



2019
Project Implementation Review (PIR)



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NAMAs in the energy generation sector

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A. Basic Data

Project Information	
UNDP PIMS ID	5232
GEF ID	5586
Title	Appropriate Mitigation Actions in Energy Generation and End-Use Sectors in Sri Lanka
Country(ies)	Sri Lanka, Sri Lanka
UNDP-GEF Technical Team	Energy, Infrastructure, Transport and Technology
Project Implementing Partner	Government
Joint Agencies	<i>(not set or not applicable)</i>
Project Type	Medium Size

Project Description
<p>Sri Lanka is highly dependent on imported oil to meet its energy needs with 49% of the primary energy supply coming from imported fuel, where 12% of the total government budget is used for electricity generation alone. This is leading to a heavy reliance on imported fossil fuels and increased GHG emissions. The National Energy Policy of Sri Lanka seeks to diversify supply mix with renewable energy resources whilst seeking to reduce energy demand through demand side management. The Renewable Energy Resources Development Plan seeks to achieve 20% from renewable energy resources by 2020 and 30% by 2030 as part of the national strategy to reduce GHG emissions through appropriate mitigation actions (NAMA). Energy Management Plan (EnMAP) seeks to achieve energy savings from the promotion of EE measures. Often the GHG savings and the cost-benefits of these low carbon interventions are not systematically quantified and their benefits remain obscure and done on ad-hoc basis. It is difficult for sub-national entities to assess the impact of their NAMA interventions at the sectors and sub-sectors level.</p> <p>In order to fill these gaps, the development of a robust, transparent and functional NAMA framework along with clear inventory and MRV system with supporting governance and oversight (NAMA Secretariat, NAMA Coordinating Entity, NAMA Implementing Entity, MRV Committee, and NAMA Registry) is needed. Such framework will systematically quantify GHG savings and benefits of the mitigation interventions using a bottom up approach to aggregate from the provincial and sub-sector levels to the national and sectors level. Furthermore, such a transparent framework will open up opportunity to access regional and international climate funding. In order to achieve this, the project will support appropriate climate change mitigation actions in the energy generation and end-use sectors as part of the initiatives to achieve the voluntary GHG mitigation targets of Sri Lanka</p> <p>To test and verify the framework, this project will seek to overcome the regulatory, institutional, technical, financial and social barriers for the scaling up of RE and EE NAMA through the dissemination of 1,000 bio-digesters, 1,300 high efficiency motors in tea factories, and 205 solar PV net metering systems with battery storage. Furthermore, the project will:</p> <ol style="list-style-type: none"> 1. Develop a robust provincial inventory system that could be updated periodically and aggregated at the national level using web-based EnerGIS database management system 2. Develop a decision making tools such as MACC tools for analyzing and prioritizing a pipeline of bankable NAMA that could be implemented

3. Leverage public, private and CSOs resources through the NAMA Implementing Entity for the implementation of bankable RE and EE NAMAs based on viable and cost effective business models to incentivize value chain actors to reduce supply risks and create demand and

4. Develop a robust and transparent MRV system that are accurate, reliable and credible and avoid double accounting.

During the implementation, in addition to GEF fund of USD 1,790,411 and UNDP fund of USD 250,000; the project will be supported by in-kind contribution and parallel activities from the government (SLSEA, MERE) to an amount of USD 3,400,000 and USD 230,000 and from private sector with an amount of USD 22,000,000. Thus, total resource for project implementation is USD 27,670,411.

Project Contacts	
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Other Partners	Dr. Sunimal Jayathunga

B. Overall Ratings

Overall DO Rating	<i>(not set or not applicable)</i>
Overall IP Rating	<i>(not set or not applicable)</i>
Overall Risk Rating	<i>(not enough data)</i>

C. Development Progress

Description					
Objective					
Support appropriate climate change mitigation actions in the energy generation and end-use sectors as part of the initiatives to achieve the voluntary GHG mitigation targets of Sri Lanka					
Description of Indicator	Baseline Level	Midterm target level	End of project target level	Level at 30 June 2018	Cumulative progress since project start
No. of implemented NAMAs in the energy generation and end use sectors by EOP	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	The Project continued with the implementation of the identified three Nationally Appropriate Mitigation Actions (NAMAs) technologies; Solar PV with battery storage, High Efficiency Motors (HEM) in the tea plantation sector, and domestic and institutional level biogas. Based on Mid-Term Review (MTR) recommendations and lessons learnt during the first 2 years of implementation, the Project has already adopted certain changes to the programme to expedite remaining targets like switching from High Efficiency Motor pilot programme to Variable Frequency Drivers pilot programme. The progress of these NAMA implementation	<p>Three (03)</p> <p>The Project is on the verge of completing the implementation of the, three identified Nationally Appropriate Mitigation Actions (NAMAs) technologies; Solar PV with battery storage, Variable Frequency Drivers (VFDs) in the tea plantation sector and domestic and institutional level biogas.</p> <p>The project implementation adopted most of the recommendations suggested by the Mid-Term Review (MTR) and the initial lessons learnt during project implementation when these three NAMAs were implemented. Key changes to NAMA implementation includes, switching from High Efficiency Motor pilot programme to Variable Frequency Drivers pilot programme and inclusion of medium-large scale biogas unit into the biogas pilot programme.</p> <p>The overall progress of the NAMA implementation can be summarized as follows:</p> <p>Thirty-four (34) Solar PV systems with battery storages (equivalent of 100 systems of original capacity) have been installed under two phases. Total capacity of these solar PV systems and battery storages are 66.5kWp and 148kWh.</p> <p>The Project has facilitated more than 70 tea factories to install 609 Variable Frequency Drivers (VFDs) with partial finance support. These installations are additional to that of the initial pilot trial phase where twenty-four (24)</p>

			<p>can be summarized as follows;</p> <p>14 Solar PV systems with battery storages (equivalent of 31 systems of original capacity) has been installed under the first phase and performance monitoring and detail techno-economical assessment is in progress.</p> <p>The Project has facilitated 48 tea factories to install 344 Variable Frequency Drivers (VFDs) with part-finance support. This is apart from pilot trial phase implementations of 24 High Efficiency Motors (HEMs) and 5 VFDs were installed in 5 tea factories.</p> <p>205 small scale biogas digesters have been constructed with the project assistance and further 24 units are under construction. As per MTR recommendation, the Project has started the facilitation of medium-large scale projects, 22 projects of medium-large scale (equivalent 260 units scale) are under consideration.</p> <p>The estimated Emission Reduction (ER) from these pilot implementations are</p>	<p>High Efficiency Motors (HEMs) and five (5) VFDs were installed in (5) tea factories.</p> <p>Small scale biogas digesters programme was completed with three hundred and sixty two (362) units in five provinces. As per the MTR recommendation, the Project mainly focused on medium-large scale biogas units during the last year and thereby supported the construction of twenty-eight (28) units. Sixteen (16) more medium-large installations are also currently under construction and is expected construction completion by Q3 2019.</p> <p>The estimated Emission Reduction (ER) from these pilot implementations were 10,259 tons CO₂equ and energy saving amount was 15,347 GJ. Further, the pilot implementations were used for the purpose of demonstration of systematic data collection, MRVing purpose and overall NAMA framework. Furthermore, significant amount of private sector and individual co-finance commitments have been brought towards these NAMA implementations.</p> <p>The detailed progress and the activities completed to date are provided under outcome No.03.</p>
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				<p>3,698 tons CO₂equ and energy saving amount is 5,654 GJ. Further, the pilot implementations are being used for the purpose of demonstration of systematic data collection, MRVing purpose and overall NAMA framework.</p> <p>The detailed progress and the activities completed to date are provided under outcome No.03, and the Project is to expedite the implementation of these three programme in next 06 months</p>	
The progress of the objective can be described as:		Progress not set			
Objective					
Established a regular update of renewable energy utilization baseline & energy intensity reference baselines, for the energy generation and end-use sectors					
Description of Indicator	Baseline Level	Midterm target level	End of project target level	Level at 30 June 2018	Cumulative progress since the beginning of the project
No. of provinces that regularly conduct sub-sectoral GHG emission inventories of their energy generation and end-use sectors by Year 4	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	The project is in the mid-way of provincial/sectorial GHG emission inventory system development, and the progress to date can be summarized as follows;	<p>4 provinces (namely Uva, Central, Southern and Central)</p> <p>The cumulative progress under the activity can be summarized as follows;</p> <p>An energy Data Management System (DMS) was developed for the purpose of inventorying energy sector GHG emissions and Emission Reduction (ER) of mitigation actions. This was integrated to EnerGIS system of Sri Lanka Sustainable Energy Authority (SLSEA). This DMS</p>

