

# **Scaling up Renewable Energy Program (SREP)**

## **Revised Investment Plan for Cambodia**

**20 July 2017**

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## Executive Summary

The Royal Government of Cambodia (RGC) has informed the Asian Development Bank (ADB), of its interest to revise the Scaling Up Renewable Energy Programme for low-income countries (SREP) Investment Plan (IP). The SREP Sub-Committee endorsed the Cambodia SREP IP in June 2016. RGC proposes to sharpen the focus of SREP support to a national solar parks program with a public-private partnership approach, which is expected to accelerate utility-scale solar development. Table ES1 summarizes the indicative financing plan as endorsed in June 2016. Table ES2 presents the revised indicative financing plan.

**Table ES-1: Indicative Financing Plan, Endorsed June 2016 (\$ Million)**

	Sector	SREP	ADB	Private Sector	Gov't	Total
<b>Component 1: Solar Energy Development</b>						
<b>1.1. Solar Energy Development</b>	<b>Public</b>	<b>6.65</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>30.65</b>
Solar Home Systems		4.0	4.0	4.0	5.0	17.0
Solar Mini-grids		2.0	2.0	4.0	5.0	13.0
Project preparation grant		0.65	-	-	-	0.65
<b>1.2. Accelerating Solar Power through Private Sector</b>	<b>Private</b>	<b>14.65</b>	<b>20.0</b>	<b>72.0</b>	<b>-</b>	<b>106.65</b>
Rooftop Solar Systems		6.0	8.0	32.0	-	46.0
Utility-scale Solar Farm		8.0	12.0	40.0	-	60.0
Project preparation grant		0.65	-	-	-	0.65
<b>Component 2: Biomass Power Project</b>	<b>Private</b>	<b>5.4</b>	<b>5.0</b>	<b>15.0</b>	<b>-</b>	<b>25.0</b>
Biomass Power Project		5.0	5.0	15.0	-	25.0
Project preparation grant		0.4	-	-	-	0.4
<b>Component 3: Policy Support and Public Awareness</b>	<b>Public</b>	<b>3.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.0</b>
<b>TOTAL</b>		<b>29.7</b>	<b>31.0</b>	<b>95.0</b>	<b>10.0</b>	<b>165.7</b>

**Table ES-2: Revised Indicative Financing Plan (\$ Million)**

Projects / Program	Sector	SREP			ADB	Private Sector	Gov't	Total
		Loan	Grant	Total				
<b>1. Solar Energy Development</b>								
<b>1.1 National Solar Park Program</b>	<b>Public</b>	<b>11.0</b>	<b>3.65</b>	<b>14.65</b>	<b>20.0</b>	<b>100.0</b>	<b>2.5</b>	<b>137.15</b>
100 MW Public-Private Partnership		11.0	3.0	14.0	20.0	100.0	2.5	136.50
Project preparation grant		-	0.65	0.65	-	-	-	0.65
<b>1.2 Private Sector Solar Development Program</b>	<b>Private</b>	<b>6.0</b>	<b>6.05</b>	<b>12.05</b>	<b>20.0</b>	<b>72.0</b>	<b>0.0</b>	<b>104.05</b>
Utility-scale / parks		5.0	-	5.0	12.0	40.0	-	57.00
Rooftop solar		1.0	5.0	6.0	8.0	32.0	-	46.00
Project preparation grant		-	1.05	1.05	-	-	-	1.05
<b>2. Policy Support and Public Awareness</b>	<b>Public</b>	<b>-</b>	<b>3.0</b>	<b>3.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.00</b>
<b>TOTAL</b>		<b>17.0</b>	<b>12.7</b>	<b>29.7</b>	<b>40.0</b>	<b>172.0</b>	<b>2.5</b>	<b>244.2</b>

The overall context and objectives of the revised IP are unchanged and are consistent with the RGC climate change policy and economic development framework. The proposed change will require a shift in investment operations from ADB's Private Sector Operations Department (PSOD) to ADB's public sector window. The revised IP is focused on achievable success in the next 12 to 18 months. The solar home systems, mini-grids, and biomass power projects have been dropped from the revised IP as there are no viable project concepts under active development. However, these types of projects, including projects under the proposed Private Sector Solar Development Program as well as other future large-scale solar energy development, may be developed with support from other funding channels, in particular the Green Climate Fund (GCF). Project preparation grants may be utilized to support the Government to design these projects that would enable access to and secure GCF funding.

Details of the proposed changes are described in the following sections.

## I. Introduction

The SREP Investment Plan (IP) for Cambodia was endorsed in June 2016 during the SREP Subcommittee (SC) meeting held in Oaxaca, Mexico, with an indicative allocation of \$30 million. The SREP IP aims to improve supply and utilization of renewable energy sources in the country which will be achieved through: (i) provision of adequate amount and appropriate financing modality to support the development of commercially viable renewable energy resources for power generation; (ii) capacity building to strengthen the government's capability to implement the project; enforce related laws, regulations, and standards; and (iii) consumer awareness through conduct of a nationwide renewable energy awareness campaign with focus on rural communities. The IP has three investment components: solar energy development, biomass energy development, and policy support and public awareness.

**Table 1: Indicative Financing Plan, Endorsed June 2016 (\$ Million)**

	Sector	SREP	ADB	Private Sector	Gov't	Total
<b>Component 1: Solar Energy Development</b>						
<b>1.1. Solar Energy Development</b>	<b>Public</b>	<b>6.65</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>30.65</b>
Solar Home Systems		4.0	4.0	4.0	5.0	17.0
Solar Mini-grids		2.0	2.0	4.0	5.0	13.0
Project Preparation		0.65	-	-	-	0.65
<b>1.2. Accelerating Solar Power through Private Sector</b>	<b>Private</b>	<b>14.65</b>	<b>20.0</b>	<b>72.0</b>	<b>-</b>	<b>106.65</b>
Rooftop Solar Systems		6.0	8.0	32.0	-	46.0
Utility-scale Solar Farm		8.0	12.0	40.0	-	60.0
Project Preparation		0.65	-	-	-	0.65
<b>Component 2: Biomass Power Project</b>	<b>Private</b>	<b>5.4</b>	<b>5.0</b>	<b>15.0</b>	<b>-</b>	<b>25.0</b>
Biomass Power Project		5.0	5.0	15.0	-	25.0
Project Preparation		0.4	-	-	-	0.4
<b>Component 3: Policy Support and Public Awareness</b>	<b>Public</b>	<b>3.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.0</b>
<b>TOTAL</b>		<b>29.7</b>	<b>31.0</b>	<b>95.0</b>	<b>10.0</b>	<b>165.7</b>

## II. Status of Implementation

Of the various project concepts included in the original IP, utility-scale solar power has advanced significantly, with limited progress on other fronts. Project preparation grants were approved via the IP endorsement, but the grants have not been converted to project preparation technical assistance within the ADB project processing system and thus are still available to support project development. The status of the various concepts is described briefly below.

### 1. Solar Energy Development Program

The program was to have two subcomponents: (i) solar energy development, and (ii) accelerating solar power through private sector. SREP funds would be utilized to take out up-front development

risks and buy down the cost of capital to facilitate private sector installation and operation and maintenance of solar systems. The program would support growth of the solar industry through expanded delivery of solar systems by existing private sector solar companies. The sector reforms would promote policy evolution to create a viable self-sustaining market for solar energy services.

