



Project Implementation Report

(1 July 2021 – 30 June 2022)

Project Title:	GHG Emissions Reductions in Targeted Industrial Sub-Sectors through EE and Application of Solar Thermal Systems in Malaysia
GEF ID:	4878
UNIDO ID:	120264
GEF Replenishment Cycle:	<i>GEF-5</i>
Country(ies):	MALAYSIA
Region:	<i>SA - Southeast Asia</i>
GEF Focal Area:	<i>Climate Change Mitigation (CCM)</i>
Integrated Approach Pilot (IAP) Programs¹:	<i>NA</i>
Stand-alone / Child Project:	<i>Stand-alone</i>
Implementing Department/Division:	<i>ENE / ETI</i>
Co-Implementing Agency:	<i>NA</i>
Executing Agency(ies):	SIRIM
Project Type:	<i>Full-Sized Project (FSP)</i>
Project Duration:	60 months
Extension(s):	3
GEF Project Financing:	USD 4,000,000
Agency Fee:	USD 400,000
Co-financing Amount:	USD 20,000,000
Date of CEO Endorsement/Approval:	4/28/2014 <i>Insert the date as per letter from GEF CEO</i>
UNIDO Approval Date:	12/18/2013 <i>Insert EB approval date of the project</i>
Actual Implementation Start:	7/18/2014 <i>Insert the PAD issuance date of the project</i>
Cumulative disbursement as of 30 June 2022:	<i>USD 3,590,594.44</i>
Mid-term Review (MTR) Date:	9/1/2018 <i>IF applicable, insert expected/actual date of MTR submission to the GEF.</i>
Original Project Completion Date:	6/30/2022

¹ Only for GEF-6 projects, if applicable

	<i>Insert the indicated project completion date as per CEO Approval / Endorsement document.</i>
Project Completion Date as reported in FY21:	6/30/2022 <i>Insert the project completion date as reported in the previous PIR for Fiscal Year 2021 (FY21)</i>
Current SAP Completion Date:	6/30/2022 <i>Insert the project completion date as currently seen in the system</i>
Expected Project Completion Date:	6/30/2022 <i>If the date is the same as above, please confirm; if you plan to extend the project completion date, please indicate here and elaborate further under section III.2</i>
Expected Terminal Evaluation (TE) Date:	12/31/2022 <i>Insert expected/actual date of TE submission to the GEF</i>
Expected Financial Closure Date:	6/30/2023 <i>Insert a date <u>no later than</u> 12 months after the TE submission date</i>
UNIDO Project Manager²:	Sanjaya Shrestha

I. Brief description of project and status overview

Project Objective
<p>To reduce GHG emissions in the country by promoting and demonstrating the energy efficiency improvements and solar thermal system application in the heating and cooling process in sector specific of Malaysian industries.</p> <p>The project "GHG Emissions Reductions in Targeted Industrial Sub-Sectors through EE and Application of Solar Thermal Systems in Malaysia" is promoted as Malaysian Energy Efficiency and Solar Thermal Application Project (MAEESTA).</p>

Baseline
<p>The high level of potential for thermal energy savings and solar thermal energy utilization in Malaysia's industry indicates the benefits associated with an initiative on solar thermal and energy efficiency in the industry. The potential in Malaysian industry lies in:</p> <ul style="list-style-type: none"> • The availability of good solar irradiation • The types of subsectors in Malaysia, in terms of numbers of companies, coincide with the subsectors whose processes have temperature levels into which solar thermal can be integrated into and; • Policies and incentives frameworks for renewable energy and energy efficiency, which have been put squarely on the map under the 10th Malaysia Plan and have been supported by policies, incentives, research and small demonstration projects. The market niche of thermal EE and solar thermal applications in the industry is limited in unleashing its potentials as it faces a number of gaps and barriers that are summarised in the project document proposal. <p>As regards government policy instruments for RE and EE, as well as the number of GEF projects, including MIEEIP and the on-going IEEMMS projects, the emphasis thus far has been mainly on electric energy, and much less on heat applications. For example, in the area of RE the emphasis has been on RE power generation; in solar energy, programmes have been implemented for solar PV. Apart from domestic solar water heaters, the government does not yet have policies, incentives or standards that specifically aim at larger-scale solar thermal system applications in commercial buildings or in industrial applications. Given</p>

² Person responsible for report content

the fact that electricity accounts for 33% of industrial energy demand, it makes sense to focus sustainable energy efforts on the 67% of fuel use for thermal applications.

As a result of this minimal focus, fewer efforts have gone into energy management of heat in industrial processes and consequently less knowledge and awareness exist in this specific area. There is a similar lack of knowledge of linking such energy conservation efforts with the use of renewable energy, in this case solar for thermal heat applications.

The project will contribute to the government's commitment in achieving its target of a 40% greenhouse gas (GHG) reduction per GDP per capita by the year of 2020, as compared to 2005 levels.

Please refer to the explanatory note at the end of the document and select corresponding ratings for the current reporting period, i.e. FY22. Please also provide a short justification for the selected ratings for FY22.

In view of the GEF Secretariat's intent to start following the ability of projects to adopt the concept of adaptive management³, Agencies are expected to closely monitor changes that occur from year to year and demonstrate that they are not simply implementing plans but modifying them in response to developments and circumstances or understanding. In order to facilitate with this assessment, please introduce the ratings as reported in the previous reporting cycle, i.e. FY21, in the last column.

Overall Ratings ⁴	FY22	FY21
Global Environmental Objectives (GEOs) / Development Objectives (DOs) Rating	<i>Moderately Satisfactory (MS)</i>	<i>Moderately Satisfactory (MS)</i>
<i>Using the progress rationale reported in section II, please briefly justify the selected FY22 GEOs/DOs ratings versus the GEOs/DOs ratings reported in FY21.</i>		
Implementation Progress (IP) Rating	<i>Satisfactory (S)</i>	<i>Satisfactory (S)</i>
<i>The project operation and all physical activities are successfully completed.</i>		
<i>Using the progress rationale reported in section II, please briefly justify the selected FY22 IP ratings versus the IP ratings reported in FY21.</i>		
Overall Risk Rating	<i>Low Risk (L)</i>	<i>Low Risk (L)</i>
<i>Using the progress rationale reported in section II and III, please briefly justify the selected FY22 risk rating versus the risk ratings reported in FY21.</i>		

II. Targeted results and progress to-date

³ Adaptive management in the context of an intentional approach to decision-making and adjustments in response to new available information, evidence gathered from monitoring, evaluation or research, and experience acquired from implementation, to ensure that the goals of the activity are being reached efficiently

⁴ Please refer to the explanatory note at the end of the document and assure that the indicated ratings correspond to the narrative of the report

Please describe the progress made in achieving the outputs against key performance indicator's targets in the project's **M&E Plan/Log-Frame at the time of CEO Endorsement/Approval**. Please expand the table as needed.

Please fill in the below table or make a reference to any supporting documents that may be submitted as annexes to this report.

Project Strategy	KPIs/Indicators	Baseline	Target level	Progress to-date
Component 1 – Development of regulatory framework, support programme and financial incentive mechanism to facilitate solar thermal energy utilization				
Outcome 1: Policy papers and financial incentive schemes established and endorsed by stakeholders				
Output 1.1: National counterparts supported to develop three policy papers on solar thermal energy.	<p>Number of policy papers developed;</p> <p>% of counterparts taking part in the development of policy papers report having benefitted from built capacity;</p> <p>Number of workshops and seminars organized.</p>	There are currently no policy papers on solar thermal energy under development.	At least 3 policy papers on solar thermal energy developed;	<p>For the moment, Malaysia do not have any act/regulations/policy and custodian on the thermal energy. The existing policy framework and support programs in Malaysia for RE focused on the grid electricity power generation over the thermal applications.</p> <p>The drafting Energy Efficiency and Conservation Act (EECA) will be the key for the thermal energy policy and frameworks enabling in Malaysia. Without the act in place, no specific policy papers and frameworks on solar thermal to be developed.</p> <p>As such, MAEESTA project works toward providing policy input and recommendation documents for the government. The targeted documents are:</p> <p>I. Solar Thermal Market Analysis for Malaysian Industries</p> <p>II. Policy Brief on Solar Thermal Deployment Strategy for Malaysian Industries</p> <p>III. Inclusion of the statement in the 12th Malaysia Plan (RMK-12)</p> <p><u>I. Solar Thermal Market Analysis for Malaysian Industries</u></p> <ul style="list-style-type: none"> The document will be published with registered International Standard Book Number (ISBN) and Ministry of Science, Technology & Innovation (MOSTI) agreed to own the document. The document is in stages of review by UNIDO for clearance to print. <p><u>II. Policy Brief on Solar Thermal Deployment Strategy for Malaysian Industries</u></p> <ul style="list-style-type: none"> The document will also be published with registered International Standard Book Number (ISBN) and will also be owned by Ministry of Science, Technology & Innovation (MOSTI). The document is in stages of review by UNIDO for clearance to print. <p><u>III. Inclusion of the statement in the 12th Malaysia Plan (RMK-12)</u></p> <p>The RMK-12 document was tabled and approved in Parliament on 27 September 2021. In the document, solar thermal technology has been included under Chapter 8 and 9 as one of the renewable energies to be promoted to the industries.</p> <p>Chapter 8: Advancing Green Growth for Sustainability and Resilience Sub-heading: Augmenting Low -Carbon Energy. "The use of existing and new technologies, namely cogeneration, solar thermal and fuel cell will be further promoted to expand options available to the industry"</p>

Chapter 9: Enhancing Energy Sustainability and Transforming the Water Sector

Sub-heading: **Increasing Renewable Energy Installed Capacity**
 “Existing and new technologies such as cogeneration, solar thermal and fuel cells will be leveraged to provide more options for the industry”

Beyond the project target.