			<p>EnerGIS data management system of SLSEA was upgraded to ArcGIS 10.5 version. An energy Data Management System (DMS) has been developed for the purpose of inventorying energy sector GHG emissions and Emission Reduction (ER) of mitigation actions. This is now integrated to EnerGIS system of SLSEA. As the first step of this energy DMS, a web-based application was developed, and GHG emission related data from energy generation and end-users can be collected through this online tool directly at the national level. Provision to extract emission levels data at provincial and sectoral levels has been made in the tool.</p> <p>Energy and GHG emission related data can be fed in to the system at the point of generation or end-user level (sectorial or sub-national level) using above application, and quality assurance and reporting facilities are also embedded. This web-based App is now in the testing phase, and trials are being performed</p>	<p>includes a web-based online application which is used to collect GHG emission related data from energy generation and energy end-users. Energy and GHG emission related data can be fed in to the system at the point of generation or end-user level (sectorial or sub-national level) using the above application. There is also quality assurance and reporting facilities embedded into this application.</p> <p>The collected data can be visualized directly at the national level and additionally, the required provision to extract emission level data at provincial and sectoral levels has also been made available in the tool. The application was initially introduced to the 4 provinces where biogas programme was active with the required training and ICT facilities.</p> <p>The same application was also introduced to the solar PV service providers registered under SLSEA to report their solar PV installations on voluntary basis which was later made mandatory. This system now contains information of more than two thousand and two hundred (2200) solar PV installations with more than 55MWp capacities. (Refer the website https://clean.energy.gov.lk/index.php for more info)</p> <p>In parallel, a web portal has been developed within SLSEA's EnerGIS system to monitor the progress of other renewable energy installations. This facilitates both the project developers and SLSEA to monitor the progress online from the submission of new project proposal/applications to SLSEA.</p> <p>As the second phase of this activity, the project completed the development of a common energy and GHG emission related data reporting application after consultation with the project's key stakeholders namely;</p> <ul style="list-style-type: none"> • Climate Change Secretariat -National Communication related emission reporting requirements • Sustainable Energy Authority – Data pertaining to Sri Lanka's energy balance and energy sector baseline assessments • Provincial Councils – Possibility of using the same application for provincial activity reporting and monitoring purpose. <p>The project is now in the process of handing over these provincial and national system to the corresponding partners. Discussions are also</p>
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			<p>with the available data from pilot technologies. The application was also introduced to 4 provinces with the required initial training.</p> <p>The same application was also introduced to the solar PV service providers registered under SLSEA to report their solar PV installations on voluntary basis, and more than 2,500 kW solar PV capacity additions have been reported to date.</p> <p>In parallel, a web portal has been developed within the EnerGIS system to monitor the progress of other renewable energy installations. This facilitates both the project developers and SLSEA to monitor the progress online from the submission of new project proposal/applications to SLSEA.</p> <p>As the second phase of this activity, the project is in the development of a common energy and GHG emission related data reporting application.</p> <p>The project has consulted the following stakeholders</p>	<p>underway with provincial authorities on the required budgetary provisions after EOP.</p>
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			<p>when developing this application;</p> <ul style="list-style-type: none"> • Climate Change Secretariat -National Communication related emission reporting requirements • Sustainable Energy Authority – Data pertaining to Sri Lanka energy balance and energy sector baseline assessments • Provincial Councils – possibility of using the same application for provincial activity reporting and monitoring purpose. <p>Overall activity has been progressing but slightly behind the original schedule. Efforts to complete are being made. These efforts include additional resource mobilization for provincial data collection process including separate budgetary provisions. Further, SLSEA staff inventory and energy manager divisional engagements are sought to operationalize the proposed system.</p>	
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No. of provinces that have established and operational sub-sectoral GHG emission inventory system by Year 4	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	<p>Overall work progress to date can be summarized as follows;</p> <ul style="list-style-type: none"> Energy DSM has been introduced to the provincial levels (four provinces) and project relevant sectors (mainly tea industry) - Further details are provided under the next activity progress reporting. The project team has consulted National Communication team under CCS and the energy manager programme of SLSEA when designing a general GHG emission related data collection template. This is now being reviewed by the International consultant for further improvements and for the consistency with international protocols and standards. In parallel, energy DSM modification accommodating these data gathering mechanism is now in progress. <p>The project expects to accelerate implementation of these reaming activities once IT based emission inventory tool is fully</p>	<p>Overall work progress under this sub-activity can be summarized as follows;</p> <ul style="list-style-type: none"> Energy DSM has been introduced at the provincial levels (four provinces, mainly on biogas data pilot data collection; Uva, Central, Southern and North-western) and project relevant sectors (mainly tea industry). Further details are provided under the next activity, progress reporting. The same energy DSM has been integrated with the GHG emission related data collection tool which was developed after consultation with the main implementing partners' addressing their national communication and reporting needs. This was completed in consistency with international protocols and standards. This system now consists of few industry sector emission data and related data inventory. This can be visualized with the link https://clean.energy.gov.lk/collector/end_user_dashboard.php The project expects to expedite sectoral & sub-sectoral emission inventory process through SLSEA's energy manager programme.
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				<p>developed. A separate programme enabling provincial authorities to collect provincial level data will be launched in Q3 of 2018. Sub-national (provincial) level GHG emission inventory data will be collected from this programme, and the same will be used for operationalization and institutionalization of this energy DMS within sub-national (provincial) levels. The project expects to address the sectoral & sub-sectoral emission inventory through SLSEA's energy manager programme.</p>	
<p>No. of provinces that utilize the functioning web-based EnerGIS GHG inventory system by year 1</p>	<p><i>(not set or not applicable)</i></p>	<p><i>(not set or not applicable)</i></p>	1	<p>The web-based Data Management System (DSM) has already been introduced to North Western, Uva, Southern and Central provinces (and sectors) for biogas pilot related data collection. Around 180 field officers and executive level officers from North-western, Uva, Sothern and Central provinces were given a comprehensive training on the use of energy DMS for pilots related GHG</p>	<p>All four provincial councils namely Uva, Central, Southern and North-western province which were in partnership with the project for biogas implementation, were introduced the web-based energy Data Management System (DSM) with training of around one hundred and eighty (180) field officers and executive level officers of these provinces. A detailed training was provided to approximately sixty (60) field officers in these four provinces on the use of energy DMS, for project pilot related GHG emission/emission reduction related data collection. The Project supported these provincials with necessary ICT facilities including portable tablet for field data collection.</p> <p>Similarly, energy DMS was introduced to tea factories in the VFD pilot programme, and relevant reporting and verification officers were trained on the use of the system. This Energy DMS enables to measure energy</p>

			<p>emission/emission reduction related data collection.</p> <p>Further under the same training programme, It was discussed with provincial councils to expand the data collection mechanism to other sectors / installations/new projects. Provincial officials proposed some important sectors which are relevant for them such as agricultural irrigation (NWP, SP, UP), fisheries (SP), dedicated coconut and solar water pumping (NWP), off-grid solar (UP, CP). These potential sectors/technologies to be included into energy DMS, and such requirements are under consideration during the on-going DMS modifications and GHG emission inventory tool development.</p> <p>The energy DMS has been introduced to tea factories in the VFD pilot programme, and relevant reporting and verification officers have been trained. Energy DMS enables measuring energy intensity of each factory comparing with national and sub-national/provincial-level baselines. This system can</p>	<p>intensity of each tea factory, comparing it with national and sub-national/provincial-level baselines.</p> <p>This system is now being modified to other sectors/industrial applications for reporting emissions reduction through energy savings. Few examples include the ceramic industry and wire/cable manufacturing facilities/applications.</p>
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				be expanded to other sectors/industries for reporting emissions reduction through energy savings.	
The progress of the objective can be described as:		Progress not set			
Outcome 1					
Prioritized Nationally Appropriate Mitigation Actions (NAMAs) in the energy generation and end-use sectors are identified and designed					
Description of Indicator	Baseline Level	Midterm target level	End of project target level	Level at 30 June 2018	Cumulative progress since project start
No. of provinces that established MAC curves for energy sector by year 1	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	<p>1 MAC Curve covering energy sector technology options has been established at national level.</p> <p>Marginal Abatement Cost (MAC) Curve analysis was initially conducted for 17 pre-selected mitigation options in the energy generation and end user sectors. This was mainly conducted as a capacity building activity for key stakeholders of the project (Sustainable Energy Authority, Climate Change Secretariat, project team).</p> <p>The required expert guidance was provided by an International Consultancy firm with the assistance of local consultants.</p>	<p>One (1) Marginal Abatement Cost (MAC) Curve covering energy sector technology option has been established at the national level.</p> <p>MAC Curve analysis was initially conducted for 17 pre-selected mitigation options in the energy generation and end-user sectors. This pre-selection was based on country priority. The required expert guidance was provided by an International Consultancy firm with the assistance of local consultants.</p> <p>The project later identified the depth of MAC analysis and its importance in deciding the energy sector's Nationally Determined Contributions (NDCs) and related decision making process. Thus, the project completed a comprehensive analysis at the country level and results were used to compare the target given under energy NDCs of the country. The results were presented to the national expert committee on Climate Change Mitigation (CCM), and the project introduced this systematic tool to the relevant decision & policy makers including the power and energy ministry.</p> <p>The results of the comprehensive MAC analysis can be accessed with the link <https://public.tableau.com/profile/rma3719#!/vizhome/MCAFinal-PPT/Names?publish=yes></p>