### *1.1 Solar Energy Development (Solar Home Systems and Solar mini-grids)*

The project would develop solar home systems and solar mini-grids with SREP as cofinancing through the updated Rural Electrification Fund operations (REF v2.0). ADB and the government have been in dialogue on energy sector developments as part of the Country Partnership Strategy (CPS) mid-term review conducted in early 2017. Given the RGC emphasis on grid extension for increased access to energy, there is limited scope for solar mini-grids development. As of July 2017, no firm project concept has been identified for ADB and SREP support.

### *1.2 Accelerating Solar Power through Private Sector (Rooftop Solar Systems and Utility-scale Solar Farm)*

Utility-scale solar farms and rooftop solar systems were proposed for support through ADB Private Sector Operations Department (PSOD). Subsequent to the IP endorsement, PSOD has supported the 10 MW Bavet solar PV project with concessional cofinancing from the Canadian Climate Fund for the Private Sector in Asia (CFPS) under the ADB Clean Energy Financing Partnership Facility (CEFPPF); ADB's Board of Directors approved financing for the Bavet project in December 2016 (discussed further below). PSOD has been engaged with other developers pursuing larger solar projects. As discussed below, additional utility-scale PV plants will be developed in coordination with Ministry of Mines and Energy (MME) and EDC, as part of the 100 MW National Solar Parks Program or in a subsequent stage. PSOD has not identified any rooftop solar projects. A captive 2.6 MW rooftop installation has been commissioned at an industrial facility in the Phnom Penh Special Economic Zone in 2016; this project is being implemented on a fully commercial basis.<sup>1</sup>

## **2. Biomass Power Project**

The project targeted two or three biomass installations of 1.5 - 5 MW capacity each to be developed by the private sector. The project would demonstrate the viability of modern biomass power for grid-connected supply in agricultural areas. Although biomass is attractive based on the wide distribution of resources, there are limited prospects for reducing the cost of electricity supply. As of July 2017, there have not been any firm project concepts under consideration.

## **3. Policy Support and Public Awareness**

Policy support will involve formulation of policy framework, strategy, and sector development plan; review and recommendations on appropriate institutional arrangements and organizational set up for implementing a national renewable energy (RE) program and development; and design of RE capacity building program with implementation arrangement/mechanism. Institutional support is

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<sup>1</sup> <https://cleantechsolar.com/success-stories-cleantechsolar/fandb/coca-cola/>

needed to introduce new modalities such as public-private partnerships (PPPs) and assistance in anticipation of rapid evolution of RE development and facilitate investment creations. The public awareness campaign will be developed on two strategic aspects: (i) an internally-oriented campaign to support project development and implementation; and (ii) an externally-oriented campaign to attract new investment and support from development partners. This activity will be further developed in coordination with MME and EDC.

Subsequent to the IP endorsement, the Royal Government of Cambodia (RGC) requested the Asian Development Bank (ADB) to support a technical assessment of the issues and challenges associated with integration of large-scale solar power plants into the grid. In parallel with the grid integration study, the national electric power utility, Electricité du Cambodge (EDC), tendered the 10 MW solar plant near Bavet. These activities resulted in a strategic change in outlook and focus for future energy development, mainly because of the price discovery achieved through tendering of the Bavet project: Utility-scale solar power can be delivered at grid parity in Cambodia. A key finding of the grid integration study is that 100 to 150 MW of large-scale solar capacity can be introduced without any major grid augmentation. A secondary aspect is that the electric power development is increasingly focused on grid-connected solar resources to reduce cost of supply, expand the solar supply chain, and support increased access to energy.

### **III. Circumstances and Rationale for Investment Plan Revision**

The proposed changes to the IP are based on RGC's change in strategy for the power generation subsector, shifting from negotiated power purchase agreements (PPAs) to a competitive tendering system. This change in strategy has been informed in part by (i) tendering the 10 MW Bavet solar project, (ii) the grid integration study and preliminary feasibility study for the national solar parks program supported by ADB, (iii) learning from other countries experiences in utility scale solar development centered on tendering approaches, and (iv) readiness for developing a national solar program.

The proposed changes will support rapid expansion of solar power in a systematic manner via a public-private partnership model, and will result in more renewable energy capacity and output than in the original IP.

#### **1. Updating the country's power development strategy**

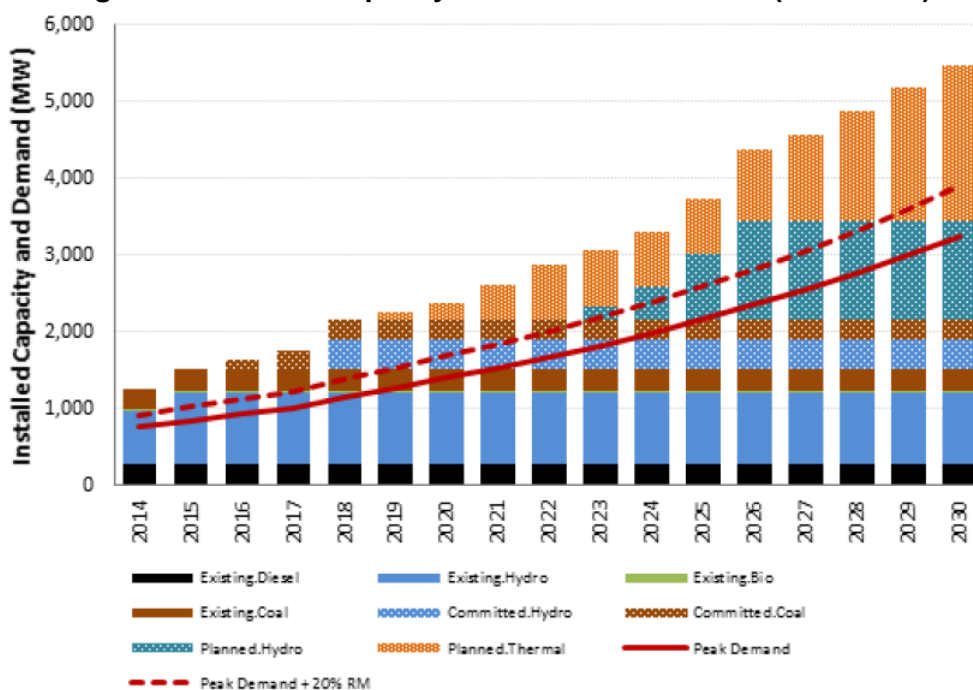
Annual electricity demand growth in Cambodia averaged 18% during 2011 to 2015. At the end of 2015, the total installed capacity was 1657 MW of which 930 MW (56%) was hydropower, 403 MW (24%) was coal-fired, 305 MW (18%) was diesel and the rest (about 20 MW or 1%) was biomass.<sup>2</sup> As of 2015, Cambodia's electricity supply mix was 36% hydro, 35% coal, 3% diesel, 1% biomass and 25% power imports from neighboring countries. The hydropower and coal-fired plants are owned by the private sector and operated under long-term power purchase agreements with take-or-pay arrangements. The current Power Development Plan (PDP), revised in 2015,

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<sup>2</sup> Electricity Authority of Cambodia. 2016. *Report on Power Sector of the Kingdom of Cambodia 2016 Edition*. Phnom Penh.

projects demand growth to average about 7% through 2030. As stipulated in the PDP, the Royal Government of Cambodia (RGC) forecasts meeting ongoing growth in demand through further investment in thermal generation (coal-fired in the short term, and either coal or gas in the long term) and large hydropower (see Figure 1). Power imports, which have been a significant source of meeting domestic demand since 2007, are being substantially reduced and replaced with domestic generation.

