



ADAPTATION FUND

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

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ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	Regular
Country/ies:	Bhutan
Title of Project/Programme:	Harnessing Alternative Renewable Energy Resources for Enhancing Community Resilience and Sustainable Food Security for Adaptation to Climate Change
Type of Implementing Entity:	National Implementing Entity
Implementing Entity:	Bhutan Trust Fund for Environmental Conservation (BT FEC)
Executing Entity/ies:	Ministry of Economic Affairs and Ministry of Agriculture & Forests
Amount of Financing Requested:	USD 10,000,000 Million (in U.S Dollars Equivalent)

Project / Programme Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

The Kingdom of Bhutan is a landlocked mountainous country in South Asia located in the Eastern Himalayas and bordered by Tibet Autonomous Region of China in the north & west and India in the south & east. Its pursues the Gross National Happiness (GNH) as its development philosophy, a new development paradigm shift from use of classical Gross National Product (GDP) as indicator to GNH as more holistic development progress indicator. Guided by this GNH Philosophy in maintaining the integrity of our pristine environment, the Royal Government of Bhutan (RGoB) has committed to remain carbon neutral to the international community. Resounding its resolute to remain carbon neutrality, the RGoB continues to make conscious effort to develop its hydropower resources with the motivation to meet not only its growing energy demand within the Country but also to export surplus power to neighboring country India to help reduce emission by supplanting coal based thermal power plants.

However, in the recent times, drying up of spring water sources used for drinking and irrigation purposes has been reported from different parts of the Country. Since these small streams feed large river systems where hydropower plants have been built, any hydrological regime change triggered either by climate change and/or long stretch of drought could have significant impact on the hydropower generation capacity and hence the nation’s revenue earning potential to support its socio-economic development and the agriculture production and productivity where 60% of the population depend for their livelihood sustenance.

Bhutan is predominantly an agriculture-based society and therefore agriculture has been identified as one of the five jewels that has significant growth potential in the Economic Development Policy 2016. However, due to increasing food demand, rapid urbanization, economic transformation, rising rural-urban migration and climate change, the agriculture sector productivity potential is highly constrained by the adverse effects of climate to meet the growing demand. The agriculture products and productivity are highly sensitive to climate condition and calls for availability of adequate perennial streams and seasonal rainfall and appropriate temperature levels. Therefore, drying up of spring water sources being reported from multiple pockets of the Country is recognized as a serious indicator calling for proactive and appropriate interventions to contain them before it is too late.

Further, development of renewable energy resources like solar is recognized as environmentally benign interventions in the energy sector. The RGoB has already achieved 100% electrification rate by 2017 and development of grid-connected solar and stand-alone system has the potential to assure reliability power supplies and improve the adaptive capacity since energy is used as critical input for diversification of economic activities and food crops.

The 5 MW Solar Power Plant is proposed to develop at Shingkhar under Bumthang district as shown in figure 1. The population of Bumthang district is 17,820 as of 2017 (Population and Housing Census of Bhutan, 2017). Out of 17,820 persons, 9,396 are male (52.7%) and 8,424 are female (47.3%). The total area is 2,667 Sq. Km and the population density is about 7 persons per Sq. Km. The unemployment rate for the district is 1.6% as of 2017. The site has potential to accommodate 35 MW of solar plant and current proposed capacity is aimed to help in scale-up to develop the full potential based on the lessons being learned from this pilot project.