				<p>The project later identified the depth of MAC analysis and its importance in deciding energy sector's Nationally Determined Contributions (NDCs) and related decision making process. Thus, the project completed a comprehensive analysis at country level and results were used to compare the target given under energy NDCs of the country. The results were presented to the national expert committee on Climate Change Mitigation (CCM), and also adopted Multi-Criteria Analysis (MCA) for technology-application screening process.</p> <p>The project has plans for introducing this systematic tool to the relevant decision & policy makers in the near future.</p>	<p>The reporting linking above MAC analysis findings against the country's NDC target can be access with https://drive.google.com/open?id=1N0RVRu7v52nhh4cg9Y9Vcx6QftbK4niS</p> <p>The results of the analysis can be used for refining energy sector's NDC targets, and the same procedure can be used as an example for the other sectors when targets are set.</p>
No. of NAMA EE/RE projects that are designed based on the prioritized NAMA projects and the detailed MAC curves for the energy generation and end-use sector by Year 4	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	<p>The project has undertaken a Barrier Analysis (BA) for energy sector mitigation options and Multi-Criteria Assessment (MCA) to prioritize NAMAs. BA is conducted to identify what barriers and risks (regulatory, technical, financial, political/institutional and</p>	<p>Three (03)</p> <p>The three (03) pre-identified pilot RE & EE NAMA projects (i.e. Solar PV net-metering with battery storage, biogas and High Efficiency Motors (later this was switched to VFDs) were designed in detail for pilot implementation, and these were used to test, verify and demonstrate the overall NAMA framework. Validation of the selection of the above technologies, was performed during MAC analysis and the following preliminary findings were made:</p>

			<p>social) are involved in the scaling up of mitigation actions at national level. The results of MAC analysis and BA will be used for screening and scoping of MCA process. National priorities and policies, co-benefits (socio-economic) and difficulty of implementation are the three main criteria of MCA process. The project expects to select 3 or more appropriate actions to be designed as an activity under the component 4 of the project (refer component 4 for further information and process under this). Full NAMA design documents will be prepared for these selected NAMAs, using the NAMA template proposed by the UNFCCC.</p> <p>In parallel, pre-identified three pilot RE & EE NAMA projects (i.e. Solar PV net-metering with battery storage, biogas and High Efficiency Motors (later this was switched to VFDs) are being used to test, verify and demonstrate the overall NAMA framework. Validation of the selection of above technologies was performed</p>	<p>Domestic Solar PV with battery is the most expensive GHG abatement option, amongst the list of abatement options selected for the analysis.</p> <p>High Efficient Motors (HEMs) used to replace an existing motor will be a 'cost'. However, efficient motor as a new purchase shall be a 'benefit'. Conversely, VFD applications had been identified as a 'benefit'. This technology was later selected as the one replacing HEMs in tea sector.</p> <p>Biogas remains as a grey area due to the lack of data or the fact that the baseline data of the technology are very different even within the same application.</p> <p>In parallel, the project undertook a comprehensive Barrier Analysis (BA) and Multi-Criteria Assessment (MCA) for energy sector mitigation options to identify NAMAs in the country. BA was conducted to identify what barriers and risks (regulatory, technical, financial, political/institutional and social) were involved in the scaling up of mitigation actions at the national level. National priorities and policies, co-benefits (socio-economic) and difficulties in implementation were taken as the three main criteria of MCA process. The results of these BA and MCA, along with MAC analysis were used to prioritize the most appropriate technology-options in the energy sector. Key results indicated that LED lights replacing CFL lights and incandescents, efficient chiller in commercial applications, wind and solar power plants (farms), domestic solar rooftop applications were 'High priority' mitigation options from which the country could benefit.</p>
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			<p>during MAC analysis, and the following preliminary findings were made;</p> <p>Domestic Solar PV with battery is the highest costly GHG abatement option among the list of abatement options selected for the analysis.</p> <p>Efficient motors replacing an existing motor will be a 'cost'. However, efficient motor as a new purchase shall be a 'benefit'. Conversely VFD applications has been identified as a 'benefit'.</p> <p>Biogas remains as a grey area due to the fact that baseline data of the technology are not very clear and not available.</p> <p>Possibility of developing full NAMA proposal(s) for pre-selected technologies based on lessons learned during implementation will also be considered, and VFD applications appear to be a promising option under this.</p>	
<p>The progress of the objective can be described as:</p>	<p>Progress not set</p>			

Outcome 2					
Identified private and public sector entities to implement prioritized appropriate mitigation actions for the achievement of Sri Lanka's voluntary mitigation target					
Description of Indicator	Baseline Level	Midterm target level	End of project target level	Level at 30 June 2018	Cumulative progress since project start
No. of identified fully capable and qualified private and public sector entities that are interested in funding prioritized NAMA projects by Year 2	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	2	<p>Sri Lanka Sustainable Energy Authority (public sector entity which is also the project implementing partner) and the Planters' Association of Ceylon (PAC) which is the private tea producers/industry collaboration remain as public and private sector entities continued to invest in NAMA activities.</p> <p>Key roles and responsibilities of Sustainable Energy Authority (SLSEA) include Renewable Energy (RE) resource identification and development, implementation and/or facilitation of RE projects/programme development with grant assistance, promotion of Energy Efficiency (EE) and implementation of EE projects/programme, RE & EE related policy and regulatory support, and knowledge management.</p>	<p>Sri Lanka Sustainable Energy Authority (public sector entity which is also the project implementing partner) and the Planters' Association of Ceylon (PAC) which is the private tea producers/industry collaboration remained as the respective public and private sector entities investing in NAMA activities throughout the project implementation period.</p> <p>Key roles and responsibilities of Sustainable Energy Authority (SLSEA) include Renewable Energy (RE) resource identification and development, implementation and/or facilitation of RE projects/programme development with grant assistance, promotion of Energy Efficiency (EE), implementation of EE projects/programme, RE & EE related policy and regulatory support, and knowledge management. Specific ongoing initiatives of SLSEA which can be considered as energy sector Appropriate Mitigation Actions include;</p> <ul style="list-style-type: none"> • 'Sooryabala Sangramaya': 1000 MW solar PV capacity addition by 2025 programme (sub programmes include 'Rivi Aruna' – Solar PV for religious places at government cost, and Solar PV for government hospitals and schools – a 2 million USD grant programme) • Support to develop other grid connected RE power plants (small hydro, wind, utility scale solar – ground mounted, and biomass) <p>Further, SLSEA leads energy efficiency activities through Demand Side Management, which is also overseen by a special Presidential Task Unit. Apart from these direct RE and EE activities, SLSEA is involved in many policy and regulatory decision making processes, capacity development and promotional activities which facilitate RE/EE mitigation actions. SLSEA led the Project's biogas pilot programme with the involvement of five provincial councils (sub-national entities).</p> <p>Tea industry companies including those under PAC have been interested in energy efficiency improvements, mainly for cost reduction by energy</p>

			<p>Specific ongoing initiatives of SLSEA which can be considered as energy sector Appropriate Mitigation Actions include;</p> <ul style="list-style-type: none"> • ‘Sooryabala Sangramaya’; 1000 MW solar PV capacity addition by 2025 programme (sub programmes include ‘Rivi Aruna’ – Solar PV for religious places at government cost, and Solar PV for government hospitals and schools – a 2 million USD grant programme) • ‘Sulan Bala Sangramaya’; newly launched small and medium scale wind turbine programme. • Support to development of other grid connected REs power plants (small hydro, wind, utility scale solar – ground mounted, and biomass) <p>Further, SLSEA leads energy efficiency activities through Demand Side Management plan which is also overlooked by a special Presidential task unit. Apart from these direct RE and EE activities, SLSEA is involved in many policy and</p>	<p>(electricity) saving which also improves overall productivity and competitiveness. This further leads to emission reduction, and an option for such initiatives to be perceived as a product & process greening, which this industry highly uses for its product marketing purposes.</p> <p>The initial commitment from the PAC to cost share, to demonstrate the benefits of the energy efficiency initiative including HEMs in tea factories was indicated at the time of project launch. This was later realized as investment towards VFD programme of the project. Tea factories under PAC installed more than Five hundred and fifty (550) VFDs with co-investments of approximately 450,000 USD (78m LKR). PAC is a private entity overseeing the tea industry companies.</p> <p>Note: During pilot trial application of High Efficiency Motors (HEMs) in the tea sector, withering application did not result in significant energy saving, whereas Variable Frequency Drivers (VFDs) application was identified as a technology with bigger energy saving potential in the same industry with more economic benefits. This was discussed at the Mid-term Review of the project and all parties agreed on the need for swift technology change in the same sector (tea industry), and are now being implemented as a NAMA.</p>
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			<p>regulatory decision making processes, capacity development and promotional activities which facilitate RE/EE mitigation actions.</p> <p>Tea industry companies including those under PAC are also interested in energy efficiency improvements mainly for the cost reduction by energy (electricity) saving which also improves productivity and competitiveness. This also leads to emission reduction as well as such initiatives are perceived as a product & process greening, and this industry highly uses this for product marketing purposes.</p> <p>The initial commitment of USD 4 million from the PAC as cost share to demonstrate the benefits of energy efficiency initiative including HEMs in tea factories is now being realized as investment towards VFD programme of the project. In the first VFD programme cycle, 48 tea factories of which majority of factories were plantation companies under PAC invested in VFDs. The project initially supported</p>	
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			<p>them up to 35% of total costs to make their investment viable. This share was reduced to 25% in the second phase. More than 50+ tea factories have applied for the second phase of the project. As the impacts both on energy savings and product quality are positive, tea factories are expected to invest in Variable Frequency Drivers (VFDs) on their own in the future.</p> <p>Further, it has been noticed that there is a growing interest among tea industry/factories to invest in solar PV installations, and more than 10 factories have already installed solar PVs in their factories.</p> <p>Note: During pilot trial application of High Efficiency Motors (HEMs) in tea sector withering application did not result in significant energy saving whereas Variable Frequency Drivers (VFDs) application was identified as a technology with bigger energy saving potential in the same industry with more economic benefits. This was discussed at the Mid-term Review of the project and all</p>	
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				parties agreed on this swiftly technology change in the same sector (tea industry), and now being implemented as a NAMA.	
No. of NAMA EE/RE projects that are designed and implemented based on detailed MAC curves for the energy generation and end-use sector by Year 2	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	<p>The lessons learned from initial implementation and trial phase have been used to make the required changes for the three pre-selected RE&EE NAMAs in the energy sector; i.e. domestic Solar PV with battery storage, biogas as solution for waste management and High Efficiency Motors. These requirements were discussed and agreed at the Mid-Term Review (MTR) and now being implemented. These can be summarized as follows;</p> <ul style="list-style-type: none"> Biogas as a waste management solution – Though the project has supported more than 200+ small scale biogas units in five selected provinces, the programme is somewhat lagging behind due to less demand, inherent technical and other limitations of the technology which is beyond the project scope. The demand for small scale unit as energy generation or 	<p>Three (03).</p> <p>The lessons learned from initial implementation and trial phase have been used to make the required changes for the three pre-selected RE&EE NAMAs in the energy sector; i.e. domestic Solar PV with battery storage, biogas as solution for waste management, and Variable Frequency Drivers (replacing initially selected High Efficiency Motors pilot). Overall progress of these three NAMAs can be summarized as follows;</p> <ul style="list-style-type: none"> Biogas as a waste management solution: The project supported more than three hundred and fifty (350+) small scale biogas units in five selected provinces. However, the programme fell short of the original target due to less demand, inherent technical and other limitations of the technology which is beyond the project scope. Biogas as an application for alternative fuel energy was an unlikely demand. However, there was a clear need for medium-to-large scale biogas units, as a waste management option for environment compliance. Hence, the project considered medium-to-large scale biogas units as demonstration pilots with the MTR recommendation. The Project mainly focused on medium-large scale biogas units after the MTR review, and thereby supported twenty eight (28) such units constructions. Sixteen (16) more medium-large installations are also under construction and are expected to be completed in Q3 2019. The project has been targeting to achieve the given target in terms of equivalent biogas digester volume (total digester capacity/volume of the original biogas programme as the new target). High Efficiency Motors (HEM) in the tea sector – The efficiency gain from an application of HEM was found to be offset by other parameters of the tea withering process and the technology deemed financially unviable. On the other hand, application of Variable Frequency Drivers (VFD) had a bigger energy saving