**Figure 1: Installed Capacity and Demand Forecast (2014-2030)**



Source: ADB (2017) Towards a National Solar Program in Cambodia: Pre-Feasibility Study Findings

Some key recent developments indicate the need for updating the strategy adopted by the PDP and argue for a greater diversity in the generation mix. RGC's Industrial Development Policy (IDP) 2015—2025<sup>3</sup> identifies high power tariffs as a major impediment to the competitiveness of the country's manufacturing sector, and calls for alternate sources of energy to be developed. These alternate sources of energy – mainly domestic renewable resources – should complement installed and planned hydropower-based generation, which has performed well below design output in recent years<sup>4</sup>, as well as help provide grid stability and other ancillary benefits, around the key demand centers.

To alleviate the impact of high residential power tariffs on vulnerable consumers, the government recently initiated a tariff subsidy scheme for the poor and vulnerable households in 2016. Customers that consume less than 10 kWh a month are being charged about \$0.12/kWh (480 riels) and those that consume less than 50 kWh are being charged about \$0.15/kWh (610 riels).

<sup>3</sup> Royal Government of Cambodia. 2015. *Cambodia Industrial Development Policy 2015 – 2025: Market Orientation and Enabling Environment for Industrial Development*. Phnom Penh.

<sup>4</sup> In 2015, actual output was about half of the rated design output (25% effective plant load factor versus design basis of 50% plant load factor).



The current retail tariff for those that consume above 50 kWh is about \$0.195/kWh (780 riels). Since the initiation of this program, lowering the cost of power has become an even higher priority of the RGC. The price of imported coal has gone up during the 2015-2017 period, making coal-fired expansion less advantageous. In addition, the siting of coal and large hydropower plants is increasingly facing opposition from local communities and civil society. RGC recently announced a moratorium on the construction of large hydropower plants until 2020.<sup>5</sup>

Promotion of sustainable energy sources is key to achieving RGC's emissions reductions targets and broader economic development goals. Cambodia's Nationally Determined Contribution, enshrined in the 2016 Paris Agreement, commits to a 16% reduction in GHG emissions from a business as usual scenario by 2030 from the energy sector.<sup>6</sup> In order to meet the growing demand for electricity in Phnom Penh, which represents approximately 70% of national demand, as well as to address the country's electrification target of 100% of villages by 2020, the RGC has prioritized the development of renewable energy in its National Strategic Development Plan 2014-2018 and Rectangular Strategy Phase III (2013-2018).<sup>7</sup>

The country needs to diversify its generation mix to enhance reliability and security of supply. Solar is the most promising renewable energy resource in Cambodia: The country has the best solar resources in the Lower Mekong basin, with average solar irradiation of 5 kilowatt-hours per square meter (kWh/m<sup>2</sup>) per day. Solar parks represent the most promising opportunity for Cambodia to scale up renewable generation rapidly in the near term, but policy support and concessional finance will be required to jump start and accelerate development, and drive down costs through competition. There are considerable potential benefits for solar power sector development in terms of potential cost savings: System costs and levelized cost of energy for solar PV will continue to decline globally, while the costs of coal-fired power and large hydropower cannot realistically be expected to decline any further.

Biomass power is also attractive as a widely distributed potential resource, but the rapid cost declines observed for solar are not occurring with biomass. Considering the RGC objective of reducing the average cost of supply, solar is the single most promising resource. A recent report prepared by World Bank concluded that in developing countries where pro-active government support reduces upfront development risks and costs, competitive tendering programs are resulting in PPA off-take prices of US\$0.06 - 0.08 per kilowatt-hour (kWh). In exceptional cases with very low risk profiles, off-take prices of US\$0.03 - 0.04 per kWh or less have been documented.<sup>8</sup>

## **2. Tendering of 10 MW utility-scale solar plant in Bavet City**

In February 2016, the MME tendered a build-own-operate transaction for a 10 MW solar plant located in Bavet city in Svay Rieng Province, about 150 km from the capital Phnom Penh. This is the first utility-scale solar project in the country and the first competitively tendered renewable

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<sup>5</sup> See also: K. Schneider. (2016). *Popularity of Big Hydropower Projects Diminishes Around the World*. Circleofblue.org.

<sup>6</sup> Royal Government of Cambodia. 2015. *Cambodia's Intended Nationally Determined Contribution*. Phnom Penh.

<sup>7</sup> Royal Government of Cambodia. 2014. *National Strategic Development Plan 2014-2018*, Phnom Penh, Ministry of Planning; Royal Government of Cambodia. 2013. *Rectangular Strategy Phase III (2013-2018)*. Phnom Penh.

<sup>8</sup> Source: Dobrotkova, Zuzana. 2016. *Price of Solar PV Electricity in Developing Countries*. The World Bank Group.

energy project with an independent power producer (IPP). The project went through an international competitive bidding process to foster transparency and competitiveness. Bidders' response was strong with participation of five bidders, of which four moved on to the financial evaluation stage. The tendering process resulted in a competitive and sustainable tariff. The Sunseap Group, the winning bidder, offered a highly competitive tariff of \$0.091 per kWh, which is below EDC's average cost of supply (which was \$0.095 per kWh in 2015).

The Bavet project is ADB's first non-sovereign power generation project in Cambodia. ADB's PSOD was engaged early in the bidding process to ensure that bidders had the opportunity to optimize their proposals by leveraging the involvement of international financial institutions. The implementation of the project is a signal to the government, investors, and international financiers that private sector-led infrastructure investments can be undertaken successfully in a transparent manner, at a competitive price, and with a sound financing package. PSOD mobilized concessional loan co-financing from the Canadian Climate Fund for the Private Sector in Asia (CFPS) under the ADB Clean Energy Financing Partnership Facility (CEFPF).<sup>9</sup> The project will help unlock Cambodia's underutilized renewable energy resources and will set an important precedent in the renewable energy sector in the country. It will increase renewable energy capacity and sustainable provision of competitively priced, reliable electricity by the private sector.

### **3. National Solar Park Program**

Pursuant to endorsement of the IP in 2016, the government requested ADB assistance for a grid integration study to evaluate rapid expansion of grid-connected utility scale solar power. This study includes: analysis of grid conditions and ability to absorb variable-output RE; identification of appropriate grid connection points; and potential upgrades that may be necessary to accommodate large scale solar power plants. The grid integration study concluded that rapid uptake of solar in Cambodia is technically feasible and it is possible to have up to 150 MW of utility-scale solar online by 2020, representing about 10% RE penetration in terms of power capacity.

In parallel with the grid integration study, RGC began reformulating its strategy for the generation subsector. Based in part on the experience with the 10 MW Bavet project, RGC has requested ADB support for a national solar program be implemented in stages. The first stage will identify a suitable area for a solar park large enough to host 100 MW of PV capacity, which constitutes an advanced market commitment on the part of RGC. EDC will build, own and operate common infrastructure for the solar park, including the requisite substation, 115 kV line to connect to the national grid, and the appropriate control and monitoring infrastructure. Candidate sites for the solar park have been identified and a preliminary feasibility study is underway. With ADB Transaction Advisory Services support<sup>10</sup>, EDC will tender out an initial 30-50 MW power plant with an independent power producer (IPP) selected through a competitive process. The remainder of the 100 MW (50 - 70 MW, depending on the size of the first solar farm) will be tendered in a

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<sup>9</sup> Due to internal administrative procedures and in keeping with the principle of minimum concessionality, ADB PSOD utilized the Canadian fund as the first option for concessional cofinancing; these funds were sufficient to proceed with the project leaving SREP in reserve for future investments.