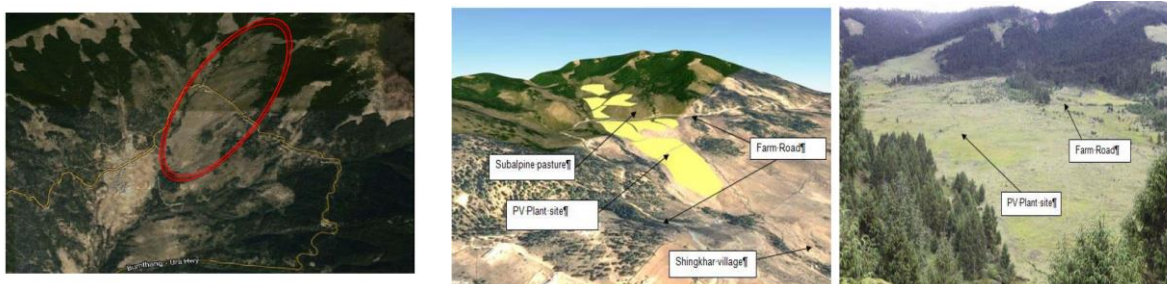


Figure 1: Solar Project site at Shingkhar, Bumthang

The relationship between energy and food production have evolved and grown stronger over the time as agriculture has become increasingly reliant on irrigation and mechanization. Post production activities such as food storage, cooling, processing and distribution are also energy intensive. Consequently, the cost of energy has direct impact on the production costs of the agriculture sector and food process, in particular in the case of medium to large farms. Therefore, the integration of renewable energy into food production chain will give better opportunity for the community and enhance the adaptive capacity to climate change. A safe integration of food and energy production may be one of the best ways to improve national food and energy security and simultaneously reduce poverty in a climate smart way.

Therefore, the primary purpose of the captioned Project under Adaptation Fund, is to develop (i) grid connected 5 MW solar power plants to enhance national energy security during the lean season and to (ii) enhance agriculture production and productivity at the selected community level using alternative renewable energy resources.

Project / Programme Objectives:

List the main objectives of the project/programme.

The objectives of the project are;

- (i) Diversification and exploration of Alternative Green Energy Resource to build up adaptive capacity to the climate change.
- (ii) Enhance crop production and productivity for food security and import substitution through adoption of climate resilient smart farming technologies powered by alternative energy sources.
- (iii) Encourage and establish enterprise development opportunities for communities especially for women and vulnerable groups in organic agriculture and renewable energy to create meaningful employment opportunities.

Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well-defined interventions / projects.

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)
Component 1: Diversification	Efficient and alternative green	Guaranteed energy supply for	8,100,000

and Exploration of Alternative Green Energy Resources	energy power plant installed and commissioned	households and contribute to energy security	
Component 2: Enhance crop production and productivity for food security and import substitution	Protected cultivation structures, storage and processing structures established	Demonstrated effective use of RE for intensive farming (for climate control, irrigation, processing, heat supply, etc.), Enhanced year round production of high value crops for domestic and export market.	750,000
Component 3: Encourage and establish enterprise development opportunities for communities	Enhanced knowledge and skills of the stakeholders, Establish business community centre	Business opportunity created for private enterprises or youth in agriculture.	250,000
6. Total Project/Programme Cost			9,100,000
7. Project/Programme Execution cost			200,000
8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			600,000
Amount of Financing Requested			10,000,000

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme

Milestones	Expected Dates
Start of Project/Programme Implementation	July 2019
Mid-term Review (if planned)	December 2020
Project/Programme Closing	June 2021
Terminal Evaluation	December 2021

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

The published data on impacts of climate change is limited. However, several cases across the Country have reported the drying up of spring waters, which serve as critical water source for drinking and irrigation purposes for the communities and hydropower generation at the national level. Further, with rising population, increasing demand for food, rapid industrialization and economic transformation, increasing rural-urban migration and the changing global climate, the country is confronted with number of challenges, which are exacerbated by the adverse impacts of climate change. To address these issues, ensuring secured, reliable and affordable energy system is seen as the robust national strategy to build up the climate resilience both at the level of community through the introduction of climate smart farming system by harnessing alternative energy sources and at the national level by diversifying the energy supply mix using alternate source of energy. Climate proofing becomes feasible only when there is access to energy that is affordable, reliable and secured and allows to adoption of appropriate technologies.

Bhutan is endowed with enormous water resources draining 2238 m³/sec annually but precipitation and surface runoff are the main sources of water (DoA, National Irrigation Master plan 2016) which are highly susceptible to changes in seasonal water availability, floods, and landslides which in turns are influenced by anticipated changes in climatic parameters like rainfall and temperature. As a result, it is expected that climate change may not only negatively impact rain-fed agriculture, but also irrigated

agriculture production and Bhutan's energy source (Hydro power). Further, about three fourth of the agriculture land in Bhutan is rain-fed and depend almost entirely on monsoon rains for crop production. Hence the impact of climate change on Bhutan's overall agriculture production will be severe. It is anticipated that agriculture production would decline by 4 to 10% in the future if appropriate measures are not taken to mitigate or adapt to climate change. Changes in weather and climate are already having an impact on regional ecosystems, evident by significant losses in the size and distribution of Himalayan glaciers, as well as the decreased water availability for irrigation, agriculture, hydropower and household uses (Shrestha et al. 2012).