			<p>alternative fuel has reduced. On the contrary, medium to bigger scale biogas units are being proposed as a waste management option for environment compliance. Hence, the project allowed medium to large scale biogas units to participate in the project as demonstration pilots for MRV in biogas technology sector with MTR recommendation. The project now aims to achieve the given target in terms of equivalent biogas digester volume (total digester capacity/volume of the original biogas programme as the new target). In the first call for proposal cycle, the project has approved 7 biogas units whereas in the second cycle the project would consider approval of 15 proposals.</p> <ul style="list-style-type: none"> • High Efficiency Motors(HEM) in the tea sector – The efficiency gain from an application of HEM was found to be offset by other parameters of the tea withering process and the technology is not financially viable. Application of Variable Frequency Drivers 	<p>potential, financial viability and long-term sustainability than HEMs in comparison. Thus, pilot technology change (from HEMs to VFDs) within the same industry (tea) was discussed and approved at Mid-Term Review. Due to this, the new VFD pilot programme had to be limited to few cycles for call for proposals, due to the time constraint of just one and a half year that was available after the MTR process. The Project facilitated more than seventy (70+) tea factories to install 609 Variable Frequency Drivers (VFDs) with part-finance support. This was additional to the pilot trial phase installations of twenty- four (24) High Efficiency Motors (HEMs) and five (5) VFDs that were installed in 5 tea factories.</p> <ul style="list-style-type: none"> • Domestic Solar PV with battery: The technical feasibility of the concept was observed during the trial conducted with 14 Solar PV systems. The cost of battery (and technology) was too high which make the technology-application not financially viable or economical in the current context. Though the project discussed about few technology alternatives like solar PV for government schools and hospitals etc, a growing interest towards the battery application was shown by the key stakeholders of the project. Thus, the project continued with the same technology largely due to future prospects and installed another 20 Domestic Solar PV with batteries (a total of 34 units). <p>A validation for the pre-selection of these three technologies was completed with MAC analysis, and the results are discussed above (indicator 2 of Outcome 2).</p>
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			<p>(VFD) has a bigger energy saving potential, financial viability and long-term sustainability than HEMs. Thus, technology change (from HEMs to VFDs) within the same industry (tea) is discussed and approved at Mid-Term Review, and is now being successfully implemented. 48 tea factories were facilitated in the 1st programme cycle, and the project received approximately 40 applications for the second phase. Further information are provided in the next indicator progress description.</p> <ul style="list-style-type: none"> • Domestic Solar PV with battery – Though the technical feasibility of the concept was noticed during the trial conducted with 14 Solar PV systems, the cost of battery (and technology) is too high which make the technology-application not financially viable or economical in the current context. Though the project discussed about few technology alternatives like solar PV for government schools and hospitals etc, a growing interest towards the 	
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				<p>battery application is shown by the key stakeholders of the project. Thus, the project is to continue with the same technology largely due to future prospects.</p> <p>A validation for the pre-selection of these three technologies was completed with MAC analysis, and results were discussed above (indicator 2 of Outcome 2).</p>	
No. of individual projects that constitute the country's NAMAs by Year 4	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	<p>1,000 biogas systems</p> <p>1,300 tea factories</p> <p>205 solar systems</p>	<p>205 small scale biogas digesters have been installed in five provinces and 24 units are under construction (126 units for the PIR reporting period). 2 medium-to-large scale biogas units with equivalent total volume capacity of 57 have also been facilitated by the project, and further 5 units are under construction.</p> <p>344 Variable Frequency Drivers (VFD) in 48 tea factories. This is excluding the 24 High efficiency motors and 5 VFDs installed under trial phase (349 VFDs and 24 HEMs in total).</p> <p>14 Solar PV systems (31 equivalent systems under</p>	<p>Three-hundred and sixty two (362) small scale biogas digester installations were facilitated in five provinces including One hundred and fifty seven (157) unit installations during the PIR reporting period. So far twenty- eight (28) medium-to-large scale biogas units, with equivalent total volume capacity of three hundred and eighty nine (389) have been facilitated by the Project, and another sixteen (16) units are under construction with equivalent volume capacities of three hundred and twenty four (324). (Small scale unit).</p> <p>Six-hundred and nine 609 Variable Frequency Drivers (VFD) in seventy-one (71) tea factories and few other industries have been installed. This is excluding the Twenty four (24) High efficiency motors and five (5) VFDs installed under trial phase (614 VFDs and 24 HEMs in total).</p> <p>Thirty four (34) Solar PV systems (100 equivalent systems under initially proposed capacities) with battery storages have been installed with total capacity installation of 66.5kWp.</p>

				initially proposed capacities) with battery storages have been installed, and total capacity installation is 21.5kWp.	
No. of operational Private-funded NAMA projects by EOP	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	1 (high efficient motors in tea factories)	<p>As the application of HEMs in the tea industry application did not result in significant energy saving due to various constraints as well as was not financial viable., alternatively, Variable Frequency Drivers (VFDs) application indicated bigger energy saving potential in the same industry with more economic benefits. Thus, the project introduced VFDs to the tea industry after key stakeholder consultation (Tea Research Institutes, private tea factories, HEM/VFD suppliers, Sustainable Energy Authority, and other industry experts).</p> <p>The project completed a few awareness programs for the sector before VFD programme was launched. In the first programme cycle, the project provided matching re-bate grant of 35% to 48 tea factories. Project financial support toward these factories was</p>	<p>The application of HEMs in the tea industry application did not result in significant energy saving due to various constraints as well as its financial unviability. Alternatively, Variable Frequency Drivers (VFDs) application indicated bigger energy saving potential in the same industry with more economic benefits. Thus, the project introduced VFDs to the tea industry after key stakeholder consultation (Tea Research Institutes, private tea factories, HEM/VFD suppliers, Sustainable Energy Authority, and other industry experts).</p> <p>VFD programme was launched after few awareness and promotional programs. The project facilitated the installation of Six hundred and nine (609) Variable Frequency Drivers (VFD) in seventy- one (71) tea factories and few other industries. Project financial support toward these factories was USD 160,000, whereas co-investment made by these factories was USD 510,000. The project also conducted the required O&M training for all levels of staff at the tea factories. They were also made aware of best practices and use of VFDs for their tea withering process, and the required training for Monitoring and Reporting of energy saved. The project also supported few other industries, such as ceramic and cable manufacturing considering the scalability and replicability of this VFD pilot initiative.</p>

				USD 110,000 whereas co-investment made by these factories was USD 294,000. The project also conducted the required O&M training for all levels staff of tea factories, best practices and use of VFDs for their tea withering process, and the required training for Monitoring and Reporting of energy saved. The project has now called for proposal for the second phase.	
The progress of the objective can be described as:		Progress not set			
Outcome 3					
Accurate measurement and accounting of actual GHG emission reduction from mitigation actions in the energy generation and end-use sectors					
Description of Indicator	Baseline Level	Midterm target level	End of project target level	Level at 30 June 2018	Cumulative progress since project start
No. of NAMA projects with GHG ERs correctly verified by the established and operational MRV systems for mitigation actions by Year 4	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	The project has progressed in the following key areas: Monitoring procedures, protocols, logbook/template for data collection, reporting and verification at different levels of the data flow structure were developed with the assistance of international consultants. The same energy Data Management System (DMS)	Three (03). Emission Reduction of three (03) implemented NAMA projects (i.e. Solar PV net-metering with battery storage, biogas and High Efficiency Motors (later this was switched to VFDs) are currently under MRV. The overall progress of the activity can be summarized as; Monitoring procedures, protocols, logbook/template for data collection, reporting and verification at different levels of the data flow structure were developed with the assistance of international consultants. Energy Data Management System (DMS) was developed in-line with these protocols, and provision for expanding this energy DMS for future climate mitigation interventions/CCMAs is made available to the energy sector.