MAEESTA project took the initiative to implement some recommendations in the document of Policy Brief Solar Thermal Deployment Strategy for Malaysian Industries. These initiatives focus on recommendations for Phase 1 (2020-2022). Updates of these initiatives are reported in related project components under **Sustainability Program** part.

Sustainability Program: Development of Thermal Energy Guidelines

Energy Commission (EC) of Malaysia is the regulator for the new coming Energy Efficiency and Conservation Act (EECA). For the act implementation, EC works with UNIDO MAEESTA to develop THREE guidelines as follows;

- i. Energy Management System
- ii. Energy Audit Procedures and Requirement
- iii. Energy Efficiency and Conservation (EE&C) Reporting

Upon consultation with EC, UNIDO appointed Universiti Teknologi MARA (UiTM) as the Technical Consultant for drafting the guidelines.

As progress to date, the guidelines development was completed and handover to Energy Commission as follows;

Activities	Energy Management System (EMS)	Submission of Energy Efficiency & Conservation report	Energy audit reporting
Deliberation of draft: • First circulation to stakeholder for review and compile comments • Half-a-day engagement session with stakeholders for comments/discussions	23 July – 9 Aug 2021 17 Aug 2021	9 – 15 Sep 2021 20 Sep 2021	27 Sep – 15 Oct 2021 28 Oct 2021
Improvement of draft: • Second circulation to stakeholder for review and comments	30 Aug 2021	24 Oct 2021	22 Nov 2021
Finalization and submission to EC: • Final draft accepted by the Energy Commission	15 Nov 2021	15 Nov 2021	22 Nov 2021

Notes: The draft will be presented to the Energy Commission’s Technical Committee for final approval, subject to the progress of EECA approval by the Cabinet (targeted in the third quarter of 2022). This activity is beyond MAEESTA scope of work.

Sustainability Program: Industry Standards

For the moment, Malaysia does not have standards or accreditation that specifically aim for solar thermal applications in commercial buildings and industries. During the stakeholder’s engagement workshop for Solar Thermal Deployment Strategy (STDS) held in March 2019, the requirement to develop the industrial standards for the solar thermal technology and practice in Malaysia was highlighted. The proposed agency was SIRIM STS.

			<p>At least 70% of counterparts taking part in</p>	<p>The NPSC Meeting held on 5th October 2020 had approved budget for the development of solar thermal industry standards.</p> <p>FOUR Industry Standards on solar thermal technology developed as listed below;</p> <ul style="list-style-type: none"> i) Solar Heating Water Systems: Design Specifications ii) Solar Heating Water Systems: Installation Guidance iii) Solar Heating Water Systems: Testing & Commissioning iv) Solar Heating Water Systems: Operation & Maintenance <p>Progress of the industry standards development are as follows;</p> <p>- As progress to date, the development of industry standards was completed.</p> <p>Details activities are as follows;</p> <table border="1" data-bbox="787 527 1323 865"> <tr> <td>Online drafting discussion sessions on the preliminary drafts were held as follows;</td> <td>Draft review sessions by the Project Committee</td> </tr> <tr> <td>i) Design Specifications – 2 July 2021</td> <td>24 Aug & 5 Oct 2021</td> </tr> <tr> <td>ii) Installation Guidance 12 July 2021</td> <td>26 Aug & 14 Sept 2021</td> </tr> <tr> <td>iii) Testing & Commissioning 13 July 2021</td> <td>17 & 5 Oct 2021</td> </tr> <tr> <td>iv) Operation & Maintenance 9 & 15 July 2021</td> <td>14 Sep 2021</td> </tr> </table> <p><u>Stage 3: Public comments and stakeholder consultations</u></p> <p>a) Circulation of drafts to relevant stakeholders for comments and feedback Public comments started on 13 October 2021 until 12 November 2021 when the Technical Secretaries sent notification emails to identified stakeholders.</p> <p>The draft and comment template were uploaded to https://www.sirimsts.my/stakeholders-consultation/ and promoted on the project website (www.maeesta.com).</p> <p>b) Half a day stakeholder consultation session Stakeholder consultation sessions were held on 18 October 2021 (half a day) and 21 October 2021 (half a day). On each day, two drafts were presented to the stakeholders.</p> <p><u>Stage 4: Finalization and submission for standards approval</u> The industry standards were submitted to the external standard reviewer and UNIDO for final review before being presented to the SIRIM's Standard Committee for approval. The Standard Committee meeting that was held on 22 December 2021 accepted the presented solar thermal industry standards with minor corrections.</p> <p><u>Conversion of Industry Standards to Malaysia Standards</u></p> <ul style="list-style-type: none"> • 2 Mar 2022 – meeting between PMU and Standard Malaysia. The agency agreed for PMU to submit the application to convert the solar thermal industry standards to the national standards. • 6 April 2022 - PMU submitted the application form together with the industry standards documents • 11 May 2022 - The Technical Committee Meeting TC/E/8 – Renewable Energies Bil. 1-2022 under Standards Malaysia approved the application for the industry standards to be the New Work Item Proposal (NWIP) for Malaysian Standards. The NWIP will be discussed under Working Group WG/E/8-1 – Solar Energy Technologies. <p><u>Number of workshop/events organized:</u></p>	Online drafting discussion sessions on the preliminary drafts were held as follows;	Draft review sessions by the Project Committee	i) Design Specifications – 2 July 2021	24 Aug & 5 Oct 2021	ii) Installation Guidance 12 July 2021	26 Aug & 14 Sept 2021	iii) Testing & Commissioning 13 July 2021	17 & 5 Oct 2021	iv) Operation & Maintenance 9 & 15 July 2021	14 Sep 2021
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			<p>the development of policy papers report having benefitted from built capacity;</p> <p>At least 5 workshops and seminars organized.</p>	<p>For FY2022, 8 workshops organized which are;</p> <p><u>Thermal Energy Guidelines for EECA</u></p> <ol style="list-style-type: none"> 1) 17 Aug 2021: Guideline on Energy Management System 2) 20 Sep 2021: Guideline on Submission of Energy Efficiency & Conservation report 3) 28 Oct 2021: Guideline on Energy Audit Reporting <p><u>Solar Water Heating Industry Standards</u></p> <ol style="list-style-type: none"> 1) 24 Aug 2021: Solar Water Heating Systems - Design specification 2) 26 Aug 2021: Solar Water Heating Systems - Installation Guidance 3) 14 Sep 2021: Solar Water Heating Systems - Installation Guidance & Operation & Maintenance 4) 17 Sep 2021: Solar Water Heating Systems - Testing & Commissioning 5) 5 Oct 2021: (Discussion on outstanding items) for Solar Water Heating Systems - Design Specification and Testing & Commissioning <p>In summary, a total of 21 workshops were organised to come out with the market analysis(4), policy brief (4), thermal energy guidelines(3), solar water heating industry standards(5) and solar thermal NOSS (6) documents.</p> <p><u>Market Analysis</u></p> <ol style="list-style-type: none"> 1) 21 Jun 2017: Workshop 1 - Vision workshop and presentation of the first Progress Report to the Task Force 2) 4- 5 Dec 2017: Workshop 2 - Internal workshop with the Task Force and presentation on the draft roadmap 3) 7 Dec 2017: Workshop 3 - Stakeholder consultation 4) 28 Mar 2018: Workshop 4 - Industry consultation <p><u>Policy Brief on Solar Thermal Deployment Strategy</u></p> <ol style="list-style-type: none"> 1) 12 Mar 2019: Workshop 1 – Roadmap Deployment Plan 2) 29-30 Mar 2019: Workshop 2 – Roadmap Deployment Plan 3) 4 Nov 2019: Workshop 3 - Stakeholder feedback session <p><u>National Occupational Skills Standards(NOSS)</u></p> <ol style="list-style-type: none"> 1) 20 – 22 Jul 2020: Workshop 1 - Thermal Energy Audit Measurement 2) 17-19 Aug 2020: Workshop 2 - Thermal Energy Audit Measurement (Curriculum) 3) 16-18 Nov 2020: Workshop 1 - Solar Thermal System Installation 4) 30 Nov – 2 Dec 2020: Workshop 2- Solar Thermal System Installation (Curriculum) 5) 20-23 Sep 2020: Workshop 1 - Solar Thermal System Engineering 6) 4-7 Oct 2020: Workshop 2- Solar Thermal System Engineering (Curriculum)
Output 1.2:	Two financial incentive schemes focusing on solar thermal applications developed.	No financial incentive schemes for the specific purpose of promoting the utilization of solar thermal energy in industry are available.	At least 2 financial incentive schemes developed.	<p>Currently, there is NO existing Act, Regulation or Policy on thermal energy/ solar thermal available. The draft Energy Efficiency and Conservation Act (EECA) had been presented and approved by the Cabinet in June 2019 and is expected to be tabled to the Parliament after August 2021. Until then NO NEW government's financial incentive and scheme can be developed.</p> <p>MAEESTA continuously promoting the existing financial instrument to is the industries and solar thermal technology to the policy makers and financial institutions.</p> <p>MAEESTA - managed to clarify and provide awareness to the related agencies on the applicability of solar thermal projects for the existing green technology financial incentive and scheme.</p> <p>The applicable green technology financial incentives and schemes are listed below;</p> <p>- Green Technology Financing Scheme</p>