<sup>10</sup> A Transaction Advisory Services agreement between ADB and EDC was signed on 26 June 2017.

subsequent stage, with further development informed by the experience on the first solar park as well as lessons learned from other developing countries.<sup>11</sup>

#### **IV. Proposed Changes to the Investment Plan**

The objectives of the revised IP are consistent with the original IP objectives to improve energy supply through developing renewable energy sources, strengthen institutional capacity, increase energy access, and improve consumer awareness. The proposed changes will focus SREP support more intently on utility-scale solar development, shifting from individual private sector projects to a national solar program with focus on utility-scale solar farms developed through a public-private approach. The solar home systems, mini-grids, and biomass power projects have been dropped from the revised IP as there are no viable project concepts under active development. However, these types of projects, including projects under the proposed Private Sector Solar Development Program as well as other future large-scale solar energy development, may be developed with support from other funding channels, in particular the Green Climate Fund (GCF). In this context, project preparation grants may be used to support the Government to design projects that would enable access to and secure GCF funding.

The National Solar Park Program with \$14 million of SREP funding supersedes the Accelerating Solar Power through Private Sector (Rooftop Solar Systems and Utility-scale Solar Farm) project of equal size in the sealed SREP pipeline; the funding proposal for this program will be submitted after the endorsement of the Revised IP. SREP support for private sector solar development is retained with revised allocations.

The proposed reallocation and revised indicative financing are shown in Tables 2 and 3.

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<sup>11</sup> The business model of solar parks development under government leadership, followed by tendering of individual solar plants to the private sector has been very successful in rapid development of several gigawatts of solar capacity in India, as well as in other developing countries. The proposed investment operation to be supported by SREP is similar to some of the investments in India supported by the Clean Technology Fund, where public sector investments finance grid infrastructure and the private sector builds and owns the generation assets.

**Table 2: Proposed Reallocation of SREP Resources (\$ Million)**

Component/Projects/Program	Sector	SREP Funding (Endorsed June 2016)	Proposed Funding Reallocation	Revised SREP allocation (Revised IP)
<b>Original IP</b>				
1. Solar Energy Development				
1.1 Solar Energy Development (Solar Home Systems and Solar mini-grids)	Public	6.0	(-) 6.0	0
Project preparation grant		0.65	(-) 0.65	0
1.2 Accelerating Solar Power through Private Sector (Rooftop Solar Systems and Utility-scale Solar Farm)	Private	14.0	(-) 14.0	0
Project preparation grant		0.65	(-) 0.65	0
2. Biomass Power Project	Private	5.0	(-) 5.0	0
Project preparation grant		0.4	(-) 0.4	0
3. Policy Support and Public Awareness	Public	3.0	[no change]	3.0
<b>Revised IP</b>				
1. Solar Energy Development				
1.1 National Solar Park Program	Public	n/a	(+) 14.0	14.65
Project preparation grant			(+) 0.65	
1.2 Private Sector Solar Development - Utility Scale / Parks	Private	n/a	(+) 5	5.0
1.2 Private Sector Solar Development - Rooftop solar	Private	n/a	(+) 6	6.0
Project preparation grant	Private	n/a	(+) 1.05	1.05
<b>Total</b>		<b>29.7</b>		<b>29.7</b>

**Table 3: Revised Indicative Financing Plan (\$ Million)**

Projects / Program	Sector	SREP <sup>a</sup>			ADB	Private Sector	Gov't	Total
		Loan	Grant	Total				
<b>1. Solar Energy Development</b>								
<b>1.1 National Solar Park Program</b>	<b>Public</b>	<b>11.0</b>	<b>3.65</b>	<b>14.65</b>	<b>20.0</b>	<b>100.0</b>	<b>2.5</b>	<b>137.15</b>
100 MW Public-Private Partnership		11.0	3.0	14.0	20.0	100.0	2.5	136.50
Project preparation grant		-	0.65	0.65	-	-	-	0.65
<b>1.2 Private Sector Solar Development Program</b>	<b>Private</b>	<b>6.0</b>	<b>6.05</b>	<b>12.05</b>	<b>20.0</b>	<b>72.0</b>	<b>-</b>	<b>104.05</b>
Utility-scale / parks		5.0	-	5.0	12.0	40.0	-	57.00
Rooftop solar		1.0	5.0	6.0	8.0	32.0	-	46.00
Project preparation grant		-	1.05	1.05	-	-	-	1.05
<b>2. Policy Support and Public Awareness</b>	<b>Public</b>	<b>-</b>	<b>3.0</b>	<b>3.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.00</b>
<b>TOTAL</b>		<b>17.0</b>	<b>12.7</b>	<b>29.7</b>	<b>40.0</b>	<b>172.0</b>	<b>2.5</b>	<b>244.20</b>

Note: <sup>a</sup> Excludes Investment Plan Preparation Grant (IPPG) of US\$ 0.3 million

## V. Implementation Potential and Risks Summary

Updated risk assessment and mitigation measures are presented in Table 4.

**Table 4: Implementation Potential and Risks Summary**

Risk	Potential Risks	Mitigation	Residual risk
Policy and Regulatory Framework	<p>Weak institutional and legal framework to support RE investments.</p> <p>Slow progress on the drafting and approval of framework and policies.</p>	<p>A sector development plan will be drafted, with Sustainable Development Goal 7 and Cambodia's Intended Nationally Determined Commitments (INDC) to the Paris accord as starting points.</p> <p>The capacity building program targets improvement in national RE regulatory and policy framework, which will cover the introduction of policies to expand solar energy development in support of national grid extension and increased access to energy.</p> <p>The solar parks program supported by ADB technical assistance and Transaction Advisory Services will reduce upfront development risk for utility-scale solar.</p>	Low
Financial Risk	<p>Tariff policies need to evolve to support bankable power purchase agreements.</p>	<p>Some concessional finance will be needed to catalyze commercial investment in solar energy. The 100 MW solar parks program is a learning-by-doing approach to establish a standardized model for commercial RE development including bankable power purchase agreements.</p> <p>EAC is developing new regulatory guidelines to address rooftop solar market development. ADB can assist in developing alternative approaches, e.g., development of a virtual solar farm via aggregation of multiple rooftop installations under a single power purchase agreement.</p>	Low
Social and environmental risks	<p>Limited institutional capacity for addressing social and environmental issues</p>	<p>Project preparation will cover due diligence to assess potential environmental and social impacts of the proposed solar and biomass projects to ensure that the government and ADB safeguards requirements are fulfilled.</p>	Low

ADB = Asian Development Bank, EAC = Electricity Authority of Cambodia, MW = megawatt, RE = renewable energy

## VI. Impacts

Assessment of the proposed changes with respect to SREP investment criteria is summarized in Table 5. Results indicators are presented in Table 6.