Therefore, it is envisaged that the project will not only look at adaptation measures by developing climate resilience at the community level but would help the economy by diversifying clean energy sources for pursuing sustainable economic development. This project proposes three specific components that focuses on - (i) Enhance crop production by incorporating climate resilient technology (ii) Empowerment of women and vulnerable groups, and (iii) Diversification of sustainable energy sources.

Proposes Activities

Component 1: Diversification and exploration of Alternative Green Energy Resources

1.1 Rationales for specific project site selection

Under ADB TA, the detailed technical study has been carried out at Shingkhar under Bumthang district. The study report has revealed that the site has the potential to develop 30MW of solar and has recommended this potential be harnessed in three phases so that the lesson learned from first phase could be used to scale up the project development. It is also assessed as one of the most feasible project sites in the country. Therefore, the proposed project size of 5 MW is being proposed under AF fund as fraction of larger capacity proposed to be piloted and use the lessons learned to scale up the development to harness the full potential.

The agriculture site has been chosen based on the vulnerability of the population at the project site of the renewable energy project sites - Shingkhar. The data shows that Shingkhar, Ura has a total population of 1,724 with 229 households who are dependent on rain fed agriculture with poor resilience to any climate change. The community is located at high altitude and also being dependent on agriculture are highly vulnerable to the climate change. The project targets at least 50 percent of the households for climate resilient activities in terms of agriculture productivity.

The following activities will be carried out under Component 1:

1.1 Installation and commissioning of 5 MW solar power plant at Shingkhar

- 1.1.1 Finalization of 3 MW solar power design
- 1.1.2 Procurement of equipment
- 1.1.3 Installation and commissioning of 5 MW solar power plant

1.2 Installation of captive solar power plant for smart farms

- 1.3.1 Identification of sites
- 1.3.2 Design of the infrastructural and energy requirements
- 1.3.3 Procurement of equipment
- 1.3.4 Installation and commissioning of captive solar power plant at the identified sites

Component 2: Enhance crop production and productivity for food security and import substitution

The following activities will be carried out under Component 2:

2.1. Integration of renewable energy in agriculture production system

- 2.1.1. Promotion of climate resilient crop varieties (stress tolerant crop varieties), water harvesting structures, water use efficient irrigation systems and organic agriculture production systems in both the project pilot sites.
- 2.1.3. Solar energy for heating, drying and processing in Shingkhar, Bumthang – Promotion of household level polyhouse dryer and processing with energy supplement from the solar plant. The community are mostly involved in mushroom and medicinal plants which requires proper drying and processing to maintain the quality of the final product.

2.2. Establishment of production infrastructure (Greenhouses) powered by renewable energy

The following activities are proposed for developing climate resilient agricultural production through use of clean energy sources:

- 2.2.1. Establish small size (100 m²) at household level – with fabricated poly-houses (5x10 m), drip & fertigation system installed, insect proof net and energy required for the system (especially pumping of water for drip irrigation) met from solar energy by installing solar PV and solar thermal system for energy and heat generation. Promotion of poly-house dryer and processing plants at household level.
- 2.2.2. Establish medium size (500 m²), which will be focused in farmer groups or youth groups. Forced ventilated fan and pad system Greenhouses with controlled temperature and humidity, misting/fogging system, air heating, insect proof net.
- 2.2.3. Establish large scale (>1000 m²) will be established in Farm Machinery Corporation Limited (FMCL) farms. Installation of Hi-Tech Greenhouse (Multi span forced ventilated fan and pad system with all the climate control system).

Component 3: Encourage and establish enterprise development opportunities for communities/women

- 3.1.1. Establish community center
- 3.1.2. Training workshop for women and vulnerable group on climate resilient and organic vegetable farming
- 3.1.3. Workshops with stakeholders
- 3.1.4. Documentation and dissemination of best practices & lessons learnt to other areas/communities

B. *Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.*

Agriculture, responsible for growing food, is major user of water (more than 70% of all water use globally) and energy. Freshwater, once abundant, is undergoing stresses due to increased demand for competing uses and growing uncertainty due to climate change. There are also several reported cases of spring water getting dried up in different parts of Bhutan mostly attributable to climate change and partly to human induced activities, which adversely affect the food production and hydropower generation capacity. There is relationship among food, energy and water. Actions in one area usually have impacts in one or both of the others, with profound economic, environmental, and social implications. Use of renewable energy technologies like solar PV, solar thermal system and light emitting diodes will go a long way in promoting climate smart farming system and ensure food security under impending climate change scenario.