			<p>has been developed in-line with these protocols and will be extended for any future climate mitigation interventions/CCMAs in energy sector.</p> <p>The energy DSM is now used for the MRVing of Emission Reductions (ER) of biogas pilot in 4 provinces (North Western, Southern, Central and Uva), Variable Frequency Drives (VFDs) in tea factories and Solar PV installations. However, the project is yet to verify the ERs reported under the energy DMS.</p> <p>MRVing of biogas systems is integrated to the administration structure within provincial councils. MRVing of the energy efficiency intervention in tea sector is also integrated to the existing structure within the respective factory/plantation company. Any lesson learned during execution of these MRVing protocols will be used to improve these existing systems and arrangements in place.</p>	<p>The energy DSM is now used for MRV of Emission Reductions (ER) of the biogas pilot in four (4) provinces (North Western, Southern, Central and Uva), the Variable Frequency Drives (VFDs) in tea factories and the Solar PV installations.</p> <p>MRV of biogas systems has been integrated to the administrative structure of the provincial councils. MRV of the energy efficiency intervention in tea sector has been integrated to the existing structure within the respective factory/plantation company.</p> <p>The MRV of ER of for the above interventions are yet to be fully accomplished, due to deficiencies of data follow and lower priority given for the MRV aspects by the lower layers of the engaged parties of these pilot programme. The project is working on strengthening this aspect in remaining few months.</p> <p>MRV of project NAMAs were also facilitated by the following training and capacity building activities under component 4:</p> <p>Two national level training programs were conducted by international experts on MRV of GHG mitigation projects.</p> <p>Four provincial level training programs were conducted in North-western, Southern, Uva and Central provinces on MRV targeting by field officers and executives engaged in monitoring and verification. Further trainings were provided to provincial level officials on development of MRV framework for future NAMAs/ GHG mitigation interventions and few follow up training workshops on MRV of biogas programme have been held.</p> <p>Similar training programmes were conducted for factory and group level operators & officials of tea factories on ERs MRV of VFD programme.</p> <p>The link <https://clean.energy.gov.lk/> provides ER of project pilots and awareness materials developed by the project can be accessed with the link <http://www.climatechange.lk/nama/?page_id=459></p>
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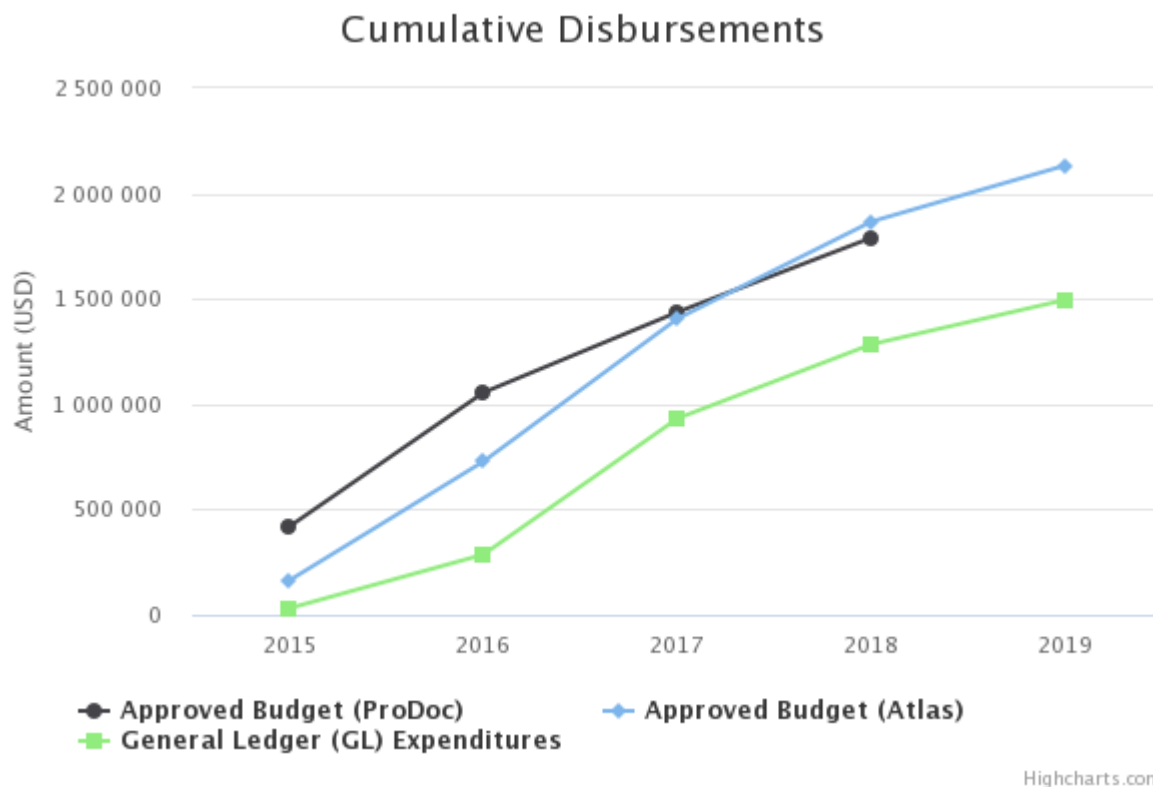
				<p>Training and capacity building under the component 4;</p> <p>Two national level training programs were conducted by international experts on MRVing of GHG mitigation projects.</p> <p>Four provincial level training programs were conducted in North-western, Southern, Uva and Central provinces on MRVing targeting field officers and executives engage in monitoring and verification. Further trainings were provided to provincial level officials on development of MRV framework for future NAMAs/ GHG mitigation interventions.</p> <p>Similar training programmes were conducted for factory and group level operators & officials of tea factories on ERs MRVing of VFD programme.</p>	
No. of projects in the energy generation and end use sectors that are registered in the National NAMA registry by EOP	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>	3	The project, in collaboration with Climate Change Secretariat of Sri Lanka (CCS), is in the establishment of the proposed NAMA institutional framework. This NAMA	<p>Three (03) NAMAs to be registered.</p> <p>The project, in collaboration with Climate Change Secretariat of Sri Lanka (CCS), has established the proposed NAMA under an institutional framework set-up. This NAMA institutional set-up was developed in order to facilitate future NAMAs of the country, and the NAMA registry will be a part of this set-up under which these NAMAs are to be registered.</p>

			<p>Institutional set-up is expected to facilitate the development of future NAMAs of the country, and the proposed NAMA registry will be a part of this set-up under which NAMAs will be registered.</p> <p>This structure includes entities identified as NAMA Coordinating Entity, Designated NAMA Entity, NAMA Secretariat and Approver, and NAMA Expert Committee. These entities' roles and responsibilities were identified as well as the relevant Designated NAMA Entities from different sectors; namely Energy, Transport, Waste, Industry, Agriculture and Forest were identified. The Cabinet of Ministers has already approved the proposed institutional framework/structure, and the project is now in the institutionalization of this set-up.</p> <p>Four sector-wise capacity building workshops were conducted on developing NAMA proposals targeting officials nominated by designated NAMA entities. A series of comprehensive</p>	<p>This institutional structure includes entities identified as NAMA Coordinating Entity, Designated NAMA Entity, NAMA Secretariat and Approver, and NAMA Expert Committee. These entities' roles and responsibilities were identified along with the relevant Designated NAMA Entities from different sector namely, Energy, Transport, Waste, Industry, Agriculture and Forest were identified. The Cabinet of Ministers have approved this institutional framework/structure.</p> <p>The project started institutionalization of this structure with several sector-wise capacity building workshops. The project assisted the nominated officials of the designated NAMA entities by developing NAMA proposals which they prioritized. This exercise was assisted by an international expert on NAMA project/programme proposal development. As a result of this work, three NAMAs were identified namely 'mangrove re-forestry in degraded mangrove lands, biogas as a mitigation action against municipal solid waste management issue and inland water transport. Another proposal on energy efficient chiller is being discussed in detail, to be developed as a potential NAMA. Once these NAMA proposals are approved, it will be registered under the NAMA registry.</p> <p>The web-based application portal has been developed to facilitate NAMA proposal submission and approval process. This portal facilitates tracing and approval processing of mitigation action proposal until it is published on the national NAMA registry.</p>
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			<p>training program is scheduled to be conducted in Q3 & Q4 of 2018 by an international expert on NAMA project/programme proposal development. A group of officials from all 5 designated NAMA entities and implementing entities will be selected for the training. Further, the engagement of provincial officials will also be taken considering MTR recommendation on supporting provincial levels with their NAMA development and MRV.</p> <p>It is expected that a minimum of 3 NAMA proposals shall be developed and registered under national NAMA registry as the key deliverable of this activity.</p> <p>Further, the web-based application portal is being developed to facilitate the NAMA proposal submission and approval process. Through the portal, a project can be traced and processed till it appear on the national NAMA registry.</p>	
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The progress of the objective can be described as:	Progress not set
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D. Implementation Progress



