regulatory framework for renewable power generation in general and rooftop power generation in particular. While it is fully in alignment with the government's strategies and policies, the project contribution to regulatory and policy framework will be indirect.
15. The TAP concludes the paradigm shift potential of the programme is "Medium/High".

1.3 Sustainable development potential

Scale: Medium/High

Economic co-benefits

16. While India has the fourth largest power generation capacity and ranks third in terms of power production in the world, its per capita electricity consumption is less than one-fourth of the world average. The programme will help the government to develop additional 250MW of renewable power generation capacity critical to the nation's economic development.

17. Private sector business will be supported in the area crucial for India's sustainable development.

Environmental co-benefits

18. The programme is expected to alleviate deterioration of air quality by installing 250 MW of new and renewable power generation capacity. To overcome power deficits, there has been increased use of diesel-based power generation, some of which were placed in urban areas, creating direct exposure to air and noise pollution. As rooftop solar projects are installed under this programme, the need for diesel-based power generation will be reduced, resulting in associated local environmental co-benefits.

Social co-benefits

19. The AE estimates that the programme will help create between 5,000 and 7,500 direct and indirect jobs, in manufacturing, construction and installation, and operation and maintenance. The estimation can not be reasonably quantified. Nevertheless, it could be achievable given the life of the programme being 20 years.

20. The TAP rates the programme sustainable development potential as "Medium/High"

1.4 Needs of the recipient

Scale: High

Absence of alternative source of financing

21. The proposed programme is aimed at helping rooftop solar power projects secure long-term debt financing. Debt finance of a tenor longer than the pay back period of rooftop solar power investments (7-10 years) is needed to make the investments feasible and bankable.

22. Commercial bank loans for renewable power projects in India currently have a tenor of 5-7 years and their amount remains limited. The programme will supply long term debt financing (of tenors of 12-15 years) which is presently unavailable in the market, but critically needed to promote rooftop solar power generation in India. Limited availability of such long-term debt financing is likely to slow down the implementation of 100 GW solar capacity that the government plans to install by 2022 to deliver its commitment under NDCs.

23. The TAP views the needs of the recipient of the programme as "High".

1.5 Country ownership

Scale: Medium/High

Existence of a national climate strategy and coherence with existing plans and policies

24. India ratified the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC) in 2016, and has submitted its Nationally Determined Contributions (NDCs) to the UNFCCC for the period 2021-2030. The government intends to reduce GHG emissions intensity of its Gross Domestic Product (GDP) by 33 to 35 per cent by 2030 from the 2005 level. It targets to increase the share of renewable power generation to 40 per cent of the

installed capacity by 2030 with the help of transfer of technology and low-cost international finance.

25. In 2008, the Government announced the NAPCC comprising eight missions targeting 175GW of renewable energy capacity to be installed by 2022. The National Solar Mission, one of the eight missions under the NAPCC, promotes the development and use of solar energy for power generation and other uses, with the ultimate objective of making solar energy compete with fossil-based energy options. It plans to reduce the cost of solar power generation through long-term policy, large-scale deployment goals, aggressive R&D and the domestic production of critical raw materials and components. Under the National Solar Mission, 100 GW of solar power generation is to be installed. Out of this 100GW, 40 GW is planned from the solar rooftop segment.

26. Various government supports have been initiated to promote rooftop solar power generation in the public and private sector. They include inter alia the Model Building Bye-Laws (2016) that mandates rooftop solar power installations for buildings exceeding a certain size and power consumption, and the Solar Rooftop Subsidy Scheme, a financial incentive to promote investment in rooftop solar installations.

27. The programme is well aligned with national priorities and India's NDCs.

Capacity of accredited entities and executing entities to deliver

28. The TCCL is a joint venture between Tata Capital and International Finance Corporation. TCCL is promoting renewable energy (solar, wind, small hydro, biomass etc.), energy efficiency and water treatment sectors. Since its inception, TCCL has provided financial and advisory services to more than 50 clients. TCCL has managed to participate in funding of over 3 GW renewable energy projects and saving approximately 4.5 million tonne CO2 emission annually. TCCL, and Tata Capital are part of Tata Group, India's largest multinational conglomerate with revenues of USD 103 billion as of 2015-16.

29. Global solar power market and investments have been volatile, and the industry has experienced an economic cycle in a short period. Therefore, TCCL's expertise in assessing risk and credit of renewable energy projects and investors can help the successful implementation of the programme. TCCL's credit portfolio and performance appear of good quality. TCCL has developed and established the local representation and network crucial for the programme's implementation.

30. The AE supports the government in meeting national targets set under NDCs. It has been an important partner for the promotion of the government subsidy programme for solar energy. Hence, the AE is in a position to facilitate financing rooftop solar power generation through its existing network in the financial sector, such as Banker's Institute of Rural Development, in India.