**Table 5: Assessment of Proposed Changes**

<b>SREP Investment Criteria</b>	<b>Original Investment Plan</b>	<b>Revised Investment Plan</b>
<b>Increased RE capacity and increased access to energy via RE</b>	<p>Strategic focus on scalable solutions for access to energy and productive end use of energy through solar power development program and waste biomass for electricity production.</p> <p>SREP will support aggregate solar capacity of at least 68 MW and energy output greater than 124 GWh/y and 10 MW biomass capacity with energy output of 60 GWh/y.</p>	<p>Strategic focus on large-scale solar power development program to drive down cost of supply and expand supply chain, complemented by parallel investment in grid expansion to meet national access objectives.</p> <p>SREP will support aggregate solar capacity of at least 150 MW and energy output greater than 273.75 GWh/y.</p>
<b>Low-emissions development</b>	<p>Cambodia has an opportunity to diversify its energy supply mix and shift toward low emissions development with solar and biomass. Solar and biomass potential is estimated to be well over 1,000 MW, which can contribute significantly to reduced reliance on unsustainable fossil power. Commercial development of these priority resources can be expected to facilitate future development of wind power.</p> <p>From the total aggregated solar and biomass capacity, an estimated 97,000 tCO<sub>2</sub>e of GHG emission is expected to be reduced.</p>	<p>Assuming a grid emissions factor of 0.67 tCO<sub>2</sub>e/MWh, GHG reductions from the total aggregated solar capacity are estimated to be 183,412 tCO<sub>2</sub>e per year.</p>
<b>Affordability and competitiveness of RE</b>	<p>Off-grid solutions can be delivered well below the cost of existing petroleum-based generation. On-grid solutions will initially require concessional financing support, but installed costs are expected to decline rapidly on successive installations and achieve grid parity in the near term. All solar components are expected to benefit from declining system costs in the near term.</p>	<p>The national solar program will expand grid-connected solar capacity and energy output, which will contribute to reducing the cost of supply. This will further expand the solar supply chain and facilitate increased access to energy as the national grid is expanded.</p>

<b>SREP Investment Criteria</b>	<b>Original Investment Plan</b>	<b>Revised Investment Plan</b>
	<p>Biomass power can be delivered at parity with grid power in rural areas where REE delivers power supplied by EDC.</p> <p>Biomass power can be delivered below the cost of diesel-based generation when feedstock is secured at low cost.</p>	
<b>Productive use of energy</b>	<p>Solar home systems and mini-grids will provide households and villages expanded and improved electricity supplies for lighting, fans, refrigeration, radio, and television. Successively larger installations will expand productive end-use of energy which enhance income and welfare of rural communities.</p> <p>Rooftop and solar farms provide on-grid capacity for residential, commercial, and industrial consumers, with benefits accruing from long-term cost savings.</p> <p>Additional capacity and output will support enhanced productivity in the agricultural sector.</p>	<p>Development of solar power will provide benefits accruing from long-term cost savings among residential, commercial, and industrial consumers.</p> <p>Rural households and villages will benefit from the expanded and improved electricity supplies to use for lighting, fans, refrigeration, radio, and television. Successively larger installations will expand productive end-use of energy which enhance income and welfare of rural communities. It will enhance productivity in the agricultural sector.</p>
<b>Economic, social, and environmental development impact</b>	<p>Economic benefits will result from reducing the cost of electricity supply to consumers and from expanded commercial use of energy.</p> <p>Social benefits will accrue from access to electricity for lighting, refrigeration, and home appliances; and from expanded energy supply in rural areas dominated by agriculture.</p> <p>Environmental benefits will accrue from reduced use of petroleum fuels for power generation and use of biomass which would otherwise be disposed as waste.</p>	<p>Economic benefits will result from reducing the cost of electricity supply to consumers and from expanded commercial use of energy.</p> <p>Social benefits will accrue from access to electricity for lighting, refrigeration, and home appliances; and from expanded energy supply in rural areas dominated by agriculture.</p> <p>Environmental benefits will accrue from reduced use of coal and petroleum fuels for power generation, as well as use of biomass which would otherwise be disposed as waste.</p>

<b>SREP Investment Criteria</b>	<b>Original Investment Plan</b>	<b>Revised Investment Plan</b>
<b>Economic and financial viability</b>	The solar home systems and mini-grids will be economically viable based on avoided costs of petroleum-based generation. Rooftop and solar farms will become commercially viable with credit enhancements provided by concessional finance. Biomass power will become commercially viable with credit enhancements provided by concessional finance.	The national program will facilitate development of utility scale solar farms on a commercial basis. Credit enhancements will be provided as necessary based on the “minimum concessionality” principle.  Rooftop solar will require additional policy support and new business models so that it is not necessary to sell daily surplus to the grid for project viability.
<b>Leveraging of other financing</b>	SREP funds will catalyze private sector development with overall leverage of about 1:4. The demonstration impact of the proposed solar program and biomass power project, along with policy evolution, are expected to result in replication and scale up in the near-term, with potential for as much as 500 MW of RE capacity in the medium to long term.	Under the 100 MW national solar parks program, SREP funds are expected to catalyze \$100 million of private sector investments with overall leverage of about 1:7.  Under the private sector component, other potential investments in rooftop solar and solar farms are expected to achieve greater than 1:4 leverage.
<b>Gender</b>	Women and children will benefit from the affordable and reliable electricity. Women can extend their work hours, while children can study at night.  Potential gender benefits to be assessed during project preparation.	The national solar program will shift emphasis to large-scale wholesale generation. Potential gender benefits to be assessed during project preparation.  Potential gender benefits will accrue primarily via extension of the national grid and improved reliability and quality of electricity supplies.
<b>Co-benefits</b>	Co-benefits will be mainly in form of reduced air emissions from diesel generation which will reduce impacts on public health.	Co-benefits will be mainly in form of reduced air emissions from diesel generation and displacement of coal-based emissions which will reduce negative impacts on public health.  The investment projects will also generate direct and indirect employment opportunities.



**Table 6: Updated Results Framework for SREP in Cambodia**

Results	Indicators	Baseline	Targets	Means of Verification
<b>SREP Transformative Impacts</b>				
Support low carbon development pathways	Percentage of total households with access to electricity <sup>12</sup>	55% in 2015	70% by 2030	MME
	RE capacity (MW) and annual electricity output (GWh/y)	Capacity: 70 MW in 2017 <sup>a</sup>  Output: 176.25 GWh/y	Capacity <sup>b</sup> : 220 MW by 2023  Output <sup>b</sup> : 450 GWh/y by 2023	MME, EDC
	Increased annual public and private investments (\$) in targeted subsector(s)	\$95 million	\$150 million in 2023 <sup>c</sup>	MME
<b>SREP Outcomes</b>				
1. Increased supply of renewable energy	Annual electricity output from RE as a result of SREP interventions			SREP Projects, MME
	Installed capacity	0	150 MW <sup>d</sup>	
	Design Output	0	273.75 GWh/y <sup>d</sup>	
2. New and additional sources for renewable energy projects	Leverage factor (\$ finance from other sources compared to SREP funding)	0	1:7	SREP Projects M&E, MME
3. Increased access to modern energy services	Number of women and men, businesses and community services benefiting from improved access to electricity and fuels as a result of SREP interventions	0	684,375 people or around 136,875 households  Male: 331,921 Female: 352,454	SREP Projects M&E, MME
4. Greenhouse Gas emissions mitigated	CO <sub>2</sub> emissions reduction	0	183,412 tCO <sub>2</sub> e/year by 2020 <sup>e</sup>	MME, MOE

CO<sub>2</sub> = carbon dioxide, GWh/y = gigawatt-hour per year, MME = Ministry of Mines and Energy, MW = megawatt, M&E = Monitoring and Evaluation, tCO<sub>2</sub>e = tons of carbon dioxide equivalent.