			<p>At least 5 workshops and seminars/events to present and discuss proposals organized</p>	<p>(GTFS). In April 2018, the scheme has been extended to GTFS 2.0 until the end of 2020.</p> <ul style="list-style-type: none"> - Energy Performance Contracting Fund (MDV) - Green Sukuk Issuance launched in 2017 - Green Investment Tax Allowance (GITA)/Green Investment Tax Exemption (GITE) – extended until year 2023. As announced in the 2020 Budget. - Eco Labelling MyHijau Mark <p>Number of workshops/events organized: For FY 2022, NO new events organized on the finance's part.</p> <p>As progress to date, few engagements were made with financial institutions such as HSBC, Malaysian Debt Venture Berhad (MDV) and Ambank.</p> <p>MAEESTA had organized awareness seminars for the stakeholders and industries in collaboration with financial institutions such as HSCB and MDV. Refer to the details in Output 2.3 (awareness seminars with state government agencies).</p> <p>In total, 8 workshops/events to discuss financial incentives/schemes had been organized;</p> <ol style="list-style-type: none"> i. Roadmap Deployment Plan Workshop 1 (Financial group); 12 Mar 2019 ii. Seminar on Thermal Energy Efficiency & Solar Thermal Application for Financial Institutions in Malaysia; 25 Apr 2019 iii. Roadmap Deployment Plan Workshop 2 (Financial group); 29 Apr 2019 iv. Meeting with financial providers and AEE INTEC; 27 Jun 2019 v. Awareness Seminar on Investment Opportunities and Incentives in Green Technology, partner with Invest Selangor; 1 Oct 2019 vi. Awareness Seminar on Investment Opportunities and Incentives in Green Technology, partner with the Sarawak Economic Development Corporation (SEDC); 8 Oct 2019 vii. Awareness Seminar on Investment Opportunities and Incentives in Green Technology, partner with the Iskandar Regional Development Authority (IRDA); 24 Oct 2019 viii. Awareness Seminar on Investment Opportunities and Incentives in Green Technology, partner with the Economic Planning Unit (EPU) Terengganu; 6 Nov 2019
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Component 2 – Awareness raising and capacity building program related to process heating and cooling optimization and solar thermal energy utilization

Outcome 1: Awareness and capacity equipment vendors, service providers, industry management, plant engineers and financial institutions in 5 targeted industrial sub sectors strengthened and utilized.

Output 2.1: Training programme in energy savings based on process heating and cooling conducted for service providers, consultants and industry in selected sub sectors	Numbers of trainees at various levels, users, experts, etc. trained in process heating optimization and waste heat recovery	No comprehensive trainings on process heating and cooling are available in the selected sub-sectors.	50 equipment vendors, 100 users and 50 experts trained.	<p>In summary, throughout the project implementation, the training programme has successfully met the target, with a total number of participants that attended the training are as follows:</p> <p>Number of joined participants is 29 equipment vendors, 495 users and 220 experts.</p> <p>From 220 participants, 127 are trained EE experts.</p> <p>For FY2022, NO training on thermal energy efficiency was held by MAEESTA project.</p> <p>In summary, types of training organized were;</p> <ol style="list-style-type: none"> i. 2- Day User Training: 278 participants ii. One Day User Training: 150 participants iii. Online training on EE: 45 participants iv. Expert Course 1: 220 participants (Energy Efficiency) v. Financial Training: 33 participants vi. Training for Vendor: 15 participants
Output 2.2: Training programme on solar thermal technology	Number of trainees trained at various levels on solar thermal systems and integration in	No comprehensive trainings on solar thermal technology are available in the	30 equipment vendors, 80 users and 40 experts trained	<p>In summary, throughout the project implementation, the training programme has successfully met the target, with a total number of participants that attended the training are as follows:</p> <p>Number of joined participants is 17 equipment vendors, 509 users and 135 experts.</p>

<p>conducted for equipment/component suppliers, service providers, consultants and industry in selected sub-sectors.</p>	<p>industrial processes.</p>	<p>selected sub-sectors.</p>		<p>From 135 participants, 49 are trained experts.</p> <p>In addition, MAEESTA also produced 26 qualified thermal energy efficiency and solar thermal application and design experts that passed the final expert examination conducted by UNIDO.</p> <p>For FY 2022, NO training on solar thermal session was held by MAEESTA</p> <p>In summary, types of training organized were;</p> <ol style="list-style-type: none"> i. Expert Course 2: 135 participants (Solar Thermal Technology) ii. 2- Day User Training: 212 participants iii. One Day User Training: 150 participants iv. Online training on ST – 59 participants v. Extended Expert Courses: <ul style="list-style-type: none"> • Course 3 on Solar Thermal Design Optimisation: 13 participants • Course 4 on Solar Thermal System Performance & Verification: 12 participants <p><u>Sustainability Program: Training Module and Certificate</u> For continuity on the project's effort, the agency to take over the activities after the project ends as determined by the project's stakeholders.</p> <p>The National Project Steering Committee (NPSC) meeting held on 4th November 2019 agreed SEDA Malaysia to be the agency to received UNIDO's training programmes and continue the training after the project ends. The NPSC Meeting on 5th October 2020 had approved the budget for the training handover activities.</p> <p>As progress to date SEDA Malaysia has appointed a national expert to review and localize the existing modules. The workshop with stakeholder will be held on 30th June 2022.</p> <p><u>Sustainability Program: National Occupational Skills Standard (NOSS)</u> In August 2019, PMU applied to the Ministry of Human Resources (MOHR) on the development of NOSS for the thermal energy audit, solar thermal design and solar thermal installer. The budget was approved by MOHR in December 2019 and released to the appointed Industrial Lead Body (ILB); Malaysia Green Technology & Climate Change Centre (MGTC) in March 2020.</p> <p>PMU works as the partner for ILB and provides technical expertise as the Working Committee and Technical Evaluation Committee members. Until June 2021, the progress updates for the NOSS development are as follows;</p> <p>The NOSS development for solar thermal was completed and approved by the National Education Advisory Council (MPPK) on 24 June 2021. The documents are updated in the NOSS directory dated on 30 June 2021.</p>
<p>Output 2.3: Awareness raising events organized for industry management and financial institutions on investment in energy savings and solar thermal application.</p>	<p>Number of awareness raising events organised; Number of publications issued; project website developed.</p>	<p>No comprehensive awareness programme on solar thermal energy utilization or on thermal EE in industry exists.</p>	<p>At least 20 awareness raising events for the target group (industry managers, financial institutions) organized, including experience with the demonstration projects;</p>	<p>In summary, throughout the project implementation of the total numbers of Awareness Seminars organized are 28 with 1,170 attended participants.</p> <p>For FY2022; THREE webinars were organized with the collaboration of international and local agencies/companies;</p> <ol style="list-style-type: none"> i. Webinar on Conducting Thermal Energy Audit in Industry; 14 Oct 2021. Number of participants registered is 61. ii. Webinar on Monitoring and optimisation of solar process heat system 23 Mar 2022. Number of participants registered is 62. iii. Seminar on Thermal Energy Technology Application; 9 Jun 2022. Number of participants registered is 52

