



REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: FULL-SIZED PROJECT

TYPE OF TRUST FUND: LDCF

PART I: PROJECT INFORMATION

Project Title: Strengthening the resilience of the energy sector in Benin to the impacts of climate change			
Country(ies):	Benin	GEF Project ID:	5431
GEF Agency(ies):	UNDP	GEF Agency Project ID:	4979
Other Executing Partner(s):	Ministère de l'Energie, des Recherches Pétrolières et Minières, de l'Eau et du Développement des Energies Renouvelables (Ministry of Energy, Mining and Petroleum Exploration, Water and Renewable Energy Development)	Submission Date: Resubmission Date:	3 Nov 2015 3 Feb 2016
GEF Focal Area (s):	Climate Change	Project Duration(Months)	60 months
Name of Parent Program (if applicable): ➤ For SFM/REDD+ <input checked="" type="checkbox"/> ➤ For SGP <input type="checkbox"/> ➤ For PPP <input type="checkbox"/>		Project Agency Fee (\$):	760,000

A. FOCAL AREA STRATEGY FRAMEWORK

Focal Area Objectives	Trust Fund	Grant Amount (\$)	Co-financing (\$)
CCA-2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level	LDCF	850,000	2,000,000
CCA-1 Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level	LDCF	2,400,000	11,000,000
CCA-3 Adaptation Technology Transfer: Promote transfer and adoption of adaptation technology	LDCF	4,370,000	17,000,000
Project management Cost (PMC) including DPC		380,000	1,570,000
Total project costs		8,000,000	31,570,000

B. PROJECT FRAMEWORK

Project Objective: To reduce the impacts of climate change and variability on Benin's energy sector						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Mainstreaming adaptation to climate change into energy policies and management and planning strategies and tools	TA	1.1 Capacities of the energy sector's stakeholders are strengthened in order to enable them to integrate climate risks in energy planning and to face climate risks	1.1.1 A multi-stakeholder platform is set up to facilitate dialogue between decision-makers in different sectors related to energy, and decision-making on the competing use of energy sources and on cross-	LDCF	850,000	2,000,000

			<p>cutting issues related to the production, access and energy efficiency in relation to climate change</p> <p>1.1.2 A training program is implemented for 500 individual stakeholders in the sectors related to energy (including members of the multi-stakeholder platform of the energy sector and members of the National Multi-sectoral Commission on Domestic Fuels) to strengthen their capacity to: i) identify climate risks for the energy sector; ii) design and implement adaptation measures; iii) integrate climate risks and parameters in key policies of the energy sector, in the energy planning tool GEOSIM, and in planning processes of energy supply and demand;</p>			
2. Sustainable land and forest management practices for strengthening the climate resilience of the zones supplying wood for energy	TA	2.1 Energy supply strategies and plans integrate climate change and adaptation measures	2.1.1 The Masterplans for Supply (SDA) of fuelwood in the cities of Parakou, Malanville, Djougou, Natitingou, Bohicon, Abomey, Cotonou, Porto-Novo and Lokossa (including Development Plans (PAF) of forest areas of Nonsinansson for Parakou, Tfougou for Djougou, Dahendé for Natitingou, Fita-Agbado for Bohicon, Zouzoukan and Abomey for Cotonou and Porto-Novo) are revised to incorporate climate risks and	LDCF	2,400,000	11,000,000

			<p>appropriate adaptation measures.</p> <p>2.1.2 A National Plan for optimal management of supply and demand of electric power in a context of climate change including climate risks (temperature, river flow, evapotranspiration, rain, sunshine, cyclones, floods ...) and adaptation measures are developed and implemented.</p> <p>2.1.3. The Information System for Permanent Evaluation (SIEP) on domestic fuels and the Ecological and Forest Information System (SIEF) are updated and functional in order to include climate risks and strategic options to address these risks</p> <p>2.1.4. The Forest Development Plans (PAF) of Middle Ouéme and communal forests of Fita Agbado (towns of Dassa and Savalou), Zounzoukan (towns of Covè and Zangnanado), Détohou (town of Abomey), Kolobi (town of Djidja), Bobe (town of Bantè), Ouogui (town of Savè), Badé (town of Ouessè), Tfougou (town of Djougou), Nonsinansson (towns of Perere and N'Dali) and Dahendé (towns of Natitingou and Toucouteuna) supplying the cities and urban centers of Benin in wood</p>			
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			energy are revised to incorporate risks of drought, wildfires, and other climate risks as well as adaptation measures			
	INV/TA	2.2. The climate resilience of watersheds of rivers Ouémé, Niger (Sota), Volta (Pendjari) housing the hydroelectric installations of Yéripao (existing) on one hand, and of Sosso waterfall, Gbassè, Koutakroukrou, Kota fall, Wabou and Kouporgou (considered in the medium term) on the other hand, is enhanced through the implementation of restoration and preservation of watershed ecosystems activities	<p>2.2.1 Riverbanks of rivers Ouémé, Sota, Pendjari, Zou, Mono (likely to harbor hydroelectric facilities of Yéripao (existing) on one hand, and of Sosso waterfall, Gbassè, Koutakroukrou, Kota fall, Wabou and Kouporgou (considered in the medium term) on the other hand, , are protected against erosion through the reforestation of twenty acres of multipurpose herbaceous species tolerant to drought and flooding</p> <p>2.2.2. Low cost community infrastructures are built and supported to protect the riverbanks of rivers Ouémé, Zou, Sota, Mono, Niger against erosion.</p> <p>2.2.3. A training program on good practices of sustainable land management integrating climate risks is implemented in communities of Djidja, Abomey, Zangnanado, Dassa, Savè, Perere, N'dali, Toukoutouna, Djougou, Bantè, Bassila, in order to fight against the erosion of land in the watersheds of rivers Ouémé, Zou, Sota, Mono,</p>			

			<p>Niger</p> <p>2.2.4. Climate resilient and environmentally sound remunerative activities such as beekeeping, small livestock farming, production and marketing of improved cooking stoves are supported through the implementation of a framework for their development (training program on good practices for business and management, support for access to needed products and components, support for access to micro-financing to start these activities).</p>			
	INV/TA	2.3. Climate resilience of fuelwood supply areas identified by revised SDAs is enhanced through reforestation and conservation of woody areas.	<p>2.3.1. Community parks of firewood resilient to climate change are set up in areas identified as most vulnerable by the revised SDAs, in the communal forests of Fita Agbado (towns of Dassa and Savalou), Zounzoukan (towns of Covè and Zangnanado), Détohou (town of Abomey), Kolobi (town of Djidja), Bobe (town of Bantè), Ouogui (town of Savè) , Badé (town of Ouessè), Tfougou (town of Djougou), Nonsinansson (towns of Perere and N'Dali) and Dahendé (towns of Natitingou and Toucoutouna)</p> <p>2.3.2. The fuelwood supply areas (Zouzoukan</p>			

			for Parakou, Tfoougou for Djougou, Dahendé for Natitingou, Fita-Agbado for Bohicon, Zouzoukan and Abomey for Porto-Novo and Cotonou) are protected against bushfires induced and / or enhanced by climate through: i) the development of management protocols against risks of increase of the frequency and intensity of wildfires linked to climate; ii) demonstration bushfire fight methods resilient to climate around ha of forests.			
3. Energy use and production Technology transfers to strengthen the resilience of livelihoods and living conditions of the vulnerable communities	INV	3.1. Electricity production and distribution facilities are protected against disasters and other climate risks	3.1.1. Protective measures for the thermal power plants of Cotonou (Akpakpa), Porto-Novo, Kandi, Natitingou, against the increase in intensity and frequency of droughts and other climate risks and natural disasters are in place. 3.1.2. Protective measures for the distribution network (cables), against winds and raising temperatures are developed.	LDCF	4,370,000	17,000,000
	TA	3.2. Development of alternative energy production sources for vulnerable localities	3.2.1. Elaboration of a feasibility study for the development of the solar sector (installation of mini-grids in villages for cooking and lighting). 3.2.2 Awareness raising and training of men, women and children to solar technology.			

			<p>3.2.3. Ten thousand (10,000) improved stoves and a thousand (1,000) pressure cookers are distributed through micro-financing and loan guarantee schemes in the most vulnerable rural communities of Djidja, Zangnanado, Dassa, Savè, N'dali Perere, Toukoutouna, Djougou and Bassila and urban centers of Cotonou, Porto Novo, Bohicon, Abomey, Parakou, Natitingou, Djougou, Malanville, Lokossa, Kandi, to reduce household demand for fuelwood.</p> <p>3.2.4. Three improved carbonization technologies applied to 100 energy efficient kilns are spread in communities producing charcoal through the training of 500 coal operators. Technologies will be based on rotor kilns and improved casamance kilns.</p>			
	INV	<p>3.3. Increased investment in clean energy technologies and low-carbon practices in the agro-forestry waste sector, and in adaptive measures to increase the resilience of the energy sector to climate change.</p>	<p>3.3.1. Financial Support Mechanism established with a policy framework and capitalized to support private investment in adaptive measures to increase the resilience of the energy sector to climate change.</p> <p>MOU signed with the Central Bank of West African States (or with commercial bank selected on the basis of competitive bidding) setting out the objective,</p>			

			<p>funding mechanism and administration rules regarding its participation as fiduciary agent of the FSM.</p> <p>Financial and other incentives to be provided to project developers/Independent Power Producers (IPPs) towards low-carbon climate resilient investments in the energy sector.</p>			
Subtotal					7,620,000	30,000,000
Project management Cost (PMC) including DPC				LDCF	380,000	1,570,000
Total project costs					8,000,000	31,570,000

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Please include letters confirming cofinancing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
National Government	MERPMEDER through Directorate of Energy	In kind	7,000,000
National Government	MERPMEDER through Directorate of Energy	Grant	1,000,000
National Government	MERPMEDER through PAGEFCOM	Grant	8,000,000
National Power Utility	CEB (Electricity Community of Benin)	In kind	15,000,000
GEF Agency	UNDP	Grant	500,000
NGO	GoodPlanet	In kind	70,000
Total Co-financing			31,570,000

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant Amount (a)	Agency Fee (b)	Total c=a+b
UNDP	LDCF	Climate Change	Benin	8,000,000	760,000	8,760,000
Total Grant Resources				8,000,000	760,000	8,760,000

E. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? no ☒

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF

There were only a few main changes made during the project design, from the original PIF:

- Two expected outcomes have been added namely 3.2 and 3.3.

Those outcomes have been added following a thorough full consultative process with stakeholders, via face-to-face meetings and stakeholders workshops in September and November 2014, respectively in Bohicon and Cotonou.

Based on the inputs from this consultative process, a first outcome was added compared to the original PIF on the development of alternative energy production sources for vulnerable localities (new outcome 3.2.).

The second new expected outcome focuses on the increase in investment in clean energy technologies and low-carbon practices in the agro-forestry waste sector and in adaptive measures to increase the resilience of the energy sector to climate change (new outcome 3.3.).

- There are some outputs and activities, initially located in the 3rd Component have been moved to the 2nd component, to keep consistency and alignment in the project activities.
- The financial mechanism proposed has a common administrative structure (Project Management Unit) with the one proposed under the MFA project 5752 (GEF ID) focusing on biomass. Thus the proposed mechanism should be capitalized by both projects with funds possible co-management with the fiduciary support of the Central Bank in order to reduce structural and management fees and leverage on the benefits from having a common administrative structure. Both projects will have the same project team. Clear and specific management rules and criteria for disbursement will be elaborated.

A.1 National strategies and plans

The following paragraphs only present summaries and key points. For additional details, please refer to the Project Document.

National context:

Benin (Republic of Benin) is a small Sub-Saharan African country of 116,622 km² and around 10 million inhabitants in 2013¹. Poverty is widespread in Benin, with more than 36% of the population living below the poverty line. The country's economy relies mainly on agriculture, in particular cotton exports, which represents one third of the Gross Domestic Product (GDP). 70% of the population is dependent on agriculture for its livelihood. Benin's economy is also highly dependent on exports and trade, especially with Nigeria, on climatic conditions for the agricultural production, and on foreign investments. As a consequence, growth rates can vary significantly from one year to another. They are currently comprised between 5 and 6%.

¹ <http://data.worldbank.org/country/benin>

The Government of Benin (GoB) adopted in 2011 a Growth and Poverty Reduction Strategy (Stratégie de Croissance pour la Réduction de la Pauvreté/SCR 2011-2015)², which aims to make Benin an emerging economy by 2025, with a sustainable growth and the achievement of the Millennium Development Goals (MDG).