**Notes:**

<sup>a</sup> Does not include large hydropower. Includes 10 MW Bavet solar project to be commissioned in August 2017

<sup>b</sup> Beyond 2017, all new RE capacity and energy output is assumed to be solar PV with output at nameplate capacity 5 hours per day, 365 days per year.

<sup>c</sup> Cumulative investment targets.

<sup>d</sup> Minimum expected capacity and generation output directly resulting from SREP cofinancing. Number of people and households benefiting are calculated based only on 150 MW / 273.5 GWh/y.

<sup>e</sup> Assumes a grid emissions factor of 0.67 tCO<sub>2</sub>e / MWh.

<sup>12</sup> The Revised SREP results framework (2012) indicates that this indicator should be a “National measure of ‘energy poverty’ such as the Multi-dimensional Energy Poverty Index (MEPI), or some equivalent mutually agreed measure.” Energy poverty is a multi-dimensional problem which includes problems associated with a lack of access to sufficient energy supply, a lack of access to clean energy, and a lack of access to affordable energy. For this purpose, energy access is used to measure poverty.

## Appendix 1: Project Concept Notes

### Component 1.1 National Solar Parks Program

#### Problem statement

1. The solar energy market remains largely undeveloped due to (i) financial barriers in the form of upfront capital costs and lack of commercial financing; and (ii) absence of clear policy support and instruments such as structured tenders, feed-in tariffs, open access for grid interconnection issues, tax incentives, and licensing procedures. Despite these constraints, there is a nascent domestic solar industry with 25 companies. The Solar Energy Association of Cambodia (SEAC) has noted that a clear policy framework is needed so that capital can be mobilized to support solar development at progressively larger scale.

#### Proposed contribution to initiating transformation

2. Solar is one of the best potential renewable energy (RE) resources in Cambodia with respect to scalability, potential applications, resource and technology risks, and speed of deployment. Cambodia's installed generation capacity in 2015 was 1,569 MW with energy output of 4,448 GWh. The technical solar energy potential is estimated at 8,100 MW, with near-term market prospects of at least 500 MW which could provide 913 GWh per year.<sup>13</sup> Expanding solar generation offers potential financial savings, environmental benefits, and improved security of electricity supply. Where pro-active government support reduces upfront development risks and costs, competitive tendering programs are resulting in PPA off-take prices of US\$0.06 - 0.08 per kWh which is below EDC's average cost of supply. Solar power has the potential to defer or even avoid construction of coal-fired or large hydropower projects, reducing carbon emissions and preventing environmental degradation. Increased solar generation will diversify the national energy mix and reduce the country's reliance on costly imports, while complementing hydropower output in the dry season.

3. The solar industry needs both a policy "pull" and a market "push." There are opportunities to develop utility scale solar farms to demonstrate the viability of solar for mainstream energy applications. ADB's grid integration study shows that 100 to 150 MW of solar generation can be added to the national grid by 2020 with no major impact on the grid and no additional transmission investment (other than connections to the existing grid); the study concluded that adding 100 MW of solar in the greater Phnom Penh area will actually improve grid stability. The existing solar industry can deliver the market push if some concessional financing is introduced, as evidenced by the learning-by-doing experience with the 10 MW Bavet project. The policy pull requires government intervention including (i) pro-active efforts to reduce up-front development risks, (ii) a structured and transparent competitive tendering process, and (iii) access to concessional finance.

4. The proposed project will assist EDC to build: (i) a solar park facility able to accommodate up to 100 megawatts (MW) of solar power generation on 150-200 hectares of land in Kampong

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<sup>13</sup> Assuming 5 hours per day of output at rated capacity.

Speu and/or Kampong Chhnang Provinces, and (ii) a 30-40-kilometer (km) 115 kilovolt (kV) transmission line connection to an existing substation (GS6). SREP funds will be utilized for the construction of the park and ancillary facilities, including fencing, drainage, roads, transmission infrastructure to the existing network, and information and control technology. By supporting these common infrastructure investments, SREP funds would be utilized to take out up-front development risks and buy down the cost of capital to facilitate private sector installation and operation and maintenance of the power plants. In combination with SREP funds, ADB will leverage its transaction advisory services (TAS), under the Office of Public Private Partnerships (OPPP), to assist EDC to design and conduct a private sector tender for procuring the first power plant (30-50 MW) in the park. The additional 50-70 MW will be developed via private sector tendering.

### **Implementation readiness**

5. The proposed physical investments for the solar park will be supported by a combination of funds from ADB's public sector operations (ADB - South East Energy Division) and SREP, while the tendering of the first power plant through the private sector will be supported by ADB-OPPP TAS. Both the SREP resources and the ADB loan amounts will be provided through a two-step loan from ADB through MEF to EDC. Project due diligence will be conducted using staff and existing TA resources, so no project preparatory grants will be sought from SREP. OPPP's upfront expenses will be covered by TA 8240-REG: Supporting Regional Project Development for Association of Southeast Asian Nations Connectivity, and any reimbursable costs, as applicable, and a success fee will be paid by EDC under the TAS agreement between EDC and OPPP. A pre-feasibility study on the solar park is being conducted and is expected to be completed by end-July 2017. Subsequent to endorsement of the revised IP, OPPP, through the TAS, will support the project feasibility study and structuring of a tender for the construction of the first solar plant. It is expected that EDC will issue invitations for bids for the construction of the solar park infrastructure and transmission line in July 2018. Project preparation including feasibility study, project structuring, and due diligence will take 8-10 months, with SREP funding approval expected approximately August 2017 and ADB Board approval by April 2018.

### **Rationale for SREP financing**

6. Lack of commercial financing, limited policy support, and off-take price risks are major barriers to commercial solar development, which can be addressed with concessional financing. The project will support growth of the solar industry through expanded solar generation by demonstrating the viability of large-scale solar power for grid-connected supply. The national program is a learning-by-doing approach to create a viable self-sustaining market for solar energy services. Table A1-1 presents results indicators. Table A1-2 shows the indicative financing plan. Table A1-3 shows the schedule for further program development and approvals.

**Table A1-1: Results Indicators and Targets**

Results	Indicators	Baseline	Targets	Means of Verification
<b>SREP Project Outcomes</b>				
1. Increased supply of renewable energy	Installed capacity	10 MW	100 MW	Project review missions
	Design output	18.25 GWh/y	182.5 GWh/y <sup>a</sup>	
2. Increased access to modern energy services	Number of women and men, businesses, and community services benefiting from SREP interventions	0	91,250 households or 456,250 people <sup>b</sup>  Male: 221,281 Female: 234,969	MME
3. Increase in investments from private sector in solar energy	\$ invested	0	\$100 million	Annual reports of energy companies, technology vendors
4. Greenhouse Gas emissions mitigated	CO <sub>2</sub> emissions reduction	0	122,275 tCO <sub>2</sub> e/year <sup>c</sup>	MME, MOE
<b>SREP Inputs</b>				
5. Capacity building activities	Technical assistance for site selection, grid integration and grid connection design, tendering procedures and documentation, bid evaluation, and standardized power purchase agreements.	0	Site selection and conceptual design completed.  First project of 30 – 50 MW awarded and constructed. Follow-on projects for balance of 100 MW awarded.	Project implementation reports and ADB review missions.  MME and EDC annual reports.