			20 publications, posters etc. issued; project website operational.	For publication and promotional material list is referred to VII. Knowledge Management, Part relevant knowledge management mechanisms/tools. ONE promotional event will be held on 28 Jun 2022 to showcase the project's success stories.
Component 3 – Demonstration and scaling up of sector-specific EE and solar thermal energy utilization in targeted industrial subsectors				
Outcome 1: Thermal energy efficiency and solar thermal technology demonstrated and deployed in 5 targeted industrial sub -sectors.				
Output 3.1: Energy saving measures and investment projects implemented in about 40 factories.	Number of facilities in which EE in thermal processes have been implemented.	No such demonstration projects are currently available in the selected sub-sectors.	40 companies with EE improvements in process heating and cooling;	<p>Energy Efficiency Implemented Projects</p> <p>In summary, throughout the project implementation SIXTEEN (16) companies had implemented the energy efficiency measures namely,</p> <ol style="list-style-type: none"> 1. Guocera Tile Industries Sdn Bhd 2. Perusahaan Perakayan Wan Feng Sdn Bhd 3. Top Glove Sdn Bhd 4. Sanwa (M) Sdn Bhd 5. Toyo Tyre Sdn Bhd 6. Spirit Aero Systems Malaysia Sdn Bhd 7. JB Cocoa Sdn Bhd 8. Perodua Manufacturing Sdn Bhd 9. Mycron Steel Sdn Bhd 10. Penfibre Sdn Bhd 11. Mewah Oleo Sdn Bhd 12. Ampang Hospital 13. Pusat Jantung Sarawak 14. IOI Pan Century Edible Oils Sdn Bhd 15. NS BlueScope Malaysia Sdn Bhd 16. Farm's Best Food Industries Sdn Bhd <p>Total lifetime implemented energy saving is 16,915,373 GJ (42%). The lifetime of CO₂ emissions reductions achieved is 979.8 tonnes (36%).</p>
Output 3.2: Of the above 40 factories, around 10 implemented solar thermal demonstration projects.	Number of facilities in which solar thermal energy utilized.	No such demonstration projects are currently available in the selected sub-sectors.	10 facilities with integrated solar thermal systems.	<p>In summary, throughout the project implementation SIX demo projects implemented as follows;</p> <ol style="list-style-type: none"> 1. PPNJ Poultry & Meat Sdn Bhd; June 2017 2. MIWA Manufacturing Sdn Bhd; May 2019 3. IOI Pan Century Oleochemicals Sdn Bhd, Oct 2020 4. NB Poultry Processing Industries Sdn Bhd; December 2020 5. Ampang Hospital; April 2021 6. Pusat Jantung Sarawak; March 2021 <p>For FY2022, the project progress updates are as follows;</p> <p>In progress projects;</p> <ol style="list-style-type: none"> 1. Kerry Ingredients Sdn Bhd The company delayed in the project implementation due to few outbreaks of Covid 19 and changes of the draft design for the solar thermal system. Kerry starts call for tendering on 22 Feb 2022 and shortlisted the tender on 26 Apr 2022. Kerry updated that the cost of the project increases by 68% from the initial budget. The NPSC meeting requested for further technical data such as efficiency deviation and payback period to re-consider approving the increasing cost. 2. IOI Pan Century Edible Oils The company delayed in the project implementation due to longer Green Investment Tax Allowance (GITA) approval from MIDA. IOI starts call for tendering on 17 Mar 2022 and shortlisted the tender on 25 Apr 2022. The company updated that the cost of the project increase by 16% from the initial budget. Similarly, with Kerry, the NPSC meeting requested for further technical data such as efficiency deviation and payback period to re-consider approve the increasing cost. <p>Cancelled Projects;</p> <ol style="list-style-type: none"> 1. Farm Best Food Industries Sdn. Bhd.

				<p>The company withdraw the project due to unattractive Energy Performance Contracting financing.</p> <p>2. FIMA Bulking Sdn Bhd The project is cancelled due to disagreement between FIMA Bulking Services (client) with FIMA Technologies (service provider) on the integration design for the solar thermal system.</p> <p>3. FPG Oleochemicals Sdn Bhd The company has few times Covid-19 cases at their plant since last year which caused missing period for project budgetary approval (Sept 2021). Although, the company will continue conducted study on Solar Heating Industrial Process (SHIP) for potential future projects.</p> <p>Total lifetime implemented energy saving is 76,788.00 GJ (21%). The lifetime of CO₂ emissions reductions achieved is 15.7 tonnes (65%).</p>
Output 3.3: Case studies prepared and presented under output 2.3 to raise more investment in EE and solar thermal integration using the trained capacity and various financial incentive schemes created.	Number of case studies prepared and presented at awareness raising events; Number of future investment opportunities identified.	Due to the lack of demonstration projects and investment in solar thermal technologies in industry, case studies are nonexistent.	10 case studies prepared and presented at seminars/workshops (total of 20 event days, held at workshops at various places throughout Malaysia);	<p>FOUR case studies completed from MAEESTA solar thermal demonstration project;</p> <ol style="list-style-type: none"> 1. MIWA Manufacturing Sdn Bhd 2. IOI Pan Century Oleochemicals Sdn Bhd 3. Ampang Hospital 4. NB Poultry Processing Sdn Bhd <p>MAEESTA also used project data from international and local projects from SIRIM and service providers for the project promotion.</p>

III. Project Risk Management

1. Please indicate the overall project-level risks and the related risk management measures: (i) as identified in the CEO Endorsement document, and (ii) progress to-date. Please expand the table as needed.

Describe in tabular form the risks observed and priority mitigation activities undertaken during the reporting period in line with the project document. Note that risks, risk level and mitigations measures should be consistent with the ones identified in the CEO Endorsement/Approval document. Please also consider the project's ability to adopt the adaptive management approach in remediating any of the risks that had been sub-optimally rated (H, S) in the previous reporting cycle.

	(i) Risks	(i) Risk level FY 21	(i) Risk level FY 22	(i) Mitigation measures	(ii) Progress to-date	New defined risk ⁵
1	Management priorities in the participating public sector and private sector organizations change over time before and during project implementation	Low risk (L)	Low risk (L)	Signing of a Terms of Reference (ToR) and Cooperation Agreement with the Project partners before commencement of the project as well as co-financing letters.	<p>Established process flow for the demonstration project which has been shared with the stakeholders and industry. In short, the requirement for the project approval for UNIDO fund are as follows;</p> <ul style="list-style-type: none"> - The proposal was presented to the top management and obtained approval to proceed. - The company provided evidence/letter of commitment before the proposal presented to the National Project Steering Committee (NPSC). 	<input type="checkbox"/>

⁵ New risk added in reporting period. Check only if applicable.

					<p>- The NPSC Chairman Office provides a letter for UNIDO regarding the agreed fund for the company. The letter was shared with the company as the commitment from the MAEESTA project to fund the proposal.</p> <p>PMU provides technical advice for the project specification for the prolonged project monitoring for the success of the project commencement.</p> <p>As progress to date: The letters issued for projects are as follows;</p> <ol style="list-style-type: none"> i. MIWA Manufacturing Sdn Bhd ii. IOI Pan Century Oleochemicals iii. NB Poultry Processing Sdn Bhd iv. Hospital Tuanku Ja'afar v. Farm Best Food Industries Sdn. Bhd vi. FIMA Bulking Sdn Bhd vii. Kerry Asia Pacific viii. KPFB Berhad ix. Encompass Sdn Bhd x. Damai Beach Resort xi. Ampang Hospital xii. Pusat Jantung Sarawak xiii. IOI Pan Century Edible Oils xiv. FPG Oleochemicals Sdn Bhd 	
2	Effective coordination between various project partners.	Low risk (L)	Low risk (L)	<p>A proper coordination will be sought through the Project Steering Committee and ad-hoc working groups per subsector or theme that can be set up as needed and by bringing in other partners and beneficiaries. The Project Management Unit (PMU) will play a key Role in the coordination of these interests and channelling them into the day to day execution of the project.</p>	<p>Effective coordination and the project progress are continuously updated through the meeting.</p> <p>In summary, the National Project Steering Committee (NPSC) is the body that purview the MAEESTA project progress and platform to network the government ministry/agency.</p> <p>The sub working groups established for the project delivery are as follows;</p> <ol style="list-style-type: none"> 1. Project Technical Committee (TC); chaired by SIRIM. Established in Dec 2016, this committee works to provide technical advice for the project implementation. The committee is continuing with its task. 2. Solar Thermal Roadmap Task Force (TF); chaired by SERI UKM. Established in Dec 2016; this committee is to provide advice and monitor the development of the national solar thermal roadmap by industry. The committee had its final meeting and completed the task in July 2018. 3. Roadmap Deployment Plan Technical Committee (RDPC); chaired by MESTECC/MOSTI. This committee was established in March 2019; to provide advice and monitor the development of the roadmap deployment plan document. The committee had its final meeting and completed the task in July 2019. <p>As progress to date, the meetings for the above committees are as follows;</p> <ol style="list-style-type: none"> i. NPSC Meeting: <ul style="list-style-type: none"> • No.11, 24 Aug 2021 • No.12, 11 Feb 2022 	☐

