

CLIMATE INVESTMENT FUNDS

June 16, 2016

**SREP Investment Plan for Cambodia
ADB Responses to Switzerland and UK Comments**

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Responses to Switzerland Comments and Questions

Questions	Responses																																																																							
<p>1. Financing plan (i) (Q) What is the requested grant vs non-grant split in the overall IP and in each component/sub-component?</p>	<p>The indicative split of grant vs. concessional finance provided by CIF Administrative Unit and SREP Sub-committee is \$17 million concessional loan and \$12.7 million grant (excluding the IP preparation grant of \$0.3 million). Table below shows the anticipated distribution of loan and grant according to component / subcomponent.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Project/Program</th> <th colspan="3" style="text-align: center;">SREP (\$ Million)</th> </tr> <tr> <th style="text-align: center;">Concessional loan</th> <th style="text-align: center;">Grant</th> <th style="text-align: center;">Total</th> </tr> </thead> <tbody> <tr> <td>1. Solar Energy Development Program</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1.1 Accelerating Solar Power through Private Sector</td> <td style="text-align: center;">1.0</td> <td style="text-align: center;">5.65</td> <td style="text-align: center;">6.65</td> </tr> <tr> <td style="padding-left: 20px;"><i>Solar Home Systems</i></td> <td style="text-align: center;">-</td> <td style="text-align: center;">4.00</td> <td style="text-align: center;">4.00</td> </tr> <tr> <td style="padding-left: 20px;"><i>Mini-grid for Rural Villages</i></td> <td style="text-align: center;">1.0</td> <td style="text-align: center;">1.00</td> <td style="text-align: center;">2.00</td> </tr> <tr> <td style="padding-left: 20px;"><i>Project Preparation</i></td> <td style="text-align: center;">-</td> <td style="text-align: center;">0.65</td> <td style="text-align: center;">0.65</td> </tr> <tr> <td>1.2 Solar Energy Development</td> <td style="text-align: center;">11.0</td> <td style="text-align: center;">3.65</td> <td style="text-align: center;">14.65</td> </tr> <tr> <td style="padding-left: 20px;"><i>Rooftop Solar System</i></td> <td style="text-align: center;">3.0</td> <td style="text-align: center;">3.00</td> <td style="text-align: center;">6.00</td> </tr> <tr> <td style="padding-left: 20px;"><i>Utility-scale Solar Farm</i></td> <td style="text-align: center;">8.0</td> <td style="text-align: center;">-</td> <td style="text-align: center;">8.00</td> </tr> <tr> <td style="padding-left: 20px;"><i>Project Preparation</i></td> <td style="text-align: center;">-</td> <td style="text-align: center;">0.65</td> <td style="text-align: center;">0.65</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Development of Biomass Energy Projects</td> <td style="text-align: center;">5.0</td> <td style="text-align: center;">5.40</td> <td style="text-align: center;">5.40</td> </tr> <tr> <td style="padding-left: 20px;"><i>Biomass Projects</i></td> <td style="text-align: center;">5.0</td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;"><i>Project Preparation</i></td> <td style="text-align: center;">-</td> <td style="text-align: center;">0.40</td> <td style="text-align: center;">0.40</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. Policy Support and Public Awareness</td> <td></td> <td style="text-align: center;">3.00</td> <td style="text-align: center;">3.00</td> </tr> <tr> <td style="text-align: center;">TOTAL</td> <td style="text-align: center;">17.00</td> <td style="text-align: center;">12.70</td> <td style="text-align: center;">29.70</td> </tr> </tbody> </table>	Project/Program	SREP (\$ Million)			Concessional loan	Grant	Total	1. Solar Energy Development Program				1.1 Accelerating Solar Power through Private Sector	1.0	5.65	6.65	<i>Solar Home Systems</i>	-	4.00	4.00	<i>Mini-grid for Rural Villages</i>	1.0	1.00	2.00	<i>Project Preparation</i>	-	0.65	0.65	1.2 Solar Energy Development	11.0	3.65	14.65	<i>Rooftop Solar System</i>	3.0	3.00	6.00	<i>Utility-scale Solar Farm</i>	8.0	-	8.00	<i>Project Preparation</i>	-	0.65	0.65					2. Development of Biomass Energy Projects	5.0	5.40	5.40	<i>Biomass Projects</i>	5.0			<i>Project Preparation</i>	-	0.40	0.40					3. Policy Support and Public Awareness		3.00	3.00	TOTAL	17.00	12.70	29.70