Focusing on climate change, on June 30, 1994, the Republic of Benin ratified the United Nations Framework Convention on Climate Change (UNFCCC) following this commitment, and the first implementation strategies elaborated in collaboration with the Global Environment Facility (GEF), the Republic of Benin launched in January 2008 the process of the National Adaptation Plan of Action (NAPA)³.

The current project is one of the five project profiles elaborated in 2008. In the NAPA 2008 document, it was entitled « P.2 – Secteur Energie : Adaptation des ménages aux changements climatiques par la promotion des énergies renouvelables et des foyers économiques performants et autocapteurs dans les zones vulnérables aux changements climatiques et dont les terres sont fortement dégradées ».

Benin faces important climate risks and adaptation has become an increasing priority. A first step towards adaptation to future climate change is to reduce vulnerability and exposure to present climate variability. Integration of adaptation into the energy sector, including the energy policy design, planning and decision making can promote synergies with the increasing demand for energy in Benin and disaster risk reduction. Building adaptive capacity is also crucial for the effective implementation of adaptation options in the energy sector.

The energy sector in Benin is characterized by a predominance of traditional uses of biomass energy, low access of population to modern energy (fuel and electricity). Benin is 100% dependent on outside supplies for petroleum products and over 80% for electricity (mainly from the Akosombo dam in Ghana).

The analysis of the energy balance from 2000 to 2010 clearly shows the dominance of biomass energy consumption over other types of energy. In 2010, the consumption structure shows a predominance of biomass energy and petroleum products.

The electrical energy consumption has shown during the 2000-2010 period an average annual growth of 7.1%. The very low share of electricity in the total energy consumption clearly demonstrates, if it was necessary, that the industry is embryonic and household access to electricity is still very low.

Benin has significant energy resources for power supply. However, the country faces more than two decades a recurring energy crisis, which will amplify with climate change. Benin has experienced four major electricity supply crisis between 1984 and 2007 because of:

- a. Decreased water level in the Akosombo dam in the Volta river in Ghana due to the modification of the rainy seasons. This was Benin's main source of power supply until 2007;
- b. At the regional level, energy deficit in the three power supply countries of Ghana, Nigeria and the Ivory Coast;
- c. The sub-optimal exploitation of the energy potential of the country. The project targets this latest weakness by strengthening the resilience of the energy sector in Benin to the impacts of climate change.

Moreover, the poor quality of the energy services has negative impacts on businesses, households and Government revenue⁴.

Vulnerability to climate change has been assessed for each type of risk for power production and transportation,

² <http://www.bj.undp.org/content/dam/benin/docs/pauvrete/SCR%203-version9dec2010.pdf>

³ <http://unfccc.int/resource/docs/napa/ben01f.pdf>

⁴ Source : Evaluation du coût socio-économique de la mauvaise qualité des services énergétiques du Bénin (Bureau d'Etudes CETRA, 2008)

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considering, in the supply chain, the vulnerability is different for each type of energy source (biomass, hydropower, other renewable energies, thermal power and electricity imports). Among those sources, the most vulnerable are biomass, hydroelectricity and electricity imports. Indirectly, the economic sectors with important energy needs will be affected by extreme climate events and by climate change.

With regards to change in rainy seasons, the main risk is posed by flooding to power stations and electricity transmission and primary distribution substations. Substations are at greater risk of river flooding, while power stations are at greater risk of tidal flooding. There may be opportunities to increase resilience to flooding when existing energy infrastructures reach the end of their lifetime and are replaced, but this will depend strongly on the design and location of the new infrastructure.

High temperatures will also impact the power network: ambient temperature can be expected to result in future derating of the overhead power lines, up to 5% for the transmission network and even higher for the distribution network. Derating means an increase in line losses due to heat waves. The electrical energy available for distribution will then undergo a significant reduction in transport. These losses will become more significant during the hottest days of the year, during which energy demands are usually higher because of an increase in energy demand for cooling.

Finally, solar energy potential would increase but, in the long term, risks of negative impacts on the equipments' performance will increase as well. Sectors requiring continuous electric supply for refrigeration and freezing, typically food industry, are also very exposed. The lack of woody biomass will impact the small catering services.

A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities.

This project has been designed in compliance with LDCF guidelines and is in line with the updated Results-Based Management Framework for the LDCF and SCCF (GEF/LDCF.SCCF.9/Inf.4, October 20, 2010).

The project is also in line with Objective 1 of LDCF/SCCF focal area aiming at “*reducing vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global levels*” and with Objective 2 aiming at “*increasing adaptive capacities to respond to the impacts of climate change, including variability at local, national, regional and global levels*”.

The links to related expected outcomes in the LDCF/SCCF Result Based Management Framework include outcome 2.1 “Mainstreamed adaptation in broader development frameworks at country level and in targeted vulnerable areas”, outcome 1.2 “reducing vulnerability in development sectors” and outcome 2.2 “Strengthened adaptive capacity to reduce risks to climate-induced economic losses”.

A.3 The GEF Agency's comparative advantage:

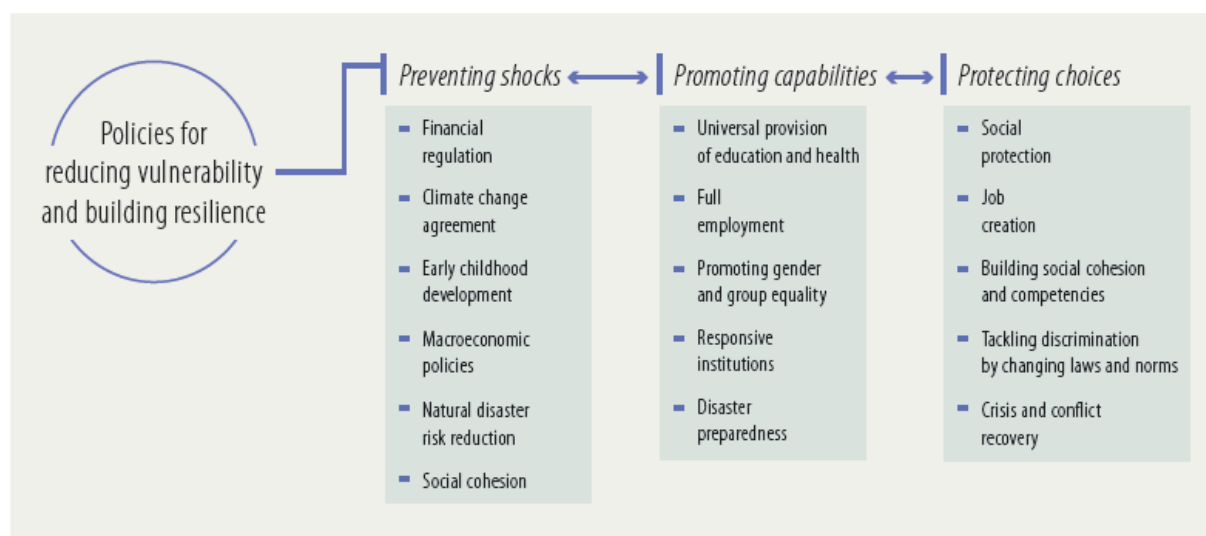
UNDP support strategy on climate change adaptation in Benin

As it is highlighted in UNDP's 2014 Human Development Report⁵, vulnerability and resilience represent a major challenge today for human development. UNDP aims at strengthening resilience of communities as a whole, while focusing on people instead of a specific sector. Because energy, in the form of electricity, fuel, heat..., is essential to human development, assessing its vulnerability and providing solutions to adapt to future changes is essential too. This is why this project is particularly in line with UNDP's development objectives. The 2014 HDR underlines, moreover, the necessity to target more vulnerable groups (women, youth, senior, poor communities, minority groups, etc.). Strengthening resilience and preparedness to crisis, be they nature or human-induced, will be part of UN's post-2015 agenda priorities. It should be reached through collective action and better international governance.

⁵ <http://www.undp.org/content/dam/undp/library/corporate/HDR/2014HDR/HDR-2014-English.pdf>
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Figure 1: Policies for reducing vulnerability and building resilience⁶

Policies for reducing vulnerability and building resilience



Source: Human Development Report Office.

Addressing risks, including natural disaster risks, will allow Benin to progress towards better human development indicators, contributing to its becoming an emerging country. Benin currently (2013 assessment) presents a low human development according to the UN criteria, with an HDI of 0.476 (on 1) that places it at the 165th rank among UN states (on 187). Climate change does not create vulnerability, but it increases it where it already exists. Thus, by rapidly increasing the rate of extreme events in the years to come, climate change will trigger more violent natural disasters and conflicts.

A.4. The baseline project and the problem that it seeks to address:

The following paragraphs only present summaries and key points. For additional details, please refer to the Project Document.

Energy is central to Benin's strategy to accelerate economic growth and poverty reduction. However, the country has little experience dealing with adaptation to climate change in the energy sector. With its global perspective, GEF is the leading body in the very new area of adaptation to climate change and well positioned to provide knowledge and institutional experience gained from its various programs on adaptation. It is essential for Benin to introduce adaptation into its development decision making process, and it is timely for power companies, energy suppliers, energy consumers, local authorities and the GoB to understand that climate change is impacting the energy sector and adapt the energy system and policy accordingly.

UNDP would be the implementing agency for the proposed project. UNDP can bring its expertise and know-how in a wide range of aspects related to project management, energy management, adaptation, etc. At the same time, the project is consistent with the goals of the United Nations Development Assistance Framework (UNDAF) in Benin for the 2014-2018 period. The proposed project will contribute to the successful implementation of this partnership strategy.

One of the solutions to the climate vulnerability of Benin's energy sector is to implement adaptation measures combining technical measures to strengthen energy sources and infrastructure, to integrate climate risks in sector planning process and to encourage behavior change to promote a climate-rational and diverse use of energy potential.

⁶ Source: UNDP, 214

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These measures should be underpinned by promoting alternative income generating activities to unsustainable practices of exploitation of forest resources and adoption / implementation by the Benin of institutional, regulatory and policy measures to remove barriers to the adoption of such adaptation.

Baseline scenario

The energy sector is vulnerable to projected climate changes. For example, it is expected that climate change will impact the power sector in numerous ways⁷. Increases in water temperature are likely to reduce generation efficiency, especially where water availability is also affected. Increases in air temperature will reduce generation efficiency and output as well as increase customers' cooling demands, stressing the capacity of generation and grid networks. Changes in precipitation patterns and surface water discharges, as well as an increasing frequency and/or intensity of droughts, may adversely impact hydropower generation and reduce water availability for cooling purposes to thermal and nuclear power plants. Extreme weather events, such as stronger and/ or more frequent storms, can reduce the supply and potentially the quality of fuel (coal, oil, gas), reduce the input of energy (e.g., water, wind, sun, biomass), damage generation and grid infrastructure, reduce output, and affect security of supply. Rapid changes in cloud cover or wind speed (which may occur even in the absence of climate change) can affect the stability of those grids with a sizeable input of renewable energy, and longer term changes in these and precipitation patterns can affect the viability of a range of renewable energy systems. Sea level rise can affect energy infrastructure in general and limit areas appropriate for the location of power plants and grids. The thermal power plant of Cotonou is under such threats.

Table 1: Indicative Impacts of Climate Change on Electricity Generation, Transmission and End Use⁸

Technology	Δ Air Temp	Δ Water Temp	Δ Water Availability	Δ Wind Speed	Δ Sea Level	Floods	Heat Waves	Storms
Coal	1	2	1-3	-	-	3	1	-
Oil	1	2	1-3	-	-	3	1	1
Natural gas	1	2	1-3	-	-	3	1	1
Nuclear	1	2	1-3	-	2a	3	1	-
Hydropower	-	-	1-3	-	-	3	-	1
Wind	-	-	-	1-3	3a	1	-	1-3
Photovoltaic	1	-	-	1	-	1	1	1
CSP/Solar tracking	-	-	2	2	-	1	1	2
Biomass/Biofuel	1	2	2	-	3a	3	1	-
Geothermal	-	1	-	-	-	1	-	-
Ocean	-	1	-	-	1	N/A	-	3
T&D grids	3	-	-	1	3a	1-2	1	2-3
End use	2	-	-	-	-	-	3	-

CSP = concentrating solar power, Δ = change in, T&D = transmission and distribution

* Higher severity in coastal or low-lying areas.