					<ul style="list-style-type: none"> No.13, 28 Apr 2022 	
					ii. NO Technical Committee Meeting held on FY2022	
3	Companies have doubts regarding techno-economic viability. Thus, demonstration projects are delayed, hence limiting the opportunity to disseminate success stories and to develop case studies.	Low risk (L)	Low risk (L)	To overcome this risk, the factories selected as demonstration sites will be carefully evaluated; this will include management support, financial strength, technical backup, and replication abilities. The demonstration project proponents are anticipated to provide initial case study results and thus serve as examples for other factories to replicate. While the GEF grant will support the demonstration projects in a number of ways (including up to 20% of equipment costs), all other costs will be borne by the participating companies, thus ensuring that continued participation is in the interest of their management.	<p>To secure the proposal for the companies, PMU focuses on the techno-economic and matching with financial providers to provide a total solution proposal. The approaches used for the company are;</p> <ul style="list-style-type: none"> i. Other than energy-saving and techno-economic viability of the proposal in terms of payback period, the proposal highlighted the Levelized Cost of Energy (LCOE) of the solar thermal system saving for long term fuel cost saving compared to the current fuel cost. ii. The project focuses on the industries using diesel-based boilers which will provide a better/attractive payback period and LCOE. iii. UNIDO increased funds for better techno economic viability for the project. The issue was discussed and recorded in the NPSC meetings as follows; <ul style="list-style-type: none"> • 18 Oct 2018: Increased from 20% to 30% with a ceiling amount of MYR 400k • 21 Jan 2021: Increased from 30% to 35% and additional 10% for heat pump cost. The ceiling amount is MYR 500k for solar thermal and MYR 50k for a heat pump. • This is due to the impact of the pandemic Covid 19 which affected the company investment commitment. iv. Matching with other fundings such as SIRIM SME Development programme which provided fund maximum MYR200k per project. <p>In order to further promote the utilization of solar thermal in the big poultry industry, SIRIM allocated a maximum RM500k fund for each solar thermal project.</p> v. Propose the Energy Performance Contracting financial model; as the option for zero capex for the company. This financial model is implemented by the Ministry of Health (MOH). 	<input type="checkbox"/>
4	Limited number of Participants interested in training and no immediate demand for services for trained experts as the growth of the market for solar thermal technology is slower than expected.	Low risk (L)	Low risk (L)	The integrated approach of the project is expected to mitigate this risk by not only promoting the technology but also creating a new market and demand for the application in heat processes in the industrial and commercial sectors. The capacity building approach adopted by the project combined with awareness campaigns and policy coordination will ensure the	<p>Currently there is low demand from the industry for solar thermal integration due to no/low enforcement from the government for the thermal energy saving and green technology application.</p> <p>However, with the government targets to increase the RE share to 35% and new Energy Efficiency and Conservation Act (EECA) that is expected to be implemented will grow the market for solar thermal. In terms of capacity building, the number of participants who attended training has exceeded the targeted</p>	<input type="checkbox"/>

				sustainability of the project and thus development of the solar thermal technology market in Malaysia to mitigate this risk. The capacity of SERI and the FMM Institute will be strengthened by the project so that they will continue providing support to the local experts, industries, and the training.	numbers, thus will be ready to serve the market needs in future years. Based on the solar thermal deployment strategy, an agency such as SEDA has been identified to be a body to promote and provide training for solar thermal technology for near future.	
5	Incentives and the financial support system are insufficient	Low risk (L)	Low risk (L)	The capacity of financial and governmental institutions will be strengthened on energy saving opportunities and solar thermal systems and their potentials. Grant and non grant instruments will be developed and applied to ensure the availability of financing resources. Experiences from other countries will be shared, and results from the demonstration projects will be widely presented.	There are sufficient and ample of existing private funding and government incentives/schemes that can be benefited from solar thermal application. PMU provides awareness and discuss with financial providers on the funding/incentive/scheme usage for the solar thermal application. More than 10 financial providers have been identified that provides funding/incentive/scheme as listed below; 1. Private Financing Advisory Network - Asia 2. Green Technology Financing Scheme 3. Energy Performance Contract Fund 4. Green Sukuk Issuance 5. Green Investment Tax Allowance & Green Income Tax Exemption 7. Eco labelling MyHIAU Mark In addition, the solar thermal performance contracting for hospitals can be a good showcase for the financing model.	<input type="checkbox"/>
6	Government financing and policy instruments for thermal energy application in industry is not effective enough to incentivize industrial stakeholders' investment in solar thermal technologies.	Low risk (L)	Low risk (L)	Chambers of Commerce and Industries, etc. will aim to mitigate this risk by designing or revising financing/policy instruments that are in line with the needs of industry. Focus will be given to provide adequate support to the industries for the implementation of solar thermal energy application: better technical support, awareness raising on the consequences of climate change, zero GHG emissions from solar energy, sufficient information on the availability of various financing schemes, etc	The new EECA which will probably be regulated in year 2022 will support the growth of thermal energy and solar thermal market in Malaysia. As progress to date, the project managed to convince the Ministry of Economic Affairs (now refer as Economic Planning Unit) for the inclusion of thermal energy in 12 th Malaysia Plan which will be from year 2021 until 2025. For the moment, the project did the matching grant such as with SIRIM, support the industries for the Investment Tax Allowance (ITA) application and continues sharing sessions with the financial institutions which support green technology and renewable energy investment through discussion and seminars.	
7	Climate change risks: increased cloud cover from climate warming reducing solar radiation levels	Low risk (L)	Low risk (L)	Careful design of the solar thermal systems will be ensured during project implementation.	The energy audit has been properly done to determine the energy consumption per heating process. The design for the solar thermal was simulate using tools that is using the real daily solar irradiation data to ensure the design system size can cater the needs of the targeted heating process. The design also been checked by the international expert to ensure workability and design optimization.	

2. If the project received a sub-optimal risk rating (H, S) in the previous reporting period, please state the actions taken since then to mitigate the relevant risks and improve the related risk rating. Please also elaborate on reasons that may have impeded any of the sub-optimal risk ratings from improving in the current reporting cycle; please indicate actions planned for the next reporting cycle to remediate this.

NA

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3. Please indicate any implication of the **COVID-19** pandemic on the progress of the project.

During the Covid-19 restriction, the project activities were carried out virtually for discussion, meetings and seminars. However, discussions via online are less effective which take more sessions for big group discussions compared to face-to-face workshop. However, MAEESTA is able to achieve the target to complete the development of thermal energy guidelines and solar water heating systems industry standards.

The real challenge is on the demonstration project completion. It is tricky to keep the company's motivation to continue the solar thermal project due to the uncertainty on their business. Few projects were dropped such as FIMA Bulking Sdn Bhd and FPG Oleochemicals Sdn Bhd. For on-going project such as Kerry Asia Pacific, the operation capacity has changed which affect the solar thermal system design and delayed the tendering process. The NPSC meeting on 21 Aug 2021 agreed for the project to be extended for another 6 months (Jan – Jun 2022).

4. Please clarify if the project is facing delays and is expected to request an **extension**.

NA

5. Please provide the **main findings and recommendations of completed MTR**, and elaborate on any actions taken towards the recommendations included in the report.

NA

IV. Environmental and Social Safeguards (ESS)

1. As part of the requirements for **projects from GEF-6 onwards**, and based on the screening as per the UNIDO Environmental and Social Safeguards Policies and Procedures (ESSPP), which category is the project?

- Category A project
- Category B project
- Category C project

(By selecting Category C, I confirm that the E&S risks of the project have not escalated to Category A or B).

Notes on new risks:

- *If new risks have been identified during implementation due to changes in, i.e. project design or context, these should also be listed in (ii) below.*
- *If these new/additional risks are related to Operational Safeguards #2, 3, 5, 6, or 8, please consult with UNIDO GEF Coordination to discuss next steps.*
- *Please refer to the UNIDO Environmental and Social Safeguards Policies and Procedures (ESSPP) on how to report on E&S issues.*

Please expand the table as needed.

	E&S risk	Mitigation measures undertaken during the reporting period	Monitoring methods and procedures used in the reporting period
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(i) Risks identified in ESMP at time of CEO Endorsement	NA	NA	NA
(ii) New risks identified during project implementation (if not applicable, please insert 'NA' in each box)	NA	NA	NA

V. Stakeholder Engagement

1. Using the previous reporting period as a basis, please provide information on **progress, challenges and outcomes** regarding engagement of stakeholders in the project (based on the Stakeholder Engagement Plan or equivalent document submitted at CEO Endorsement/Approval).

Please note that the UNIDO GEF Coordination Team will copy-paste the answer to this question into the GEF Portal.