Cumulative GL delivery against total approved amount (in prodoc):	83.53%
Cumulative GL delivery against expected delivery as of this year:	83.53%
Cumulative disbursement as of 30 June (note: amount to be updated in late August):	1,495,570

Key Financing Amounts	
PPG Amount	100,000
GEF Grant Amount	1,790,411
Co-financing	25,880,000

Key Project Dates	
PIF Approval Date	Dec 19, 2013
CEO Endorsement Date	Jan 27, 2015
Project Document Signature Date (project start date):	Jun 10, 2015
Date of Inception Workshop	Nov 12, 2015
Expected Date of Mid-term Review	<i>(not set or not applicable)</i>

Actual Date of Mid-term Review	Nov 15, 2017
Expected Date of Terminal Evaluation	Sep 30, 2019
Original Planned Closing Date	Jun 10, 2019
Revised Planned Closing Date	Dec 31, 2019

Dates of Project Steering Committee/Board Meetings during reporting period (30 June 2018 to 1 July 2019)

E. Critical Risk Management

Current Types of Critical Risks	Critical risk management measures undertaken this reporting period
Political/environment: Civil unrest including terrorist incidents delaying programme implementations (M)	The project worked with many national and sub-national government parties and some of project implementation delays were significant as the priorities of these institutions were on such incidents which the project (management) had no control over.
Organizational	Inadequate involvement and staff engagement of project implementing partners. Major project work had been led by Project Management Unit with limited human resource involvement of implementing partners. This sustainability risk (project continuity) was partly resolved after a separate project cadre was appointed in May 2019. The Project is now working with this new team closely to fill remaining gaps.

F. Adjustments

Comments on delays in key project milestones

<p>Project Manager: please provide comments on delays this reporting period in achieving any of the following key project milestones: inception workshop, mid-term review, terminal evaluation and/or project closure. If there are no delays please indicate not applicable.</p>
<p><i>The project closing date was revised to December 31, 2019 to complete the committed activities and to achieve the remaining outputs which were close to being achieved as well as smooth transferring and handing over of project activities to project implementing partners. Therefore, TE has also been planned for October 2019.</i></p>
<p>Country Office: please provide comments on delays this reporting period in achieving any of the following key project milestones: inception workshop, mid-term review, terminal evaluation and/or project closure. If there are no delays please indicate not applicable.</p>
<p><i>(not set or not applicable)</i></p>
<p>UNDP-GEF Technical Adviser: please provide comments on delays this reporting period in achieving any of the following key project milestones: inception workshop, mid-term review, terminal evaluation and/or project closure. If there are no delays please indicate not applicable.</p>
<p><i>(not set or not applicable)</i></p>

G. Ratings and Overall Assessments

Role	2019 Development Objective Progress Rating	2019 Implementation Progress Rating
Project Manager/Coordinator	<i>(Satisfactory)</i>	<i>- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -</i>
Overall Assessment	<p>The Project has demonstrated significant progress towards achieving its goal, objectives and outcomes. The overall progress of outcomes and outputs have demonstrated positive trends in in the reporting period. Progress towards achieving its' goal indicators can be considered 'satisfactory' as the project has achieved its goal of reduced CO2 emissions through NAMA implementation around 65 percent of the original target. Irrespective of the initial delays in the implementation and the MTR changes that were adopted at a later stage, the Project's lifetime emission reduction (ER) and energy saving (ES) targets will be achieved.</p> <p>Notable achievements against the project outputs can be described as;</p> <p>The physical progress and activities completed under component 1: (business-as-usual energy generation and end-use sector baselines at national and sub-national level)</p> <ul style="list-style-type: none"> • Energy Data Management System (DMS), which has been developed for energy/GHG emission inventory management and Emission Reduction (ER) reporting purpose, has been fully tested for project pilot initiatives. This system is now being used for energy sector data collection. This system is integrated with SLSEA's existing energy database "EnerGIS", which had originally been limited to the process of Renewable Energy (RE) resource allocation process. This was done after revamping "EnerGIS" with required modifications. • This Energy DMS has been introduced to the tea sector VFD and provincial level biogas programme management as well as solar PV technology providers after the required trainings were provided. Data is now being generated in an increasing manner from these programmes, and corresponding energy/emission baseline and emission reductions are being generated after data verification. • This system has been upgraded with the facility to capture GHG emission related data of any energy generator and end-users, and is used for GHG emission inventory and baseline activities. The project has targeted energy end-users' data in the first phase, and this process is now being expedited through SLSEA's energy manager programme. • Energy DMS and EnerGIS system are now facilitated with progress reporting and monitoring of SLSEA's Renewable Energy (RE) projects. <p>The project has clearly identified the regulatory requirement supporting the long-term sustainability of these (energy and related GHG emission) data reporting arrangements. This has long been discussed with the National Communication team of the Climate Change Secretariat (CCS) and key input has been provided supporting the formulation of 'Climate Information Management System' at CCS.</p> <p>Project progress under component 2, prioritizing mitigation options for the energy generation and end-use sectors:</p> <ul style="list-style-type: none"> • Completion of preliminary and comprehensive Marginal Abatement Cost (MAC) analysis of energy sector, mapping of MAC findings with the country's Nationally Determined Contributions of the energy sector. 	

- Barrier Analysis (BA) for GHG abatement options of Renewable Energy (RE) and Energy Efficiency (EE) was completed, and the results together with the findings of MAC analysis was used in Multi-Criteria Analysis (MCA) tool to prioritize mitigation options in the energy sector.

Key results of this component mainly the findings of MAC, BA and MCA were presented to the relevant authorities and policy/decision makers as the final outcome of this task. Further, the MAC analysis has also been used for defining the initial scope of few other sector analysis, including 'Partnership for Market Readiness' project as detailed in a later paragraph.

Moreover, these systematic analysis and tools have been used as an example to the other sectors on how to properly identify appropriate mitigations actions in their respective sectors.

Physical progress of component 3, implementation of appropriate mitigation actions in the energy generation and end-use sectors, can be detailed as;

- Implementation of pre-selected NAMA pilot projects, i.e. High Efficiency Motors in the tea industry, domestic solar PV with battery storage, and biogas as a solution for waste management and alternative energy have almost been completed with reasonable success. Implementation has covered the recommended and agreed to the Mid-Term Review (MTR) suggestions to achieve ambitiously set GHG emission reduction target at the beginning of the project.
 - The provincial biogas programme concluded with three- hundred and fifty one (351) unit installations. An additional eleven (11) units were completed with the assistance of one CSO (Berendina Development Service). The total number is significantly lower than the initially set target of 1000 unit. The fact there has been no clear driving force for this small scale units remains as a major challenge. Further, the lack of political and institutional commitment from initially identified provincial councils was another major challenge and these were discussed at the MTR. The identified medium-large biogas scale were mainly of commercial and industrial applications as more sustainable alternatives were focused during the last implementation year, and the project has supported twenty-eight (28) such installations. Another sixteen (16) medium to large unit installations are near completion. The overall biogas programme is on track when compared to the equivalent volume/GHG ER target with medium-large biogas units.

In supporting provincial level biogas programme, the Project has provided extensive training for one-hundred and twenty eight (128) extension officers identified as focal persons for the quality assurance of biogas programme. They will remain as a large resource pool for future activities if needed. Some of them are now engaged in biogas MRV programme.

- Fourteen (14) units of domestic solar PV with battery were initially installed as a trial installation and a comprehensive technical and cost-benefit analysis were completed with the assistance of Ceylon Electricity Board (CEB). Though there have been a number of learning points from this pilot, it remains as a high cost mitigation option. However it does have futuristic aspects to it apart from the noticeable growing interest noticeable among some of the actors including end-users. Thus, the project went ahead and installed an additional twenty (20) units, and the information obtained from these will be fed to update the previous study and make any required recommendations to the policy/decision makers.

- The project made a strategic management decision to consider Variable Frequency Drivers (VFDs) as a technology alternative for High Efficiency Motors, and necessary recommendations was obtained after a detailed case study presentation at the MTR. The project has achieved creditable results with VFD applications in seventy- one (71) tea factories for last year and a half. The total number of six-hundred and nine VFD were installed, including few installations in other sectors/applications.

The project has been able to mobilize significant private sector investments for RE/EE activities through pilot programme initiatives as detailed later. These include co-investment of private sector tea factories of approx. 510,000 USD and biogas pilots approx. 910,000 USD. Further, the project has also brought in another approx. 155,000 USD co-investment, mainly through households and individuals through small biogas programme and domestic solar PV programme. It is expected that wider adaption of these technology-applications through replication and scaling up effect will bring in more private sector investments into energy sector mitigation actions. The project has set a good example on how to attract private sector investments into climate mitigation actions by reducing certain risks and creating demand.