Notes: 3 = severe impact, 2 = medium impact, 1 = limited impact - = no significant impact, N/A = not applicable

Hence, in the baseline scenario, the Beninese energy sector does not take into account the consequences of climate change and energy access in the country remains vulnerable to drought and floods. The power sector for instance is subject to blackouts due to climate change: there are some scientific evidences that rainfall in the Volta basin and intake

⁷ <http://www10.iadb.org/intal/intalcdi/PE/2012/12152.pdf>

⁸ ADB, 2012. Climate Risk and Adaptation in the Electric Power Sector. Modified and expanded from European Commission. 2010. Investment needs for future adaptation measures in EU nuclear power plants and other electricity generation technologies due to effects of climate change. Final report. European Commission Directorate General for Energy Report EUR 24769.

water levels on the Volta lake impact hydropower generation⁹. This partly explains the difficulties for the Volta River Authority (VRA)¹⁰ in Ghana to supply Benin in power.

Today, adaptation is not present in any energy policy document nor in the national energy management system. As far as sustainable and resilient land and management practices are concerned, various masterplans and development plans (SDAs and PAFs) do exist, but they need to be revised by strengthening the climate resilience of the areas supplying wood for energy. The same applies for the Information System for Permanent Evaluation (SIEP) on domestic fuels and the Ecological and Forest Information System (SIEF). In the baseline scenario, the watersheds of rivers in Benin are vulnerable to climate change. The project will therefore set-up adaptation measures to secure the energy sector of Benin.

Adaptation measures

Changes in climate, e.g. higher temperatures and sea level rise, may result in consequences for the energy sector of Benin, urging to take actions by adopting adaptation measures.

- Adaptation Measures for Thermal Power Generation
- Adaptation Measures for Renewable Energy
- Adaptation Measures for Biomass Energy and Biofuels
- Adaptation Measures for Transmission and Distribution
- Adaptation Measures for Electricity End Use

Proposed alternatives through the project:

Objective

The project aims to reduce the impacts of climate change and variability on Benin's energy sector.

It will contribute to the removal of the main institutional, political and financial barriers and those relative to individual capacities and knowledge that hinder effective climate risk management for the energy sector in Benin. It will introduce adaptation measures to strengthen the resilience of the national energy sector.

The advanced degradation of fuel wood supply areas, in a context of predominance of energy from wood in the energy balance of Benin, the narrowness of the energy mix and the difficulties in the supply of electrical energy are obstacles to meeting households energy needs, and may worsen Benin's energy deficit. The GoB is aware of this and has taken a number of initiatives to address these shortcomings in the energy sector.

Outcomes

At the end of the project, Beninese stakeholders and beneficiaries of the energy sector will have achieved strengthened capacities, allowing them to better adapt to climate change and variability, and thus reducing their vulnerability to energy shortfalls. Benin will have further integrated and implemented adaptation strategies and measures both at the national scale and locally, in identified vulnerable areas. Finally, stakeholders and beneficiaries of the energy sector will benefit from strengthened energy supply sources throughout the Beninese territory, against the current and future impacts of climate change.

⁹ Obeng Bekoe E., and Yaw Logah F., 2013. « The Impact of Droughts and Climate Change on Electricity Generation in Ghana », Environmental Sciences, Vol. 1, 2013, no. 1, 13 – 24. <http://m-hikari.com/es/es2013/es1-4-2013/bekoeES1-4-2013.pdf>

¹⁰ Benin and Togo relies on power coming from Ghana. In 2013, the power supply arrangement of 50MW on week days (off peak) and weekends as well as 35MW during peak periods on weekdays was no longer adequate for their countries' needs, while at the same time these countries were experiencing unscheduled blackouts due to lack of power. The power is generated by the Volta River Authority, which main generation facility is the Akosombo hydropower plant (1,020 MW of installed capacity accounting for 35.83% of the total installed capacity of VRA). Drought is one of the main causes of the power rationing due to low water levels in the Akosombo dam. More information can be found on the VRA website : <http://www.vra.com/>

The project will consequently strengthen the Government's initiatives through additional measures to strengthen human resources and institutional capacities in the energy sector (**Outcome 1**), to integrate climate risks into planning policies and tools of the energy sector (**Outcome 2**), and through investing in physical adaptation measures to strengthen climate resilience of energy sources and to improve energy services for the most vulnerable households (**Outcome 3**).

To address the project's objectives and achieve the expected results, the project framework is structured along 3 components.

Project Outcomes, Outputs and Activities

Component 1: Mainstreaming adaptation to climate change into energy policies and management and planning strategies and tools

The baseline is a growing demand in energy access in the country, with existing energy planning to increase the supply from renewable sources such as hydropower (with a target set at 259,9 MW). Rural electrification is also a priority set by the GoB for around 1,000 rural communities¹¹. Under this scenario, the national energy management system does not include any module on climate-related risks.

The outcome focuses on strengthening climate change adaptation capacities of stakeholders of the energy sector to better identify and address the climate risks for the sector.

The project will bring additional resources to the existing policies and strategies of the energy sector in Benin, to the PDDC and to the PNDGRN, in order to strengthen the capacities of state and non-state stakeholders involved in managing the energy sector, to enable them to integrate climate risks and adaptation measures in planning processes for the management of supply and demand of energy in Benin, the coordination of decision-making and of initiatives in the sector.

The first output consists in setting up a multi-stakeholder platform to facilitate dialogue between decision-makers in different sectors related to energy, and decision-making on the competing use of energy sources and on cross-cutting issues related to the production, access and energy efficiency in relation to climate change. Through this output, the project will support the creation and functioning of a multi-stakeholder platform with the goals stated above. The output will also support the integration of the platform, as a technical or sector work group, into the national committee on sustainable development and the national committee on climate change. This will strengthen the institutional legitimacy of the platform and its sustainability after the end of the project (Output 1.1.1.).

Activities will be dedicated to a gender sensitive evaluation of the project and of the positioning of the actors in the platform, setting the criteria to appoint the members of the multi-platform, and develop the work plan of the members of the multi-stakeholder platform.

A training program will be implemented for 500 individual stakeholders in the sectors related to energy (including members of the multi-stakeholder platform of the energy sector and members of the National Multisectoral Commission on Domestic Fuels) to strengthen their capacity to: i) identify climate risks for the energy sector; ii) design and implement adaptation measures; iii) integrate climate risks and parameters in key policies of the energy sector, in the energy planning tool GEOSIM, and in planning processes of energy supply and demand (Output 1.1.2.). The training program planned in this output will be supervised (development and implementation) by the Direction of Energy. The training program will increase the stakeholders' knowledge of interrelations between the energy sector and climate

¹¹ <http://www4.unfccc.int/submissions/INDC/Published%20Documents/Benin/1/INDC%20BENIN%20%20Version%20finale%20revue%20septembre%202015.pdf>

change, so that they can later on provide sensible opinions and advice in the decision-making of the sector. The program should also target forestry officers from every category, technical managers from the Ministry of Energy, and beneficiaries from local authorities, NGOs and communal forestry associations.

The program will especially rely on existing structures of technical, professional and higher education and training, such as CFPP, CEB, SBEE, FSA, EPAC, and the water and forestry training center of Toffo. The program will begin by a training of these trainers, which will then be in charge of the training of stakeholders defined above. Experiences and lessons learned from this training will allow the creation of a training module on integrating climate risks into the energy sector, to be provided to CFPP and spread in their centers. Activities will focus on the capacity building of 500 stakeholders (as for 2020) in sectors related to energy with a yearly quota of at least 50 women and 50 men. At least 80% of those trainees should, during the year, apply the experience acquired in training. Also, the trained stakeholders from sectors related to energy will be assisted, by providing them with regular training reports and annual project reports. A list of parameters and indicators for energy sector risks to climate change will be defined and methodologies and tools elaborated for evaluating and prioritizing the adaptation options for advancing a climate resilient energy sector.

Component 2: Sustainable land and forest management practices for strengthening the climate resilience of the zones supplying wood for energy

Sustainable land and forest management, and biomass production are highly susceptible to climate change. The energy density of biomass can vary due to variations in photosynthetic/plant physiological interactions, often driven by CO₂ concentration changes. However, in the baseline scenario, adaptation is absent from any national biomass-based energy policy or program document.

The outcome of this component will be that energy supply strategies and plans at all scales integrate as much as possible climate change issues and adaptation measures.

Stakeholders in charge of managing the energy sector do not only need to integrate into energy planning the parameters affecting energy production, distribution and demand, but also hydro-meteorological and climatic parameters. Even though climate is not the only determining factor of energy demand, it is a key factor. Future energy demands will depend on factors such as development policies, the industrial sector's dynamism, population growth, the evolution of modes of transportation, the improvement of energy efficiency, and future climate evolutions. All of these non-climatic factors will be affected by climate and climate change, independently of any problem of the energy sector. Satisfying the energy demand will require taking into account these climate-related factors. Moreover, the energy sector will need to assess potential direct impacts of climate and climate change on energy sources, energy production and distribution, and to develop strategies to prevent these risks, in order to minimize the potential impacts of climate change on the energy balance.

In order to use wood energy resources of Benin in a rational and sustainable way, the project will support, based on future climatic projections, an assessment of risks and vulnerabilities of the communal forests identified as supply areas for fuelwood to temporal and climatic phenomena such as storms, floods, increase in frequency and intensity of droughts, intensification of wild fires, in order to adopt a proactive strategy for the management of these risks and to integrate them into the new design of SDAs. This means that these SDA, which will be looking at fuelwood in the cities of Parakou, Malanville, Djougou, Natitingou, Bohicon, Abomey, Cotonou, Porto-Novo and Lokossa, will be revised (Output 2.1.1.).

In addition, a National Plan for the optimal management of supply and demand of electric power will be developed and implemented, by considering climate risks (temperature, river flow, evapotranspiration, rain, sunshine, cyclones, floods

...) and adaptation measures. This will be based on projections of the evolution of energy demand according to economic development and demographic evolution scenarios, to elaborate a climate-resilient electricity supply masterplan and to allow minimizing imbalances between energy supply and demand due to climate change and variability as well as natural disasters (Output 2.1.2.).

In the same parallel, the Information System for Permanent Evaluation (SIEP) on domestic fuels and the Ecological and Forest Information System (SIEF) will be updated and functional in order to include climate risks and strategic options to address these risks. The revision of the SIEP and SIEF tools will enable the General Directorate of Energy (DGE) and the National Remote Sensing Center (CENATEL) to respectively integrate climate risks identified above in the monitoring, planning and management of the sub-sector of biomass energy (Output 2.1.3.).

The Forest Development Plans (PAF) of Middle Ouémé and communal forests of Fita Agbado, Zounzoukan, Détohou, Kolobi, Bobe, Ouogui, Badé, Tfougou, Nonsinansson and Dahendé will be revised to incorporate risks of drought, wildfires, and other climate risks as well as adaptation measures. These forests supply the cities and urban centers of Benin in wood energy. This output will promote climate-resilient and ecologically sustainable energy from wood. It will support the revision of Forest Development Plans corresponding to 600,000 ha in Middle Ouémé and communal forests supply energy wood to the eight big cities of Benin. These plans will integrate climate risks such as the increase in frequency and intensity of droughts, floods, rainfall perturbations, and climate factors which can favor the increase in intensity and frequency of wild fires. It will also support the development of community measures and rules enabling the concerned communities to ensure that resources and land use directives set by the revised plans are respected (Output 2.1.4.).

The second outcome under this component is the enhancement, through the implementation of restoration and preservation of watershed ecosystems activities, of climate resilience of watersheds of rivers Ouémé, Niger (Sota), Volta (Pendjari) housing the hydroelectric installations of Yéripao (existing) on one hand, and of Sosso waterfall, Gbassè, Koutakroukrou, Kota fall, Wabou and Kouporgou (considered in the medium term) on the other hand.

With the project, riverbanks of these rivers will be protected against erosion through the reforestation of 10,000 hectares of multipurpose herbaceous species tolerant to drought and flooding. Erosion on the riverbanks will be facilitated by the combined phenomena of land drying and heavy rains. This output (2.2.1.) will plan and implement the reforestation of 10,000 ha of multipurpose herbaceous species tolerant to drought and floods. These species should be palatable species for cattle, also allowing the development of beekeeping and fruit growing, in order to help strengthen the climate resilience of livelihoods of communities living in these areas.