Engagement with the project's stakeholders.

All in all, the project stakeholders are continually being updated with the UNIDO MAEESTA project progress through the National Project Steering Committee (NPSC) meetings and Technical Committee meetings that are held 2-3 times per year. The stakeholders demonstrate good commitment and support to UNIDO through the following engagements;

- i. UNIDO MAEESTA works with Energy Commission (EC) of Malaysia to develop the thermal energy efficiency guidelines for the implementation of coming Energy Efficiency & Conservation Act (EECA). Three (3) guidelines will be developed which are i) Energy Management System, ii) Energy Audit Procedures and Requirement and iii) Energy Efficiency and Conservation. The draft development was carried out by UNIDO's policy consultant from UiTM; supported by PMU and EC. The development of the guidelines was completed in November 2021.

Since April 2021, UNIDO MAEESTA works with SIRIM STS to develop the Industry Standards on solar thermal. Four (4) Industry Standards will be developed which are i) Solar Thermal Design Specifications, ii) Solar Thermal Installation Guidance, iii) Solar Thermal Testing & Commissioning and iv) Solar Thermal Operation & Maintenance. The standards' drafting groups and review committee had been formed from the relevant stakeholder's background from i) ministry/agency such as Ministry of Works, SEDA Malaysia, Energy Commission &, SIRIM itself ii) industry such as solar thermal service providers and iii) academicians from Solar Energy Research Institute (SERI-UKM), Universiti Tenaga National (UNITEN), Universiti Malaysia Pahang (UMP), Universiti Teknologi Malaysia (UTM) and Universiti Teknologi MARA (UiTM). The development of the industry standards was completed in December 2021.

- iv. SEDA Malaysia has been identified as the suitable agency to promote thermal energy efficiency and solar thermal at national level. UNIDO MAEESTA will hand over the training module and equipment to SEDA and SEDA will use the modules as an input to develop training programme for EECA. Another, SEDA also will develop the dashboard for the online monitoring system for the solar thermal projects by UNIDO and further expand the usage after UNIDO MAEESTA project ends. UNIDO and SEDA in progress finalizing the contract between these two agencies.
- v. MAEESTA collaborated with the University of Technology Malaysia (UTM) and University Malaysia Pahang (UMP) to develop micro-credential courses on thermal energy efficiency and solar thermal system & application respectively. The development of the micro-credential courses will enable the utilization of developed training modules by MAEESTA and create more experts in both theoretical and practical concepts as well as continue the training after the project ends. The development of the courses is expected to be completed by August 2022.

2. Please provide any feedback submitted by national counterparts, GEF OFF, co-financiers, and other partners/stakeholders of the project (e.g. private sector, CSOs, NGOs, etc.).

Please summarize relevant feedback received on the project.

The stakeholders provide good engagement and feedback during meetings throughout the project implementation.

The highlights of the feedback from the stakeholders is;

- Ministry of Health (MOH) is committed to install solar thermal system in as many hospitals as possible using the EPC financial model to contribute to the net-zero carbon emissions target by 2050

3. Please provide any **relevant stakeholder consultation** documents.

Please list here the documents which will be submitted in addition to the report, e.g.:

- *Project Steering Committee minutes*
- *Aide Memoire*
- *Meeting Agenda, etc.*

All attachments are to be named as per the GEF required format, i.e.: "GEFID_Document Title", e.g. 9714_PSC minutes.

- GEFID4878_NPSC Meeting11_28082021*
- GEFID4878_NPSC Meeting12_11022022*
- GEFID4878_NPSC Meeting13_28042022*

VI. Gender Mainstreaming

1. Using the previous reporting period as a basis, please report on the **progress achieved on implementing gender-responsive measures** and **using gender-sensitive indicators**, as documented at CEO Endorsement/Approval (in the project results framework, gender action plan or equivalent),.

Gender mainstreaming actions are integrated into all stages of the project cycles, particularly for the training and skills enhancement activities. For seminars and trainings, about 87% male and 13% female participated. Nevertheless, typically for the selected industrial sector, there is limited female participation, thus making this focus of activity an additional challenge.

VII. Knowledge Management

1. Using the previous reporting period as a basis, please elaborate on any **knowledge management activities / products**, as documented at CEO Endorsement / Approval.

NA

2. Please list any relevant knowledge management mechanisms/ tools that the project has generated.

In FY 2021, the MAEESTA project updated the Project Data and relevant project promotion activities such as posters, website and social media.

FY2021 the knowledge management tools generated are;

- Posters (3):
 - 1) GEFID_4878 Poster 10_Webinar 3
 - 2) GEFID 4878 Poster 11_Webinar 4
 - 3) GEFID 4878 Poster 12_ Technology Seminar
- Case study (1): GEFID_4878 Ampang Hospital
- Case study (2): GEFID_4878 NB Poultry
- GEFID 4878_SIRIM's Annual Report 2020

Refer attachments.

GEFID 4878_Copy of potential Co2 reduction 15April2022

GEFID 4878_Copy of PROJECT COST AND EXPENDITURE 13062022

GEFID 4878_List of Trainings- Awareness W-shop Sum 16062022

In summary, the generated knowledge management mechanisms and tools are:

Project Promotions

- Project Profiles (2)
- Bunting (2)
- Newsletter (1)
- Articles (1)
- Magazines (2)
- SIRIM's Annual Reports (4) – 2017, 2018, 2019 and 2020
- Website (1)
- Social media (Facebook) (1)
- Newspaper 2015 (1)
- Posters (12)
- Brochure on Case Studies (4)
- Video (1)

Project Data

- Usage of One Notes for online information exchange among PMU and external
- Tools for CO₂ emissions calculation
- Directory of the EE measures and solar thermal project
- Tools for project expenditure and co-financing record
- Directory of awareness events and trainings

VIII. Implementation progress

1. Using the previous reporting period as a basis, please provide information on progress, challenges and outcomes achieved/observed with regards to project implementation.

The Malaysia Energy Efficiency and Solar Thermal Application Project (MAEESTA) which started in July 2014 was initially designed for a five-year duration and extended for another three years, i.e. until June 2022. This is due to challenges faced while implementing the project specially to convince companies to invest in implementing energy efficiency measures and in the demonstration plant, and due to the impact of the COVID-19 pandemic which started affecting the country in early 2020. The project currently in-progress for terminal evaluation and handing over the project documents and equipment to the relevant agencies. The terminal event as project closure and showcasing the project's success stories is expected to be held

on 28th June 2022.

Overall, the project successfully achieved its targeted outcomes for Component 1 and 2 while struggling for Component 3 which the pandemic Covid-19 has toughened the challenges. For solar thermal demonstration project, only 6 projects completed out of 20 approved proposals and 13 projects were cancelled due to various reasons, such as long payback period, change in management, business impacted by COVID-19 and Energy Performance Contract (EPC) not attractive due to constraint concession period available by facility management (FM). For Energy Saving Measures (ESM), most cited reasons for not implementing ESM-related investments are due to long payback (anything above two years is considered to be long) and not a priority investment (system still functioning/production not affected). The main underlying reason could be related to how much energy is a portion of the company overall operating cost. In most cases, the cost of energy could be one of the lowest, barely making 3% of the total operating cost.

Although MAEESTA will officially close on 30th June 2022, the framework for solar thermal technology adoption was prepared for the growth of the technology in Malaysia. The collaborative outcomes with various agencies are carry out to ensure the initiatives will continue even after the project ends. With Energy Commission, MAEESTA developed thermal energy guidelines on energy management systems, audit procedures & reporting for the implementation of the Energy Efficiency & Conservation Act (EECA). The industry standards for good practice of solar thermal project implementation were completed and in progress to be upgrade for Malaysia Standard. Another, the MAEESTA's training module was handover to SEDA and in-progress to localize for future training and competency certificate for thermal energy efficiency and solar thermal. MAEESTA also works with universities such as Universiti Teknologi Malaysia (UTM) and Universiti Malaysia Pahang (UMP) to develop micro-credential for thermal energy efficiency and solar thermal system & application for the academic course. MAEESTA is pleased as Department of Skill Development, Ministry of Human Resources agreed to develop National Competency Skills Standard (NOSS) for energy audit and solar thermal design & installation.

For the environment indicators, the project achieved lifetime thermal energy savings of 16,992,161 GJ which indirectly contributed to lifetime GHG emission reductions of 995,554 tonnes.

2. Please briefly elaborate on any **minor amendments**⁶ to the approved project that may have been introduced during the implementation period or indicate as not applicable (NA).

Please tick each category for which a change has occurred and provide a description of the change in the related textbox. You may attach supporting documentation, as appropriate.