Implementation progress under component 4, MRV system and NAMA registry of energy generation and end-user sectors, can be detailed as follows:

- NAMA institutional set-up was finalized and the approval of Cabinet ministers was obtained for implementations. NAMA registry was set up within the NAMA institutional set-up, and initial capacity building activities were completed for key institutions under this institutional structure through sector specific training/awareness programme. Three (3) completed NAMA proposals from different sectors, that were developed through this NAMA institutionalization process are now in the final approval stage to be registered with the NAMA registry.
- Already developed MRV procedures and protocols, logbook/template for data gathering are now being applied for the selected technologies (i.e. Solar PV, Biogas and HEM/VFDs), and certain changes were made to improve the initial designs based on findings and learning from field level applications. Access provided to relevant stakeholders such as SLSEA, CCS, provincial councils, tea factories being used for obtaining MRVed data for their various internal and external communication purposes.

The overall financial progress of the project is 84% (84% expenditure and 92% of total utilization) of the total project budget as on June 2019. This amount This year's utilization remains, as 51% of year 2019 budget and is expecting full allocation by year end. A significant private sector investment in to RE/EE activities through pilot programme initiatives has been achieved during the last few years. These include co-investment of private sector tea factories for approx. 510,000 USD and biogas pilots for approx. 910,000 USD. Further, the project has also brought in another approx. 155,000 USD co-investment, mainly from households and individuals through small biogas programme and domestic solar PV programme. It is expected that wider adaption of these technology-applications through replication and scaling up effect will bring in more private sector investments into energy sector mitigation actions. The project has set a good example on how to attract private sector investments into climate mitigation actions by reducing certain risks and creating demand.

The project completed Mid-term Review (MTR) in Nov, 2017 with 'moderately satisfactory' to 'satisfactory' ratings for overall achievement towards results, whereas the project's implementation and adaptive management rating was 'satisfactory'. Apart from AWP activities, the project implementation has also focused on MTR recommendation and the agreed management response plan

	<p>during the last year. With the proposed changes to the pilot programmes, the project has been able to generate higher GHG ERs.</p> <p>One of the sustainability risk emphasized at MTR was governance, specifically lack of critical mass of qualified officers to manage NAMA projects. This has been successfully addressed through training and capacity building of key project stakeholders on the overall NAMA concept, NAMA prioritization processes and tools, MRV of abatement options and related IT knowledge on the use of energy DMS etc.</p> <p>The most significant barrier and risk hindering the successful implementation of the NAMA framework and related activities is that there is no clear driving force facilitating NAMA activities. There is no market mechanism established attracting appropriate mitigation actions (this was also highlighted as a sustainability risk at MTR) and there is no policy or regulatory framework enforcement. The project has initiated an active dialog between CCS to identify a supportive role addressing this barrier. Two major development related to these aspects are the project's contribution to the 'Climate Information Management System' draft and contribution to 'Partnership for Market Readiness (PMR)' project. 'Climate Information Management System' will be the initial regulatory framework providing vital access to data and information pertaining to climate actions and the Project works with the Third National Communication (TNC) on this action. Having the key focus of mitigation actions through market mechanism, PMR is working on energy MRV, emission inventory, and carbon pricing instruments. These can be considered as a necessary step for sustainability of the project activities.</p> <p>The Project was able to leverage on positive engagements to achieve the Project's major environmental objectives in GHG emission reduction. The project continued engagement with public and private sector entities through implementation of NAMA pilots; in particular, private investors/parties (mainly tea industry and few other industries like mineral, and manufacturing, hotel, food and beverage, dairy industries), general public (direct and indirect beneficiaries), private sector service providers (Renewable Energy and Energy Efficiency related services and suppliers) and R&D partners including Tea Research Institute and the Utility (Ceylon Electricity Board).</p> <p>The project received a six-month extension to complete the transition to the SLSEA and CCS with required capacity to manage NAMA activities after the EOP.</p>	
Role	2019 Development Objective Progress Rating	2019 Implementation Progress Rating
UNDP Country Office Programme Officer	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>
Overall Assessment	<i>(not set or not applicable)</i>	
Role	2019 Development Objective Progress Rating	2019 Implementation Progress Rating
GEF Operational Focal point	<i>(not set or not applicable)</i>	<i>- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -</i>
Overall Assessment	<i>(not set or not applicable)</i>	
Role	2019 Development Objective Progress Rating	2019 Implementation Progress Rating

Project Implementing Partner	<i>(not set or not applicable)</i>	- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -
Overall Assessment	<i>(not set or not applicable)</i>	
Role	2019 Development Objective Progress Rating	2019 Implementation Progress Rating
Other Partners	<i>(not set or not applicable)</i>	- IP Rating provided by UNDP-GEF Technical Adviser and UNDP Country Office only -
Overall Assessment	<i>(not set or not applicable)</i>	
Role	2019 Development Objective Progress Rating	2019 Implementation Progress Rating
UNDP-GEF Technical Adviser	<i>(not set or not applicable)</i>	<i>(not set or not applicable)</i>
Overall Assessment	<i>(not set or not applicable)</i>	

H. Gender

Progress in Advancing Gender Equality and Women's Empowerment

This information is used in the UNDP-GEF Annual Performance Report, UNDP-GEF Annual Gender Report, reporting to the UNDP Gender Steering and Implementation Committee and for other internal and external communications and learning. The Project Manager and/or Project Gender Officer should complete this section with support from the UNDP Country Office.

<p>Gender Analysis and Action Plan: <i>not available</i></p>
<p>Please review the project's Gender Analysis and Action Plan. If the document is not attached or an updated Gender Analysis and/or Gender Action Plan is available please upload the document below or send to the Regional Programme Associate to upload in PIMS+. Please note that all projects approved since 1 July 2014 are required to carry out a gender analysis and all projects approved since 1 July 2018 are required to have a gender analysis and action plan.</p> <p>While no gender analysis and action plan were included in the approved Prodoc, during the implementation the project realized the importance of gender integration in future CCM action. Therefore, the Project has commissioned a study on gender and social impact assessment with specific focus on project pilot technology interventions, and recommendation for future CCM projects in the energy sector.</p> <p>Provincial biogas programme where significant women engagement is presence is seen as an entry point for more gender actions.</p>
<p>Please indicate in which results areas the project is contributing to gender equality (you may select more than one results area, or select not applicable):</p>
<p>Please describe any experiences or linkages (direct or indirect) between project activities and gender-based violence (GBV). This information is for UNDP use only and will not be shared with GEF Secretariat.</p>
<p>Please specify results achieved this reporting period that focus on increasing gender equality and the empowerment of women.</p> <p>Provincial biogas programme where significant women engagement is presence is identified as an entry point for gender interventions. 157 biogas units largely owned by individual beneficiaries engaged in dairy and farming sector were facilitated by the project. Women in almost all these beneficiary families have benefited from the project assistance as results of improved environment conditions of their households/lands as biogas is directly addressing their waste management issues, biogas as a cleaner fuel replacing fuelwood (also a health benefit for women as they spend some significant time in the kitchen) and cheaper source of energy than LPG. Qualitative and quantities assessment of direct and indirect benefits in increasing gender equality of the programme will be completed in Q3 2019.</p> <p>Among these 157 units, there were 11 biogas units which were jointly assisted by a local civil society development partner 'Berendina Development Services' (BDS). BDS group assisted these beneficiaries including women with further grant subsidy as many of them were marginalized group or looking for external supports for continuing with their livelihood.</p>

Please explain how the results reported addressed the different needs of men or women, changed norms, values, and power structures, and/or contributed to transforming or challenging gender inequalities and discrimination.

Not available/applicable

Please describe how work to advance gender equality and women's empowerment enhanced the project's environmental and/or resilience outcomes.

This is being assessed as a part of on-going gender and social impact assessment of the project. Findings will be incorporated into future and on-going CCM projects of the country as appropriate.

I. Social and Environmental Standards

Social and Environmental Standards (Safeguards)

The Project Manager and/or the project's Safeguards Officer should complete this section of the PIR with support from the UNDP Country Office. The UNDP-GEF RTA should review to ensure it is complete and accurate.

<p>1) Have any new social and/or environmental risks been identified during project implementation? No.</p>
<p>If any new social and/or environmental risks have been identified during project implementation please describe the new risk(s) and the response to it. N/A</p>
<p>2) Have any existing social and/or environmental risks been escalated during the reporting period? For example, when a low risk increased to moderate, or a moderate risk increased to high.</p> <p>No</p> <p>The project has been continuously been tracking the previously identified social and environmental risks and make the required control actions.</p> <p>For the methane/biogas emission of biogas pilot programme (which was identified as a environment risk before), support was provided to final users/beneficiaries and technical service providers of biogas digesters for proper management of methane along with biogas appliances and monitoring equipment to avoid potential negative impacts. A series of training programme were conducted to end users and biogas service providers on this aspects.</p>
<p>If any existing social and/or environmental risks have been escalated during implementation please describe the change(s) and the response to it.</p> <p>N/A</p>
<p>SESP: PIMS 5232 SL NAMA-ESS.pdf</p> <p>Environmental and Social Management Plan/Framework: <i>not available</i></p>
<p>For reference, please find below the project's safeguards screening (Social and Environmental Screening Procedure (SESP) or the old ESSP tool); management plans (if any); and its SESP categorization above. Please note that the SESP categorization might have been corrected during a centralized review.</p>
<p>3) Have any required social and environmental assessments and/or management plans been prepared in the reporting period? For example, an updated Stakeholder Engagement Plan, Environmental and Social Impact Assessment (ESIA) or Indigenous Peoples Plan.</p> <p>No.</p>
<p>If yes, please upload the document(s) above. If no, please explain when the required documents will be prepared.</p> <p>N/A</p>
<p>4) Has the project received complaints related to social and/or environmental impacts (actual or potential)?</p>

No.
If yes, please describe the complaint(s) or grievance(s) in detail including the status, significance, who was involved and what action was taken.
N/A

J. Communicating Impact

Tell us the story of the project focusing on how the project has helped to improve people's lives.