The project will also finance the building and maintenance of low cost community infrastructures to protect riverbanks against erosion. The preparatory phase of the project will develop, with the participation of local communities, a mechanism for the operationalization and funding for maintenance of these infrastructures (Output 2.2.2.). It will support the spreading of good practices for sustainable land management (fertility management, anti-erosion practices...) through the implementation of a training program benefitting 1,000 members (with gender parity) from local communities of the rivers Ouémé, Zou, Sota, Mono and Niger, in order to lessen the erosion phenomena that contribute to the destruction and silting of the riverbanks, threatening the hydroelectric potential of these (Output 2.2.3.).

The promotion of alternative, climate-resilient income generating activities (IGAs) such as beekeeping, horticulture, small livestock, production and maintenance of improved stoves and pressure cookers will also be promoted. Indeed, the communities living in these areas derive all their income from agriculture and especially cotton production. Due to the increase in the cost of living, rural populations in these regions are forced to intensify cotton production and forestry. This is usually done at the expense of natural resources and ecosystems protecting Ouémé, Zou, Sota, Mono, Niger against drying and sanding. To do this, the output will finance training of 1,000 individuals (with gender parity)

for a dozen of the most vulnerable communities in efficient production techniques of the IGAs and financial management of businesses. In addition, the project will also support in each of the communities, the development of business plans and access to finance for 100 individuals or groups of individuals. By supporting alternative income generating activities, the project will reduce pressures on ecosystems Ouémé, Zou, Sota, Mono, Niger... and the phenomena of erosion that threaten the hydroelectric potential of these rivers. From an operational point of view, those activities should be based on the following methodology: first, an information campaign should be run on the project, its objectives and the financing mechanism of sub-projects. The partner structures are invited to see by themselves in the various concerned communities what can be done and how. The NGOs or firms from the private sector that are to work on the project are then identified and sign a cooperation agreement. The second step consists of identifying the communities' precise needs and financing means, relying for instance on an interview guide or a ZOPP method. The needs are then prioritized and the means are discussed with the Micro-Finance cell of the Ministry of Finance. Once the financing scheme is elaborated, it is submitted to the relevant party (Output 2.2.4.). Various business models can therefore be discussed and implemented, depending on the community specificities. Some will be micro-credit-based while other will rely on equity for those who can afford it. Also, subsidies can be discussed, in the form of capacity reinforcement or technical financial advice or even to provide for a certain percentage of the activity. Note that any retained business model is to be sustainable beyond project completion in order to outlive it and not rely only on external help.

The third outcome of Component 2 will be the enhancement of climate resilience of fuelwood supply areas by revised SDAs and through reforestation and conservation of woody areas. Investments from the project will include the development of climate-resilient community wood for energy parks in wood for energy supply areas as most vulnerable by the revised SDAs, to increase their climate resilience. These community parks have the dual objective of sustainably secure wood for energy supply and contribute to strengthening the resilience of livelihoods of communities living in and around these areas. These woods for energy parks will be managed by the communities themselves and according to the resilient development plans that will be developed or revised. Memoranda of agreement based on the rules and forms of local social organization will ensure compliance with these management plans by all beneficiary communities (Output 2.3.1.).

This project will finance the protection of identified supply areas for fuelwood against wild fires induced or aggravated by climate phenomena through: the development of risk management protocols for the increase in intensity and frequency of climate-related wild fires and the demonstration of fight methods against wildfires resilient to climate around 300 000 ha of forests (Output 2.3.2.).

The project will support the promotion of alternative climate-resilient income generating activities (IGAs) such as beekeeping, horticulture, small livestock, production and maintenance of improved stoves and pressure cookers, sustainable production of charcoal. Indeed, the communities living in these areas derive all their income from agriculture and especially cotton production. Due to the increase in the cost of living, rural populations in these regions are forced to intensify cotton production and forestry. This is usually done at the expense of natural resources and forest areas. To do this, the output will finance training programs for the benefit of the most vulnerable 1,500 individuals in the city communities of Djidja, Zangnanado, Dassa, Savè, Toukoutounan, Pèrèrè, N'dali and Malanville and other areas vulnerable in the technical production of these alternative IGAs and financial management businesses. The project also will accompany them in the development of business plans and access to finance for 10 individuals or groups of individuals in each of the communities (Output 2.3.3.).

Component 3: Energy use and production - Technology transfers to strengthen the resilience of livelihoods and living conditions of the vulnerable communities

Under the baseline scenario, no practical measures are taken to protect the existing power generation, transmission and distribution facilities in the country. There is no real technology transfer plan nor financial mechanism to cover the risks in the energy sector in case a climate-related extreme event hits the country.

The outcome of this component is to set the practical, technology- and financial-based, measures to strengthen the resilience of the vulnerable communities and to better protect the strategic assets in the energy sector against climate risks.

In order to strengthen climate resilience of sources of energy supply of Benin, the project will support investments for the physical protection of the most vulnerable existing electrical infrastructure, the protection of the hydropower potential of rivers destined to house hydroelectric plants, and the conservation and strengthening of forests identified by the revised SDAs (via the second component) as sources of energy wood supply. Measures will be implemented to protect thermal power plants of Cotonou (Akpakpa), Porto-Novo, Kandi, Natitingou against the increase in the intensity and frequency of droughts and other climate risks and natural disasters such as floods, cyclones and hurricanes. The goal of this output is first to conduct a vulnerability assessment of the most important electrical installations and then to support securing these infrastructure investments. The selection criteria for infrastructure for which it will assess vulnerabilities will be defined during the project preparation phase and will include the size of the concerned population, the economic activities concerned and also the common capability to cope with disruptions of electrical distribution such as acquiring generating sets (Output 3.1.1.). Measures will also be implemented to the distribution networks against winds and raising temperatures. The goal of this output is first to conduct a vulnerability assessment of the network, to analyze what technological or strategic solutions are feasible and then to support securing these infrastructure investments (Output 3.1.2.).

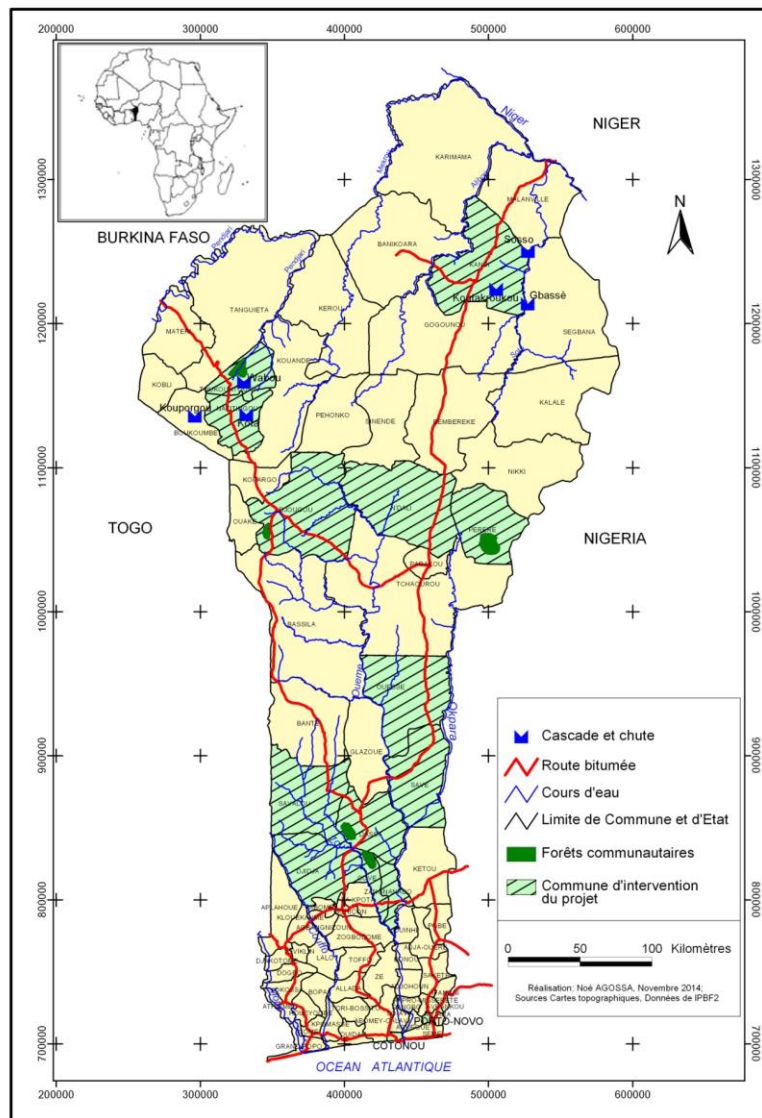
The project will also promote Benin's renewable energy generation capacity by raising the evidence to support hydro, solar or biomass-based energy generation in rural areas (one selected vulnerable locality). This is in line with the biomass project as one of the objectives mentioned in the PIF was to issue an "RFP for installed capacity of 4 MW of both on-grid and off-grid (mini-grid) generation from biomass IPPs will be launched". A cross subsidy model to fund utility scale renewable energy may not be politically possible in Benin as the country may not afford to promulgate renewable energy feed in tariffs in the way that Europe or South Africa have (residential customers are struggling to pay bills at current levels, hence innovative financing mechanisms will be needed to reduce the cost from current unaffordable levels. The study should consider incentives such as voluntary carbon market, eco-labelling, etc...). Just about 25% of the country is electrified and more than half of the households cannot pay for it at current prices (Output 3.2.1.). Communication and raising awareness to the targeted rural population will be ensured, focusing on the benefits of being organized in renewable energy user groups and of promoting hybrid diesel-PV based mini-grids (Output 3.2.2.). Ten thousand (10,000) improved stoves and a thousand (1,000) pressure cookers will be distributed through micro-financing and loan guarantee schemes in the most vulnerable rural communities of Djidja, Zangnanado, Dassa, Savè, N'dali Perere, Toukoutouna, Djougou and Bassila and urban centers of Cotonou, Porto Novo, Bohicon, Abomey, Parakou, Natitingou, Djougou, Malanville, Lokossa, Kandi, to reduce household demand for fuelwood (Output 3.2.3.). Three improved carbonization technologies will also spread in communities producing charcoal through the training of 500 coal operators (Output 3.2.4.).

Finally, a Financial Support Mechanism (FSM) will be established and capitalized to support private investment in adaptive measures to increase the resilience of the energy sector to climate change. The FSM will be in line with the UNDP micro grant Policy. The mechanism will be able to provide micro-capital grants for non-credit purposes as inputs to the project activities. A policy framework will be established, with a adaptation compartment to cover climate related extreme events such as floods and/or droughts. The compartment of the FSM related to the current project is a national insurance fund for the GoB. It is an energy sector insurance instrument which is not similar to indemnity type products which are usually offered by the traditional insurance companies. It will operate at a different level from insurance companies because it is a national mechanism for the GoB targeting the vulnerable communities. It will be the first-of-

its-kind instrument in the country, and even in the region. The CCA compartment of the FSM will be able to meet the claims-paying requirements in the energy sector in case a climate-related extreme event (floods, droughts, etc.) is harming the population of the country in terms of energy access. Hazards that are considered in computing the loss are wind, floods, droughts and storm surge in coastal areas where assets can be at risk. The FSM payout is based on the loss assessment from the climate-related extreme event as it happens. Losses calculated will primarily focus on the assets in the energy sector in rural areas. However, the FSM will develop a policy framework for the purpose. The framework will be designed to help the most vulnerable communities in terms of access to energy, especially after a disaster. So a loss estimate will be designed to give an estimate of what the charge to the GoB accounts can be. The payout is designed to help the communities in that short period between the disaster and 3-6 months later when they can get other resources to reconstruct what has been damaged. The CCA FSM will enable the GoB to learn how to deal with such critical climate-related extreme events. In the future, the FSM and its policy framework is expected to help the GoB to have its own process. The recognition of an extreme event or a climate-related hazard, by a decree for instance, should lead to the coverage of the damages directly by the GoB, once the FSM will be depleted.

The FSM will have a common administrative structure (Project Management Unit) with the one proposed under the MFA project focusing on biomass (GEF ID 5752). A MOU will be signed with the Central Bank of West African States (or with commercial bank selected on the basis of competitive bidding) setting out the objective, funding mechanism and administration rules regarding its participation as fiduciary agent of the FSM (Output 3.3.2.). Financial and other incentives will be provided to project developers/Independent Power Producers (IPPs) towards low-carbon climate resilient investments in the energy sector (Output 3.3.3.).