<input type="checkbox"/>	Results Framework	
<input type="checkbox"/>	Components and Cost	
<input type="checkbox"/>	Institutional and Implementation Arrangements	
<input type="checkbox"/>	Financial Management	
<input type="checkbox"/>	Implementation Schedule	
<input type="checkbox"/>	Executing Entity	
<input type="checkbox"/>	Executing Entity Category	
<input type="checkbox"/>	Minor Project Objective Change	
<input type="checkbox"/>	Safeguards	

⁶ As described in Annex 9 of the *GEF Project and Program Cycle Policy Guidelines*, **minor amendments** are changes to the project design or implementation that do not have significant impact on the project objectives or scope, or an increase of the GEF project financing up to 5%.

<input type="checkbox"/>	Risk Analysis	
<input type="checkbox"/>	Increase of GEF Project Financing Up to 5%	
<input type="checkbox"/>	Co-Financing	
<input type="checkbox"/>	Location of Project Activities	
<input type="checkbox"/>	Others	

3. Please provide progress related to the financial implementation of the project.

Please provide a description of the main expenditures during the reporting period. Describe the current status of funds mobilization activities and the related implications for project implementation. Provide information on status of obtained / mobilized co-financing, etc. as per CEO Endorsement/Approval document.

UNIDO PROJECT DELIVERY REPORT		Project:	120264 - GHG EMISSIONS REDUCTIONS IN TARGETED INDUSTRIAL SUB-SECTORS THROUGH EE AND APPLICATION OF SOLAR THERMAL SYSTEMS IN MALAYSIA				Project Manager:	Sanjaya Shrestha		Project Validity:	01.06.2014 - 30.06.2022 Assess	
Reporting Period:	18.07.2014 - 30.06.2022		Project Theme:	Energy and Environment			Country:	Malaysia		Region	Asia and Pacific	
Sponsor Nr.	Sponsor	Grant	Grant Description	Fund	Currency	Grant Status	Grant Validity					
400150	GEF - Global Environment Facility	200002774	MALAYSIA - GEF 5 - F	GF	USD	Authority to implement	18.07.2014 - 30.06.2022					
	Description	Released Budget Current Year (a)	Obligations Current Year (b)	Disbursements Current Year (c)	Expenditures Current Year (d=b+c)	Total Agreement Budget (e)	Released Budget (f)	Obligations + Disbursements (g)	Funds Available* (h=f-g)	Support Cost (i)	Total Expenditures (j=g+i)	
200002774												
120264-1-01-01	1.1.Regulatory & Financial Framework	USD	USD	USD	USD	USD	USD	USD	USD	USD	USD	
1100	Staff & Intern Consultants	27,887.28	0.00	0.00	0.00	36,106.74	36,106.74	8,219.46	27,887.28	0.00	8,219.46	
1500	Local travel	18,598.27	747.91	20,566.73	21,314.64	108,657.05	108,657.05	111,382.42	(2,725.37)	0.00	111,382.42	
1700	Nat.Consult./Staff	56,087.24	3,304.26	78,367.33	81,671.59	78,540.19	78,540.19	104,124.54	(25,584.35)	0.00	104,124.54	
2100	Contractual Services	60,964.48	(60,699.68)	107,868.15	38,168.47	599,014.30	599,014.30	576,218.28	22,796.02	0.00	576,218.28	
3000	Train/Fellowship/Study	16,805.70	0.00	0.00	0.00	25,032.44	25,032.44	8,226.74	16,805.70	0.00	8,226.74	
3500	International Meetings	5,000.00	7,435.35	1,654.80	9,090.15	9,596.00	9,596.00	13,686.15	(4,090.15)	0.00	13,686.15	
4500	Equipment	0.00	0.00	0.00	0.00	1,054.51	1,054.51	1,054.51	0.00	0.00	1,054.51	
5100	Other Direct Costs	11,362.36	0.00	5,103.78	5,103.78	88,391.93	88,391.93	82,133.35	6,258.58	0.00	82,133.35	
9300	Support Cost IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90,504.69	90,504.69	
120264-1-01-01	Total	196,696.34	(58,212.16)	213,569.79	155,348.63	946,393.16	946,393.16	905,045.45	41,347.71	90,504.69	995,550.14	
120264-1-02-01	2.1.Awareness Raising &Capacity Building	USD	USD	USD	USD	USD	USD	USD	USD	USD	USD	
1100	Staff & Intern Consultants	19,187.39	0.00	0.00	0.00	141,800.30	141,800.30	122,612.91	19,187.39	0.00	122,612.91	
1500	Local travel	4,636.02	(2,334.86)	2,618.43	283.57	103,118.79	103,118.79	98,766.34	4,352.45	0.00	98,766.34	
1600	Staff Travel	0.00	0.00	0.00	0.00	63.93	63.93	63.93	0.00	0.00	63.93	
1700	Nat.Consult./Staff	9,207.24	0.00	0.00	0.00	380,731.65	380,731.65	371,624.41	9,207.24	0.00	371,624.41	
2100	Contractual Services	52,216.10	32,818.50	16,944.96	49,763.46	633,814.11	633,814.11	631,361.47	2,452.64	0.00	631,361.47	
3000	Train/Fellowship/Study	8,587.13	0.00	0.00	0.00	36,505.40	36,505.40	27,918.27	8,587.13	0.00	27,918.27	
3500	International Meetings	0.00	0.00	0.00	0.00	537.47	537.47	537.47	0.00	0.00	537.47	
4300	Premises	0.00	0.00	0.00	0.00	896.12	896.12	896.12	0.00	0.00	896.12	
4500	Equipment	16,221.54	0.00	1,142.65	1,142.65	43,148.20	43,148.20	28,069.31	15,078.89	0.00	28,069.31	
5100	Other Direct Costs	3,254.03	(4,375.77)	3,975.90	(399.87)	50,688.39	50,688.39	47,034.49	3,653.90	0.00	47,034.49	
9300	Support Cost IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	132,879.62	132,879.62	
120264-1-02-01	Total	113,309.45	26,107.87	24,681.94	50,789.81	1,391,304.36	1,391,304.36	1,328,784.72	62,519.64	132,879.62	1,461,664.34	

120264-1-03-01		3.1.Demonstration Projects & Scaling-Up									
		USD	USD	USD	USD	USD	USD	USD	USD	USD	USD
1100	Staff & Intern Consultants	49,796.95	0.00	0.00	0.00	74,741.41	74,741.41	24,944.46	49,796.95	0.00	24,944.46
1500	Local travel	30,374.27	(2,951.89)	1,405.46	(1,546.43)	67,838.19	67,838.19	35,917.49	31,820.70	0.00	35,917.49
1700	Nat.Consult./Staff	9,332.75	0.00	0.00	0.00	207,212.55	207,212.55	197,879.80	9,332.75	0.00	197,879.80
2100	Contractual Services	138,129.47	(25,286.52)	100,146.74	74,880.22	585,692.89	585,692.89	522,443.64	63,249.25	0.00	522,443.64
3000	Train/Fellowship/Study	24,181.32	0.00	0.00	0.00	26,465.53	26,465.53	2,284.21	24,181.32	0.00	2,284.21
4300	Premises	10,000.00	0.00	0.00	0.00	98,236.47	98,236.47	88,236.47	10,000.00	0.00	88,236.47
4500	Equipment	52,363.34	0.00	1,050.15	1,050.15	104,406.23	104,406.23	53,093.04	51,313.19	0.00	53,093.04
5100	Other Direct Costs	11,634.84	(1,089.91)	9,968.47	8,878.56	55,019.46	55,019.46	52,263.18	2,756.28	0.00	52,263.18
9300	Support Cost IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97,706.93	97,706.93
120264-1-03-01	Total	325,812.94	(29,308.32)	112,570.82	83,262.50	1,219,612.73	1,219,612.73	977,062.29	242,550.44	97,706.93	1,074,769.22
120264-1-04-01		4.1.Monitoring & Evaluation									
		USD	USD	USD	USD	USD	USD	USD	USD	USD	USD
1100	Staff & Intern Consultants	21,093.08	5,225.00	10,020.55	15,245.55	40,596.17	40,596.17	34,778.64	5,817.53	0.00	34,778.64
1500	Local travel	8,895.57	0.00	0.00	0.00	8,895.57	8,895.57	0.00	8,895.57	0.00	0.00
1700	Nat.Consult./Staff	15,482.19	1,918.31	3,885.61	5,803.92	20,050.00	20,050.00	10,371.73	9,678.27	0.00	10,371.73
3000	Train/Fellowship/Study	10,000.00	0.00	0.00	0.00	10,000.00	10,000.00	0.00	10,000.00	0.00	0.00
5100	Other Direct Costs	10,927.08	0.00	0.00	0.00	11,000.00	11,000.00	72.92	10,927.08	0.00	72.92
9300	Support Cost IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4,522.32	4,522.32
120264-1-04-01	Total	66,367.92	7,143.31	13,906.16	21,049.47	90,541.74	90,541.74	45,223.29	45,318.45	4,522.32	49,745.61
120264-1-05-01		5.1. Project Management Cycle									
		USD	USD	USD	USD	USD	USD	USD	USD	USD	USD
1100	Staff & Intern Consultants	10,229.26	0.00	0.00	0.00	24,703.65	24,703.65	14,474.39	10,229.26	0.00	14,474.39
1500	Local travel	1,151.07	0.00	0.00	0.00	26,181.19	26,181.19	25,030.12	1,151.07	0.00	25,030.12
1700	Nat.Consult./Staff	10,381.53	0.00	4,521.74	4,521.74	294,750.15	294,750.15	288,890.36	5,859.79	0.00	288,890.36
3000	Train/Fellowship/Study	0.00	0.00	0.00	0.00	245.38	245.38	245.38	0.00	0.00	245.38
4500	Equipment	0.00	0.00	0.00	0.00	891.12	891.12	891.12	0.00	0.00	891.12
5100	Other Direct Costs	634.97	0.00	205.77	205.77	5,376.52	5,376.52	4,947.32	429.20	0.00	4,947.32
9300	Support Cost IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33,448.43	33,448.43
120264-1-05-01	Total	22,396.83	0.00	4,727.51	4,727.51	352,148.01	352,148.01	334,478.69	17,669.32	33,448.43	367,927.12
2000002774	Total	724,583.48	(54,269.30)	369,447.22	315,177.92	4,000,000.00	4,000,000.00	3,590,594.44	409,405.56	359,061.99	3,949,656.43
120264	USD Total	724,583.48	(54,269.30)	369,447.22	315,177.92	4,000,000.00	4,000,000.00	3,590,594.44	409,405.56	359,061.99	3,949,656.43