ADB = Asian Development Bank, CO<sub>2</sub> = carbon dioxide, MME = Ministry of Mines and Energy, MOE = Ministry of Environment, tCO<sub>2</sub>e = tons of carbon dioxide equivalent.

Notes: <sup>a</sup> Calculated based on nameplate capacity output 5 hours a day x 365 days a year

<sup>b</sup> Calculated based on 400 kWh per person per year current average consumption; 5 people per household.

<sup>c</sup> Grid emissions factor of 0.67 tCO<sub>2</sub>e/MWh, displacing a combination of grid-supplies and diesel generation.

Reference: Institute for Global Environmental Strategies, March 2011.

With 10 years of operation from 2020-30, the avoided GHG emissions represent about 20-25% of Cambodia's Intended Nationally Determined Contributions for Energy Industries.

**Table A1-2: Financing plan (\$ Million)**

Projects / Program	SREP	ADB	Private Sector	Gov't <sup>a</sup>	Total
1.1 National Solar Park Program					
100 MW – Public-Private Partnership	14.00	20.0	100.0	2.5	136.5
Project preparation grant <sup>b</sup>	0.65				0.65
<b>Total</b>	<b>14.65</b>	<b>20.0</b>	<b>100.0</b>	<b>2.5</b>	<b>137.15</b>

Note: <sup>a</sup> Government counterpart funding for national solar program

<sup>b</sup> Preparation is being supported by ADB RETA 8018 and OPPP transaction advisory services

**Table A1-3: Project preparation timetable**

Milestone	Date
SREP Revised IP Endorsement	Q3 / 2017
SREP funding approval	Q3 / 2017
ADB Board/Management consideration	Q2 / 2018

## **Component 1.2 Private Sector Utility Scale / Parks and Rooftop Solar**

### **Problem statement**

1. Development of new utility scale solar projects and rooftop solar face similar challenges as other renewable energy development, as noted above. With the 10 MW Bavet experience, much of the first-mover psychological risk has been eliminated, but accelerating development of successively larger projects will continue to face challenges in raising commercial financing. In the case of rooftop solar, there has been some progress on relatively small installations, but a “chicken and egg” situation persists due to limited policy support which precludes commercial financing to scale up projects.

### **Proposed contribution to initiating transformation**

2. In addition to the national solar parks program described above, there are opportunities to develop utility scale solar farms in special economic zones (SEZs) and other areas, and rooftop solar which would demonstrate the viability of solar for mainstream energy applications. The existing solar industry can deliver a market push if a pipeline of scalable projects can be identified, and if concessional financing is available. A policy pull requires intervention to reduce up-front project development risk and develop appropriate incentives and instruments to crowd in private sector investment.

3. However, defining and implementing new regulations and tariffs is a time-consuming process, during which technology development and new business models can out-run – and ultimately inform – the policy, regulatory, and pricing framework. For example, the introduction of the solar parks program is in effect a new business model designed to foster competition and economies of scale, with a primary objective of reducing cost of electricity supply; this business model does not require an entirely new regulatory framework, but concessional finance may be needed to bridge commercial viability gaps to support initial development.

4. In the case of rooftop solar, the traditional approach in most countries has been to promote deployment through net metering and feed-in tariffs (FITs), which are complicated to develop and prone to some market distortions: if FITs are too low there will be no investment and no deployment; FITs which are set too high simply reward first movers with economic rent. An alternative approach is for rooftop solar service companies to aggregate multiple rooftop projects into a larger “virtual” solar farm with a single power purchase agreement; with this approach, land acquisition can be minimized by leasing rooftop space (a combination of rooftop and ground-mounted installations could be used, and floating installations could also be considered). EDC could facilitate several virtual farms by designating areas which could support multi-MW installations, and award development rights through a competitive process similar to that for solar parks. In this instance, the distinction between rooftop and ground-mounted solar is meaningless and the traditional model based on net metering and FITs is unnecessary.<sup>14</sup>

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<sup>14</sup> This approach is being adopted in Nepal, where the Nepal Electricity Authority designates grid connection points and IPPs are allowed to combine ground-mounted and rooftop solar to optimize capacity and energy output.

5. SREP funds would be utilized to take out up-front development risks and buy down the cost of capital to facilitate solar deployment. For solar parks and virtual farms SREP funds could cover part of the cost difference as necessary between solar output and EDC's average cost of supply (which was \$0.095/kWh in 2015). Specific funding mechanisms need to be identified and agreed to, so that SREP grant funds will catalyze private investment without over-subsidizing developers and service providers. Based on the indicative financing shown in Table 5 of the main text (and below in Table A1-5), at least 50 MW of additional solar capacity could be developed above and beyond the 100 MW National Solar Parks Program.

### Implementation readiness

5. The solar farms and rooftop solar will be developed by ADB's Private Sector Operations Department (ADB-PSOD), supported by concessional finance and other appropriate instruments. As discussed above, some of the utility scale solar farms may be included in the 100 MW National Solar Parks Program, i.e., if concessional funds are necessary for the IPPs to reach financial closure. The rooftop solar (including virtual farms) will take longer to develop and will require active participation of solar service companies and agreement in principle with EDC. Project preparation will be required to identify the appropriate financing modalities and implementation arrangements. Subsequent to endorsement of the Revised IP, project identification and due diligence will take at least 9-12 months, with SREP funding approval in second quarter of calendar year 2018 at the earliest.

### Rationale for SREP financing

6. Lack of commercial financing, limited policy support, and off-take price risks are major barriers to commercial solar development, which can be addressed with concessional financing. The program will support growth of the solar industry through expanded delivery of solar systems by existing private sector solar companies. Table A1-4 presents results indicators. Table A1-5 shows the indicative financing plan. Table A1-6 shows the schedule for further program development and approvals.

**Table A1-4: Results Indicators and Targets**

Results	Indicators	Baseline	Targets	Means of Verification
<b>SREP Project Outcomes</b>				
1. Increased supply of renewable energy	Installed capacity	10 MW	50 MW	Project review missions
	Design output	18.25 GWh/y	91.25 GWh/y <sup>a</sup>	
2. Increased access to modern energy services	Number of women and men, businesses, and community services benefiting from SREP interventions	0	45,625 households or 228,125 people <sup>b</sup>  Male: 110,640 Female: 117,485	MME
3. Increase in investments from private sector in solar energy	\$ invested	0	\$72 million	Annual reports of energy companies, technology vendors
4. Greenhouse Gas	CO <sub>2</sub> emissions reduction	0	61,137 tCO <sub>2</sub> e/year <sup>c</sup>	MME, MOE

Results	Indicators	Baseline	Targets	Means of Verification
emissions mitigated				
<b>SREP Inputs</b>				
5. Capacity building activities	Technical assistance for site selection, grid integration and grid connection design, tendering procedures and documentation, bid evaluation, and standardized power purchase agreements including for “virtual” farms.	0	New capacity of 50 MW awarded and constructed (above and beyond 100 MW National Solar Parks program).	Project implementation reports and ADB review missions.  MME and EDC annual reports.