31. The capacity and track record of the AE and TCCL can enhance successful implementation of the programme.

Engagement with NDAs, civil society organizations and other relevant stakeholders

32. During programme preparation, the AE and TCCL have conducted consultations with various stakeholders including Ministry of Environment, Forests and Climate Change (NDA), Ministry of New and Renewable Energy, public and private financiers, and project developers.

33. Consultations will be continued and feedback will be incorporated into the programme at intervals to ensure the programme objectives are achieved. TCCL will participate in workshops and conferences to understand the stakeholders' expectations and concerns and disseminate lessons learned to further promote the programme.

34. A no-objection letter of NDA is attached to the proposal.
35. The TAP assesses country ownership of the proposed programme is “Medium/High”.

1.6 Efficiency and effectiveness

Scale: Medium/High

Cost-effectiveness and efficiency

36. The programme aims to mobilize USD 250 million in total to finance 250 MW of rooftop solar power generation capacity. The unit cost of generation capacity of around USD 1 million/MW appears reasonable.
37. Based on the estimated amount of carbon dioxide equivalent to be reduced or avoided by the programme to be 5,212,200 tCO₂eq during the programme’s life, estimated programme cost per tCO₂eq is presented as USD 47.96/tCO₂eq. With respect to GCF financing, it is estimated to be USD 19.19/tCO₂eq. The estimation and results appear reasonable.
38. The GCF is requested to price its USD 100 million loan to the AE (and in turn to TCCL) at below market rate. While detail assessment is not included in the proposal, such concessional rate can be reasonably assumed to be in need to compensate risks and costs assumed by TCCL and private sector investors in developing rooftop solar power projects so that the viability and bankability of those projects can be established.
39. The AE confirmed that the concessionality of the GCF loan would be passed on to sub-projects. The Secretariat will monitor and review, on a yearly basis, the pricing terms of sub-loans provided by TCCL to ensure the spread charged by TCCL is reasonable and the concessionality is passed on to sub-projects as committed by the AE and TCCL.
40. The 20 year duration of the programme is long, but can be justified given that the tenor of sub loans to rooftop solar sub-projects is expected to be 12-15 years.
41. Procurement of goods and services will be carried out by private sector investors (borrowers of TCCL loans) who have strong incentive to control capital costs to sustain and increase investment returns. As a provider of long-term loans, TCCL monitors feasibility and competitiveness of goods and technology procured by its borrowers.

Co-financing, leveraging and mobilized long-term investments

42. The GCF’s USD 100 million loan will be cofinanced with the TCCL’s USD 100 million loan. Additional USD 50 million is expected to be mobilized in a form of equity contribution of private sector investors at project level. Accordingly the cofinancing ratio of GCF assistance is estimated to be 1.0x with TCCL financing. If the equity contribution is included, the ratio will be 1.5x.
43. The cofinancing ratio is unlikely to be high because potential cofinancing sources, which can offer long tenor loans, are limited in India. Needless to say, mobilizing cofinancing of shorter tenor does not contribute to the effectiveness of the programme.
44. It can be noted further that an additional USD 150 million, i.e. TCCL USD 100 million plus private sector investors USD 50 million is sourced entirety from the private sector. No public sector funding is envisioned.

Financial viability

45. Each rooftop solar power generation project under the programme will be required to meet certain profitability and credit criteria required by TCCL. TCCL will assess and monitor the technical and economic feasibility of each individual project during the life of loan.

46. The credit risk of each rooftop solar power project will be assessed and assumed by TCCL while foreign exchange risk will be hedged by the AE. The hedging cost will be passed onto TCCL and in turn to sub-projects.

Application of best practices

47. TCCL is a renewable energy focused financier having funded over 3 GW renewable energy projects, saving approximately 4.5 million ton CO₂ emission annually. TCCL's expertise and experience will contribute to the programme developing and adopting feasible and efficient practices in financing, investing and operating rooftop solar projects in India.

48. The TAP views efficiency and effectiveness of the programme to be "Medium/High".

II. Overall remarks from the independent Technical Advisory Panel

49. The TAP recommends the Board support the proposed project as presented.

50. The programme will promote 250MW of rooftop solar power generation critical for the country to meet its NDCs and economic development in a sustainable manner. It will provide technical, legal and financial support, and advance public and private sector participation in the sector.

51. The programme will offer long-term debt financing critically needed, but currently absent from the market. TCCL will assess the financial and technical sustainability of each rooftop solar power project before it extends financing. The capacity and track record of the AE and TCCL will contribute to the programme's successful implementation. The concessionality of the GCF loan will be passed on to projects. That will be monitored by the AE.