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<p>2. Expected results</p> <p>(i) (Q/C) Please detail the expected outcomes by indicating for each project the additional generating capacity and expected annual electricity output from renewable energy sources, as well as the number of beneficiaries (men and women) who (improved) access to electricity.</p>	<p>At the IP level, it is expected that SREP will support about 78 MW RE capacity with 184 GWh/year generation output. This will benefit an estimated of 460,000 people or 92,000 households. Table below shows the expected outcomes for each component. Specific targets for each subcomponent/project will be determined during the project preparation stage.</p> <table border="1" data-bbox="888 480 1900 992"> <thead> <tr> <th data-bbox="888 480 1314 574" rowspan="2">Project/Program</th> <th colspan="3" data-bbox="1318 480 1900 516">Target SREP Outcomes</th> </tr> <tr> <th data-bbox="1318 519 1507 574">Installed Capacity</th> <th data-bbox="1512 519 1671 574">Generation Output</th> <th data-bbox="1675 519 1900 574">No. of beneficiaries</th> </tr> </thead> <tbody> <tr> <td data-bbox="888 578 1314 727"> 1. Solar Energy Development Program 1.1 Accelerating Solar Power through Private Sector 1.2 Solar Energy Development </td> <td data-bbox="1318 578 1507 727" rowspan="2"> > 68 MW </td> <td data-bbox="1512 578 1671 727" rowspan="2"> 124 GWh/y </td> <td data-bbox="1675 578 1900 727"> 310,000 people (62,000 households) Male: 150,350.00 Female: 159,650.00 </td> </tr> <tr> <td data-bbox="888 730 1314 863"> 2. Development of Biomass Energy Projects </td> <td data-bbox="1318 730 1507 863"> > 10 MW </td> <td data-bbox="1512 730 1671 863"> 60 GWh/y </td> <td data-bbox="1675 730 1900 863"> 150,000 people (30,000 households) Male: 72,750.00 Female: 77,250.00 </td> </tr> <tr> <td data-bbox="888 867 1314 992" style="text-align: center;"> TOTAL </td> <td data-bbox="1318 867 1507 992" style="text-align: center;"> 78 MW </td> <td data-bbox="1512 867 1671 992" style="text-align: center;"> 184 GWh/y </td> <td data-bbox="1675 867 1900 992"> 460,000 people (92,000 households) Male: 223,100 Female: 236,900 </td> </tr> </tbody> </table>	Project/Program	Target SREP Outcomes			Installed Capacity	Generation Output	No. of beneficiaries	1. Solar Energy Development Program 1.1 Accelerating Solar Power through Private Sector 1.2 Solar Energy Development	> 68 MW	124 GWh/y	310,000 people (62,000 households) Male: 150,350.00 Female: 159,650.00	2. Development of Biomass Energy Projects	> 10 MW	60 GWh/y	150,000 people (30,000 households) Male: 72,750.00 Female: 77,250.00	TOTAL	78 MW	184 GWh/y	460,000 people (92,000 households) Male: 223,100 Female: 236,900
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<p>(ii) (Q/C) Please explain the mechanism by which the expected transformative impact leading to the targets listed in the Results Framework shall be reached. How can the sustainability and replication be assured beyond the direct outcomes of the SREP interventions?</p>	<p>Cambodia's RE development is still at a nascent stage. Many of the on-going RE projects are small and at pilot stages. SREP can help initiate sector transformation by successfully demonstrating solar and biomass projects and delivering electricity at grid parity. The combination of learning-by-doing investments complemented by policy evolution is seen as critical to a viable RE sector in the medium to long term. SREP will help integrate other RE resources (aside from large hydropower) into the grid and expand off-grid programs through public and private sector investments in the power sector. Its successful demonstration will promote replication and scale up of RE projects in the country, thereby contributing towards the achievement of transformative impacts. The institutionalization of RE policies and increase consumer awareness – informed in part by new investments in RE projects -- will ensure sustainability of RE projects.</p>																			

