GEF-6 PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND:Special Climate Change Fund

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PART I: PROJECT INFORMATION

Project Title:	Building Adaptive Capacity through the Scaling-up of Renewable Energy Technologies in Rural Cambodia (S-RET)		
Country(ies):	Cambodia	GEF Project ID:[1]	
GEF Agency(ies):	IFAD (select) (select)	GEF Agency Project ID:	
Other Executing Partner(s):	Ministry of Agriculture, Forestry and Fisheries	Submission Date: Resubmission Date:	20 March 2015 30 March 2015
GEF Focal Area(s):	Climate Change	Project Duration (Months)	48
Integrated Approach Pilot	IAP-Cities ☐ IAP-Commodities ☐ IAP-Food Security ☐	Corporate Program: SGP ☐	
Name of parent program:	[if applicable]	Agency Fee ($)	437,000

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES[2]

Objectives/Programs (Focal Areas, Integrated Approach Pilot, Corporate Programs)	**Trust Fund**	**(in $)**	
		GEF Project Financing	**Co-financing**
(select) CCA-1 (select)	SCCF-B	2,000,000	12,000,000
(select) CCA-3 (select)	SCCF-B	830,000	500,000
(select) CCM-1 Program 1	SCCF-B	1,770,000	10,500,000
Total Project Cost		4,600,000	23,000,000

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective: To achieve a large-scale adoption of Renewable Energy Technologies (RET) in the rural development sector of Cambodia through testing high potential new RET, improving the rate of adoption of RET proven to work in Cambodia and establishing enabling conditions for scaling-up

Project Components	**Financing Type**	**Project Outcomes**	**Project Outputs**	**Trust Fund**	**(in $)**	
					GEF Project Financing	**Co-financing**
1. Promoting uptake of climate resilient RET to support smallholder agriculture, production and marketing.	Inv	Approximately 10,000 smallholder farm households with improved climate resilience due to investments in economically viable RET for agriculture production, processing and / or marketing.	1. 4000 best practice biodigesters installed of proven models showing consumer preference under the baseline project 2. 4000 solar energy systems installed for agriculture value addition 3. 2000 units in total of high potential innovative RET systems piloted and assessed for scaling up under the baseline project.	SCCF-B	$3,570,000	$21,300,000
2. Stimulating scale-up of climate resilent RET through agriculture sector policy making and resource	TA	Enabling policy framework and institutional modalities for facilitating scale-up of climate resilient RET in agriculture.	1. Capacity Development of the Technical Working Group on Climate Change of MAFF (TWGCC-MAFF) for facilitating coordination among departments within MAFF and other relevant ministries for mainstreaming	SCCF-B	$800,000	$500,000

[1] Project ID number will be assigned by GEFSEC and to be entered by Agency in subsequent document submissions.
[2] When completing Table A, refer to the excerpts on *GEF 6 Results Frameworks for GETF, LDCF and SCCF*.

allocation.			climate change resilience building and RET scale up 2. Policy Studies to engender an enabling environment for scaling up RET in agriculture sector 3. Awareness raising and knowledge management for advancing policy dialogue and resource allocation for RET scale up in the rural sector 4. A policy, institutional and incentive framework for scaling up RET adoption nationally			
				Subtotal		4,370,000	21,800,000
				Project Management Cost (PMC)[3]	SCCF-B	230,000	1,200,000
				Total Project Cost		4,600,000	23,000,000

C. INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount ($)
Recipient Government	Royal Government of Cambodia	In Kind	$3,500,000
GEF Agency	IFAD	Loan and Grant	$18,500,000
Beneficiaries	Beneficiaries of smallholder farm households	In kind	$1,000,000
Total Co-financing			$23,000,000

D. INDICATIVE TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS a)

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	(in $)		
					GEF Project Financing (a)	Agency Fee (b) b)	Total (c)=a+b
IFAD	SCCF-B	Cambodia	Climate Change	(select as applicable)	4,600,000	437,000	5,037,000
Total GEF Resources					4,600,000	437,000	5,037,000

a) Refer to the Fee Policy for GEF Partner Agencies.

E. PROJECT PREPARATION GRANT (PPG)[4]

Is Project Preparation Grant requested? Yes ☒ No ☐ If no, skip item E.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

Project Preparation Grant amount requested: $150,000				PPG Agency Fee: $14,250			
GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in $)		
					PPG (a)	Agency Fee[5] (b)	Total c = a + b
IFAD	SCCF-B	Cambodia	Climate Change	(select as applicable)	150,000	14,250	164,250
Total PPG Amount					**150,000**	**14,250**	**164,250**

[3] For GEF Project Financing up to $2 million, PMC could be up to10% of the subtotal; above $2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

[4] PPG requested amount is determined by the size of the GEF Project Financing (PF) as follows: Up to $50k for PF up to$2m (for MSP); up to $100k for PF up to $3m; $150k for PF up to $6m; $200k for PF up to $10m; and $300k for PF above $10m. On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

[5] PPG fee percentage follows the percentage of the Agency fee over the GEF Project Financing amount requested.

F. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS[6]

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	*Hectares*
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	*Hectares*
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	*Number of freshwater basins*
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	*Percent of fisheries, by volume*
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO_{2e} mitigated (include both direct and indirect)	*32,300 metric tons (conservative assessment of direct benefit at the PIF stage)*
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides)	*metric tons*
	Reduction of 1000 tons of Mercury	*metric tons*
	Phase-out of 303.44 tons of ODP (HCFC)	*ODP tons*
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	*Number of Countries:*
	Functional environmental information systems are established to support decision-making in at least 10 countries	*Number of Countries:*

PART II: PROJECT JUSTIFICATION

1. *Project Description.*

1) Adaptation problems and root causes

Despite rapid improvement in its social and economic indicators in the past ten years, Cambodia remains a least-developed country. It is highly vulnerable to the effects of global climate change because of its physical characteristics as a low-lying, flood prone tropical country, but also because the large majority of its population remains dependent on rain-fed agriculture for income, employment and food security. About 80% of Cambodians live in rural areas and engage in agriculture, although off-farm employment makes an increasingly important contribution to household incomes. Agriculture provides about 35% of Cambodia's GDP. Rice is the predominant crop, accounting for about 87% of crop land, while the rice value chain accounts for about 15% of GDP. About 79% of rice is produced in the wet season and this high proportion reflects the under-development of irrigation systems. Cambodia produces a significant rice surplus, estimated as 3 – 4 million tonnes of paddy, but most of the surplus production is exported to Vietnam for processing. The Royal Government of Cambodia gives a high priority to its Policy on Paddy Production and Rice Export which has the target of achieving one million tonnes of milled rice exports by 2016.

[6] Provide those indicator values in this table to the extent applicable to your proposed project. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the *GEF-6 Programming Directions*, will be aggregated and reported during mid-term and at the conclusion of the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and/or SCCF.

According to UNDP Climate Change Country Profile, mean annual temperature has increased by 0.8C since 1960 with most rapid increase observed during the dry season. Future global climate change is predicted to result in Cambodian average temperatures increasing by between 0.7 to 2.7°C by the 2060s, and 1.4 to 4.3 degrees by the 2090s. The projected rate of warming is similar in all seasons and regions of Cambodia. Further, there will be a substantially increased frequency of days and nights that are considered 'hot' in the current climate. Annually, projections indicate that 'hot' days will occur on 14-49% of days by the 2060s, and 20-68% of days by the 2090s. Days considered 'hot' by current climate standards for their season are projected to increase fastest in June – August, occurring on 29-96% of days of the season by the 2090s. Nights that are considered 'hot' for the annual climate of 1970-99 are projected increase at a faster rate than hot days, occurring on 24-68% of nights by the 2060s and 38-88% of nights by the 2090s. Nights that are considered hot for each season are projected to increase most rapidly in June - August occurring on 73-99% of nights in every season by the 2090s. All projections indicate decreases in the frequency of days and nights that are considered 'cold' in current climate. These events are expected to become exceedingly rare, occurring on 0-7% of days in the year, potentially not at all under the higher emissions scenarios by the 2090s.

Average annual rainfall is predicted to increase as a result of climate change. This increase will occur mainly due to increased rainfall in the wet season (i.e. May - October). Conversely, the central predictions are for a decrease in rainfall during the dry season. The intensity of rain storms will increase: the proportion of total rainfall that falls in heavy events is projected to increase by up to 14% by the 2090s. Again, these increases arise mainly due to increases in heavy events in wet season rainfall, and are partially offset by decreases in the dry season. The magnitude of 1- and 5-day rainfalls is projected to increase by up to 54mm and 84mm respectively by 2090.

There is some regional variation in predicted changes, with rainfall in the June to August season predicted to increase in the northwest of the country and to decrease somewhat in the northeast.

Farmers and local communities commonly report that the climate is less predictable than formerly: average rainfall and temperature date conceal significant annual variations but farmers find that it is becoming more difficult to plan the timing of planting and other key activities while floods and droughts can happen in seasons when they did not previously occur.

Sea level rise is likely to be significant for low-lying coastal plains and may also impact indirectly on the Mekong River system and its floodplains. According to the Fourth Assessment Report of the IPCC, sea levels in the region are projected to rise by between 0.18 and 0.56m by 2090. The highest predicted rise would cause permanent inundation of about 25,000 ha of coastal Cambodia.

Increasing temperatures and, in particular, increasing unpredictability of the climate area already having important negative impacts on vulnerable smallholder farmers. Without access to adequate irrigation, farmers delay planting for fear of losing crops to droughts early in the wet season, but then are more vulnerable to flooding late in the wet season (the peak flooding periods occur in September-October) as well as losing the opportunity to plant a second crop.

Cambodia's Greenhouse Gas (GHG) emissions are low but rising, and the agriculture sector is estimated to produce over 80% of overall national equivalent CO_2 emissions (10,560Gg of the total 12,764.74Gg of CO_2 equivalent)[7]. The contribution of domestic livestock to the total emissions was 48% followed by rice cultivation and agricultural soils – hence rationale for enhancing the adoption of biodigesters. Agricultural emissions are largely in the form of CH_4 (methane) and N_2O (nitrous oxide) which have much higher greenhouse effects than CO_2.