The introduction of green energy smart farming technologies at three strategic level of production scale is expected to address the following:

1. State-owned-enterprise: The large-scale green energy smart farming technology is proposed to pursue by engaging state-owned-enterprises like FMCL. Currently FMCL takes unutilized land on lease and undertake large scale farming activities. Introduction of green energy smart farming technology under state-owned-enterprise will allow large-scale vegetables to meet the high volume demand in the urban centers and cities. The impact of this intervention would be the reduction of food imports, enhanced availability of organically homegrown food supplies.
2. Cooperatives/Youth Groups: The medium-scale green energy smart farming technology is proposed to take up with village cooperatives and youth groups with the focus on women engagement. These will allow production of farm produce to feed the local regional demand. The impact of this intervention at the community level will be the increase farm produce; more income generated from sale of surplus produce, and enhanced economic independence.
3. Progressive and vulnerable farmers: The small-scale green energy smart technologies will be pursued through progressive farmers who are willing to take up and focusing on vulnerable groups of farmers. The impact of such intervention will be enhanced level of food sufficiency at the household level, more income through sale of surplus product, more nutritious intake, better health, more content life and build up resilience to climate change impacts.
4. Installation of grid connected 5 MW solar power plant will ensure 1500 families being guaranteed power supply from solar power in the event that hydroelectricity cannot meet the demand due to constrained power generation owing to climate change or transmission and distribution lines to these communities get damaged/cut off due to snows in winter.

5. Capacity building measures would ensure enhancement of the institutional strength to sustain the project benefits and to build up the national resilience against the adverse effects of climate change.

As far as the compliance with the environmental, social and gender policy of the fund are concerned, the existing laws of the land assure the fulfilment.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

The cost of developing 5 MW of solar power plant is estimated at USD 8.10 Million (approximately USD 1.6/W), which is within the range of capital cost of solar published by the International Renewable Energy Agency. Due to the project location being at the interior part of the Country, which drastically increases the transportation cost, lack of institutional expertise for such development and hence the need to hire the experts during the design and construction, the need to develop other infrastructures like community center, control rooms, dedicated power evacuation lines to a nearest substation, the cost of USD 1.6/W is assessed to be justified. All the equipment will be procured through international competitive bidding as per the prevailing norms and the cost reduction on equipment and hence overall cost is expected.

In the interest of cost effectiveness, the project is proposed to be built on Government land, and as such it is not capitalized in the project. The land will be treated as Government contribution to the project and the Department will work with relevant agencies to ensure the same as per the Land Act of Bhutan. To the extent possible, local labour force will be deployed especially for civil works in order to reduce the cost of the project. However, for specialized works, the project may have to recruit international consultants and technicians.

In the neighbouring states, India is one country where renewable energy projects are being promoted in massive scale. Due to lack of reliable database, cost comparison of RE in Bhutan and India is difficult. Nonetheless, since all the equipment will be procured through international competitive biddings, such information is of secondary significance.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

Table 1: National Key Result Areas of the 12th plan

1. Macroeconomic Stability Ensured	5. Healthy Ecosystem Services Maintained	9. Efficiency and Effectiveness of Public Services Improved	13. Democracy and Decentralization Strengthened
2. Economic Diversity and Productivity Enhanced	6. Carbon Neutral, Climate and Disaster Resilient Development Enhanced	10. Gender Equality, Women and Girls Empowered	14. Healthy, Safe and Caring Society Sustained
3. Poverty and Inequality Reduced	7. Quality of Education and Skills Improved	11. Productive and Gainful Employment Created	1. Livability and Sustainability of Human Settlements Improved
4. Culture and Traditions Preserved and Promoted	8. Food and Nutrition Security Enhanced	12. Corruption Reduced	2. Justice Services Improved

The proposed project is linked to the Sustainable Development Goals (SDGs), National Key Results Areas (NKRAs) and Agency Key Result Areas (AKRAs) of the 12 Five Year Plan (2018-2023) of RGoB.