Project Delivery Report FY 2022;

IX. Work Plan and Budget

1. Please provide **an updated project work plan and budget** for the remaining duration of the project, as per last approved project extension. Please expand/modify the table as needed.

The project is successfully completed including the project evaluation by the independent evaluation experts.

X. Synergies

1. **Synergies** achieved:

Describe potential synergies arising out of UNIDO internal cooperation and/or cooperation with (external) bilateral and multilateral projects/programmes, if applicable.

For FY2022, the achieved synergies are as follows;

Institute Higher Learning:

- University Technology of Malaysia (UTM)
Collaboration for the development of academic short course for thermal energy efficiency
- University of Malaysia Pahang (UMP)
Collaboration for the development of academic short course for solar thermal system & application

In summary, MAEESTA had cooperated with various agencies to enhance the outreach of the project to the targeted audiences.

Government/ Government Related Agencies:

- Partnering with state government agencies such as Invest Selangor, Sarawak Economic Development Region (SEDC), Iskandar Region Development Authority (IRDA), Yayasan Pembangunan Usahawan Terengganu (YPU) and East Coast Economic Region (ECER) in organizing the awareness seminar.

Total 4 awareness seminars organized; in Selangor, Sarawak, Johor and Terengganu. Five solar thermal projects were identified, proposals were prepared and approved for the UNIDO funding from this engagement.

- Ministry of Health (MOH)

Collaboration on the technical consultation and training for the engineers of MOH on solar thermal technology. PMU granted asses to do energy audit to the hospitals for the potential integration of the solar thermal technology

- Sustainable Energy Development Authority (SEDA)

Will handed over the UNIDO training programme and experts list for the training continuity after the project ends.

- Ministry of Human Resources (MOHR)

Collaboration on the training skills standards for the thermal audit, solar thermal technology & design and installation. The ministry approved the budget to develop the skills standards for the proposed skills.

- SIRIM STS Sdn Bhd

Development of the industrial standards for the solar thermal technology for the sustainability program of the project.

- Malaysia Green Technology Corporation (MGTC)

- Co-organize seminar for the registered supplier and industries under MyHijau certification.

- Co-organize seminar for the registered financial providers for the Green Technology Financing Scheme (GTFS)

- Collaboration for the development of National Occupational Skills Standards (NOSS)

- Energy Commission

- Provide support for the training promotions to the registered Certified Electrical Energy Managers.

- Collaboration for the thermal energy efficiency guidelines

- SIRIM Berhad

- Partner for events, seminars, trainings and project proposals for the demonstration project

- A stakeholder in the project committees.

Industry Associations:

- Federation of Malaysian Manufacturers (FMM)

- Since year 2016 until now, MAEESTA and FMM organized seminars for their members throughout the regions such as Shah Alam, Johor, Penang, Sabah and Sarawak. FMM is one of the stakeholders that has been actively participating in the project committee at the steering and working group level.

- Malaysian Rubber Products Manufacturers Association (MRPMA)

- Co-organize awareness seminars for the members.

Consultant Associations:

- Malaysia Energy Service Companies (MAESCO)

- Co-organize training for the members and invited stakeholders in the MAEESTA programmes

Universities

- Process Systems Engineering Centre (PROSPECT), University Technology Malaysia

- Training for the industries engaged with the universities

Solar Thermal Service Providers/Vendors

- For potential solar thermal projects

- Partnering with international and locals service providers as speakers for the web-based seminars (webinars) on the business and opportunity of the solar thermal projects. The international speakers are from AEE Intec (Austria), Ecoligo GmbH (Germany) and Heliac (Denmark) and local

speakers are from Green Solar Energy Sdn Bhd, Solar District Cooling Sdn Bhd and Aumada Energy and Technologies (M) Sdn Bhd

3. Stories to be shared (Optional)

NA

EXPLANATORY NOTE

1. **Timing & duration:** Each report covers a twelve-month period, i.e. 1 July 2021 – 30 June 2022.
2. **Responsibility:** The responsibility for preparing the report lies with the project manager in consultation with the Division Chief and Director.
3. **Evaluation:** For the report to be used effectively as a tool for annual self-evaluation, project counterparts need to be fully involved. The (main) counterpart can provide any additional information considered essential, including a simple rating of project progress.
4. **Results-based management:** The annual project/programme progress reports are required by the RBM programme component focal points to obtain information on outcomes observed.

Global Environmental Objectives (GEOs) / Development Objectives (DOs) ratings	
Highly Satisfactory (HS)	Project is expected to achieve or exceed <u>all</u> its major global environmental objectives, and yield substantial global environmental benefits, without major shortcomings. The project can be presented as “good practice”.
Satisfactory (S)	Project is expected to <u>achieve most</u> of its <u>major</u> global environmental objectives, and yield satisfactory global environmental benefits, with only minor shortcomings.
Moderately Satisfactory (MS)	Project is expected to <u>achieve most</u> of its major <u>relevant</u> objectives but with either significant shortcomings or modes overall relevance. Project is expected not to achieve some of its major global environmental objectives or yield some of the expected global environmental benefits.
Moderately Unsatisfactory (MU)	Project is expected to achieve <u>some</u> of its major global environmental objectives with major shortcomings or is expected to <u>achieve only some</u> of its major global environmental objectives.
Unsatisfactory (U)	Project is expected <u>not</u> to achieve <u>most</u> of its major global environmental objectives or to yield any satisfactory global environmental benefits.
Highly Unsatisfactory (HU)	The project has failed to achieve, and is not expected to achieve, <u>any</u> of its major global environmental objectives with no worthwhile benefits.

Implementation Progress (IP)	
Highly Satisfactory (HS)	Implementation of <u>all</u> components is in substantial compliance with the original/formally revised implementation plan for the project. The project can be presented as “good practice”.
Satisfactory (S)	Implementation of <u>most</u> components is in substantial compliance with the original/formally revised plan except for only few that are subject to remedial action.
Moderately Satisfactory (MS)	Implementation of <u>some</u> components is in substantial compliance with the original/formally revised plan with some components requiring remedial action.
Moderately Unsatisfactory (MU)	Implementation of <u>some</u> components is <u>not</u> in substantial compliance with the original/formally revised plan with most components requiring remedial action.
Unsatisfactory (U)	Implementation of <u>most</u> components is <u>not</u> in substantial compliance with the original/formally revised plan.
Highly Unsatisfactory (HU)	Implementation of <u>none</u> of the components is in substantial compliance with the original/formally revised plan.

Risk ratings	
Risk ratings will assess the overall risk of factors internal or external to the project which may affect implementation or prospects for achieving project objectives. Risk of projects should be rated on the following scale:	
High Risk (H)	There is a probability of greater than 75% that assumptions may fail to hold or materialize, and/or the project may face high risks.
Substantial Risk (S)	There is a probability of between 51% and 75% that assumptions may fail to hold or materialize, and/or the project may face substantial risks.
Moderate Risk (M)	There is a probability of between 26% and 50% that assumptions may fail to hold or materialize, and/or the project may face only moderate risk.
Low Risk (L)	There is a probability of up to 25% that assumptions may fail to hold or materialize, and/or the project may face only low risks.