The proposed SCCF project will be implemented in the five southern provinces of Kandal, Takeo, Kampot, Prey Veng, and Svay Rieng provinces which are the target provinces of the IFAD supported Project for Agriculture Development and Economic Empowerment (PADEE). These provinces are mainly low-lying with the exception of parts of Kampot Province where flash flooding can be a problem. The target provinces include areas of high

[7] http://unfccc.int/resource/docs/natc/khmnc1.pdf.

agricultural productivity but are densely populated and many small farmers do not have enough land to fully meet their food security needs. Farmers in these provinces face the challenge of depleted natural resources - particularly forest areas that provide fuel wood and the wild fisheries on which rural Cambodians traditionally depend for a large proportion of the protein in their diets. Soil erosion and nutrient depletion is increasingly a problem and is exacerbated by flooding. In response, farmers increasingly rely on chemical fertilisers to maintain crop yields.

Energy costs are high in Cambodia and this is recognised as one of the key obstacles to achieving the Royal Government of Cambodia's (RGC) targets for increased in-country processing of agricultural commodities. Cambodia's electrification rate (34% in 2011[8]) is still one of the worlds lowest and within the target areas only a minority of farmers have access to grid electricity.

Within the home, almost all farm households (94% nationwide average) rely on fuel wood and charcoal for cooking[9] while lighting is provided by a mixture of kerosene lamps and car batteries charged by diesel generators. A typical household might consume between 1 to 2 tonnes/year of fuel wood which represents an important contributor to gradual forest degradation. The increasing demand and unsustainable harvesting of biomass for cooking and other domestic, agricultural and industrial (e.g. brick-making) purposes is leading to increased deforestation rates and land degradation and the consequent release of GHG emissions. In addition, women are disproportionately affected from the use of firewood as they suffer from respiratory diseases and eye infections as a result of exposure to smoke. Use of firewood also imposes a high drudgery load on women for collecting firewood which may be at an increasing distance from the home. Time spent on collecting firewood is time that is lost for income-generating activities.

Increasing mechanisation of agriculture, partly driven by labour shortages associated by migration for paid work, is leading to increased use of energy in agriculture. Climate change is also leading to increased pumping from groundwater (particularly in Svay Rieng and Prey Veng provinces) and from surface water bodies. Mechanical traction, water pumping and post-harvest processing as well as transport overwhelmingly rely on diesel engines which are often old and inefficient. Because of lack of capital, the engines used are often multi-purpose but this means that their efficiency for any particular task is low. Lack of affordable energy for pumping inhibits agriculture production and increases vulnerability to drought. Lack of affordable energy is also a major constraint to local post-harvest processing, meaning that Cambodian farmers and local communities lose the opportunity to benefit from these value-added activities, to diversify the local economy and to create wage employment opportunities in the local area.

Poor soil management techniques and erosion driven by deforestation, higher rainfall intensities and flooding is leading to loss of soil fertility in some areas of Cambodia. In turn, this drives increased use of chemical fertilisers in an attempt to maintain yields.

Potential Role of RET

Given the high energy costs, depletion of natural resources and impacts on women's health and workload resulting from the current mix of energy sources used in Cambodian smallholder agriculture, there is high potential for increased adoption of renewable energy technologies (RET). Adoption of RET will increase smallholders' climate resilience directly (through adaptive uses such as solar pumping for irrigation, and through use of RET by-products as natural fertilisers for improved soil management) and indirectly for increasing household incomes and assets and so making households less vulnerable to climate shocks. Increased use of RET will also reduce emissions of greenhouse gases (GHG). RET are known in rural Cambodia but technological advances (for example, the reduced cost of solar panels, improved designs of biodigesters, etc) favour more widespread adoption and a broader range of uses in agriculture production and processing and by agricultural households and communities.

Cambodia has an average sunshine duration of 6-9 hours per day which make solar electricity and other forms of solar energy use attractive. Photovoltaic (PV) panels and accessory equipment are mainly imported. There is one

[8] International Energy Agency's World Energy Outlook, 2012
[9] http://www.fao.org/docrep/w7519e/w7519e08.htm

local manufacturer (Star8 – an Australian company), but costs of local manufacture do not appear to be competitive with imported equipment as yet.

Specific benefits to local communities expected from the adoption of RET include:

- Lower energy costs (such as reduced costs for water pumping);
- More widespread availability of electricity for domestic purposes;
- Potential to increase post-harvest processing using modern technologies;
- Reduced health impacts from fuelwood and charcoal use;
- Reduced workloads, particularly for women;
- Environmental benefits, particularly from reduced deforestation and sanitation;
- Economic benefits, particularly saving from buying fuel wood and chemical fertiliser;
- Reduced impact on soil micro-organisms from use of chemical fertilizers; and
- Improved soil fertility through the use of biodigester slurry as fertilizer and improved crop yields

The table below illustrates a range of innovative RET technologies that have potential for introduction and/or scale-up in Cambodia. The list neither is exhaustive nor implies that all the illustrated technology will be supported by the proposed SCCF project. Additional technologies will be considered for promotion by the project once they are field-tested for product quality, consumer acceptance, practicality, cost-effectiveness, and applicability and replication in different geographical settings.

RET	DESCRIPTION	INNOVATIVE ASPECT	BENEFITS
New Innovation hollow brick biodigesters, NBP	The hollow brick biodigesters are comprised of inlet, digester tank and outlet. The digester tank is in-depth 0.8 m under-ground with diameter 2 m, keeping temperature between 28-30 degree Celsius. This can be built in various size of 2, 3 or 4 m^3.	This new innovation hollow brick biodigester is easy to build, less maintenance and easy operation. All construction materials are available in the local market and easy to transport. The space is 5.7 m x 2 m and above the system piggery, poultry or home gardening can be practiced. The underground part helps keep the temperature between 28-30 degree Celsius which enables a high rate of fermentation and gas production. The gas pressure is high, up to 15 Kilo Pascal, which is best for lamp lighting and fast cooking.	Clean biogas for cooking and lighting, and high quality of organic fertiliser
Portable Biogas, Biogas International	Portable biogas such as flexi biogas is simpler and less costly to build and operate. The digester is a simple 6m x 3m digester envelope made of high-quality biogas tank material.	A portable above-ground system housed in a greenhouse tunnel. The tunnel acts as an insulating jacket, trapping heat and keeping the temperature between 25 and 36^0 Celsius ensuring a high rate of fermentation and gas production. This system does not require agitation unlike fixed dome biogas system and thus saves labour and costs.	Clean fuel for cooking and high quality organic fertilizer
Solar MoonLight KamWorks,	Simple to operate and maintenance-free solar lights with integrated panels. The technology engaged allows the product to take the optimum power from the solar panel, thus optimizing the life of batteries. Charging is susceptible to weather conditions however.	Compared to traditional Kerosene lamps used in the rural areas, the MoonLight, a solar powered lantern allows three different levels of light intensity (with the medium light level, duration of 4-6 hours of light is possible). Electronic applications charged through the MoonLight can last longer through an improved technique that optimizes the link between the solar panel and the battery.	Solar charger for mobile phones and solar lantern with different brightness to ensure longer lighting periods

Portable Solar Pumping technology, Atom Solar	The equipment includes a 1HP (or 750 watts) solar pump with 12 solar panels mounted on a mobile trolley. A portable water pumping system can pump out approx. 10,000 litres of water per hour which can meet the demand of drinking water in hills or for farming in low areas.	A portable water pumping system can allow a new model of irrigating farms for its versatile, submersible pump that is mounted as a trolley to a bicycle. The technology is a winning design of Green Peace Challenge Award 2013.	Potable drinking water, water filtration and pumping for agriculture production
Solar-biomass Hybrid Dryer, Cambodian Technology Institute (ITC).	A hybrid cabinet dryer with an automatic temperature control mechanism for drying agricultural products. The hybrid pairs a domestic gasifier stove (DGS) and a flat plate solar air heater to supply hot air for drying products inside the cabinet.	Hybrid drying powered by biomass and solar energy is a potentially important option for small-scale operations since it combines the advantages of drying systems operated by respectively solar energy and biomass. A continuous operation despite the weather condition is ensured through this technology.	Fish drying machine through a combination of solar and biomass
Bio Lite Home Stove, SNV	The BioLite HomeStove is an advanced forced ventilation biomass cook stove. It uses the thermoelectric technology to convert temperature differences between fire and air into an electric voltage, which powers a fan that improves fire combustion.	The stove is designed to be consistent and easily adaptable to local cooking practices. It provides direct economic returns through a combination of both fuel savings as well as electricity generation. The thermoelectric technology results in a reduction in toxic indoor smoke by up to 90% and reduced fuel consumption by 50%, eliminating up to 2.5 tons of greenhouse gas emissions per stove per year. Surplus electricity generated during cooking sessions charges USB-powered devices such as mobile phones and LED lights.	Cooking and mobile charging through USB port

Although the main focus of Cambodia's climate change response to date has been on adaptation, Cambodia is beginning the process of estimating its GHG emissions and developing policies for emissions reduction. The national Green Growth Policy (MoE and NCCC, 2013) identifies the following objectives:

- Defining a GHG reduction target, especially carbon dioxide;
- Preparing methodologies and defining an implementation standard for carbon reduction at small medium large enterprises; and
- Enhancing carbon credit through international carbon sale by increasing forest cover for carbon storage sinks.

2) Barriers to adoption of Renewable Energy Technologies (RET)

Despite the potential for enhanced use of RET in Cambodia, the current rate of adoption is low. The barriers to be overcome to increase the rate of adoption include lack of awareness of the technologies among Cambodian farmers, and cost barriers, particularly among the poor and vulnerable households. In addition, decision-makers in Government, the private sector and civil society lack awareness of the potential of RET and of the technology options available, and RET are not consistently promoted as a policy priority in the agricultural sector.

Knowledge Barrier

Most Cambodian farmers have some familiarity with basic RET technologies – most often, bio-digesters and solar panels. However, the range of technology options with which they are familiar is very limited. Biodigesters are perceived to be suitable only for relatively better-off farmers who can afford the installation costs and who have substantial numbers of animals to provide the feedstock. Uptake of solar panels for any purposes other than auxiliary lighting is very low. There is a need both to increase awareness of the potential of existing, proven technologies, to expand the range of uses for RET technologies and to introduce, test and demonstrate new technologies that are not yet present in the Cambodia countryside.