- E.** Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The national technical specifications including the grid code of Bhutan will be strictly adhered to during the design, implementation and operation of the 5 MW project. For agriculture component, distributed solar power system will be installed as per the prevailing norms for powering the greenhouse technologies and processing plants that are not connected to grid electricity. Therefore, every aspect of environmental and social policy of the Adaption Fund will be taken care of.

From the construction of the greenhouse sheds, no environmental impact is foreseen irrespective of the sizes. However, for the installation and commissioning of the solar power plant, Environment Impact Assessment will be carried out in line with Environment Assessment Act 2000 and the Regulation for the Environment Clearance of the Projects (RECP 2002).

- F.** Describe if there is duplication of project / programme with other funding sources, if any.

The activities proposed in this project will not have any duplication with other projects or initiatives. Rather, there might be several programs and projects the executing agencies might implement in which the proposed project will seek complementarity. The table below shows some of the projects that are planned for implementation during the 12 FYP.

S#	Project description	Objective	Units	Baseline	Target 12 FYP	Implementing entity and region
1	National Biogas Programme	Reduce LPG imports	Nos	5000	4400	Department of Livestock, nation wide
2	Improved Cook stoves	Reduce fuel-wood consumption	Nos	14000	3000	Department of Renewable Energy and Local Government, Nation wide
3	Solar water heating system	Reduce electricity consumption	System	12	65	Department of Renewable Energy and Private Sector, public institutions
4	Installed capacity of solar Power	Diversify supply mix	kW	82 kW	3,000 KW	Department of Renewable Energy and Bhutan Power Corporation, Bumthang and Wangdue districts
5	Installed capacity of wind power	Diversify supply mix	kW	600 kW	2,000 kW	Department of Renewable Energy and Bhutan Power Corporation, Wangdue district

- G.** If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The lessons learned from this AF project will capture through progress, augmented by annual and evaluation reports that will be vetted by the Project Steering Committees on regular basis.

The dissemination of knowledge on capacity development needs, productive use of energy and diversification of income generating activities that have the potential to maximize socio-economic benefits will be done through national workshops and meetings. Also, the national broadcasting service will be invited at the project sites for capturing the project activities and broadcasting at national level. The Executing agencies will ensure experience sharing through dedicated websites, social medias, newsletters and forums to the general public, and the similar programmes/projects will be replicated in other parts of the country.

- H.** Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

The consultation process has undertaken at three different levels. The first level of consultation has been between the Ministry of Agriculture & Forests and the Ministry of Economic Affairs on this project concept. The second level of consultation has been

between the respective ministries and their sister agencies like FMCL, cooperatives/groups and Bhutan Power Corporation Limited. The third level of consultation has been with the Ministry and the people at the project sites.

As for development of solar power plants, communities have been consulted and their consents have been obtained. Currently, solar meteorological stations been installed to measure the solar data at the project sites with due approval from the community. The extracted version of the environment and social impact assessment report on the proposed project site is attached.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Since energy is used as input for all socio-economic activities, the energy demand within the country is growing up almost at 12% per annum. The energy peak demand takes place in winter when the hydropower generation is at the lowest levels, requiring to import deficit power from India. Reported cases of spring water that feed the larger river system where hydropower plants have been built is big concern for the Country, as it makes the nation very vulnerable to the climate change. Therefore, this funding request is being tabled to diversify the energy supply mix through the development of 5MW of solar power to enhance the adaptive capacity both at the nation and community level. At the national level, the lesson learned from this project will be used to scale up the installation size and improve the generation capacity. At the community level, people will be assured of reliable power supply even during the winter months when transmission and distribution lines get damaged by snowfall.

With increasing severity of climate conditions being experienced, the ability to grow food crops is declining specially off-season vegetables. Therefore, the project aims to pilot smart farming techniques and diversify crop variety and productivity to enhance the adaptive capacity to the climate change.

Expected outputs	Base line (current status)	Impact due to the proposed programme (with the support of AF)
Efficient and alternative green energy power plant installed and commissioned	Small scale solar home lighting projects have been implemented as off-grid electrification means.	Energy security enhanced due to diversification of energy
Protected cultivation structures, storage and processing structures established	Cultivation of crops done mainly through traditional means	Climate resilient farming methods developed.
Enhanced knowledge and skills of the stakeholders	Use of traditional energy and farming methods widely practiced.	Knowledge on sustainable energy and climate resilient farming methods developed.
Establish business community center	No business community centers established	Community center and sales outlet of the products established

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.