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<p>(iii) (Q) What is the logic behind the estimated 97'000 tCO₂e/y avoided emissions?</p>	<p>The estimated 97,000 tCO₂e/y avoided emission is based on the total expected emissions reduction from the implementation of the proposed solar and biomass projects with 184 GWh RE-based generation total target. This estimate assumes the displacement of a combination of grid supplies and diesel generation by 533 tCO₂e per MWh.</p> <table border="1" data-bbox="926 407 1871 667"> <thead> <tr> <th data-bbox="926 407 1549 467">Project/Program</th> <th data-bbox="1554 407 1871 467">GHG emissions Mitigated (tCO₂e/year)</th> </tr> </thead> <tbody> <tr> <td data-bbox="926 469 1549 586"> 1. Solar Energy Development Program 1.1 Accelerating Solar Power through Private Sector 1.2 Solar Energy Development </td> <td data-bbox="1554 469 1871 586" style="text-align: center;">> 66,000</td> </tr> <tr> <td data-bbox="926 587 1549 626">2. Development of Biomass Energy Projects</td> <td data-bbox="1554 587 1871 626" style="text-align: center;">> 31,000</td> </tr> <tr> <td data-bbox="926 628 1549 667" style="text-align: center;">Total</td> <td data-bbox="1554 628 1871 667" style="text-align: center;">97,000</td> </tr> </tbody> </table> <p>Fossil fuel combustion is among the major sources of GHG emissions in the country's energy sector. Tapping solar and biomass potential for power supply can contribute significantly to reduce reliance on unsustainable fossil fuel. This will facilitate national effort towards shifting to low-emission economy. With 10 years of operation from 2020-30, the avoided GHG emissions represent about 25% of Cambodia's Intended Nationally Determined Contributions for Energy Industries.</p>	Project/Program	GHG emissions Mitigated (tCO ₂ e/year)	1. Solar Energy Development Program 1.1 Accelerating Solar Power through Private Sector 1.2 Solar Energy Development	> 66,000	2. Development of Biomass Energy Projects	> 31,000	Total	97,000
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Total	97,000								
<p>(iv) (Q) Are there any targets regarding the affordability of energy and in particular electricity?</p>	<p>Table 2 of the IP shows the retail electricity prices which includes subsidized lifeline tariffs for poorer consumers. These tariffs are established by the sector regulatory authority (EAC) and have taken affordability into account. Aside from the lifeline tariffs, electricity pricing to other consumers is based on full cost recovery principles.</p>								
<p>3. Prioritization of renewable energy options (i) (C/Q) The ranking of RE options in Table 9 is incomplete because certain options like wind power and small/mini/micro hydro power were excluded beforehand. Has a full ranking of options supporting these exclusions been made or could this be provided?</p>	<p>As explained in Section II of the IP, biomass and solar are the most abundant resources, are also more widely distributed and accessible compared to wind and hydro, and have better prospects for replication and scale up than wind and hydro. MME concluded that in the SREP context, solar and biomass should be the top priority (an exhaustive quantitative analysis would not change this decision). Wind and hydro will be considered going forward as the RE sector develops further.</p>								