Technical Development Barrier
Newer, more innovative options cannot be promoted at scale to smallholder farmers until they have been field-tested, monitored, assessed, and evaluated in Cambodian conditions. There is a need for further research and development of RET applications in the Cambodian rural context for making technical improvements with regard to longevity, reduced operation and maintenance, and ease of handling. Also, the introduction of RET for energy generation along the agriculture value-chain needs to be examined as a means of building resilience and reducing GHG emissions.

Cost Barrier
While basic RET options are familiar in Cambodia, there remains a lack of quantitative evidence on the costs and benefits. The most widespread RET used in Cambodia is the brick-domed biodigester which is supported by the National Biodigester Programme (see description of Baseline Project below). The cost of an NBP biodigester to the farmer is between $420 and $1,100 depending on the size of the installation. $420 is approximately equivalent to the annual per capita consumption of a household living at the official poverty line. Poor households lack the capacity to save, with income from agriculture and from paid work being largely used for daily consumption. Despite a large expansion in formal credit through micro-finance institutions, poorer households face difficulty in accessing credit and high interest rates, often 3% - 4% per month. Combined with insecure incomes, this makes it difficult for poorer households to invest in RET. Other familiar technologies, such as solar lighting (except for the most basic portable models) price from $500-$1,000 and solar pumping sets price from $1,000-$2,000, are priced beyond the reach of small Cambodian farmers. This underlines the need for building incentive schemes to make RET adoption more affordable by the poorest households.

Policy Barrier
The policy environment in Cambodia is generally supportive of the use of biodigesters but a broader scope of RET for its contribution to rural development in Cambodia has not been fully explored. Promotion of RET is mainly at small scale and is fragmentary with insufficient coordination and sharing of knowledge. At present, there is lack of awareness amongst policymakers of the potential of RET, particularly in the agriculture sector. Internally, increased technical capacity of key stakeholders in policymaking to formulate, implement and enforce renewable energy strategies is required. National Policy on Rural Electrification drafted by the Ministry of Industry, Energy and Mines (MIME) also recognizes that there is a collective need for coordinated effort to increase awareness of RET and the different technology options to ensure that the potential role of RET is systematically considered in development of policy and programmes in the agriculture sector and beyond.

This lack of awareness and technical capacities among policy makers has also resulted in the absence of policies that could neutralize any disadvantages of RET in the marketplace. Cambodia has the high rates of electricity tariffs, the most expensive in ASEAN, due to its status as a net oil importer. Supportive policies and a favourable market framework (ex. establishment of a favourable tariff regime for all RET as done for solar panels) can help stimulate the adoption of RET and diffuse RET deployment effectively.

3) Baseline: Promotion and Adoption of RET in Cambodia

Markets are emerging in Cambodia for RET for solar home lighting systems, solar pumping/drying technology, solar ovens, fixed dome, new innovation hollow brick, and portable biodigesters, and biomass-energy plants (rice husk gasification). There is great potential for stimulating this nascent market for facilitating a broad take up of RET and for promoting decentralised renewable energy options to meet the energy needs of the rural populace as a means to improve their ability to better adapt to climate change. There are a considerable number of externally assisted programmes, mainly implemented through local or international NGOs, promoting RET in rural Cambodia. However, these efforts remain fragmentary and supporting systems for marketing, installation, finance and after-sales services have yet to develop to create a self-sustaining market. Existing efforts focus primarily on installation capacity and less on the optimal productive use of RET in agriculture. The current challenges with specific RET are not related to the technology per se, but the difficulties related to creating a network of satisfied customers who have gained trust in the technology and who receive quality and timely after-sales services. There are also weak linkages between RET uptake and advocacy for policy reforms to create an enabling policy, regulatory, incentive and institutional environment.

Baseline Programme: National Bio-digester Programme

The National Bio-digester Programme (NBP) is a programme of MAFF with the Department of Animal Health and Production as the advisory and coordinating agency. The Netherlands Development Organisation (SNV) provides technical assistance. NBP commenced in 2005 and operates in fourteen of Cambodia's 24 Provinces. Up to December 2014, 22,116 bio-digester units had been installed, benefitting over 100,000 household members. The first phase of the programme (2005-2012) concentrated on the introduction, promotion and dissemination of the technology and on setting up sector infrastructure, including training of masons. Phase 2 (2013-18) has a strong focus on private sector development and on strengthening all actors to ensure long-term sustainability and decrease dependence from donor funding.

Specific activities of the NBP in Phase 2 are:

- To increase the number of family sized, quality biodigesters in selected provinces;
- To ensure the continued operation of all biodigesters installed under the bio-digester programme;
- To maximise the benefits of the operated biodigesters, in particular the optimum use of digester effluent; and
- Technical and promotional capacity development for further wide scale deployment of biodigester technology in Cambodia.

To date, NBP has focused on installation of brick-lined, fixed-dome bio-digesters using five sizes from 4 m^3 to 15 m^3. The total costs of the installations ranges from $420 for the smallest to $1,100 for the largest. NBP provides a direct conditional grant to the farmer which is $150 for all sizes of bio-digester. NBP partners with three Micro-Finance Institutions (MFI) of PRASAC, Amret and Hatta Kaksekar. Using low-cost capital, these MFI provide loans for bio-digester construction at interest of 1.2% per month which is well below the interest rate for general credit in the Cambodian countryside (2.5% - 4% depending on size of loan and collateral). About 70% of bio-digester constructions are supported by these credit arrangements. Sales of Gold Standard verified emission reductions (VERs) are supported through the Dutch based institution, Humanist Institute for Cooperation with Developing Countries (HIVOS)[10].

The NBP provides a baseline to which additional value can be added through: (1) supporting innovation for diversification of technologies; (2) researching and demonstrating through a structured Research and Development (R&D) unit within NBP and applying new innovation hollow brick, and other best practice RET accessible to poorer smallholders; (3) using innovative extension approaches to strengthen the linkage between bio-digester use and climate resilient agriculture (i.e. integrated farming systems through the use of bioslurry as organic fertilizer); (4) development of strategic plan 2015 – 2025 and road map, business plan for its implementation, and; (5) resource mobilisation for further scaling-up for national wide.

Baseline Project: PADEE

The Project for Agriculture Development and Economic Empowerment (PADEE) is an IFAD-financed project targeting 90,000 productive poor and vulnerable smallholder farmers in the provinces of Kampot, Kandal, Prey Veng, Svay Rieng and Takeo in southern Cambodia. The project implementation period is 2012-18 and the total project cost is $43.2 million of which $35 million is IFAD loans and grants. PADEE has two key project components: Improved Access to Financial Services, introducing an Improved Group Revolving Fund (IGRF) model in cooperation with FAO; and Improved Access to Technology and Markets, which focuses on agriculture extension but also includes a small-business development sub-component. SNV is an implementing partner in PADEE and provides technical assistance for extension and for the small-business development sub-component. In addition, iDE supports (through the Lors Thmey social enterprise) its network of Farm Business Advisers (FBA) who conducts extension activities and retail quality-controlled inputs. Also, within the small business development sub-component, PADEE works with the NBP to develop, test, demonstrate with monitoring and assessment and market viable pro-poor biodigesters. This work on pro-poor biodigesters is intended to have smaller size, lower cost and reliable

[10] Hivos has calculated to date, over 1,500 hectares of intact forest have been saved through the NBP.

technologies, and to be less dependent on animal waste feedstock as compared to the standard brick dome biodigesters.

PADEE targets provision of 4,000 of these pro-poor biodigesters. A floating drum model was developed in prototype but it has not proved possible to reduce the costs of this model below the cost of the fixed dome biodigester (Farmer's Friend model) by a sufficient margin. The project is now examining the possibility of supporting lower-cost versions of the new innovation hollow brick Farmer's Friend construction and / or a lower volume digester. Beyond this, the project will support the field testing and scale up of other biodigester models that show potential for replication in the rural Cambodian context. The intention is to move beyond biogas for cooking and lighting, and enhance extension services support to implement an integrated farming systems approach ensuring that farmers can make full use of the bioslurry (by-product of biodigesters) for increasing agricultural production. Under the NBP programme, the bio-slurry (about 10-15 tons per annum[11]) is applied in different forms (liquid, middle dry and dry form). Most farmers dry the slurry in a compost hut and some farmers dry liquid slurry through sun-drying and transport it to their respective rice farms as dry matter. The mode of transport (where rice farms are far, 500m-2km) is through ox-carts pulled by water buffalos and/or cattle. However, smallholder farmers that have adopted biodigesters do not have the skills or marketing knowledge for selling bioslurry thus losing out on an income revenue stream. With PADEE set to roll out an improved biodigester technology to around 4,000 of its total 92,000 beneficiaries, the opportunity exists for additional funding to increase both the scope (more types of RET) and the scale (number of beneficiaries) of this linkage of RET support to climate resilient agriculture.

Baseline Projects: Upcoming IFAD Supported projects

The Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE) is an agriculture extension sub-sector programme with a strong focus on mainstreaming climate change resilience in smallholder agriculture. The total estimated project costs are USD 82.2 million over seven years. ASPIRE will commence in 2015 and will expand into the five southern provinces (the target for the SCCF project) on phase-out of PADEE in 2018. The roll-out of ASPIRE will ensure continuity of supporting arrangements for the SCCF project and will open possibilities for integrating support to RET into the MAFF Strategic Budget Programme at Provincial level, as well as for mobilising additional resources for scale-up.

The Accelerated Inclusive Markets for Smallholders (AIMS) project will be designed in 2016 with a probable 2017 start date. AIMS will take a value chain approach to improving market access for smallholders. The sustainable business model approach of the SCCF project is a good fit with AIMS and options for synergies and scale-up support will be examined during AIMS design.

Baseline Programme: SNV – Renewable Energy Programme.