Figure 2: Intervention areas of the project



A. 5. Incremental /Additional cost reasoning:

The principle of financing the additional costs necessary to respond to the adverse impacts of climate change for purposes of the LDCF¹² applies for the current project. Moreover, addressing the adverse impacts of climate change imposes an additional cost on vulnerable countries in their effort to achieve national sustainable development goals and Benin is no exception.

Practically, activities that would be implemented in the absence of climate change constitute a project baseline, and the costs of achieving this scenario **without the project** are referred to as baseline costs or baseline financing. In **this** case and with a view to improving the energy supply system (infrastructure), the quantity and the quality of energy sources and **enhancing** the efficiency of energy supply and demand, the Government of Benin has developed and adopted in 2009 a national development strategy for the energy sector. The main axis of this strategy is to: i) enhance the human, institutional and regulatory capacity for a better planning and management of the energy resources; ii) increase the production, transport and distribution of the different forms of energy; iii) improve poor rural access to energy. To achieve **these** ambitious objectives, the GoB, with the technical and financial support of its partners, including UNDP, has initiated several programs and projects. Among baseline projects, the following are relevant for the proposed LDCF project:

- Programme in support to decentralization and communal development (PDDC)
- Support for the sustainable management of Benin Communal Forests
- Program for the enhancement of the management of the Energy supply and demand - 2013-2015
- Support to the implementation of Millennium Villages in Benin

Therefore, it is undeniable that the GoB has undertaken an ambitious program for improving energy access based mainly, on improving the management capacity of the energy sector, developing new tools and strategies for managing the energy demand and supply and increasing energy production. However, the climate variability and change are likely to worsen Benin's energy deficit if appropriate adaptation measures are not adopted.

The proposed LDCF financed project will contribute in overcoming the political, institutional, financial barriers and those relating to individual capacities and to knowledge impeding to prevent and reduce the impacts in vulnerable communities of climate-related risks on the energy sector of Benin. **These barriers to adaptation measures are the following:**

- **Low technical and institutional capacities**
- **Limited access of decision makers from the energy sector to climate information**
- **Limited access of producers of charcoal to efficient carbonization technologies**
- **Difficult access of households to efficient equipment for fuel wood use**
- **Limited knowledge of the evolution of renewable energy potential**

Overcoming these barriers will involve the development of a strategy for strengthening resilience of the key energy sources, the integration of climate risks in the planning and budgeting processes of the energy sector and the promotion of behavioral change on the part of both consumers and producers of energy. Both climate resilient energy use and the development of alternative energy sources (portfolio approach) will be necessary to reduce vulnerability. Given the importance of biomass in the context of Benin's current energy supply, these measures will also need to be backed up by the practice of sustainable land management options especially in areas that are more vulnerable and the promotion of income-generating activities, alternatives to non-sustainable forest and land uses practices in riparian communities of wood energy supplying landscapes and the adoption and implementation by Benin, of institutional, political and regulatory measures aiming at removing any obstacles to such adoption of adaptation measures.

¹² <https://www.thegef.org/gef/sites/thegef.org/files/documents/GEF.C.28.18.pdf>
GEF5 CEO Endorsement Template-February 2013.doc

To achieve these results, it will first be necessary to improve climate change capacity of the decision makers and technical staffs in charge of the energy and forests resources sectors. Through the Programme to support decentralization and communal development (PDCC), the government of Benin is implementing capacity building program for national and local authorities for the management of the energy sector. Also, the project for the sustainable management of Benin Communal Forests is carrying out capacity development for communal forest association members in the development and management of wood energy communal forests. Through this outcome, the LDCF resources will support the design and implementation by the Energy Directorate of a training program to create within the country capacity able to support the integration of climate change concerns (climate risks, including the ones for the energy sector in the importing countries and adaptation options) in the planning tools and processes of the energy sector, the management of hydroelectric and thermal power plants, the policy, strategies, and development programmes of the sector. This capacity building program will include the strengthening of the capacities of the communal forest association members, the land and forest managers to develop and implement climate resilient sustainable land and forest management strategies and measures for preventing and managing bushfires and other climate resilient strategies (under the outcomes 2 et 3).

Additionally, the outcome 1 will support the creation and the functioning of a multi-stakeholders climate change and energy platform (from energy, forest, land and water resources, agriculture, private sector, ...) to facilitate dialogue and coordination of the decision-making processes about the cross-cutting climate changes related issues of the energy sector including the energy production, the access, the efficiency and the competing use of energy sources.

On top of contributing to reduce the pressure on the wood energy sources (baseline scenario), the initiatives supported by this project are expected to have 2 additional adaptation benefits: i) to reduce the impacts on households energy budget of the price increase that could stem from the reduction of the wood energy availability induced by the projected impacts of climate changes in the ligneous resources, and ii) to prevent the increase of time and effort dedicated for collecting wood energy in rural communities, above all, for women and girls, due to the climate induced degradation of wood resources. This will allow Beninese households of which 80% depends on wood energy for cooking, to dedicate more resource, time and energy to the other households activities such as IGAs, education, health, participation in communities affairs, necessary for increasing their livelihoods and life conditions. Finally, the improved cook stoves will also contribute to reduce the indoor pollution and related health problems from the use of traditional wood stoves.

While the investment of the project amounts for 8 million USD, with an important the co-financing in grant, for 9 million USD, and the involvement also of the power utility company, the *Compagnie d'Electricité du Bénin* (CEB), the return is high. The project will enable i) to enhance the adaptive capacities of the rural population in accessing biomass for energy purposes, and ii) to better protect the entire supply chain in the power sector, i.e. the assets related to generation, transmission and distribution of power. Inadequate attention to the impacts of climate change can increase the long-term costs of electric power sector investments, the likelihood that they will not deliver intended benefits, and the probability of failure under climate stress. In certain cases, existing high-risk infrastructure may be retrofitted for protection against storms, flooding, and increased salinity and temperature, and relocated where necessary. Transmission and distribution lines may require relocation and revised design codes for protection against wind, high temperatures, corrosion, and flooding. Besides, the project will enable to better estimate specific areas related to the energy sector, such as the costs and benefits of retrofitting cooling systems where the economic efficiency of such climate-proofing investments is often proven. Relocation or refitting of extremely vulnerable infrastructure may also need to be considered. A broader mix and balance in generation option can improve energy security and stability of supply. Options may include decentralized renewable energy, decentralized planning and generation, integration of adaptation and mitigation planning, forecasting demand changes with warming and improving supply-side management, integrating power planning with that of other sectors, and rezoning land use so future energy infrastructure is in less vulnerable areas. In some cases, small additional costs at the development and design stages of power plants,

transmission lines or the distribution network are expected to result in substantial net benefits¹³. These aspects will be considered under Component 3.

In conclusion, the costs of inaction, or poorly considered and badly executed actions, are expected to be far higher than well-planned and implemented efforts to improve energy sector resilience to climate change. Inadequate attention to these impacts can increase the long-term costs of energy sector investments, the likelihood that they will not deliver intended benefits, and the probability of eventual failure under climate stress.

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:

The proposed implementation of the project aims to allow multiple consistent results, with a replicable and sustainable approach. This does not go without risks. It is necessary to make an assessment of the elements that could prevent the proposed project from leading to the expected results, and also to anticipate a strategy for managing these risks in order to maximize benefits from the project.

Obstacles can be of different kinds: political (delays in decision-making or in providing information), institutional (management structures proposed in the project document inefficient), technical (low potential for partnerships, complexity of project themes), environmental (potential deforestation in the future micro plants areas) and financial (high costs, lack of attracted financial partners).

They can also meet various phases of the project: inception and recruitment phase at the beginning of the project, implementation of the activities, involvement of stakeholders, monitoring and adaptive management during the project, or sustainability and impacts of the project actions after the end of the project period.

While identification and assessment of risks is addressed at an early stage of project design, the overall risk management should be considered an iterative process given that potential impact of anticipated risks may change, and new risks can emerge throughout the project lifecycle. At this stage all identified risks and associated information have been documented in a risk assessment table. They are analyzed from an environmental, economic, technical, social perspective and from the perspective of the overall governance of the sector. Based on the risk analysis and management responses identified, the initial Risk Log has been created to keep track of the identified risks.

Table 2: Initial risk framework

#	Risk Description	Category	Impact severity	Likelihood	Risk Management strategy and safeguards	By when / whom?
1	Strong winds	Environmental	High	Medium	Strengthening prevention mechanisms, Establishment of infrastructure maintenance program Awareness raising of populations impacted	Government (DGE, CEB, SBEE, DGCC, WAPP), Civil Society, Beneficiaries
2	Rising temperatures	Environmental	High	Medium	Strengthening prevention mechanisms, Establishment of infrastructure	Government (DGE, CEB, SBEE,

¹³ ADB, 2013

#	Risk Description	Category	Impact severity	Likelihood	Risk Management strategy and safeguards	By when / whom?
					<p>maintenance program</p> <p>Awareness raising of populations impacted</p>	DGCC, WAPP), Civil Society, Beneficiaries
3	Influence of rainfall: late and heavy rain (risk for supply) or flooding (flooding of power plants).	Environmental	High	Medium	<p>Strengthening prevention mechanisms,</p> <p>Establishment of infrastructure maintenance program</p> <p>Awareness raising of populations impacted</p>	Government (DGE, CEB, SBEE, DGCC, WAPP), Civil Society, Beneficiaries
4	Inconsistence between institutional arrangements due to lack of coordination and synergy among the stakeholders.	Organizational	High	Medium	<p>Strengthening dialogue among partners</p> <p>Upstream awareness raising of partners and strong involvement in the process</p>	Government, Financial and Technical partners
5	Implementation capacities / capabilities of stakeholders (Appointment of unqualified persons).	Organizational	High	Medium	<p>Capacity building (training, access to technical resources)</p> <p>Establishment of a knowledge transfer system</p>	Government, Research and development institutions, Financial and Technical partners, Civil Society, Private sector, Land chiefs, Beneficiaries
6	Management and implementation arrangements must be specified beforehand and respected (delay in mobilizing and recruiting people).	Organizational	Medium	Medium	Designation of a Ministry "Champion" for steering the process	Government
7	Problem of energy sector management (governance and management) (delay in the development of protocols).	Organizational	Medium	High	<p>Improving good governance</p> <p>Establishment of procedures for monitoring and progress monitoring</p> <p>Definition of participatory management systems and an independent framework to implement the agreed measures.</p>	Government
8	External economic factors of price	Financial	Medium	Medium	Awareness raising of stakeholders	Government, Financial and

#	Risk Description	Category	Impact severity	Likelihood	Risk Management strategy and safeguards	By when / whom?
	volatility.				on price indexation.	Technical partners, Private sector
9	Access to financial services.	Financial	Medium	Medium	Financial Support Mechanism is up and running. Strengthen applied research to reduce the cost of new technologies in the African context (energy products fitted to the context of Benin and other African countries such as prepaid energy access).	Research and development institutions, Financial and Technical partners, Private sector
10	Lack of ambitious incentives for private sector (implementation costs of activities are greater than expected revenue)	Financial	Medium	Medium	Identify and mobilize key stakeholders to support the development of a favorable framework (investors, artisans, entrepreneurs, micro-finance, associations).	Financial and Technical partners, Private sector
11	Payback: the question of the attractiveness and profitability of renewable technologies	Financial	High	Medium	Identify and mobilize key stakeholders to support the development of a favorable framework (investors, artisans, entrepreneurs, micro-finance, associations).	Financial and Technical partners, Private sector
12	Period of political instability	Political	Medium	Medium	Anticipate election periods.	Government, Civil Society
13	Change within government structures: monitoring and skills (no appointment of proper profiles)	Political	High	Medium	Focal point appointment. Knowledge transfer to ensure monitoring.	Government, Civil Society
14	Geopolitical: Regional interdependence	Political	High	Medium	Strengthening of the coordination of regional policies. Strengthening dialogue.	Government, Financial and Technical partners
15	Complexity and innovative nature of the project (Project Management: Cumbersome administrative process, Breach profile nominees, Ignoring gender in the selection of	Operational	Medium	Medium	Lobbying governments Defining objective criteria for appropriate persons designation.	Government, Financial and Technical partners