Sustainability has been considered as the guiding principle from the very beginning when defining objectives, expected outcomes, outputs and activities of the project. The sustainability of the project outcomes will be ensured through a close collaboration with communities/beneficiaries and make sure that their needs in terms of adaptation to climate change and variability have been properly considered. In order to ensure proper O&M of the equipment, wherever possible, domestic firm/companies will be encouraged to participate for supply of equipment and construction. Capacity development at multiple levels (institutions and communities) would ensure that the programme results sustained in the long run.

It is also to state that the initial investment cost required for the proposed project is proposed to finance by the AF. However, the Government will cover cost of operation and maintenance and sustain the plant through the cost recovery mechanism from the sale of electricity to the citizens in the country.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

Amended on Jan 4, 2019

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>	The project will be implemented as per the law of the land. No issues anticipated	
<i>Access and Equity</i>	<p>Access and equity to energy will not be an issue as all the communities are grid connected and installation of 5 MW solar will ensure adequate power supply to the local grid feeding the community.</p> <p>The community will be given equal opportunity to diversify their socio-economic activities through capacity development program under the project</p>	
<i>Marginalized and Vulnerable Groups</i>	Marginalized and vulnerable people of the community will be given preference in terms of employment and benefits. Specific capacity development programme will be designed to enhance the participation of the vulnerable groups.	
<i>Human Rights</i>	The project will be implemented in compliance to human right	
<i>Gender Equity and Women's Empowerment</i>	Women will be involved during design, implementation and operation of the project. Special capacity development program will be designed to allow women to participate and access the project benefits.	
<i>Core Labour Rights</i>	The project will be implemented as per the national labour law	
<i>Indigenous Peoples</i>	The project will not have any negative impact to the indigenous people	
<i>Involuntary Resettlement</i>	The project site is located on the government land and does not include voluntary or involuntary resettlement	
<i>Protection of Natural Habitats</i>		Detailed EIA to be carried out
<i>Conservation of Biological Diversity</i>	<i>The development of the project will not entail felling of vegetation or the loss of the habitat. It will be built on the barren land. Hence, loss of biological diversity is not anticipated by the project.</i>	
<i>Climate Change</i>	The project aims to enhance the adaptive capacity of system through the diversification of energy supply and socio-economic activities.	
<i>Pollution Prevention and Resource Efficiency</i>	No issues anticipated	
<i>Public Health</i>	No issues anticipated	
<i>Physical and Cultural Heritage</i>	The project activities will not affect the community's cultural heritage sites.	
<i>Lands and soil conservation</i>	No issues anticipated	

PART III: IMPLEMENTATION ARRANGEMENTS**A.** Describe the arrangements for project / programme implementation.

The Department of Renewable Energy, Ministry of Economic Affairs, Royal Government of Bhutan and the Department of Agriculture, Ministry of Agriculture and Forests will be the executing agencies for respective components.

Project Steering Committee (PSC) will be established, which will oversee and provide strategic guidance for the implementation of the project. The PSC will be chaired by the Director, Gross National Happiness Commission and Co-chair by the Director, Bhutan Trust Fund for Environmental Conservation and will be composed of representatives from relevant agencies.

The Project Management Units (PMU) will be established within the implementing agencies for the day-to-day implementation, coordination and monitoring of the project.

B. Describe the measures for financial and project / programme risk management.

The table below identifies the main risks that the project management may face during the implementation of the project and provides possible mitigation measures to address these risks.

Risk	Mitigation measures
Delays in the disbursement of fund	Long term expenditure forecast to be put in place
Lack of knowhow on financial management	Trained staff in relevant field will be assigned for the project
Lack of coordination among executing and implementing agencies	Periodic meetings among the agencies will be held to fast track the project implementation.
Long term sustainability of the project	The executing and implementing agencies will make sure that local communities will be engaged and enhance their participative capacities

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

As mentioned above, from the construction activities of Greenhouse shed, no environmental damage is foreseen and hence requirement of environmental risk management is not felt.