SNV's cooperation with the NBP forms one component of its renewable energy portfolio in Cambodia. Other elements of the portfolio include the Waste-to-Energy (W2E) programme introducing advanced rice-husk gasification technology into the rice milling sector in Cambodia, the Advanced Clean Cooking Solutions (ACCS) programme in Cambodia and Laos and a Solar Microfinance Programme which will work with MFIs in cooperation with the Solar Energy Association Cambodia (SEAC) to provide affordable finance for solar electricity to Cambodian rural households. The four-year Solar Microfinance Programme is the largest solar energy program in Cambodia to date, largely funded by the French Development Agency (AFD). Yet, this scheme is still in its initial phases therefore requires supporting policies, institutional and financing mechanisms for bringing to scale proven solar technologies through a market-driven approach. In addition, the incentive scheme offers the basis for the introduction of solar technologies and the project will examine opportunities of this program to expand and integrate other RET.

Baseline Projects: UNIDO Renewable Energy Projects.

[11] Pro-Poor Biodigester Monitoring Report, SNV 2013

United Nations Industrial Development Organisation (UNIDO) is implementing two interrelated projects financed by GEF and concerned with transfer of renewable energy technology in Cambodia. These projects are 'Reduction of GHG Emission through Promotion of Commercial Biogas Plants' (GEF ID: 5421) and 'Climate Change Related Technology Transfer for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solutions' (GEF ID: 4042). The latter is expected to be completed by November 2015 according to its PIF. Both projects focus on medium- (3 – 5 MW range) to large-scale uses of RETs while the proposed Project addresses smallholder household and farm-level energy supply. During the design phase, the Project will further work with MIME and MAFF to find synergy between the small-scale RET and the medium- and large-scale commercial energy system established by the above two UNIDO projects, seeking how the advancement of small-scale RET can benefit from and contribute to the larger scale commercial energy system.

4) Alternative Scenario: Project Components, Outputs, Additional Cost Reasoning and expected contributions from the baseline, SCCF and co-financing

In the alternative (with project) scenario, the uptake of RET for agriculture will be enhanced by testing and demonstrating innovative technologies and agriculture-linked applications of RET, by upscaling proven technologies, by developing the necessary supporting market system for RET through improved business models for RET retailing and after-sales, and by facilitating policy research and dialogue to improve the enabling environment for scaling up RET adoption.

The project will build upon and add value to the baseline scenario outlined above in the following key ways:

- Introduction, testing, demonstration and evaluation of innovative RET, particularly those providing direct or indirect benefits to PADEE beneficiaries who are poor and vulnerable smallholders with productive potential (referred to as "productive poor"). Technologies that are supported will be ones that have proved effective in comparable conditions in countries other than Cambodia: the project will not support "pure" research and development of new technologies;
- Specifically linking RET to agricultural production, processing and marketing to increase income by smallholder farmers and thereby build resilience;
- Upscaling adoption of proven technologies within the specific target group of PADEE farmers and their communities;
- Working with local entrepreneurs to develop business models for marketing, financing, installation and after-sales service for RET;
- Assisting policy makers in the agriculture sector with the understanding, knowledge and resources they need to advocate and mobilise resources for increased promotion of RET in agriculture;
- Assisting policy makers to identify policy bottlenecks that inhibit the uptake of RET and to propose policy solutions.

The project will be implemented in two components. Component 1 will promote uptake of RET to support smallholder agriculture production, processing and marketing. Component 2 will promote uptake of RET in agriculture sector policy making and resource allocation. The two components will be closely interlinked and will support each other, with knowledge and lessons learned from Component 1 feeding into policy dialogue while policy formulated with the support of Component 2 will encourage the further uptake of RET.

Component 1: Promoting uptake of climate resilient RET to support smallholder agriculture, production and marketing.

Expected Outcome: Approximately 10,000 smallholder farm households with improved climate resilience due to investments in RET for agriculture production, processing and / or marketing.

Additional Costs (Indicative): US$ 3,570,000 of SCCF-B financing, in addition to the direct cost of conditional grants for RET installations during the initial phase, the costs include technical assistance to NBP, introduction of RETs, testing and documentation of selected innovative technologies, capacity development for farmers and for local businesses that make up market support (i.e. suppliers, marketers, installers, finance agents, after-sales service agents) for RETs,.

Co-Financing (Indicative): US$ 21,300,000 consisting of the following three contributions:

i) US$ 17,600,000 of co-financing from the PADEE project (IFAD loan and grant).The PADEE supports the costs of establishment, capacity development and extension training of 90,000 smallholder farmers of whom 48,000 are enrolled in IGRF groups. Direct beneficiaries of the SCCF project will be selected from amongst IGRF groups. PADEE also includes funding for research and development of pro-poor biodigesters and a decision on adoption and scale-up of one of the pilot models is expected from NBP shortly. The biodigester support activities of PADEE will be coordinated closely with the SCCF project which may directly scale up the PADEE pro-poor biodigester model if this is found suitable.

ii) US$2,700,000 from RGC (in-kind) including staff salary contribution, and development and provision of incentive schemes; and

iii) Approximately US$1,000,000 in contributions to the costs of RET installations by project beneficiaries.

Baseline: Biodigesters are increasingly familiar in rural Cambodia after the NBP disseminated over 22,500 Farmer's Friend biodigesters in 15 provinces. Farmer's Friend Biodigester is a modified fixed dome model originated from Indian Deenbandhu. To select the best suitable model of biodigester for wide-scale dissemination in Cambodia among the most commonly used types, the NBP contracted a local consulting firm, ILI Consulting Engineers Mekong Ltd. in August 2005 to conduct a study. After reviewing the technical details of five different models, the study recommended the Indian Deenbandhu Biodigester as the most suitable model of biodigester for the Cambodian context.

Solar energy is also promoted (mainly through NGO programmes and by the private sector) but uptake for agriculture production, processing and marketing is low and there is little local capacity for installation and after-sales service. Other RET trialled in rural Cambodia include biomass gasification but these technologies are not yet available to smallholders on any scale.

The GEF-funded UNIDO projects are supporting technology transfer for medium scale (3 – 5MW) electricity generation using biogas and biomass. These activities are implemented by MoE and UNIDO in collaboration with AFD.

Additionality: Component 1 will use the mechanisms of the NBP and other existing market and technical support infrastructure to bring RET to farmers participating in the PADEE project. Selection of beneficiaries for the RET will be carried out with the participation of the PADEE IGRF group members and priority will be given to farmers proposing to use the technology to enhance production, processing and / or marketing. Technical support will be provided to assist the farmers to manage and maintain their RET installations and to self-evaluate the value of the benefits they receive. Extension support will be provided to the RET-adopting farmer and other members of her / his IGRF group to maximize the benefits from RET in production (e.g. use of bio-slurry for fertilizer, use of RET pumping technologies, other production technologies requiring electricity). Where farmers wish to adopt RET for innovative uses in processing and marketing, targeted support will be provided to the first adopters who will also assist in demonstrating the technology to other PADEE farmers. The additional (climate change adaptation and climate change mitigation) costs thus arise from the adoption of RET which both assist adaptation and provide global environmental benefits (reduced GHG emissions).

The total number of RET installations supported by the project is estimated at 10,000 (see below subcomponent description for details). Therefore the 10,000 households adopting and investing in these technologies are considered as the direct beneficiaries of the project. The number of indirect beneficiaries may be considerably higher and will principally consist of PADEE IGRF group members who will participate in trainings and demonstrations linked to the RETs and their agricultural applications.

Component 1 will assist low-income households who have low adaptive capacities (from whom the PADEE IGRF group members are drawn) to overcome the cost barrier to RET adoption by improving their access to low-cost finance. Beneficiaries will be selected through consultations with PADEE IGRF members with priority given to adopters with a clear business plan for linking the RET to agriculture production, processing and/or marketing

operations. IGRF group members are selected from the poorer members of the community based on Participatory Wealth Ranking and these farmers with least adaptation means will have the highest priority for project support. Beneficiaries may also include other farmers within the community whose adoption of RETs will provide learning opportunities or other indirect benefits to IGRF members given their interest in RET and/or involvement in the community-level action. Particular priority will be given to synergies with the small business development activities of PADEE which build upon and extend the IGRF group model.

Component 1 is comprised of the following three sub-component activities:

Subcomponent 1.1. Best practice biodigesters installed of proven models showing consumer preference under the baseline project

Relatively well-understood RET technologies will be promoted under subcomponent 1.1 in order to reinforce and harmonize activities under PADEE's component on biodigester testing under the NBP. Certain models have been piloted for over two years under PADEE. For example, an innovative, lower cost hollow-brick alternative has been considered suitable for market commercialization and other local best practice biodigester technolocies are near to commercialization. During the detailed project design, a consensus on the scaling up of best practice models will be reached with NBP and other relevent stakeholders. On the other hand, technologies that have been identified as requiring further testing/piloting will be financed under subcomponent 1.3. The objective is to support the NBP's portfolio diversification in order to promote quality standard biodigesters with the ultimate objective of reaching the poorest rural households.

Direct support to households who adopt best pracice biodigersters will be the same as, or financially equivalent to, the package of low-interest loans and conditional grants provided by NBP.

Subcomponent 1.2. Solar energy systems installed for agriculture value addition

Solar panels are most likely to be used for solar pumping for horticulture but other uses are possible in production (e.g. electric lighting for chicken breeder units) or for driving machinery for processing. The project will specifically encourage PADEE farmers to develop innovative, climate-resilient applications of solar energy in their farming. For example, in rural areas, the common practice of drying fish is through exposure to direct sunlight in the open, which can be very unpredictable and inefficient as it takes several days to reduce the moisture content to appropriate levels that will minimize microbial and pest attacks. When it rains or is cloudy it is difficult or even impossible to dry fish causing high percentages of spoilage and lower quality, leading to fish being sold for lower prices. Dried fish has a niche market and is especially important for inland markets and remote areas where fresh fish is unavailable. PADEE offers an entry point through a grant component for innovations managed by SNV, with a concept of a hybrid solar-biomass machine developed by the Cambodia Technology Institute (ITC). The project will seek to support such innovations as well as test other innovative models that will be first desk-reviewed and if considred viable, tested in local rural conditions. For example, a concept of solar tunnel drier with a windmill electricity generation is being piloted in East Africa to ensure that fish drying is continuous for 24 hours without disruption during damp weather conditions or at night[12].