Questions	Responses
	It is important to note that there is considerable private sector interest in solar and biomass and very little private sector interest in wind and small hydro.
(ii) (Q) To what extent is it foreseen that a systematic wind mapping is undertaken as part of the policy support component of the IP? It is only mentioned as a possibility in paragraph 51 p.24.	This will be considered going forward, but as noted above wind is not viewed by MME as a high priority in the SREP context. As noted above, stakeholder consultations indicate no private sector interest in wind project development in Cambodia at the moment.
<p>4. Program description</p> <p>(i) (Q) It is mentioned that the RGC will continue to subsidize a \$0.20/kWh tariff. To what extent do these subsidies also cover electricity generation from fossil fuel sources? How much of the subsidy is covering transmission and distribution charges? What about the mini-grids?</p>	Table 2 of the IP shows the details of retail electricity pricing which includes the \$0.20/kWh <u>retail</u> tariff for lifeline consumers, i.e., this is a pro-poor policy intervention. The \$0.20/kWh is rate that Rural Electrification Enterprises (REEs) are allowed to charge to their consumers (Table 2 also shows the lifeline tariffs). The REEs may have a higher cost of supply, so this retail tariff cap provides an incentive to switch from diesel generation to cheaper options such as solar and biomass which are expected to have LCOE below \$0.20/kWh. The wholesale tariffs paid to generation plants are not subsidized.
(ii) (Q/C) Please detail in what form the SREP funding will be used for each project/subcomponent and the way the SREP funding is expected to trigger private sector investments.	As noted in the IP, the generation subsector is essentially set aside for private sector, so new RE projects are by default going to be executed by IPPs and possibly energy service companies supporting REEs. Alternatively stated, new RE projects are going to be “dropped in” to the existing private sector generation business. The total investment envisioned assumes that ADB contributions will cover 25% of total projects costs, and that SREP cofinancing will facilitate additional private sector investment (financing plans for individual projects will be determined during project preparation). Detailed financing plans and financing instruments will be identified during project preparation and may include grants, loans, equity, risk-sharing, guarantees, and output-based aid.
(iii) (Q/C) Please explain in particular the concept of credit enhancement to be provided by concessional finance to make rooftop solar systems, solar farms and biomass power commercially viable. What are the required degrees of concessionality in each of these cases?	These details will be determined during project preparation, especially since concessionality is project- and location-specific. In general, the principle of minimum concessionality will be applied; alternatively stated, precision-guided subsidies will be used to maximize the effectiveness of SREP cofinancing. [Also, see the discussion about the next query on rooftop solar’s possible financial impact on EDC below.] Experiences from previous and on-going RE programs in Cambodia and other developing countries

Questions	Responses
	<p>will be drawn upon to inform project design and financing arrangements. At least 2 examples are worth noting here:</p> <ul style="list-style-type: none"> • In 2010 ADB’s Private Sector Operations Department (ADB-PSOD) utilized a small grant from ADB’s Clean Energy Financing Partnership Facility (CEFPF) as part of the construction contingency funds for a 55 MW solar project in Thailand which was the first utility-scale thin-film solar PV plant in Asia. At the time the project was being designed, construction contingencies for solar plants were higher than conventional plants by a factor of 10 or more, i.e., about \$200,000 per MW of solar versus \$15,000 – 20,000 for a conventional gas-fired power plant. A \$2 million grant was approved as a standby contingency fund, which was ultimately not required for project commissioning; the grant was returned to ADB’s CEFPF. This project helped set the stage for several private sector utility scale solar and wind power projects which were supported by the Clean Technology Fund cofinancing with through ADB-PSOD. • In 2016, the SREP Sub-committee approved \$20 Million SREP cofinancing for on-grid utility-scale solar development in Nepal. The SREP cofinancing will be used as viability-gap financing, with payments made as necessary to the Nepal Electricity Authority (the single buyer of grid-connected power) so that the purchase of solar output is a revenue neutral proposition. This approach will incentivize private sector solar development without directly subsidizing the private sector.
<p>(iv) (Q) What will be the effect on the sustainability of EDC if rooftop solar systems are promoted through the introduction of net metering to commercial consumers, which we assume provide an essential part of EDC’s income?</p>	<p>Because tariffs are set by EAC, it is impossible to predict at this point. However, as noted above, except for lifeline retail tariffs, electricity is priced on a full cost recovery basis and EDC is allowed to earn return on equity for transmission and distribution operations. The impact to EDC’s bottom line will be vanishingly small at the outset.</p> <p>For purposes of illustration, let’s assume that the first 100 MW of rooftop solar needs a feed-in tariff of \$0.12/kWh to be financially viable versus EDCs average cost of supply in 2015 of about \$0.095/kWh. If the rooftops provide full energy about to the grid 5 hours per day 100 days per year (weekends and holidays), EDC’s exposure would be 50,000,000 kWh per year at \$0.12/kWh = \$6 million per year. In this instance, some</p>