In general, the development of renewable energy is considered as environment friendly project contributing to reduction of GHG emission. However, since the development involve various activities including construction, Environment Impact Assessment will be carried out. The environmental management plan will also be prepared as an integral part of the project to set out the procedural framework for ensuring the implementation of all mitigation measures. The environmental monitoring plan will include description of type of monitoring parameters, risk involved and scheduled for monitoring to ensure implementation of mitigation measures.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

Monitoring and evaluation (M&E) will be part of the regular M&E system and will be carried out in line with the guidelines of the Bhutan Trust Fund for Environmental Conservation and the adaptation fund. M&E activities will be carried out based on the logical results framework, which will be developed at the next stage of the proposal.

A mid-term evaluation will be carried out on the effectiveness and efficiency and where necessary, corrective action will be taken for successful implementation of the project. The Final Evaluation will occur at the end of the project and will be based on the same approach as the mid-term evaluation. An ex-post evaluation will be undertaken, that would provide on assessing the sustainability of project results, lessons learned including best practices for replication

E. Include a results framework for the project proposal, including milestones, targets and indicators.

Objective/ Output/ Outcome	Indicator	Baseline	Target	Means of verification
To diversify alternative green energy resources to enhance climate resilience and sustainable food security for adaptation to climate change	Capacity of alternative renewable energy	500 kW	5 MW	Installation and commissioning report
	- Area under protected cultivation powered by alternative green energy	None	- 14,500 m ²	Project completion report
	- No of post-production facilities	None	-3 Nos	
Component 1: Diversification and exploration of Alternative Renewable Energy Resources				
Outcome 1: Guaranteed energy supply for households and contributed to energy security	Capacity of alternative renewable energy	Solar – 500 kW Small scale solar – 82 kW	Solar – 5MW	Installation and commissioning report
Output 1.1: Solar power plant installed and commissioned	Capacity of solar power plant	500 kW	5 MW	Installation and commissioning report
Output 1.2: Captive solar power plants installed and commissioned	Capacity of solar captive power plant	82 kW	1.2 MW	Installation and commissioning report
Component 2: Enhance crop production and productivity for food security and import substitution				
Outcome 2.1: Demonstrated effective use of RE for intensive farming (for climate control, irrigation, processing, heat supply, etc.)	Area under protected cultivation powered by alternative green energy	None	- 14,500 m ²	Project completion report
Outcome 2.2: Enhanced year round production of high value crops for domestic and export market	Number of post-production facilities	None	3 Nos	
Output 2: Different level of protected cultivation structures established.	Area under protected cultivation powered by alternative green.	None	- 14,500 m ²	

Component 3: Encourage and establish enterprise development opportunities for communities				
Outcome 3: Business opportunities created for private enterprises, women or youth in agriculture	Number of women/youth in business activities	0	100	Project completion document
Output 3: Knowledge and skills of all the stakeholders enhanced	Number of women/youth trained	0	100	Project completion document

F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Project Objective(s)¹	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator
To diversify alternative green energy resources to enhance climate resilience and sustainable food security for adaptation to climate change	<ul style="list-style-type: none"> - Capacity of alternative renewable energy - Area under protected cultivation powered by alternative green energy - No of post-production facilities 	Outcome 4: Increased adaptive capacity within relevant development and natural resources	4.2 Physical infrastructure improved to withstand climate change and variability-induced stress
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator
Outcome 1: Guaranteed energy supply for households and contributed to energy	Capacity of alternative renewable energy	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)

¹ The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

Outcome 1: Guaranteed energy supply for households and contributed to energy	Capacity of alternative renewable energy	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)	8,500,000
Outcome 2.1: Demonstrated effective use of RE for intensive farming (for climate control, irrigation, processing, heat supply, etc.)	Number of post-production facilities	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)	500,000
Outcome 2.2: Enhanced year round production of high value crops for domestic and export market	Area under protected cultivation powered by alternative green	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)	750,000
Outcome 3: Business opportunities created for private enterprises or youth in agriculture	Number of youth trained Number of youth in business activities	Output 2.1: Strengthened capacity of national and regional centres and network	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events	250,000

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

- A. Record of endorsement on behalf of the government²** Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:

(Enter Name, Position, Ministry)	Date: (Month, day, year)
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- B. Implementing Entity certification** Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (.....list here.....) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Name & Signature Implementing Entity Coordinator	
Date: (Month, Day, Year)	Tel. and email:
Project Contact Person:	
Tel. And Email:	

²⁶. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.