Subcomponent 1.3. Piloting and readiness for scaling-up of high potential innovative RET systems

During project preparation and implementation, additional technologies suitable for the rural Cambodian context and relevant to agriculture will be identified for promotion. These technologies will be tested and demonstrated and supported for roll-out. By diversifying the number of technologies and the ways in which RET can be used in agriculture, a broader menu of options can be provided for farmer selection thus ensuring greater up-take. This in turn will stimulate more investment by the private sector in farmer selected RETs for provision of better terms and supporting services (marketing, finance, installation, after-sales) and will lead to a self-sustaining market place for RETs.

[12] Marine and Fisheries Research Institute - http://www.kmfri.co.ke/News/kipini%20secure.pdf

The innovation process will include development of the knowledge necessary for successful introduction of new technologies and for expanding the range of applications of existing technologies. Specific studies will be carried out in relation to each new technology such as the following:

1. Demand assessments for energy services at the household and farm level (for agricultural production and processing);
2. Sources of income for rural households and savings strategies of beneficiaries;
3. Baseline data collection/entry on energy expenditure and client's income base including their willingness to pay for purchasing RET;
4. Cash flow analysis of the impact of RET on farm incomes over the short and medium-term;
5. Market survey on the potential for the promotion of RET.

Component 1 will seek to extend the range of RET for which low-cost finance is available through working with MFIs to increase their understanding of innovative RET and their impact on farm incomes. Component 1 will also experiment with alternative financing models which may include group-based lending support (based around the existing PADEE Improved Group Revolving Funds) and leasing or lease-purchase of RET. Activities will focus on provision of more cost effective RET as well as by improving or introducing incentive schemes that would make RET further affordable to smallholder farmers. For the new models being tested preferential grant financing will be provided to assist smallholders thereby reducing the risk of adopting an untested model. Capacity development activities of PADEE will assist beneficiaries to better understand the financial benefits of adopting RETs in post-harvest processing and also, through engagement in financial literacy courses and, cash management. Furthermore, the local private sector will be strengthened to facilitate easy import of RET, provide installation and after-sales services, financing and marketing.

Work will be undertaken with the NBP and its partner financing institutions to deliver biodigester installations and will work with a selected partner for solar energy systems. The possibility of NBP diversifying into solar energy systems and other RET has been discussed with NBP management. If the NBP decides this option is not in line with their mandate, a partner from the private sector, social enterprise or NGO will be selected. The selection will be based on the partner having existing technical and marketing capacity and links to finance institutions, and is capable of delivering installation and post-installation technical support.

The expected outputs of Component 1 are:

1. 4,000 best practice biodigesters sustainably operated and used by PADEE beneficieries for agriculture production, processing and / or marketing;
2. 4,000 solar energy systems sustainably operated and used by PADEE beneficiary communities for extension and demonstration of use of solar electricity in agriculture production, processing and marketing.
3. 2,000 innovative RET installations in PADEE beneficiary communities sustainably operated and used for extension and demonstration of use of renewable energy for an innovative use related to agriculture production, processing and / or marketing.

Component 2: Stimulating scale-up of climate resilent RET through agriculture sector policy making and resource allocation.

Expected Outcome: An enabling policy framework and institutional modalities for facilitating scale-up of climate resilient RET in agriculture.

Additional Costs (indicative): US$ 800,000 from SCCF-B funds.

Co-Financing (indicative): US$ 500,000 comprising of US$ 200,000 from IFAD loan and grant for case studies and technical support from Senior Policy Adviser under the IFAD-supported ASPIRE programme as well as US$ 300,000 from RGC as in-kind support from senior policy-makers in other institutions, notably Minstry of Economy and Finance (MEF) and Supreme National Economic Council (SNEC) and from NBP staff for support to stakeholder

organization and meetings, policy dialogue and knowledge product dissemination.

Baseline: MAFF has established an internal Technical Working Group on and Climate Change TWGCC-MAFF under the leadership of Secretary of State H.E. Ty Sokun who is the MAFF representative on the National Climate Change Committee. The TWGCC-MAFF has prepared the MAFF Climate Change Action Plan which is a pre-condition for accessing funding from the Cambodia Climate Change Alliance (CCCA) Trust Fund. An application for initial funding has been submitted and is being reviewed by CCCA. However, even when the CCCA support is realized, the capacity and effectiveness of the TWG will remain limited, with insufficient coordination of climate change adaptation and mitigation initiatives within MAFF and between MAFF and other Ministries. MAFF policies and programmes are not routinely reviewed for climate change implications or opportunities to mainstream climate change adaptation or RET adoption.

The baseline expenditures of RGC on costs of salaries of TWGCC-MAFF staff, premises, utilities, relevant policy studies and dialogue efforts of line ministries, use of premises and vehicles etc are considered as in-kind co-finaning. The indicative amount of these costs is estimated as $75,000 per year or $300,000 over the life of the project.

Additionality: Component 2 will provide the TWGCC-MAFF with the resources and capacity it needs to play an effective role in coordinating and advocating for climate change initiatives in MAFF at the policy and programme level, with a specific emphasis on the role of RET in agriculture. The proposed SCCF-B grant will seek to define the policy orientation on RET among government institutions and departments, especially between MAFF and Ministry of Environment (MoE), and within MAFF, between the Climate Change Working Group and the NBP. Furthermore, support will be provided to the National Adaptation Plan (NAP) development process for articulating the role of RET in meeting adaptation objectives. The key areas that need attention are the following: 1) the overall enabling environment for RET, which may include adjustments to the tariff regime for imported RET equipment, 2) gaining consensus on which RET should be promoted and the corresponding regulatory framework required; 3) enhancing the national institutional arrangements for advancing a broader set of RET options; and 4) financing options for cost reduction of RET, including carbon financing. Analyses will be undertaken for informing policy discussion on the different options relevant to these 3 areas building on past and on-going work. The policy dialogue forums will engage a range of actors including, the private sector, NGOs and development cooperation partners, in addition to government institutions. Therefore, the additional costs are directly related to strengthening the policy response to climate change within the agriculture sector.

Through Component 2, the TWGCC-MAFF will gain capacity through implementation of study and research in RET, analysis of findings, engagement in dialogue with other stakeholders in the environment, climate change and renewable energy fields. The ultimate objective of the RGC is to have a unified approach with no overlaps on climate change policies across different line ministries. To this end, the second component will extend its support to other line ministries including National Climate Change Committee (NCCC) for articulating the role of RETs in meeting adaptation and mitigation objectives.

The expected outputs of Component 2 will be as follows:

1. Developing the capacity of the TWGCC-MAFF; i.e. providing its members with support so that they can effectively design and implement policy studies and engage in policy dialogue related to climate change within MAFF and externally;
2. Policy Studies including
    a. Study of Energy Use in the Agriculture Value Chain, including energy consumption, typical source and costs for selected smallholder agriculture-based commodities;
    b. Research, study and review of RET technologies with potential for introduction or scaling-up in smallholder agriculture production in Cambodia. This is likely to include innovative technologies being piloted by Government, civil society and / or the private sector in Cambodia or in neighbouring countries.
    c. Study of the key obstacles to more widespread adoption of RET by Cambodian smallholders.
3. Outreach and knowledge sharing activities. Technial assessments including costs and benefits, and GHG emission reductions for environmental financing, and best practice examples of RET will be

documented and disseminated.

4. Preparation and dissemination though high-level seminars and other means of policy analysis documents (policy briefs and similar) advocating for policies and resource allocation to promote uptake of RET by Cambodian smallholders
5. A policy, institutional and incentive framework for scaling up RET adoption nationally.

5) Adaptation benefits:

Adaptation benefits will arise from increasing the scope and scale of adoption of RET by Cambodian smallholders for agriculture production, processing and marketing. The adaptation benefits of biodigester technology include the decrease in deforestation and land degradation leading to improved ecosystem services and resilience as well as improved soil management using bio-slurry fertilizer. The switch from fuelwood to biogas is having the following multiple benefits: (i) labour saved from collecting firewood leading to increased labour productivity and improved incomes; ii) reduced health costs; iii) decrease in deforestation and land degradation leading to improved ecosystem services; (iv) reduced methane emissions from better livestock manure management and substitution of chemical fertilisers with organic bioslurry (reduced GHGs); (v) reduced dependence on fossil fuels for post-harvest processing; and (vi) increased household assets. All of these benefits contribute to increasing several capitals (natural, financial, human and physical) of smallholder farmer's that make them more resilient to contending with climate change.

Solar and other electricity-generating RET will power small-scale irrigation development with improved water use efficiency for production of high-value off-season vegetables, thus decreasing the risks associated with rainfed systems. The change from fossil fuels to RET will have the important effect that the reduced marginal cost of RET energy will remove energy-cost constraints that discourage smallholders from enhancing their production, for example by using small-scale irrigation to extend the cropping season. Furthermore, the ability for smallholder farmers to power agricultural machinery such as chaff cutters, rice drying and milling machines, irrigation pumps, and cold storage can facilitate a significant transformation in their value-addition activities and increase household incomes. This is a key element for building household level resilience to climate shocks.

Other important household benefits to be monitored by the project from a gender perspective include: labour saved from collecting firewood leading to increased labour productivity and improved incomes; increased food and nutrition security through home gardening; and reduction in respiratory diseases and eye infections.

6) Global environmental benefits

The change from fuelwood and fossil fuels to RET will have important global environmental benefits due principally to reduced green-house gas emissions (CO_2 and CH_4[13]) and decreased deforestation and forest degradation. While emissions from Cambodian agriculture remain low, mechanization is proceeding rapidly using mainly general-purpose diesel engines which are of low efficiency for any given application. Therefore, the opportunity to avoid future GHG emissions by encouraging the widespread adoption of RET is considerable.

The current estimation of reduced CO_{2e} emission is mainly based on the replacement of Kerosene lamp and firewood use. The RET will allow approximately 32,300 t CO_2e of direct emission reduction[14]. This is a conservative assessment without considering the mitigation benefit from avoided deforestation, land use changes, improved manure management[15] and indirect benefits from scaling-up of the selected RETs. During the project design, the amount of indirect benefits as well as CO_{2e} emission reduced from avoided deforestation and improved land management will be calculated.

[13] According to the US Environmental Protection Agency, Methane (CH_4) is more efficient at trapping radiation than CO2 and its comparative impact on climate change is over 20 times greater than CO_2 over a 100-year period.

[14] This is based on the assumption that a biodigester reduction in workload of 2.5 hours per day, and reduction of 4-6 kg of firewood per day or 50 litres of kerosene saved for 10 years. Emission factor of 71.9 tCO_2/TJ for Kerosene was applied.