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	<p>SREP resources could be used to cover part of this cost to EDC as a way to jump-start the rooftop solar business. Alternatively, SREP cofinancing could be used to buy-down the interest rates for rooftop suppliers so that the break-even cost of rooftop solar output would be equal to or less than EDC's cost of supply. The alternatives will be assessed further going forward in project preparation.</p> <p>Beyond the first 100 MW of rooftop capacity, the LCOE of rooftop systems can be expected to decline rapidly and achieve grid parity. At the Asia Clean Energy Forum hosted by ADB from 6-10 June 2016, one Canadian-headquartered solar supplier and developer (with global operations) noted that rooftop solar benchmark costs are now around \$1 / Watt installed with LCOE of around \$0.10/kWh.</p>
<p>5. Policy support and public awareness component (i) (C) This component is welcome, in particular with regards to its potential to enhance the enabling environment for RE in Cambodia.</p>	
<p>(ii) (C/Q) It is noted that in addition to training, new recruitment is considered at the level of MME. Is it understood that SREP funding will not be used to pay for operating expenses (e.g. salaries) of MME employees?</p>	<p>Correct, SREP will be used to support project and capacity building investments as outlined in the IP.</p>
<p>(iii) (C/Q) The IP mentions a comprehensive capacity development program for MME but does not mention capacity development for other involved institutions, notably EDC which is listed as the implementing agency of the projects under the IP. What measures of capacity development are foreseen for EDC? Are other institutions (e.g. banks) foreseen to benefit from capacity development under this IP?</p>	<p>The capacity development program will be further defined subsequent to IP endorsement and would logically include support for EDC and EAC. Commercial banks could also be included in the capacity development program.</p>

Responses to UK Comments and Questions

Questions	Responses
<p>We have reviewed the proposed investment plan for Cambodia and have the following questions for the project team:</p>	
<p>1. Regarding Component 1 of the Investment Plan, we note that they are primarily aimed at either the household level in the case of elements a, b and c. We also note that element d, solar farms will supply electricity to Special Economic Zones and grid connected projects. We are keen to understand how community facilities, such as schools, street lighting, waste treatment etc fit with the plan.</p>	<p>Grid-connected consumers including schools and hospitals would benefit indirectly from RE power plants (both biomass and solar farms) which sell power to the grid, and directly from possible rooftop solar arrays. Waste biomass is a candidate feedstock, and these types of installations should be viewed in the context of industrial cleaner production. Additional details of potential consumer benefits will be elucidated during project preparation.</p>
<p>2. We have concerns about the development of biomass energy as set out in Component 2. We would like assurances that the burning of biomass will not negatively affect soil composition and fertility in the areas that it comes from. We would also like assurances that the use of biomass as an energy source will significantly reduce net emissions and will have an acceptable impact on air quality.</p>	<p>ADB's energy policy and environmental and social safeguards policy will be rigorously applied. This will include implementation of emissions controls consistent with international best practices (e.g., as detailed in World Bank Groups environmental standards which are referenced in ADB's environmental safeguards policy). Open burning of biomass is not foreseen as part of any SREP-supported investments. Waste biomass is a candidate feedstock, and these types of installations should be viewed in the context of industrial cleaner production.</p>
<p>3. The IP notes that biogas and waste-to-energy were NOT included for consideration due to poor performance in Cambodia. We seek an assurance that whatever factors led to poor performance of biogas and waste-to-energy sector will not negatively affect this investment plan.</p>	<p>Subsequent to IP endorsement, further assessment of past RE experience will be made to incorporate lessons learned and prepare viable projects. In the case of biogas, MME does not view the experience favorably in the SREP IP context, and as such the terminology "poor performance" was noted in the 2014 Expression of Interest submitted to the SREP Sub-committee. There are some countervailing views of biogas experience, with some observers noting that some biogas projects have been successful. Waste-to-energy is much more complicated than biogas, and in the absence of a more robust municipal solid waste system are not considered attractive</p>

Questions	Responses
	in the SREP context. Waste biomass from agro-industrial plantations would be an exception, and as these types of projects would have captive feedstock.
4. As the 'availability of sites' is one of the criteria in selecting options we would like to have an assurance that any sites chosen for this project follow the international best practices in relocation, if relocation is involved.	As noted above, ADB's energy policy and environmental and social safeguards policy will be rigorously applied including involuntary resettlement. At the moment, the envisioned projects would have minimal resettlement requirements if any.