ADB = Asian Development Bank, CO<sub>2</sub> = carbon dioxide, MME = Ministry of Mines and Energy, MOE = Ministry of Environment, tCO<sub>2</sub>e = tons of carbon dioxide equivalent.

Notes: <sup>a</sup> Calculated based on 5 hours a day x 365 days a year

<sup>b</sup> Calculated based on 400 kWh per person per year current average consumption; 5 people per household.

<sup>c</sup> Grid emissions factor of 0.67 tCO<sub>2</sub>e/MWh, displacing a combination of grid-supplies and diesel generation.

Reference: Institute for Global Environmental Strategies, March 2011.

With 10 years of operation from 2020-30, the avoided GHG emissions represent about 20-25% of Cambodia's Intended Nationally Determined Contributions for Energy Industries.

**Table A1-5: Financing plan (\$ Million)**

Projects / Program	SREP	ADB	Private Sector	Gov't	Total
1.2 Private Sector Solar Development					
Utility-scale / parks	5.0 <sup>a</sup>	12.0	40.0	0.0	57.0
Rooftop solar	6.0	8.0	32.0	0.0	46.0
Project preparation grant	1.05				1.05
<b>Total</b>	<b>12.05</b>	<b>20.0</b>	<b>72.0</b>	<b>0.0</b>	<b>104.05</b>

Note: <sup>a</sup> Allocation in sealed pipeline as of June 2017

**Table A1-6: Project preparation timetable**

Milestone	Date
SREP Revised IP Endorsement	Q3 / 2017
SREP funding approval	Q2 / 2018
ADB Board/Management consideration	Q4 / 2018

## Appendix 2: Stakeholder Outreach

On 19 June 2017, the Ministry of Mines and Energy (MME), in collaboration with the Asian Development Bank (ADB), led a half-day consultation meeting with representatives from different government agencies, development partners, private sectors, and non-government organizations. The meeting informed relevant stakeholders regarding the status of SREP funds in general and the SREP IP for Cambodia, and solicited feedback on the proposed changes to the investment components of the plan.

Excellency Mr. Victor Jona, Director General, General Department of Energy, Ministry of Mines and Energy welcomed the participants and gave an update on government's electrification targets of 78% of villages with access to the national grid (target is 100% in 2020) and 64% of households connected to the national grid (target is 70% in 2030). Mr. Christian Ellermann, ADB Climate Change Specialist presented the structure of CIF funds and overview of the original SREP IP for Cambodia. He explained the current situation and available funds within the SREP fund. Mr. Andy Pang, Manager Finance and Corporate Development of Sunseap, shared their experience on the implementation of first grid connected 10MW solar farm in Bavet (Svay Rieng province) which is planned to be operational in August 2017. Mr. Pradeep Tharakan, ADB Senior Climate Change Specialist, introduced the National Solar Park Program and the grid integration study. The study is in collaboration with EDC and expected to become available by early August 2017. Mr. Tharakan also presented the proposed changes in the SREP IP for Cambodia.

Many of the participants relayed their concerns on the role of government in creating an enabling environment such as regulatory framework for rooftop solar systems, support for local capacity building, and employment generation. Participants discussed 'smart cities' which is becoming a global movement where rooftop solar system plays a key role and given the local capacity better suits the local solar sector thereby keeping profits within Cambodia.

Table below shows the lists of participants who attended the meeting.

**Table A1.1: List of Participants for the Stakeholders Consultation Meeting, 19 June 2017**

	Organization	Name	Position	Email Address
<b>Government</b>				
1.	Electricity Authority of Cambodia	Mr. Thy Selaroth	Chief	selaroth168@gmail.com
2.	Electricité du Cambodge	Mr. Rann Seihakkiry	Deputy Director, CPPD	<a href="mailto:rs_kiry@hotmail.com">rs_kiry@hotmail.com</a>
3.	Electricité du Cambodge	Mr. Leng Sovannarith	Staff, CPPD	sovannarithic@yahoo.com
4.	Electricité du Cambodge	Mrs. Oeng Iysorng	Staff	
5.	Ministry of Economy and Finance	Ms. Veng Youim	Chief OMC	youim2002@yahoo.com
6.	Ministry of Economy and Finance	Mr. Om Macthearith	Deputy Director	
7.	Ministry of Mines and Energy	Mr. Chiphong Jarasy	Chief of RE	sarasy.mme@gmail.com
<b>Development partners</b>				



	<b>Organization</b>	<b>Name</b>	<b>Position</b>	<b>Email Address</b>
8.	Agence Française de Développement (AFD)	Ms. Sorya Chan	Project Officer	chans@afd.fr
9.	International Fund for Agricultural Development	Mr. Karan Sehgal	Portfolio Officer, RE Technologies Environment and Climate Division	k.sehgal@ifad.org
10.	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Mr. Sokhai NOP	Advisor-Planning and Budgeting Climate Finance Readiness	sokhai.nop@giz.de
11.	Japan International Cooperation Agency	Mr. Chhorn Chamna	Program Officer, Infrastructure Division	chhornchamna.cm@jica.go.jp
12.	International Finance Corporation	Mr, Panos Vlahakis	Operations Officer	pvlahakis@ifc.org
13.	International Finance Corporation	Mr, Kea Kumea		kkea@ifc.org
14.	United Nations Industrial Development Organization	Mr. Ngov-Veng Chheng	National Project Coordinator	n.chheng@unido.org
15.	United Nations Industrial Development Organization	Mr. Sok Narin	Country Representative	n.sok@unido.org
<b>Private sector/developers</b>				
16.	Solar Partners Asia (Cambodia) Ltd	Mr. Rogier Van Mansvelt	Chief Technical Officer	rogier.mansvelt@comin.com.kh
17.	Kamworks	Mr. Jeroen Verschelling	Chairman and Co-founder	jeroen@kamworks.com
18.	Nexus	Nodira Akhmedkhodjaeva	Program Development Director	n.akhmedkhodjaeva@nexusfordevelopment.org
19.	NRG Solutions	Mr. Daniel Pacheco	Chief Executive Officer	daniel@nrg-renewables.com
20.	NRG Solutions	Mr. Jack Pegler	Operations Manager	jack@nrg_renewables.com
21.	Upgrade Energy Company	Mr. Phanny Sras	Country Manager	<a href="mailto:phanny@upgrade-energy.com">phanny@upgrade-energy.com</a>
22.	Clean Power Asia – Private Financing Advisory Network	Ms. Cecile Dahome	Country Coordinator	cdahome@sevea@consulting.com
<b>CSOs/NGOs</b>				
23.	Enrich Institute	Mr. Pheakdey Heng	PhD, Founder & Chairman	hengpheakdey@yahoo.com
24.	Green Global Growth Institute	Dr. Heng Pheakdey	Policy Lead	pheakdey.heng@gggi.org
25.	Live & Learn	Mr. Socheath Sou	Executive Director	socheat@gmail.com
26.	Mekong Strategic Partners	Nick Boerema	Head of Renewable Energy	nb@mekongstrategic.com
27.	OGE/NCSSO	Mr. Sophea Mel	Technical Officer	mel.sophea@gmail.com
28.	SNV Cambodia	Dennis Barbian	Associate Adviser RE Market Development	dbarbian@snvworld.org
29.	Solar Energy Association Cambodia (SEAC)	Mr. Cyril Monteiller	General Secretary	<a href="mailto:secretary@seac-cambodia.org">secretary@seac-cambodia.org</a>