[15] In a similar case of Viet Nam, changes in manure management and fertilizer use from an improved biodigester was estimated to 2.1 tons of CO2e emission reduction.

7) Innovation

Innovation within the proposed SCCF project has a number of dimensions. First, the project will introduce, test and demonstrate the use of small scale RET technologies (50kw – 300kw) which are not in use as yet in Cambodia for application in smallholder agriculture. In addition, proven technologies such as portable biogas digesters and solar ovens etc. which have a track record of success in other countries will be introduced. The project will not support "pure" technological research and development activities. Second, the project will identify, test and evaluate innovative uses of RETs in smallholder agriculture such as for more innovative applications in agriculture production and processing, and use of biogas energy and slurry in integrated mixed-farming systems. This approach will be supported by integrating technical support to new adopters of RETs with agricultural extension, through partnership with the iDE Farm Business Advisers. Third, the project will seek innovative ways to strengthen the market in support of rapid uptake of RETs and of making RETs more accessible to poorer households. Potentially, this could include models such as rental or lease-for-purchase of RET equipment as an alternative to loan-financed direct purchase. The GEF grant can also enhance this project by creating increased technical training opportunities for the rural youth through collaboration with research institutes and technical universities (i.e. Polytechnic Insitute where majority of masons under NBP are trained to construct biodigesters).

Stakeholders – smallholder farmer participants in the PADEE project and their wider communities – will be active participants in the innovation process, through competitive process for allocating RET packages, based on ideas for use of RET in agriculture submitted by the beneficiaries themselves.

8) Sustainability

The project supports uptake of RET, which have a high inherent sustainability. Because of the good performance of existing RET systems and the low running costs, the sustainability of installed systems is very high. After eight years of NBP operations, 96% of installations were found to be operating satisfactorily. Where biodigesters were no longer in use this usually resulted from a change in household circumstances or economic activities, for example migration for work or reduction in livestock farming for reasons unconnected with the biodigester. Other proven technologies such as solar photovoltaic (PV) systems have a similar good sustainability record in service. The process for introducing innovative technologies supported by the project will include a realistic assessment through field trials on a continuous basis on the impact of proposed RET in relation to household level costs, benefits and other factors affecting long-term sustainability.

A self-sustaining market will be achieved through reaching a "critical mass" of RET users so that it becomes a viable economic endeavour that the private sector can invest in. A number of investment and employment generation opportunities will also be created along the value chain relating to supply, marketing, finance, distribution, installation and after-sales service. The project will work with private sector partners in each of these areas and with a specific focus on the application of RETs to smallholder agriculture, which represents a very large potential market in Cambodia. The GEF grant will aim to provide the market space for private companies to operate in more difficult conditions (legal, regulatory, policy and governance). Sustainability will also derive from policy frameworks that will create institutional mechanisms to develop the rural energy sector through promotion of decentralized RET (micro/pico-hydro, biomass technologies including biogas and solar PV).Within the biodigester sector, NBP has a well-established system (the "BioDigester Construction Companies or BCCs") for local private-sector installation of biodigesters and this model will be replicated in other technology fields through the building of necessary installation and after-sales service provision capacity. The project will seek to build on existing partnerships through the PADEE project, notably iDE's Farm Business Adviser (FBA) network who are local entrepreneurs using agriculture extension as a marketing technique for quality-controlled agriculture inputs. Other such schemes in-country will be reviewed and assessed for potential integration.

By linking RET to income-generating activities, the project will assist smallholders to invest in RET as an economic investment with a clear and identifiable impact on household income and cash-flow. Broader uptake of RET will reduce costs for installation and after-sales and thus enhance sustainability. Where viable, the RET installations should ensure linkages with potential agricultural processing activities that can increase agricultural productivity and increase income levels of which a percentage will be set aside for operation and maintenance.

At the policy level the project will assist the TWGCC-MAFF to develop a favourable policy, institutional and incentive framework for widespread adoption of RET in Cambodia, thus assisting the development of a self-sustaining market in support of RET scale up. A review of existing government strategies surrounding the promotion of renewable energy in rural areas (i.e. Green growth strategies, curbing Greenhouse Gas emissions, reducing deforestation rates etc.) will allow for better linkage and alignment to national-driven programs.

9) Potential For Scale-Up

The potential for scaling up use of RET in smallholder agriculture in Cambodia is very large amounting to around 2 million smallholder households. Less than half have access to electricity and only a minority use RET at present. Full scale adoption of RET will come about mainly through market forces, based on familiarity with demonstrated successful technologies and income-generating applications in agriculture. Increasing up-take will lead to stronger market mechanisms andmechanisms and reduced costs from economies of scale.

The SCCF project will directly facilitate scale-up through (1) increasing the number of proven RETs, particularly income-generating applications in smallholder agriculture and closely related activities, thus increasing the attractiveness of RETs to smallholders; (2) support to, and capacity development of the local private sector; and (3) policy support to remove policy barriers to adoption of RETs.

Despite the large long term potential, the remaining barriers to adoption are significant and will require continued support of RGC and development partners to overcome. An increasing share of this support should be in the form of conditional grants which off-set the cost of capturing the global environmental benefits of RETs (i.e. reduced carbon emissions[16]. The existing NBP combination of conditional grants and affordable finance (i.e. the baseline scenario) is a good model, but more can be done to bring RET within the reach of poorer households.

Through its knowledge management activities and through the advocacy of the TWGCC-MAFF, the SCCF project will raise awareness of the potential of RETs in smallholder agriculture amongst Government and development partners and thereby facilitate resource mobilisation for support to scale-up. The integration of RETs into the IFAD Cambodia Country Programme will lead directly to possibilities for additional funding on a significant scale. On phase-out of the PADEE project, the ASPIRE programme will extend its results-based approach to agriculture extension services into the project target provinces. There will also be opportunities for collaboration with an upcoming IFAD-supported value-chain project (Accelerated Inclusive Markets for Smallholders, AIMS) which will be designed in 2016. By integrating RET into these projects a sustained campaign over 15 – 20 years is anticipated with regard to scaling up RET in the agriculture and rural development sector.

2. Stakeholders. Will project design include the participation of relevant stakeholders from civil society and indigenous people? (yes ☒ /no☐) If yes, identify key stakeholders and briefly describe how they will be engaged in project design/preparation.

Stakeholders in the project include the smallholder farmers (members of PADEE IGRF groups and their communities) who are the principle beneficiaries of the project; local private sector actors who will be involved in marketing, financing, installation and after-sales service of the RET installations, strategic private sector and civil society partners, government agencies and development partners. Project preparation will follow an open, inclusive process in which the views and needs of all these stakeholder groups will be taken into account. In particular, smallholder farmers will assist in optimizing the project design to meet their needs.

There are no significant groups of (non-Khmer) indigenous peoples in the project target provinces.

Stakeholder Group	Role in Project	Role in Project Preparation
Smallholder Farmers	Identifying opportunities to apply RET to production, processing and marketing, and identifying potential RET	During project preparation, groups of smallholder farmer participants in the PADEE

	demonstrators and beneficiaries. Participation in demonstration and extension activities linked to RET as part of the Component 2 "package."	project will be engaged in discussions about their energy use and needs, their familiarity with RET technologies and their expectations from the project. Following a model used successfully by the IFAD Cambodia programme in the past, selected smallholders will be provided with expert facilitation to assist them to play a role in validation of the project design, for example by participating in and contributing to the design validation workshop.
Local Private Sector Actors and Civil Society Groups	The project will foster the development of a supporting market eco-system for adoption of RET for smallholder agriculture. This is likely to require capacity development support with a range of civil society groups and private sector actors. These may include (1) local farmer organisations, including but not limited to those based on the PADEE IGRF groups; (2) local organisations involved in agriculture extension support and related activities; (3) local agents and representatives of micro-finance institutions; (4) local skilled craftsmen who will learn skills for installation and after-sales service of RET; and (5) local retail agents, for example agriculture input sellers, who have potential to support marketing of RET.	Representatives of local private sector actors and civil society groups will be engaged in discussions during project preparation with a particular focus on additional data collection, refining the design and validating assumptions about the capacities of the local private sector. Selected representatives will participate in project design validation.

Strategic Civil Society and Private Sector partners.	Strategic Civil Society and private sector partners will include the international NGOs Netherlands Development Organisation (SNV) and International Development Enterprises (iDE). Other stakeholders will include local NGOs involved in promoting RET as well as private sector companies with supply chain capacity (e.g. for importing and wholesaling RET equipment and for supporting local marketing and installation). Micro-finance institutions will also be important partners in the project. SNV has expertise globally and in Cambodia in three development areas: agriculture, renewable energy and water and sanitation. SNV is an implementing partner in the PADEE project, providing support to agriculture extension, small business development and biogas installation. SNV separately provides technical assistance to the NBP. Therefore SNV will be a key technical partner for the project. SNV will assist in project preparation with detailed advice on technology options and implementing modalities. iDE specializes in private-sector development approaches and in Cambodia promotes agricultural development through its social enterprise Lors Thmey, which supplies quality-controlled agriculture inputs through a network of local Farm Business Advisers (FBA). iDE is an implementing partner in PADEE and is expanding the FBA network through the project target districts. The FBAs are local skilled farmers with a entrepreneurial outlook and could play an important non-technical role in marketing and after-sales service of RET as well as supporting extension and demonstration of RET use in agriculture. iDE will be consulted closely in the project preparation process particularly on beneficiary identification, marketing strategy and design of extension packages linked to the RET.	Strategic Civil Society and Private Sector partners will be closely consulted during project design and models for cooperation will be discussed and developed, leading where possible to specific provisional agreements (while maintaining consistency with applicable procurement regulations). SNV and other key partners will be invited to assign technical staff to participate directly in project preparation activities. All strategic partners will be given the opportunity to review the draft project design and to participate in the design validation exercise.
Micro-Finance Institutions	Cambodia has a healthy and expanding micro-finance sector with outreach to most rural areas. A number of MFIs with a pro-poor focus, including PRASAC, Amret and Hatta Kaksekar, are already engaged in providing specialist financing for RET investments. The project will seek means to extend these arrangements to project beneficiaries or to develop a financing model which is financially equivalent from the buyer's point of view. Therefore the MFIs will play an important role in project implementation. At this stage it is envisaged that arrangements with MFIs would be non-exclusive, i.e. a number of different MFI may participate in providing specialized financial products to finance RET.	Potential MFI partners will be engaged in discussions on the optimal financing arrangements for RET installations based on their previous experience in this sector and their capacity for providing financial services to smallholder farmers in the project area. Engagement with MFIs will include both senior staff and local service delivery agents who often have the best understanding of constraints to providing financial services in their areas. MFIs will be invited to participate in the project design validation exercise.