(This text will be used for UNDP corporate communications, the UNDP-GEF website, and/or other internal and external knowledge and learning efforts.)

Mrs. Alagiri Padmavathi is a beneficiary, who had received partial-finance support to install a biogas digester unit. The family depended on a small dairy farm, and this farm has been their main source of income. They are now using the biogas generated by the biogas unit as their main source of fuel for cooking, and their total fuel wood and LPG costs have been saved by this. This is approximately Rs. 500-600/month saving. The family is using the slurry to produce compost which they then use in their vegetable patch where they cultivate beans and tomatoes. They also sell compost for the price of Rs. 350 per bag generating some additional income. More importantly, they are very happy with the biogas system as this has greatly helped them in waste management of their dairy farm. Earlier, there had been complains from neighbors on odour and hygiene issues. They are now able to address them through this solution. They are also contemplating the selling of available excess biogas to their neighbours for an amount. They have set a good example on how to maximize a given part-subsidy integrating it into their livelihood.

Summary based on a discussion held with Mrs A. Padmavathi of Panvila, Central Province, Sri Lanka.

Knowledge Management, Project Links and Social Media

Please describe knowledge activities / products as outlined in knowledge management approved at CEO Endorsement /Approval.

Please also include: project's website, project page on the UNDP website, blogs, photos stories (e.g. Exposure), Facebook, Twitter, Flickr, YouTube, as well as hyperlinks to any media coverage of the project, for example, stories written by an outside source. Please upload any supporting files, including photos, videos, stories, and other documents using the 'file library' button in the top right of the PIR.

Energy Data Management System: <http://www.cleanenergy.gov.lk>

NAMA sub webpage and portal: <http://www.climatechange.lk/nama>

NAMA promotional materials: http://www.climatechange.lk/nama/?page_id=459

VFD Programme video (done by third party supplier for their internal use):

<https://drive.google.com/file/d/1k8buMfsPj0XDbYDut4qHZ9mb1fGqTw-o/view>

K. Partnerships

Partnerships & Stakeholder Engagement

Please select yes or no whether the project is working with any of the following partners. Please also provide an update on stakeholder engagement. This information is used by the GEF and UNDP for reporting and is therefore very important! All sections must be completed by the Project Manager and reviewed by the CO and RTA.

Does the project work with any Civil Society Organisations and/or NGOs? YES
Does the project work with any Indigenous Peoples? NO
Does the project work with the Private Sector? YES
Does the project work with the GEF Small Grants Programme? NO
Does the project work with UN Volunteers? NO
Did the project support South-South Cooperation and/or Triangular Cooperation efforts in the reporting year? YES
Request for MSP Approval: PIMS 5232 SLK NAMA CER Document 160115.docx
Provide an update on progress, challenges and outcomes related to stakeholder engagement based on the description of the Stakeholder Engagement Plan as documented at CEO endorsement/approval (see document below). If any surveys have been conducted please upload all survey documents to the PIR file library. N/A
<p>The stakeholder engagement plan which was mainly based on initially identified stakeholder and institutional analysis was followed to leverage environment and climate mitigation benefits, some adaptation benefits as well as socio-economic benefits. The project, following the engagement plan led to effective coordination among the key stakeholders and their representation for needed inputs to the meetings, workshops, targeted consultations, individual or group interactions and focused discussions. These activities can be further elaborated as follows;</p> <p>The Project Board chaired by the Ministry of Power and Energy has continuously been monitoring project progress, guiding project implementation and supporting the project in achieving its intended outputs and outcomes. The representatives from the public, private and CSO stakeholders have also been invited to the Board meeting where necessary. Other specific stakeholder engagements and their progress is detailed as follows.</p> <p>Sri Lanka Sustainable Energy Authority (SLSEA) and Climate Change Secretariat (CCS): As key responsible parties and the two main stakeholders, they continuously engaged in the implementation process despite limited human resources (engagement) and changing their main priority during the rapidly changing political environment.</p> <p>Provincial Councils (PCs) and entities under them: Five Provincial Councils (PCs) namely North Western, Southern, Central, Eastern and Uva, are involved in the pilot project of biogas technology dissemination. The Project had continued to work with various departments and entities under these Provincial Councils like the Local Government Departments, Ministries of Fisheries, Energy and Power etc, and Department of Agriculture, Department of Animal Production and Health, Department of Livestock Development etc,. Despite numerous Project efforts made towards these provincial actors, the Project has had a difficult year as these provincial councils had other priorities and concerns to be addressed beyond the control of the project.</p>

Private Sector Actors: The project ensured continued private sector engagement throughout the project implementation mainly in technology piloting.

- Technology end-users are mainly from the private sector; tea plantations companies like Evergreen PVT LTD, Talawakelle Tea Estates PLC, Kelani-valley Plantations PLC and individual privately owned tea factories bringing capital investments as co-finance into the Project which is more than 70% of total investments.
- Technology supplier: Starting from High Efficiency Motor (HEM) trial phase to VFD programme, biogas programme and solar PV pilot more than fifteen (15) leading technology supplier have been joined in hand. Their engagements have been noticed in R&D activities as well.

CSOs: The project had approached few CSOs during the last year, and Berendina Development Services Ltd is one of CSOs with which the project entered into fruitful partnership. They agreed to undertake installation of biogas units in places with marginalized and people in need. They provided upto 30% biogas system cost, as a grant to these groups. Their support has led to completion of eleven (11) small biogas units and few more units are under construction. In a larger role, engagement of the Planters Association of Ceylon (PAC)'s continuous engagement was greatly helpful in successful implementation of VFD pilot programme in the tea sector.

Ceylon Electricity Board (CEB): The utility body has actively supported domestic Solar PV with battery storage pilot phase with a detailed technical assessment to identify the impact on the grid of solar battery application, technical feasibility to use solar battery application for peak demand saving purpose, integration of more scattered RE with minimum disturbance to the grid which they perceives as the need of the hour.

Other: Project collaboration with the Tea Research Institute (TRI) of Sri Lanka has immensely helped in HEMs & VFDs trial phases. Further, the Tea Board has also been integral part of VFD programme, taking the key message across the industry.

Government and semi-government institutions under NAMA Institutional Set-up: Although engagement through focused group discussion for institutionalization of NAMA institutional set-up is underway, this remains as key challenge.

L. Annex - Ratings Definitions

Development Objective Progress Ratings Definitions

(HS) Highly Satisfactory: Project is on track to exceed its end-of-project targets, and is likely to achieve transformational change by project closure. The project can be presented as 'outstanding practice'.

(S) Satisfactory: Project is on track to fully achieve its end-of-project targets by project closure. The project can be presented as 'good practice'.

(MS) Moderately Satisfactory: Project is on track to achieve its end-of-project targets by project closure with minor shortcomings only.

(MU) Moderately Unsatisfactory: Project is off track and is expected to partially achieve its end-of-project targets by project closure with significant shortcomings. Project results might be fully achieved by project closure if adaptive management is undertaken immediately.

(U) Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets by project closure. Project results might be partially achieved by project closure if major adaptive management is undertaken immediately.

(HU) Highly Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets without major restructuring.

Implementation Progress Ratings Definitions

(HS) Highly Satisfactory: Implementation is exceeding expectations. Cumulative financial delivery, timing of key implementation milestones, and risk management are fully on track. The project is managed extremely efficiently and effectively. The implementation of the project can be presented as 'outstanding practice'.

(S) Satisfactory: Implementation is proceeding as planned. Cumulative financial delivery, timing of key implementation milestones, and risk management are on track. The project is managed efficiently and effectively. The implementation of the project can be presented as 'good practice'.

(MS) Moderately Satisfactory: Implementation is proceeding as planned with minor deviations. Cumulative financial delivery and management of risks are mostly on track, with minor delays. The project is managed well.

(MU) Moderately Unsatisfactory: Implementation is not proceeding as planned and faces significant implementation issues. Implementation progress could be improved if adaptive management is undertaken immediately. Cumulative financial delivery, timing of key implementation milestones, and/or management of critical risks are significantly off track. The project is not fully or well supported.

(U) Unsatisfactory: Implementation is not proceeding as planned and faces major implementation issues and restructuring may be necessary. Cumulative financial delivery, timing of key implementation milestones, and/or management of critical risks are off track with major issues and/or concerns. The project is not fully or well supported.

(HU) Highly Unsatisfactory: Implementation is seriously under performing and major restructuring is required. Cumulative financial delivery, timing of key implementation milestones (e.g. start of activities), and management of critical risks are severely off track with severe issues and/or concerns. The project is not effectively or efficiently supported.