#	Risk Description	Category	Impact severity	Likelihood	Risk Management strategy and safeguards	By when / whom?
	nominees)					
16	Probable reluctance to appropriation of technologies (Opposition landowners , poorly applied reforestation techniques Lack of knowledge and henceforth possible negative perception (lack of or limited social and cultural acceptance) on the use of new technologies for cooking	Operational	High	Medium	Strategies taking into consideration the social context Awareness targeted to experienced actors key within communities to frame reforestation	Research and development institutions, Civil Society Private sector Land chiefs Beneficiaries
17	Strategic vision, planning and communication.	Strategic	Medium	Medium	Definition of participatory management systems and an independent framework to implement the agreed measures	Government, Civil Society
18	Relationships between stakeholders: lack of dialogue with the beneficiaries and involvement of all stakeholders	Strategic	Medium	Medium	Strengthening of participatory dialogue	Government, Civil Society Private sector Land chiefs Beneficiaries
19	New unexpected regulations or policies: Finance Act 2015	Regulatory	High	High	Anticipation of deadlines for implementing new regulations	Government, Private sector

As identified in the NAPA and Second National Communication of Togo and Benin under the United Nations Framework Convention on Climate Change, the major climatic risks that impact the energy sector are:

- Strong winds: the effects of high winds cause disruption on the distribution network;
- Rising temperatures cause expansion of cables;
- The influence of rainfall and heavy rains (lack of precipitation leading to drought and flooding) is that heavy rainfall lead to atmospheric discharges that often cut the transportation cables;

About organizational risks some institutional arrangements are inconsistent due to lack of coordination and synergy between stakeholders (states), which can induce random decisions. Also often implementing stakeholder capacity is

weak because the designated focal points, often lack recent data that do not allow certain representations abroad to be technically competent. Also the terms of the project management and implementation should be identified before and respected so that stakeholders can meet their commitments towards proper implementation. Finally strongly related to the previous point strengthening of good governance is essential. The lack of good governance for the energy sector is a problem.

Pertaining to financial risks climate change phenomena affect the energy sector. However, innovative solutions specific to the African context such as prepaid access to energy should offset the increase in financial risk due to the great impact of climate change. It nevertheless becomes necessary to put in place incentives to involve closer financial partners and the private sector.

First, the major external economic factor is price volatility due to economic fluctuations and related market elements. Second internal factors to consider are:

- Access to financial services for certain actors or households is still difficult.
- Lack of ambitious incentives for private sector.
- The introduction of new technologies in particular involves a major risk for cost recovery.

Regarding political risks a period of political instability is to anticipate with the presidential elections to be held in 2016. The changes in the structures of government (High turnover in government structures) may result in disruption of resources for monitoring and competent skills. On the geopolitical arena Benin is highly dependent on importation of energy from neighboring countries. It is therefore vulnerable to political instability within ECOWAS. The types of instability that can be anticipated are mainly civil wars, political crisis in a member country or demographic / socio-economic growth that would increase national demand for energy. Additionally future parliamentary and presidential elections in Nigeria, Burkina Faso, Cote d'Ivoire, Ghana and Togo in 2015 and 2016 need to be carefully anticipated, as those political changes may impact bilateral or regional processes as well as agreements.

Looking at operational risks now the programmatic aspect of project induces a factor of complexity and an innovative nature for the management arrangement to design. Regarding project beneficiaries' possible reluctance to the appropriation of technologies may arise during training or awareness raising campaigns

At the strategic level it has been stressed several times during the interviews with stakeholders that political discourse does not fit the reality of the energy sector needs. Strategic vision, planning and communication are not in synchrony. The involvement of all stakeholders is needed to foster productive dialogue towards acceptable and useful solutions to all beneficiaries.

Finally regarding the possible regulatory risks unexpected new regulations or policies be need to be anticipates. This is the case for instance with the Finance Act 2015 that will offer a tariff exemption for the importation of generators. This regulation is at odds with the efforts already made towards sustainable energetic transition (the country is not an oil producer).

In summary and based on discussions with stakeholders, it is expected that the overall project risk will be moderate. The potential risks, which could hinder the successful project implementation and/or reduce project effectiveness, are itemized in details the table below. To address these anticipated risks, the project will be designed to include an effective means to monitor, and to the extent possible, mitigate these risks. A project monitoring and evaluation plan has been prepared to track not only the project milestones, but also the indicators that will show that the identified risks are, if not eliminated – at least mitigated. Stakeholders were engaged during the project design stage. The measures that have been taken during the preparation and design of the Project and/or will be taken during the implementation phase so that these potential risks will be mitigated are also outlined in the table.

Table 3: Risks, Rating and Mitigation Approach

Risks	Rating	Mitigation Approach
Policy and Regulatory: Reluctance in some quarters of the Government to introduce the necessary supporting policies and regulations.	Moderate	The Government of Benin is strongly motivated to provide access to modernized energy services to the large rural and peri-urban population that utilizes fuel wood/charcoal for cooking and is driven by its plans to reduce the massive deforestation that accompanies the use of forestry resources. Hence, it will ensure that all Government Institutions (Ministries/Departments/Directorates, etc.) get on board to put in place a conducive policy and an enabling regulatory framework for biomass gasifier promotion and development. This will also be in line with its December 2003 “Energy Policy and Strategy” and the updated October 2009 “Strategic Plan for Energy Sector Development”.
Economic/Financial: Non-availability of credit to promoters of biomass gasifiers.	Moderate	The project will work with local lending institutions to develop their capacity to understand and appraise gasifier projects for lending. In addition, the Financial Support Mechanism will contribute towards minimizing risk exposure on the part of lenders.
Financial: The poor investment climate may impact the project.	High	Benin ranks 135 out of 189 economies on protecting investors and 169 out of 189 on enforcing contracts, as per the WB/IFC “Doing Business 2015” publication. With this in mind, the project will put in place a Financial Support Mechanism that will be directed at minimizing the financial risks that both project developers and lenders may face in doing business targeting biomass gasifiers.
Technology: Likelihood of gasifiers of inappropriate design and/or of poor quality introduced in the country.	High	The project will establish network arrangements with other countries that have several years of experience with biomass gasifiers, like Brazil, Cambodia, China, India, etc. This will ensure that only successful models of gasifiers will be introduced and mistakes made elsewhere are not repeated. In addition, the project will bring in trainers from these countries to train Beninese technical personnel in high-quality installation, operation and maintenance of gasifiers. Moreover the project will identify a fall back plan with the identification of a list of alternative suppliers for the technology.
Strategy: Village level commitment to change and adopt new agricultural methods is not sufficient for the widespread adoption.	Moderate	Project success will depend on the participation and commitment of all the relevant stakeholders at the local level including traditional authorities, municipal and national agencies, NGOs and research centers. Participatory planning and decision-making processes as well as capacity building and organizational support will mitigate the risk of certain stakeholders restraining from participating in project implementation at least temporarily. To convince people to change long-held habits, the project will demonstrate the effectiveness (social, financial and environmental) of alternatives in the short and long-term. Most rural villages operate at extreme levels of poverty and people may be unwilling to try new approaches when their basic livelihood needs are not being met. Hence, pedagogic plots, trainings and visits to experimental farms are key activities to promote changes in rural areas.
Political: Land conflict and conflict among traditional / religious groups	Moderate	The recently adopted land tenure law reduces significantly the potential land conflicts as it improves the Rural Land tenure Plan, recognizing the customary rights (“Rural certificate”). The project will be implemented through participatory processes, consensus building and conflict resolution and capacity building, with the underlying agenda of pre-empting conflict that could otherwise undermine project success.
Environmental/ Climate Change.	High	There are multiple environmental risks (e.g. decrease in the availability of agricultural biomass due to land degradation, reduced rainfall/water flows, drying up of watershed areas due to a change in climatic conditions) that can affect agricultural output and result in a reduction in crop residues, thus negatively impacting on the biomass supply chain. This risk will be mitigated by introducing appropriate water management techniques in agricultural production, like drip irrigation and boreholes.
Overall	Moderate to High	

A.7. Coordination with other relevant GEF financed initiatives

Past initiatives

Benin and UNDP, with the collaboration of GEF and MEPN, implemented in 2008 Benin's first National Adaptation Programme of Action (NAPA), which set the framework for future adaptation actions in Benin.

The NAPA already pointed out the vulnerability of the energy sector to climate change, with less regular functioning of hydroelectric installations and slowed growth of forest resulting from the rise in temperature, as well as the growing anthropogenic pressure for fire wood and charcoal.

Priorities options were set for the energy sector:

- Promoting economically efficient stoves;
- Spreading new and renewable energies (biogas, solar energy, biofuel, micro hydroelectricity);
- Reforestation with fast growing species;
- Promoting agroforestry;
- Promoting income generating activities.

Finally, the NAPA drew five project profiles with matching objectives as follow:

- Providing to agricultural stakeholders and communities climatic and meteorological information and warnings in case of forecast extreme events likely to harm production systems;
- Reducing populations' vulnerability to climate change impacts by providing a better access to sustainable energy sources and protecting forest resources;
- Strengthening water availability during droughts in order to adapt communities to climate change;
- Contributing to the reduction of morbidity and mortality due to malaria;
- Correcting sedimentary unsteadiness, coastal erosion and retreat, restoring mangroves and promoting improved salt extraction technologies combining solar and wind power.

Another significant partnership between UNDP and Benin led to the publication of the First¹⁴ and the Second¹⁵ National Communications to the UNFCCC, respectively in 2002 and in 2011. In the same vein, UNDP CO supported the development of the National Strategy for the Implementation of the UNFCCC¹⁶ in 2003. This assistance from UNDP related to climate change includes capacity building to enable the participation of Beninese negotiators to the various climate-related Conferences of the Parties (COP) and the integration of climate change in public policies.

Other projects have been implemented in Benin by UNDP, before or after the setting of the NAPA.

The integrated climate change adaptation program for agriculture and food safety in Benin (NAPA1 priority)¹⁷ began in 2010. It seeks to enforce rural communities' capacities of resilience to climate change in four vulnerable agro-ecological areas of Benin. Its main results so far were urgent measures to enhance vulnerable populations' resilience to climate change, and the setting of an institutional, legislative and governance framework to integrate climate issues into development.

A project of capacity building for rural communities' adaptation to climate change was led from 2007 to 2011 by the NGO *Initiatives pour un Développement Durable (IDID)*¹⁸ to identify and disseminate relevant climate change adaptation strategies.

¹⁴ http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=3543

¹⁵ http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=7590

¹⁶ <http://unfccc.int/resource/docs/natc/benne1fa1.pdf>

¹⁷ http://www.bj.undp.org/content/benin/fr/home/operations/projects/environment_and_energy/project_sample1/

¹⁸ <http://www.ididong.org/>

The same NGO led a second project, from 2011 to 2014, aimed at strengthening economic knowledge and adaptation abilities in Benin (the French acronym being *PRECAB* for *Projet de renforcement des connaissances économiques et de la capacité d'adaptation face aux changements climatiques au Bénin*)¹⁹. It strengthened local stakeholders' capacities on adaptation strategies and disaster management, and implemented a sectoral approach to integrate climate change adaptation into development strategies and policies.

The CCDARE (Climate Change Adaptation and Development Initiative) project²⁰ sought to integrate climate change adaptation in local development planning and strengthening of stakeholders, more specifically in communal development plans and annual investment plans.

Finally, an Adaptation GEF Project was submitted in 2012 and is currently under implementation. This project ("Strengthening climate information and early warning systems in Western and Central Africa for climate resilient development and adaptation to climate change – Benin") aims at strengthening the climate monitoring capabilities, implementing early warning systems and collecting available information for responding to climate shocks and planning adaptation to climate change in Benin.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

B.1 Describe how the stakeholders will be engaged in project implementation.

The following paragraphs only present summaries and key points. For additional details, please refer to the Project Document.

The project will be managed by an organizational structure as follows: the project will be implemented by the MERPMEDER and UNDP, with other responsible organizations (including the ministries related to agriculture, environment and finance), and in close consultation with other stakeholders.

A common management organization will be established with the biomass project in order to coordinate their activities.

The project will be implemented according to the guidelines of the UNDP projects executed nationwide. The project meets the objectives of the UNDAF framework, and as such, the responsibility of the execution returns to the Government.

Instances and governing bodies of the project:

Following a reform of the UNDP country's Program, the project NAPA Energy will be managed within the Directorate General of Energy (DGE). However, neither of the two projects (NAPA Energy and Biomass) will have a dedicated Steering Committee. There will be a unique Steering Committee for all the projects managed under the Environment Unit. The DGE will coordinate and oversee the delivery and execution of the projects.

In other words, the Steering Committee of the sub-program Environment, Climate Change and Sustainable Development will be hosted by the Secretariat General of the Ministry of Environment and serve as a common committee for both projects (NAPA Energy and Biomass).

This Steering Committee will provide strategic direction and approve the annual budget of the project. It will also examine the various project activities, through inputs provided by the project management team (PMT). The Steering Committee will be the organ of key project decision. It is co-chaired by the Ministries of Environment and Energy, and consists of representatives of UNDP, the GoB (including SBEE, other ministries, etc.), the

¹⁹ <http://www.ididong.org/?Le-Projet-PRECAB>

²⁰ <http://www.unep.org/climatechange/adaptation/KnowledgeandPolicy/CCDARE/tabid/29582/Default.aspx>

private sector, the civil society and eventually other donors contributing to the financing of the project.

Resources of the project:

Another element of the country's reform program is that the projects will not have dedicated coordinators. In order to ensure national ownership, the Government administrations, in which the projects are hosted, will ensure the Technical and Operational Coordination of projects. Technical or General Directors will designate a National Focal Point for the coordination of each project. The Focal Point who will be a state official (civil servant) shall not be paid by the project grant since he would already receive a salary as a civil servant. However he will be granted a bonus or incentive paid from the National co-financing that the Government will allocate to the project.

The National Focal Point will have the following tasks:

- Coordinate project activities with activities of other government bodies;
- Supervise project expenditures in accordance with the work plans and approved by the Steering Committee budgets;
- Assist, monitor and report on the markets and the implementation of activities within the deadlines;
- Accept the terms of reference for consultants and tendering documents for the inputs resulting in a subcontracting;
- Make reports to UNDP on the implementation and impacts of the project.

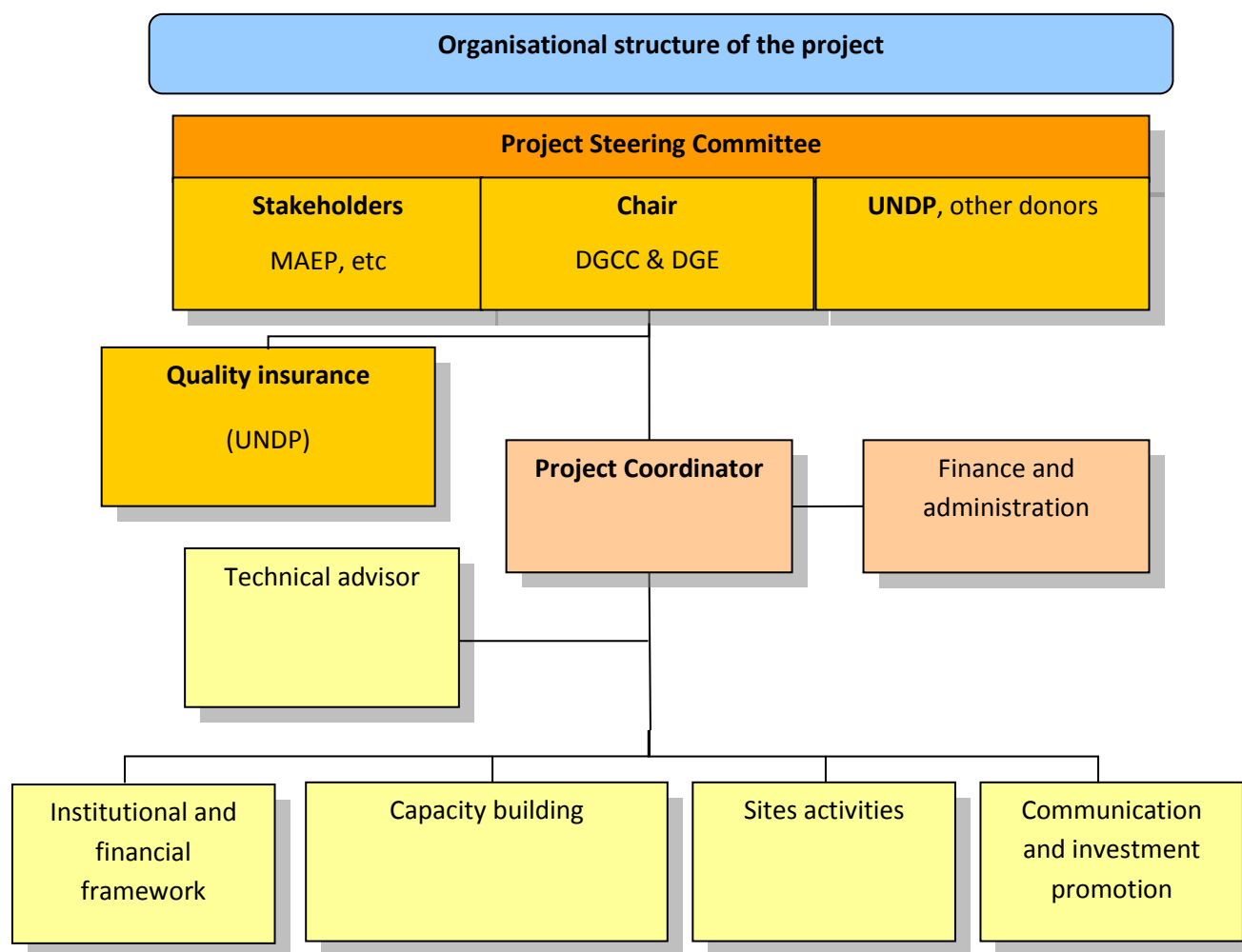
For technical requirements, experts and specialist will assist the National Focal Point. They will be recruited to lead the implementation of specific technical activities of the project components. In the present case, this means that for both projects (NAPA Energy and biomass), it is expected that technical experts will be recruited (e.g. an adaptation specialist in the area of energy or a mitigation specialist in the energy sector). Other specific expertise will be called upon in order to cover specificities of each project to be implemented for which the country has no capacity. Contacts should be established with experts and institutions of other countries that have already implemented similar projects to strengthen energy resilience to climate change and with useful experience.

An Administrative and Financial Manager is scheduled and budgeted for a year of implementation for the two projects.

Organization of the project management:

The Steering Committee will make management decisions consensus when the National Focal Point will seek his advice. It reviews and approves quarterly work plans where required, based on the Annual Work Plans (AWP) approved in advance, and gives permission for any major modification work plans quarterly or annual. In addition, it approves the appointment and defining the responsibilities of the National Focal Point and any delegation of responsibilities to the Project Manager in terms of quality and assurance.

Figure 3: Organization of the project management



B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits

The project approach is to establish the institutional capacity, the financing, the technological know-how and the potential for increasing the resilience of the energy sector sin Benin that will allow sustainability in the development of the energy sector and in responding to the growing energy needs of the country while mitigating the risks related to climate change. The adaptive measures will avoid putting at risks the current and future revenue streams through diversification and innovation, introducing private partnerships, and a fund mechanism acting as an insurance mechanism, that are so far untried in Benin in the energy sector. A high-level of support for innovation is expected in view of the commitment of the GoB towards adapting to climate change and mitigating the risks.

The project is designed to test means of reducing risks that contribute to a better resilience of the energy sector vis-à-vis climate change and climatic extreme events. By doing so, the project will improve the overall financial sustainability of the energy sector. The institutional sustainability will be assured by focusing on capacity building, on energy assets

coverage and technological aspects. Benin will be able to offer useful lessons on the best way to strengthening the energy sector against growing climatic risks.

The participation of women in many field activities of the project will enable to mainstream gender in the issues related to the climate change and to access to energy. The mechanism for gender mainstreaming in the project will be i) ensuring gender balance in all the project activities, especially those benefiting to the field activities, ii) optimizing entrepreneurial and direct employment opportunities for women, and iii) assessing financial impacts of the project for men and for women. Hence, if there would be a difference, it will be important to find out why and try to address it if possible.

B.3. Explain how cost-effectiveness is reflected in the project design:

The proposed project targets the realization of a substantial increase in the sustainable, resilient and efficient production and use of energy through affordable technology transfers. It includes improved land and forest management practices, especially in the zones supplying wood for energy. It will be facilitated through the barrier removal activities focusing on institutional strengthening, regulatory framework, capacity building, market development and other technical assistance activities that will be implemented. During the NAPA process, the actions proposed have been compared against a large array of adaptation alternatives and selected through a multi-criteria analysis that used cost-benefit ratio as one of the decision criteria. The proposed interventions clearly came out of this prioritization process as the cheapest and most effective means to achieve the desired adaptation outcomes in the energy sector. In addition, the project will promote affordable technology transfers and low carbon and resilient approaches that are predicated on preventive management practices, rather than on costly engineering and high-investment related responses to climate hazards which have proven very costly and unsustainable in most instances. Also, the programmatic approach taken by the project (linked to the biomass project) and its embedding into existing national programmes will ensure lower transactions costs, higher impacts and greater profitability over the long run. During the PPG implementation phase, these considerations were further elaborated and cost-effectiveness of the outputs proposed in this PIF thoroughly assessed. The project will hence lead to a catalytic investment in securing the long-term institutional and financial sustainability of the energy sector against increased climate change impacts and severe climatic events.

Costs incurred in project implementation will focus only on those additional actions required to provide key incremental assistance to the GoB in undertaking strategic interventions to increase the resilience of the energy sector of the country vis-à-vis climate change. To accomplish this, the project will complement and build upon the extensive baseline activities already underway in the energy sector. Wherever possible, the project will use the competencies and technical skills within the mandated Government and public institutions such as SBEE to implement project activities. Where applicable, project resources will also be deployed to strengthen and expand existing initiatives and programmes to avoid duplication of effort. Increased co-financing commitments will continue to be targeted by the project during the project implementation (e.g. co-financing of the private sector, co-financing of the NGOs, etc.). Also, the project is considered cost-effective for the following primary reasons: i) project support to strengthening the adaptive capacities and the resilience of the energy sector to the impacts of climate change is expected to improve the overall cost-effectiveness of the energy sector, especially in rural areas where the access to energy is difficult, by introducing affordable and resilient technologies and approaches to energy production and use. It is anticipated that a modest investment of GEF resources will result in: (a) significant improvements in the preparedness of the energy sector, especially power production, transmission and distribution to face extreme climatic events and long-term variability in temperature and water flows affecting the power sector, (b) more efficient energy access in rural areas with the development of alternative sources of energy; and (c)

improvements in the individual skills of adapting to climate change and access to energy. Project support to introducing innovative mechanisms such as the financial mechanism to cover damages in the energy sector due to climatic events should ensure a better resilience of the industry and the people.

Finally, cost-effectiveness has been reflected in the project design on several levels: i) throughout the project, LDCF funding is aligned with project Outputs that have competitive procurement components to ensure best value for money; ii) The project has made a successful effort to secure cash co-financing of the project, which diversifies financial risks and increases financial flexibility. iii) Additional due diligence will be conducted by the project team during project implementation, as per established UNDP practices.

C. DESCRIBE THE BUDGETED M & E PLAN:

The following presents only the M&E budget. For additional details, please refer to the Project Document.

Type of M&E activity	Responsible Parties	Budget USD Excluding project team staff time	Time frame
Inception Workshop and Report	Project Manager PMT (Project Management Team – GoB- UNDP) UNDP CO, UNDP GEF	Indicative cost: \$50,000	Within first two months of project start up with the full team on board
Measurement of Means of Verification of project results.	UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. PMT, esp. M&E expert	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on output and implementation	Oversight by Project Manager PMT, esp. M&E expert Implementation teams	To be determined as part of the Annual Work Plan's preparation. Indicative cost is \$100,000	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	Project manager PMT UNDP CO UNDP RTA UNDP GEF	None	Annually
Periodic status/ progress reports	Project manager and team	None	Quarterly
Mid-term Review	Project manager PMT UNDP CO UNDP RCU External Consultants (i.e. evaluation team)	Indicative cost: \$100,000	At the mid-point of project implementation.
Terminal Evaluation	Project manager PMT UNDP CO UNDP RCU External Consultants (i.e. evaluation team)	Indicative cost : \$100,000	At least three months before the end of project implementation
Audit	UNDP CO Project manager PMT	Indicative cost per year: \$8,000 (\$40,000 total)	Yearly

Type of M&E activity	Responsible Parties	Budget USD Excluding project team staff time	Time frame
Visits to field sites	UNDP CO UNDP RCU (as appropriate) Government representatives	For GEF supported projects, paid from IA fees and operational budget	Yearly for UNDP CO, as required by UNDP RCU
Total indicative cost Excluding project team staff time and UNDP staff and travel expenses		US\$ 450,000	


PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT:

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Delphin Aidji	Secetaire General Adjoint du Ministere	MINISTERE DE L'ENVIRONNEMENT DE L'HABITAT ET DE L'URBANISME	05/02/2013

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Adriana Dinu Executive Coordinator, UNDP-GEF		Feb 03, 2016	Saliou Toure Regional Technical Advisor, EITT	+251 912 503 320	saliou.toure@undp.org

ANNEX A: PROJECT RESULTS FRAMEWORK

An abridged version of the logframe is provided below. However, a complete version can be found in the GEF-UNDP project document.

Component objectives	Outcomes	PERFORMANCE INDICATORS			Sources of Verification	Assumptions
		Indicators	Baseline (2015)	Target (2020)		
Outcome 1: Strengthen capacities in order to reduce risks of economic losses due to climate changes	1.1. Capacities of the energy sector's stakeholders are strengthened in order to enable them to integrate climate risks in energy planning and to face climate risks	- Gender sensitive multi-stakeholder platform installed and functional	0	1	- Decree - Installment report	- No cumbersome administrative - Profile of nominees are compliant - Gender is well considered in the selection of nominees - Appointment of persons is appropriate - No delays in issuing the no-objection notice by donors
		- Integration and implementation by stakeholders of climate resilient energy access approaches in their business activities - A training plan is developed and approved by the Steering Committee; - Each year, at least 50 women and 50 men from the energy sector are trained; - Each year, at least 80% of the women and men trained apply the experience acquired in training	0	1 At least 500 managers/executives (men and women)	- Training plan - Training reports - Project annual reports	

Outcome 2: Integrate adaptation in enlarged frameworks at the national scale and in vulnerable areas	2.1. Energy supply strategies and plans integrate climate change and adaptation measures	- The gender-sensitive Masterplans for Supply (SDA) of fuelwood in the selected cities are developed and validated.	8	8 SDA revised	- SDA revised - PAF revised	- No delays in updating the SDA and PAF
		- The development plans of selected forest areas (PAF) are adopted and validated. (revised to incorporate climate risks, gender and appropriate adaptation measures)	5	5 PAF revised	- Execution reports from the DGFRN	- No delays in the adoption by the Government of revised SDA and PAF
		National Plan for optimal management of supply and demand of electric power in a context of climate change including climate risks and gender-specific needs is available, leading to a decrease in power shortages due to climatic events	0	1 National gender-sensitive plan	- National Management Plan - Project execution reports	- No delay in the process of recruitment of a qualified Consultant
		The SIEP on domestic fuels and the SIEF updated and including climate risks, gender-sensitive issues and strategic options are functional.	1 SIEF	1 SIEF updated, gender sensitive	Reports on the publication of data on domestic fuels, ecology and forests.	- Qualified resources available
		PAF of the relevant areas supplying the cities and urban centers of Benin in biomass are revised to incorporate risks of droughts, wildfires, and other climate risks, as well as adaptation measures and gender-specific needs.	1 SIEP	1 SIEP updated, gender sensitive		
			1 PAF 10 simple management plans non gender-sensitive	01 PAF 10 simple management plans	Project annual execution reports	- Good cooperation from the landowners

	<p>2.2. The climate resilience of watersheds of rivers Ouémé, Niger (Sota), Volta (Pendjari) housing the hydroelectric installations of Yéripao (existing) on one hand, and of Sosso waterfall, Gbassè, Koutakroukrou, Kota fall, Wabou and Kouporgou (considered in the medium term) on the other hand, is enhanced through the implementation of restoration and preservation of watershed ecosystems activities</p>	<p>Riverbanks likely to harbor selected hydroelectric facilities are effectively protected against erosion through reforestation (involving men, women and youth) with multipurpose species tolerant of drought and flooding.</p>	<p>0 ha of riverbanks converted</p>	<p>At least 20 hectares of riverbanks reforested</p> <p>- Proportion/ role of women, men and youth involved in the reforestation process</p>	<p>- Reforestation report</p> <p>- Reforestation monitoring reports of each site.</p> <p>- Project annual execution reports</p> <p>- Execution reports</p>	<p>- Reforestation techniques well applied</p>
		<p>Community infrastructures built, by type (reforestation, dikes, gabions, riprap, etc.)</p>	<p>0</p>	<p>At least 100 infrastructures/works</p>	<p>- Infrastructure monitoring reports</p> <p>- Project annual execution report</p>	<p>- No Land conflicts</p>
		<p>Increase in the amount of people mastering good practices of sustainable land management, both men and women</p>	<p>0</p>	<p>1 training program involving each year 20% women, 30% men and 30% youth trained on good practices for sustainable land management integrating climate risks</p>	<p>- Training program.</p> <p>- Training evaluation report</p>	<p>- Proper understanding of the practices taught during training</p>
		<p>Climate resilient and environmentally sound remunerative activities (beekeeping, small livestock farming, and marketing of improved cooking stoves), involving men, women and youth, and ecologically rational exist.</p>	<p>0</p>	<p>At least 200 resilient remunerative activities involving each year at least 50% women, 30% youth and 20% men are supported</p>	<p>- Training program</p> <p>- Project execution reports</p>	<p>- Proper balance between implementation costs of activities and projected income (i.e. revenues recover the costs)</p>

	2.3. Climate resilience of fuelwood supply areas identified by revised SDAs is enhanced through reforestation and conservation of woody areas	Existing community parks of firewood resilient to climate change in areas identified as the most vulnerable	0	10 community parks (adding to 600,000 ha) in the concerned communal forests, involving men, women and youth, are set up	- Project execution report - Annual management reports of the community parks in the concerned areas	-Good mobilization of local leaders for the setting up of the parks
		- Bushfire management protocols developed and signed	0	At least 4 protocols signed	- Protocols - Protocol signature statement	- No delay in protocol development
		- Demonstration sessions for resilient bushfire fight methods around fuelwood supply forest areas carried out	0	40 sessions	- Session reports - Project execution reports	
		Number of existing remunerative activities alternative to forest resources use (beekeeping, horticulture, small livestock breeding, production and maintenance of improved stoves, pressure cookers etc.)	0	At least 200 activities generating income, involving each year at least 50% women and girls and 50% men and boys achieving activities alternative to forest resources exploitation	- Project annual execution reports - Project monitoring reports	- Proper balance between implementation costs of activities and projected income (i.e. revenues recover the costs)
Outcome 3: Reduce vulnerability in the Benin energy sector	3.1. Electricity production and distribution facilities are protected against disasters and other climate risks	Thermal power plants protective measures are implemented, lowering the risk of breakdowns of the installed capacity during extreme climatic events.	0	At least 2 measures for each station	- Project annual execution reports	- Protective measures are effective
		Protective measures for the distribution network implemented.	0	At least 2 measures by area exposed to a risk within the network	- Project annual execution reports	- Protective measures are effective

	3.2. Development of alternative energy production sources for vulnerable localities	Existing feasibility study (for each locality)	0	1 study for a vulnerable locality	- Project execution report - Awareness campaign	- Baseline data are available to develop the study - No delay in the process of recruitment of a qualified Consultant
		Existing training plan and awareness campaign		1 training program 1 awareness campaign	- Training sessions - Training report	- Proper understanding of the new technologies taught during training
		- Technical capacity building program to make improved stoves and pressure cookers, integrating women's specificities	0	1 capacity building program At least 10.000 improved stoves At least 1.000 pressure cookers	- Project annual execution reports	- Improved stoves appropriate given the social context of populations
		- Improved stoves and pressure cookers distributed in the most vulnerable rural communities of the selected areas.				
		- Improved carbonization technologies spread in charcoal production communities, integrating gender needs and specificities.	0	At least 3 technologies	- Training sessions - Training reports - Training monitoring reports	- Technologies appropriate given the social context of populations
		- Number of improved kilns built and functioning among charcoal production communities	0	At least 500 operators (50% men / 50% women), adult and youth, trained 100 kilns		

	3.3. (in common with the biomass project): Increased investment in clean energy technologies and low-carbon practices in the agro-forestry waste sector, and in adaptive measures to increase the resilience of the energy sector to CC.	<p>FSM operationalized with a policy framework and an investment manual with fiduciary principles, ESS and risk coverage criteria, MOU drafted, finalised, signed and enforced with Central Bank, paving the way for a financial climate protection mechanism in the energy sector</p> <p>Incentives to be provided by Government to project developers/Independent Power Producers (IPPs) approved and operationalised with climate risks reduction coverage mechanisms (eg weather risk insurance-related solutions such as LPC and LPP).</p>	0	1		
			0	1	- Project documentation.	Good cooperation of Government entities and staff

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

RESPONSES TO COUNCIL RECOMMENDATIONS

Comment	Response	Reference
<p><u>Germany's Comments:</u></p> <p>Germany approves the PIF in the work program but asks that the following comments are taken into account:</p> <p>Regarding other relevant projects, we are pleased to see that the proposed project plans to build on various on-going initiatives.</p> <p>The PIF lists the Program for Decentralisation and Local Development (PDDC), the implementation of which is assisted by GIZ on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), as one the planned baseline projects.</p> <p>The program's "Rural Area Electrification" component is an EU Energy Facility co-financing with contributions by the Federal Ministry for Economic Cooperation and Development (BMZ), the French Agency for Development (AFD) and the Energising Development (EnDev) programme.</p> <p>The main objective of this component is to connect 105 rural villages to the power grid. In this context, the program also supports the Beninese Society for Electric Energy (SBEE) and the Beninese Agency for Rural Electrification and Prime Contracting (ABERME) in optimizing the planning processes, particularly in terms of cost-benefit optimization and low-cost technologies. In general, adding a climate-sensitive component to the GEOSIM tool seems reasonable and worth promoting.</p> <p>It would however be desirable that the initiative be embedded into the ongoing sector dialogue as well as the sector strategy which is currently being elaborated by the Ministry of Energy.</p> <p>We therefore recommend initiating inclusion into these processes as soon as possible, in order to ensure that the initiative can be anchored into the SBEE and ABERME proceedings in a sustainable manner.</p>	<p>Germany's comments are very relevant and the present document has been elaborated in collaboration with provided recommendations.</p> <p>During all the consultative process, the Ministry of Energy was involved with strong interactions with the Director General for Energy. In addition, the formulation team included former high-ranking officials from the Ministry of Energy that are still involved in the on-going sector dialogue and strategic issues.</p>	

RESPONSES TO STAP RECOMMENDATIONS

No STAP recommendations

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS²¹

²¹ If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

C1. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

The PPG objective of formulating detailed Project Document has been achieved. The project formulation was done through consultations involving a range of stakeholders. Consultative activities were taken up through individual interviews with stakeholders and workshop (Problem/solution analysis and Log frame Workshop).

C2. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

N/A

C3. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

The activities achieved during PPG are shown in the table below:

<i>Project Preparation Activities</i>	<i>Implementation Status</i>	<i>GEF Amount (\$)</i>				<i>Co-financing (\$)</i>
		<i>Amount Approved</i>	<i>Amount Spent to date</i>	<i>Amount Committed</i>	<i>Uncommitted Amount*</i>	
Collection and analysis of baseline data including comparative review of other countries under similar conditions and circumstances	Completed	80,000	80,000			40,000
Review of experiences in Benin and other countries of the following: - Vulnerability of the energy sector to climate change	Completed	30,000	30,000			15,000
Conduct a Logical Framework Analysis (LFA) to define project goal, objectives, outcomes, outputs and activities, including success indicators as well as delineation of responsibilities and coordination mechanisms	Completed	30,000	30,000			15,000
Stakeholder engagement, capacity needs assessment of key local implementing partners and co-financing	Completed	40,000	40,000			20,000
Detailed design of project implementation plan	Completed	20,000	20,000			10,000
Preparation and finalization of the full-sized Project Document	Completed	0	0			20,000
Total		200,000	200,000			120,000

*Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee. N/A