Development Partners	Role in Project: A number of development partners with activities in the field of climate change adaptation and / or RET will be engaged through the knowledge sharing activities of the programme. UNDP provides the key technical assistance to Ministry of Environment and to the National Climate Change Committee, and provides technical assistance to the multi-donor Cambodia Climate Change Alliance implemented through Ministry of Environment. CCCA has a strong component of knowledge management and policy support. UNDP is also preparing to implement two GEF-LDCF projects, one focused on resilient livelihoods and the other on early warning systems. UNDP implements it's "NAPA Follow Up" project in the climate-adaptive agriculture and water management sectors through MAFF-PSU. For these reasons UNDP will be an important partner for implementation of the project and in particular for coordinating climate change policy support (i.e. between NCCC and the TWGCC-MAFF). Partnership arrangements with UNDP will focus on knowledge sharing and may extend to co-financing of some learning, knowledge sharing and policy development activities. FAO is an implementing partner in PADEE (responsible mainly for technical support to the inclusive finance component) and is also engaged in a number of climate change – related activities in Cambodia including implementation of one LDCF funded (Coastal Zone) project. Asian Development Bank is a major financier of climate change adaptation measures in Cambodia through a number of programme and project instruments, particularly the Special Programme for Climate Resilience (SPCR). ADB is also engaged in policy dialogue in the agriculture and climate change areas. IFAD enjoys a close working relationship with ADB Cambodia (with one joint project under implementation). ADB will be a key partner for exploring options for scaling up of successful RET technology options. European Union is a major financier of the CCCA and has a number of other activities related to climate change and RET in Cambodia. In particular, EU supports SNV to develop and roll out rice husk gasification technology for rice milling and (with Agence Francaise de Developpment) to implement the Solar Microfinance Programme. EU supports MAFF particularly in the forestry, fisheries and livestock sectors.	The project preparation team will engage in dialogue with key development partners in order to (1) raise awareness of the project and its development context; (2) obtain suggestions and advice for refining the project design; (3) identify opportunities for collaboration and (4) avoid duplication or potential clashes with other ongoing activities. It is anticipated that close cooperation with UNDP in particular will enhance the design and build linkages with the wider climate change policy area. All key development partners will be invited to comment on the outline design and to participate in the design validation stage.

Government	The project will be implemented through MAFF under the mandate of its TWGCC-MAFF. PADEE is implemented under the MAFF Project Support Unit (PSU) and close cooperation between the two bodies will be needed. As the TWGCC-MAFF does not have a secretariat, it may be that administration and financial management functions of the project will be assigned to PSU under the authority of the Project Director who will be the Chair of TWGCC-MAFF. Also under MAFF, the NBP will be responsible for implementing key activities in Component 1. The Chair of TWGCC-MAFF (and Project Director) is the MAFF representative on the inter-Ministerial National Climate Change Committee and thus provides the link to climate change policy-making within RGC.	The project preparation team will work in close collaboration with MAFF under the oversight of the Chair of the TWGCC-MAFF (who will be the Project Director) and the Head of PSU / PADEE project director, both of whom have Secretary of State Rank. MAFF support to the project preparation will include (1) ensuring that the project design supports and enhances the project priorities of MAFF, particularly as expressed in the Agriculture Sector Development Plan and the MAFF Climate Change Action Plan; (2) facilitating liaison and coordination with other branches of Government and with sub-national administrations; and (3) logistical support to the activities of the project preparation team. Details of the project component designs will be developed through discussion with the relevant MAFF agencies, in particular the TWGCC-MAFF, MAFF-PSU (PADEE) and the NBP. The MAFF Department of Planning and Statistics will assist in ensuring alignment between the project design and the ASDP.

Development Partners	A number of development partners with activities in the field of climate change adaptation and / or RET will be engaged through the knowledge sharing activities of the programme. UNDP provides the key technical assistance to MOE and to the NCCC, and provides technical assistance to the multi-donor CCCA implemented through MOE. CCCA has a strong component of knowledge management and policy support. UNDP is also preparing to implement two GEF-LDCF projects, one focused on resilient livelihoods and the other on early warning systems. UNDP implements its "NAPA Follow Up" project in the climate-adaptive agriculture and water management sectors through MAFF-PSU. For these reasons UNDP will be an important partner particularly for coordinating climate change policy support (i.e. between NCCC and the TWGCC-MAFF). Partnership arrangements with UNDP will focus on knowledge sharing and may extend to co-financing of some learning, knowledge sharing and policy development activities. FAO is an implementing partner in PADEE (responsible mainly for technical support to the inclusive finance component) and is also engaged in a number of climate change – related activities in Cambodia including implementation of one LDCF funded (Coastal Zone) project. Asian Development Bank is a major financier of climate change adaptation measures in Cambodia through a number of programme and project instruments, particularly the Special Programme for Climate Resilience (SPCR). ADB is also engaged in policy dialogue in the agriculture and climate change areas. IFAD enjoys a close working relationship with ADB Cambodia (with one joint project under implementation). ADB will be a key partner for exploring options for scaling up of successful RET technology options. European Union is a major financier of the CCCA and has a number of other activities related to climate change and RET in Cambodia. In particular, EU supports SNV to develop and roll out rice husk gasification technology for rice milling and (with Agence Francaise de Developpment) to implement the Solar Microfinance Programme. EU supports MAFF particularly in the forestry, fisheries and livestock sectors.	The project preparation team will engage in dialogue with key development partners in order to (1) raise awareness of the project and its development context; (2) obtain suggestions and advice for refining the project design; (3) identify opportunities for collaboration and (4) avoid duplication or potential clashes with other ongoing activities. It is anticipated that close cooperation with UNDP in particular will enhance the design and build linkages with the wider climate change policy area. All key development partners will be invited to comment on the outline design and to participate in the design validation stage.

3. Gender Considerations. Are gender considerations taken into account? (yes ☒ /no☐). If yes, briefly describe how gender considerations will be mainstreamed into project preparation, taken into account the differences, needs, roles and priorities of men and women.

Adoption of RET for domestic and agricultural use are of special relevance to Cambodian rural women who are the most likely to suffer health impacts from the use of fuelwood and charcoal for cooking, as well as to undertake the drudgery work of firewood collection. Approximately 4.3 million people globally (mainly women and children) are

affected by this situation (World Health Organization, 2012). Women participate in all smallholder agriculture activities but are particularly likely to be responsible for activities carried out near the home including tending small livestock, aquaculture and vegetable gardening. Migration for work is predominantly undertaken by men (for work in plantation agriculture and in construction) and young, unmarried women (garment manufacturing) so that an increasing share of the burden of managing the household and the farm falls upon married women. Consequently, women are likely to be disproportionately represented among the operators and users of RET as well as among the beneficiaries.

Ministry of Women's Affairs (MoWA) is an implementing agency of the PADEE project, supporting gender mainstreaming and women's livelihood activities. Through its Provincial departments and District offices, as well as through the MoWA-supported network of Women and Children Focal Points in the District and Commune councils, MoWA is well positioned to assist in ensuring that project design and implementation reflects the needs and priorities of rural women. Through PADEE, MoWA will participate in the process of identifying opportunities to apply RET in agriculture and selecting beneficiaries. The project will maintain gender-disaggregated monitoring and evaluation data and will specifically research the different impacts of RET on women and men as part of its research and development activities. The project will observe gender equity in hiring of staff and engagement of contractors and service providers.

4 Risks. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable).

Risk	Impact Probability	Comments and Mitigation Measures
1. Technical Risk: Selected RET prove inappropriate and / or unsustainable in smallholder agriculture applications in Cambodia	I: high P: Low	The RET selected for scale-up are based on technologies already familiar and successful in Cambodia and / or in IFAD programmes elsewhere. Care will be taken to ensure that necessary support is in place (i.e. local private sector provision of marketing, installation, after-sales, plus extension support for application of RET to climate resilient agriculture) for successful technology transfer. For less proven technologies the project will focus on demonstration, testing and evaluation before any scale-up decision is taken. Given the innovative aspect of the project, it is acceptable that not all tested technologies will prove successful in a Cambodian context.
2. Market Risk: future energy market changes reduce the scope for applying RET to smallholder agriculture	I: Medium P: Low	Expansion of the mains electricity grid could radically change the economics of RET electricity generation (e.g. solar panels). Grid expansion plans will be taken into consideration in selecting project sites. The risk of a large (further) fall in fossil fuel prices is considered small.
3. Capacity Risk: Support system risk: the local private sector (marketing, installation, finance, after-sales) does not develop to achieve self-sustainability	I: High P: Medium	With the partial exception of NBP (MFIs and BCCs) the market infrastructure needed to support RET remains underdeveloped in rural Cambodia. The project will address this need through specific capacity building measures aimed at equipping local entrepreneurs with the skills needed to serve the market.
4. Financing Risk: RET remain inaccessible to smallholder farmers because of lack of access to suitable finance	I: Medium P: High	The cost of RET installations is high compared to the resources of smallholder farmers and compared to capital costs of alternatives such as diesel engines. Poor and vulnerable households face additional difficulties in accessing credit due to lack of secure incomes, lack of collateral and low educational levels making interaction with formal finance institutions intimidating. The project will seek to ensure that finance is available to PADEE beneficiary farmers on at least equivalent basis to the financing arrangements of NBP, and will investigate financing options (e.g. rentals) that could bring RET installations within reach of poorer farmers.

5. Financing risk: financing system fails because RET loans are not repaid	I: Medium P: Low	This risk is considered low based on the previous experience of the microfinance sector in Cambodia both related to RET and generally. Loan default rates are low. Through careful selection and support to beneficiaries, the project would expect a lower than usual rate of defaults. Defaults at a scale to pose a risk to the project would likely only occur either in the event of technology failure (Risk 1 above) or in association with social or political instability which does not seem likely at present.
6. Political risk: policy environment is unsupportive of RET or of the specific options promoted by the project	I: Medium P: Medium	The overall policy environment is generally favourable for RET and the risk of policy changes making RET less viable is considered low. However there is a degree of inertia in policy-making in Cambodia particularly concerning cross-sectoral / inter-Ministerial issues. This could make it challenging to secure positive policy changes. This is not considered an overall risk to the viability of the project. Through Component 2 the project will work to build awareness and consensus on the need for policy changes to favour RET (e.g. lower feed-in tariff rates and net measuring of electricity production from RET for selling back to national grid).

5. Coordination. Outline the coordination with other relevant GEF-financed and other initiatives.

Coordination with PADEE
The Project will be closely coordinated with PADEE, particularly for (1) identification of agriculture applications of RET and direct RET beneficiaries through the PADEE IGRF group members; and (2) implementation of agriculture demonstration and extension activities through the PADEE implementing partners (i.e. the Provincial Departments of Agriculture and / or the Farm Business Advisers). The potential for the FBA to take a role as retailers and technical support for RET, in addition to demonstrating RET applications in agriculture, will be examined in the project preparation phase.

Coordination with NBP
The Project support for bio-disgester techologies will be closely coordinated with the National Biodigester Programme (NBP). This coordination will be strengthened though technical cooperation with SNV which provides technical assistance for NBP as well as being an implementing partner in PADEE. The Project will coordinate selection of biodigester technologies, financing packages and selection of target areas and beneficiaries with NBP to ensure synergy and avoid duplication. The NBP Biodigester Construction Companies (BCC) will be a focus for capacity development support under the Project. The possibility that NBP could play a major role in deilvery of other RET will be considered by NBP leadership. Expanding the capacity of the BCCs for installation and after-sales service of other RET could assist the BCCs to become fully commercially sustainable. The project will assist NBP to advocate for a favourable policy environment through Component 2.

Coordination with other IFAD projects / programmes
The major IFAD supported ASPIRE programme is about to commence and will eventually expand into the PADEE provinces by 2018. Therefore, sub-national coordination and delivery of the Project through PADEE will be taken over by ASPIRE after 2018. ASPIRE includes a major component supporting policy for extension and links will be developed between this and Component 2. RGC and IFAD will design the AIMS project in 2016 and opportunities for synergies with the Project will be identified.

Coordination with UNDP-GEF Resilient Livelihoods Project
UNDP has submitted a proposal for LDCF funding for a project supportign climate resilient livelihoods in two Provinces, which is expected to be approved shortly. The Implementing Partner is Ministry of Environment (MoE) with MAFF and NCDDS as Responsible Parties. The Resilient Livelihoods project has a strong knowledge management component which will be implemented by the MoE through its Climate Change Department in close collaboration with the knowledge management platform of the CCCA. The Project will seek opportunities for coordination and knowledge sharing which may focus on (1) suitable investments in RET to enhance climate

resilient livelihoods; and (2) climate resilient agriculture extension materials and methodology suitable for implementation in synergy with RET packages.

Coordination with UNDP-GEF Early Warning Systems Project
UNDP is implementing an LDCF Early Warning Systems Project with Ministry of Water Resources and Meteorology (MoWRAM) as the Implementing Partner. The Project will seek opportunities for coordination and knowledge sharing which may include locally specific climate data which will be of use in assessing the potential of RET, particularly solar energy.

Coordination with UNIDO-GEF Renewable Energy Projects
UNIDO is implementing two projects transferring renewable energy technology for medium-scale electricity generation (3MW-5MW range) in Cambodia, using biogas and biomass (rice husk) technologies respectively. The technologies supported by the UNIDO projects are similar to those that will be supported by the SCCF project, but the SCCF project will work with much smaller installations (50kw-300kW), suitable to its beneficiary group of smalholder farmers, and the direct applications of the RETs are different. Possible synergies between the UNIDO projects and the SCCF project, and options for mutual learning, knowledge sharing and other forms of cooperation, will be explored during project preparation and coordination arrangements will be included in the final project design.

Coordination with SNV Renewable Energy Programme
As described above, SNV has a country Renewable Energy Programme backed by its worldwide expertise and focussing on biodigesters, rice husk gasification, clean cookstoves and microfinance for solar energy. The partnership of SNV in the project will provide opportunity for extensive sharing of knowledge, technical expertise and data and will particularly enhance the research and innovation aspects of the project. SNV is also initiating work ensuring quality control systems for selling above standards solar products into rural areas. With funding from ADF, SNV is establishing an incentive scheme fund of US$1 million. The GEF grant can enhance this initiative also by diversifying into other RET and creating increased technical training opportunities for the rural youth.

Coordination with Cambodia Climate Change Alliance
Cambodia Climate Change Alliance is a sector policy support programme linked to the Global Climate Change Alliance and financed by GCCA, Sweden and European Union. UNDP provides technical assistance. The Project will coordinate with the CCCA particularly for policy support and promotion of policies favourable to RET. CCCA has a Trust Fund which provides grants, principally for policy development support based on the Climate Change Action Plans of priority Ministries including MAFF. The possibility of collaboration in this area will be explored.

6. Consistency with National Priorities. Is the project consistent with the National strategies and plans or reports and assessements under relevant conventions? (yes ☒ /no☐). If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, etc.

Cambodia has prioritised the enhancement of the agriculture sector's contribution to national development, and renewable energy is a key element to achieving this objective particularly with low-cost alternatives. The RGC's overarching Rectangular Strategy gives a high priority to high priority to the expansion of low-cost energy production and supply and distribution network, aimed at ensuring energy security, reliability and affordability to meet development needs, and to expanding the capacity of low-cost and hi-tech electricity production, especially from new and clean energy sources. The National Strategic Development Plan commits the RGC to foster development of all types of renewable energy such as biomass, biogas, bio-fuel etc., and enhance the efficiency of energy through the use of energy-saving stoves, to reduce the use of fuel, firewood, charcoal, etc. Other key policy documents promoting renewable energy systems to reduce GHG emissions and impacts on health include the Cambodia's Climate Change Strategic Plan (2014 – 2023) and the Green Growth Plan (2013-30. The potential for introduction of RET in Cambodia has been confirmed int Cambodia's Techhnology Needs Assessments (TNAs) and Technology Action Plans (TAPs) for climate change mitigation technologies.

Cambodia's climate change adaptation priorities are identified in the National Adaptation Action Plan (NAPA). The NAPA identiies and prioritises a range of project types contributing to CCA. Amongst the agriculture sector priorities in the NAPA, with which the proposed SCCF project is aligned, are (1) Promotion of Household Integrated Farming (high priority) and (2) Improving Farmers' Adaptive Capacity to Climate Change.

The Project is also aligned with Cambodia's Climate Change Action Plan (CCCAP) and its sectoral plan for Agriculture, Forestry and Fisheires 2014-2018. The CCCAP captures the main strategic objectives and directions for a climate-smart development of Cambodia in the next 10 years. The Project particualarly focuses on supporting the following three strategic objectives:

- Strategic objective 1: Promote climate resilience through improving food, water and energy
- Strategic objective 4: Low-carbon planning and technologies to support sustainable development of the country
- Strategic objective 7: Strengthen institutions and coordination framework for national climate change response

As well, CCCAP for the agriculture sector identifies 5 priority actions for 5 sub-sectors (agriculture and agro-industry, rubber, livestock, forestry and fisheries) and the Project will specifically contribute to the following actions:

- Agriculture and Agro-Industry Sub-Sector
    - Action 1: Promoting and up-scaling sustainable farming system that resilient to climate change
    - Action 4: Promote research work on appropriate technology responding to climate change in Agricultural sector
    - Action 7: Promote appropriate technology/techniques that reduce GHG.
- Livestock Sub-Sector
    - Action 2: Enhancing animal waste management and climate change emission mitigation.
- Cross-cutting
    - Action 3: Institutional Mainstreaming Climate Change Adaptation by building capacity and scaling up community resilience
    - Action 4: Promote marginalized groups and women participation to climate change adaptation and mitigation strategy

7. Knowledge Management. Outline the knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

Knowledge management activities will be integrated in both components of the project, with strategic and policy lessons learned (Component 2) informed and enriched by collection, analyis, reporting and dissemination of data and lessons learned from Component 1. Knowledge management activities will build on existing capacity within the IFAD country programme which includes a dedicated website (www.cambodiagreen.org) and experience in producing a range of knowledge products including video, web content, policy briefs, study papers and reports as well as organising successful knowledge sharing events (workshops and seminars).

Specific knowledge management activities will include: (1) careful monitoring of technical performance and gender-disaggregated economic impacts of RET installations and associated agriculture applications supported under Component 1; case studies, video segments, web content and reports based on Component 1; instructional videos on how to construct, operate and maintain specific RET as part of the capacity development activities (also through schools, universities and research institutes) and public commercials for raising awareness and promoting scale up of RET. Knowledge products of Component 2 will include study reports and policy briefs. The project will support knowledge sharing events (seminars and workshops) and will ensure outreach and dissemination of lessons learned and policy recommendations through the representation of MAFF on the National Committee for Climate Change, through the Cambodia Climate Change Alliance and through development partner coordination mechanisms. The project will also coordinate with the knowledge management sub-component of the LDCF financed Resilient Livelihoods Project implemented through UNDP.

PART III: approval/endorsement by gef operational focal point(s) and GEF agency(ies)

A. RECORD OF ENDORSEMENT[17] OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):

(Please attach the Operational Focal Point endorsement letter(s) with this template. For SGP, use this SGP OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE *(MM/dd/yyyy)*
Mr. Lonh HEAL	GEF OFP, Technical Director General	Ministry of Environment	03/16/2015

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies[18] and procedures and meets the GEF criteria for project identification and preparation under GEF-6.

Agency Coordinator, Agency name	Signature	Date *(MM/dd/yyyy)*	Project Contact Person	Telephone	Email
for Gernot Laganda IFAD		30/03/2015	Roshan Cooke	+39 6 5459 2156	ro.cooke@ifad.org

[17] For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required even though there may not be a STAR allocation associated with the project.

[18] GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF