

# **Independent Terminal Evaluation**

## **Industrial Energy Efficiency for Malaysian Manufacturing Sector (IEEMMS)**

UNIDO project No.: 103042  
GEF project No.: 3908



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

# UNIDO INDEPENDENT EVALUATION DIVISION

## Independent Terminal Evaluation

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## Abbreviations and acronyms

Abbreviation	Meaning
AEC	ASEAN Economic Community
ASEAN	Association of South East Asian Nations
BAP	Business Accelerator Programme
EE	Energy Efficiency
EnMS	Energy Management System
EPC	Energy Performance Contract
EPI	Energy Performance Indicator
EPU	Economic Planning Unit
ESCO	Energy Services Company
FMM	Federation of Malaysian Manufacturers
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GoM	Government of Malaysia
GTFS	Green Technology Financing Scheme
HQ	Headquarters
IEE	Industrial Energy Efficiency
IEEMMS	Industrial Energy Efficiency for the Malaysian Manufacturing Sector
ISO	International Standard Organization
KeTTHA	Ministry of Energy, Green Technology and Water
M&E	Monitoring and Evaluation
MAESCO	Malaysian Association of Energy Service Companies
MIDA	Malaysian Investment Development Agency
MIEEIP	Malaysian Industrial Energy Efficiency Improvement Project
MITI	Ministry of International Trade and Industry
MTE	Mid-Term Evaluation
NEEAP	National Energy Efficiency Action Plan
NPM	National Project Manager
PIR	Project Implementation Review
PMU	Project Management Unit
PPG	Project Preparation Grant
PRF	Project Results Framework
PSC	Project Steering Committee
QAS	Quality Assurance System
RE	Renewable Energy
RM	Malaysian Ringgit

<b>Abbreviation</b>	<b>Meaning</b>
ROtI	Review of Outcomes to Impacts
SCORE	SME Competitiveness Rating for Enhancement
SEC	Specific Energy Consumption
SEDA	Sustainable Energy Development Authority
SIRIM	Standards and Industrial Research Institute of Malaysia
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
SME	Small and Medium Enterprises
SO	Systems Optimization
ST	Energy Commission (Suruhanjaya Tenaga)
TAC	Technical Advisory Committee
ToC	Theory of Change
UNDP	United Nations Industrial Development Programme
UNIDO	United Nations Industrial Development Organization
UNITEN	Universiti Tenaga Nasional
USD	United States Dollars

## Glossary and evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change due directly or indirectly to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved or are expected to be achieved.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impact	Positive and negative, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.
Logframe (logical framework approach)	Management tool used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcome, impact) and their causal relationships, indicators, and assumptions that may affect success or failure. Based on RBM (results-based management) principles.
Outcome	The likely or achieved (short-term and/or medium-term) effects of an intervention's outputs.
Outputs	The products, capital goods and services which result from an intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Relevance	The extent to which the objectives of an intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	The specific individuals or organizations for whose benefit an intervention is undertaken.

# Map of Malaysia



# Executive summary

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## Introduction

The “Industrial Energy Efficiency for Malaysian Manufacturing Sector” Project (herein referred to as the “IEEMMS” or the “Project”) was developed with the ultimate goal of reducing greenhouse gas (GHG) emissions by establishing a policy environment that both enables and supports the adoption of sustainable, energy efficient technologies and managerial methodologies as an integral part of industries’ business practices. The objective of the Project was to promote energy efficiency (EE) improvements in the Malaysian manufacturing sector through the development of a national energy management standard and the implementation of systems optimization. The Project was designed to achieve this objective by: (a) enhancing the regulatory framework, (b) raising awareness and strengthening capacities in the public and private sectors, and (c) facilitating access to finance for the implementation of energy efficiency projects.

IEEMMS was approved for implementation in May 2011 over 5 years. Operations commenced in June 2011 and were completed by April 2017. The project was supported by a GEF project grant of USD 4.2 million and received co-financing of USD 5.56 million in cash and USD 13.55 million in-kind from the private sector and government partners. The Ministry of International Trade and Industry (MITI) was the primary counterpart responsible for the execution of the Project, while the SME Corp. – under the MITI – served as the local executing partner. The Project was managed by a UNIDO Project Manager based at the Headquarters (HQ) in Vienna, Austria, and implemented by a Project Management Unit (PMU) housed in the SME Corp. building in Kuala Lumpur. The PMU received strategic guidance from the Project Steering Committee (PSC) composed of representatives from the key Project stakeholders.

## Evaluation purpose, approach and methods

Evaluation rationale and purpose: In accordance with UNIDO and GEF Evaluation Policy, the terminal evaluation was carried out to provide a comprehensive and evidence-based account of the Project’s performance. It assessed the project’s relevance, effectiveness and efficiency, and determined the actual and potential outcomes and impacts of the Project, including its sustainability.

Intended use and users: The terminal evaluation is intended to assess the achievement of Project results, draw lessons and provide recommendations for

the Government, counterparts, UNIDO, the GEF and other stakeholders to enhance the design and implementation of similar future projects and activities.

Key evaluation issue: The terminal evaluation focused on the key questions specified in the ToR: whether the Project had achieved or was likely to achieve its main objectives of promoting EE improvements in the Malaysian manufacturing sector through the development of national energy management standards and the implementation of systems optimization (SO), as evidenced through direct and indirect emission reductions and energy savings.

Main evaluation phases: The evaluation comprised of three phases: (1) inception and document review; (2) field mission including stakeholder interviews, Project site visits, surveys and direct observations to gather evidence; and (3) an evidence-based qualitative and quantitative analysis and reporting. The evaluation was conducted by Brahmanand Mohanty (International Evaluation Consultant and team leader), and Ali Askar Sher Mohamad (National Evaluation Consultant).

## **Evaluation results**

The IEEMMS Project's aim was to assist industries in adopting the internationally recognized ISO 50001 energy management standard and improving the EE of their facilities by optimizing at the systems level (pumps, fans, steam and compressed air). To make EE an integral part of industrial corporate management system, the Project employed a combination of market push strategies via policy, regulatory and financial interventions in partnership with the key institutional partners, and market pull strategies through awareness raising and capacity building of several government officials, industrial engineers and managers, equipment suppliers and distributors, energy professionals and service companies.

The evaluation concludes that the Project was relevant to national development and environmental priorities and received strong support from the key institutional stakeholders during its formulation. The Project built on the experience of the previous "Malaysian Industrial EE Improvement Project" (MIEEIP) and was designed to address barriers such as the lack of corporate decision making and management of energy use in industrial establishments, limited knowledge and experience in implementing energy management standards and systems optimization, and the absence of a clear industrial EE policy and action plan. The Project's focus was well within the mandate of UNIDO, which is internationally recognized as the pioneer in promoting energy management standards as a key market-based policy tool, thereby making EE an integral part of industrial best practices. The Project is also consistent with the strategic objective 2 of GEF-4: tackling climate change through the promotion of energy efficient technologies and practices.

The project document was found to be logical and easy to comprehend. The objective was clearly stated in the project design phase, and the intervention logic and causal links from activities to outputs presented in the Project Results Framework (PRF) were coherent. Barring a few exceptions, the indicators for assessing the relevance and effectiveness of the outputs were SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). However, the PRF excluded quantifiable indicators that assess the outcomes which happen to be the key deliverables resulting from the outputs and contributing to the attainment of the project objective. Monitoring and Evaluation was considered during the project design. Moreover, the project document proposed a comprehensive project implementation management organogram based on the mapping of the key institutional stakeholders.

Gender mainstreaming was not part of the project design as it was not a requirement under the GEF-4 cycle. However, during the project implementation, measures were taken to raise awareness on gender dimensions relevant to project management and execution.

The evaluation of the Project's effectiveness is based on the outputs and outcomes achieved by the Project in its pursuit of promoting industrial EE through Energy Management System (EnMS) and Systems Optimization (SO). Taking into consideration all the awareness-raising and capacity building activities undertaken by the Project, the evaluation concludes that the Project's objective has been largely achieved, though some shortfalls were noted in terms of enforcing policies and proposing an action plan as important drivers for sustainable EE improvements in industries, and making tangible changes to the existing eco-system that supports EE investments in SMEs.

The Project was successful in creating an enabling environment for industrial enterprises to adopt energy management and systems optimization practices by raising their awareness on the potential benefits of adopting EE measures, and in mobilizing experienced international experts to develop a cadre of trained EE professionals who are capable of providing EnMS and SO-related services. Moreover, training sessions were held to strengthen the capacities of participants from public and private sector, including personnel from the accreditation body SIRIM QAS and industrial equipment suppliers. The Project established an information exchange network and communication platform to share best practices and case studies with experts and industrial representatives.

As reported in the output and impact reports of the Project, the annual savings accrued from the various EE measures taken by the 49 industrial enterprises amount to 4,865 GWh of electricity and 949,701 GJ of thermal energy. These savings are equivalent to a reduction of approximately 3.4 million tons of CO<sub>2</sub>.

With a cumulative capital investment of RM 27.55 million in electricity saving measures alone, the factories have reported cost savings amounting to RM 51.6 million in electricity expenses annually, with a payback period of a little over half a year.

Most of the Project's outputs and outcomes were achieved within the planned timeframe and budget, while adequate measures were taken to ensure good geographical coverage of the awareness-raising and training activities. Additionally, UNIDO HQ staff had a very good understanding and constructive interactions with the PMU and provided timely advice and support for the completion of Project activities. Since the Project did not keep track of the financial disbursements at outcome level as well as project expenditures, hence it is not possible to determine whether or not these were in-line with the budget plan. Nevertheless, the fact that most project outputs were achieved within the budget is evidence of the efficiency of the execution of the Project. However, it was determined that with greater participation of the key counterpart agencies, the Project's budget could have been used in an even more productive manner.

The ToC analysis shows that the Project has raised awareness and created an enabling environment for strengthening the capacity of public and private players. Taking into account the political will to progress towards greater energy sustainability, the ToC analysis has identified the "drivers" needed for the likely progress towards the achievement of the desired impacts.

The Government of Malaysia (GoM) is well aware of the need to gradually reduce the subsidy on fossil fuels in order to render EE actions more cost-effective. What is needed now is the development of sectoral benchmarks to make manufacturers better aware of the EE gaps to be bridged and opt for solutions that go beyond the low-cost and quick return measures. Furthermore, in order to achieve the GoM's goal of reducing GHG emissions intensity of GDP by 45% by 2030, a mechanism needs to be devised to periodically update the energy intensity indicators and ensure their strict enforcement.

The key factors contributing to the success of the Project are a) the good collaboration of UNIDO and the PMU with the key national stakeholders, b) the establishment of the peer-to-peer network to exchange information, design and implement energy management plans for industrial enterprises, and c) a dynamic and proactive PMU that is well-guided and supported by the UNIDO HQ staff. The adoption of EnMS and SO approaches by industries combined with investments to lower the industrial energy intensity is bound to result in reduced energy needs and abatement of GHG emissions. Hence, the Project's activities do not have any negative consequences on the environment.

While there is clearly a political will to progress towards the Project's long-term objectives, the gap between the rhetoric and reality needs to be bridged through greater ownership and engagement by the institutional players. This can be achieved through more targeted policies and financing mechanisms in favour of EE, especially in small and medium industries.

## Recommendations

The following recommendations are made on the basis of the findings of the evaluation:

Recommendation 1 (GoM): In order to improve the coordination of EE awareness-raising activities at the institutional level, the GoM should consider re-allocating the mandate and legitimacy to an entity that could be hosted by the Economic Planning Unit (EPU) under the Prime Minister's Department.

Recommendation 2 (GoM): The GoM should sustain the outcomes of the IEEMMS Project through sectoral benchmarking and by setting sectoral energy performance targets.

Recommendation 3 (GoM): Considering the prevailing ambiguity at the institutional level regarding what exactly the term "energy" encompasses (for example, when the EPU, KeTTHA and ST refer to energy, be it fossil or renewable, they only consider electricity), the GoM should clarify this issue and take appropriate measures to ensure that thermal energy is also considered systematically along with other energy forms.

Recommendation 4 (UNIDO): A GEF-funded project's outcome- and output-wise delivery and financial aspects should be monitored simultaneously so that appropriate corrective measures can be taken if deviations/discrepancies are found.

Recommendation 5 (UNIDO): For GEF-funded projects, it is not enough to just keep track of the overall co-financing but also the details so that the executing agency can remind the project's institutional partners that apart from contributing additional resources to achieve GEF objectives, co-financing also demonstrates country ownership.

## Lessons learned

Lesson 1: During project development, it is essential to define good performance indicators that facilitate monitoring against the targets set for the outcomes and progress towards intended impacts.

Lesson 2: To reap long-term EE benefits, governments should give more priority to the mobilization of resources for developing human capital as opposed to providing capital subsidies.

Lesson 3: During the implementation of a project, it is important to keep in mind that while the project is executed satisfactorily, it is also being implemented in a manner that ensures the sustainability of the outcomes.

Lesson 4: Co-financing is important not only in order to mobilize additional resources for achieving GEF objectives, but also because it demonstrates country ownership.

# 1. Evaluation objectives, methodology and process

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## 1.1 Information on the evaluation

The UNIDO-GEF Project entitled “Industrial EE for Malaysian Manufacturing Sector”, referred to as the IEEMMS Project, was started in June 2011 and was completed in April 2017. An evaluation was conducted at the end of the Project to assess the Project’s performance (in terms of relevance, effectiveness, efficiency, sustainability and impact) and to determine outcomes and impacts (actual and potential) stemming from the Project, including their sustainability.

The evaluation process is independent of the GEF, UNIDO, Ministry of International Trade and Industry (MITI) and the Project’s counterparts. Instead, it has been conducted in accordance with UNIDO Evaluation Policy and the Terms of Reference as included in Annex 1. The terminal evaluation was conducted by Brahmanand Mohanty (International Evaluation Consultant and Team Leader) and Ali Askar Sher Mohamad (National Evaluation Consultant). The findings and recommendations of this terminal evaluation are those of the evaluation team and do not necessarily reflect the views of GEF, UNIDO, MITI or any other project stakeholders.

The evaluation covered the whole duration of the Project from July 2011 to March 2017. The evaluation was carried out in April 2017 and the evaluation timeline and itinerary are provided in Annex 2. Finally, the list of documents reviewed during the evaluation is included in Annex 3.

## 1.2 Scope and objectives of the evaluation

By providing an analysis on the attainment of the Project’s objectives and the corresponding technical components or outputs, the terminal evaluation aims at: (a) enabling the Government, the national GEF Operational Focal Point (OFP), counterparts, the GEF, UNIDO and other stakeholders and donors to verify prospects for development impact and promoting sustainability; and (b) re-examining the relevance of the objectives and other elements of project design according to the various project evaluation parameters.

The key question stated in the evaluation terms of reference (TOR) is whether the Project has achieved or is likely to achieve its main objective of promoting EE improvements in the Malaysian manufacturing sector through the development of national energy management standards and implementation of SO measures, as evidenced through direct and indirect emission reductions and energy savings.

The structure of this report is based on a specific list of review criteria for the terminal evaluation as included in the TOR. Information used in the evaluation was evidence-based and efforts were made to triangulate information and

opinions from interviews. A participatory approach was adopted during the interview of all the key stakeholders of the Project.

### **1.3 Information sources and availability of information**

The UNIDO National Project Manager (NPM) as well as the Project Management Unit (PMU) shared all the documents with the evaluation team to facilitate the desk review of project activities, outputs and achievements. These included the original project document, Inception Report, Annual Project Report (APR), Project Implementation Review (PIR), Steering Committee minutes of meetings, Training Reports, Mission Reports, Mid-Term Evaluation (MTE) report, Output and Impact Report, Terminal Report, brochures, newsletters, synthesis reports, etc.

Apart from the review of the above documents, the findings of the evaluation are based on the following:

- Interviews with the UNIDO Project Manager and other relevant staff at UNIDO Headquarters (HQ) in Vienna;
- Interviews with the National Project Coordinator, the PMU, and staff of the key Government Agencies who partnered with the Project;
- Individual and group meetings with project partners and stakeholders, including government agencies, the GEF OFP, representatives from industry and civil society including the Standards Organization and University, and co-financing partners;
- Meetings and discussions with representatives of enterprises which participated in demonstration projects;
- Face-to-face interviews with other stakeholders, including project beneficiaries and project consultants; and
- Site visits of factories around Kuala Lumpur, Melaka and Johor Bahru and an assessment of the results achieved by the various demonstration projects.

All additional information and materials requested by the evaluation team were shared by the PMU.

### **1.4 Methodological remark and limitations of the evaluation**

The evaluation team studied carefully the intervention logic in the project document and the Project Results Framework (PRF) to establish the Project's Theory of Change (ToC), which was assessed based on consistency. A "reconstructed" ToC was enhanced to ensure that there is a clear and conceptual understanding of the Project's impact pathways that can guide the terminal evaluation. The validity of this "reconstructed" ToC was examined through specific questions for the interviews with the different stakeholders.

The reconstructed ToC used for the analysis of the Project performance and sustainability is presented in Section 3 of this report.

In terms of the limitations of the evaluation, the evaluation consultants were not able to meet some of the key Government partners because of their unavailability. Also, a few of the representatives of Government partners were not so familiar with the Project because of their limited interaction and the lack of continuity due to the changes in personnel. Meetings and discussions with the Project Steering Committee members were not very fruitful for the same reason. Due to time constraints and the large distances to be covered, only a limited number of industrial enterprises were visited.

## 2. Country and project background

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### 2.1 Brief country context

Malaysia is one of the key member states of the Association of South East Asian Nations (ASEAN), with a population of 28.7 million, ranking 61 out of 187 countries on the UNDP Human development index, with a high score of 0.789 in 2016. Considered as a highly open and upper-middle economy, Malaysia has succeeded in sustaining inclusive economic growth and has recorded average growth of over 7 percent per year over the last 25 years.

Malaysia is heavily endowed with natural resources. Strategic investments in physical infrastructure, primary education and primary healthcare services over the last four decades have helped Malaysia in achieving healthy economic growth and social development. The country has succeeded in nearly eradicating poverty and achieving gender parity at all levels of education.

From an economy dominated by the production of raw natural resource materials, such as tin and rubber, even as recently as the 1970s, today, Malaysia has a diversified economy and has become a leading exporter of electrical appliances, electronic parts and components, palm oil, and natural gas. After the Asian financial crisis of 1997-1998, Malaysia continued to achieve solid growth rates, averaging 5.5 percent per year from 2000-2008. Though Malaysia was hit by the Global Financial Crisis in 2009, it was able to recover rapidly, achieving growth rates at an average of 5.7 percent since 2010.

The Government commitment to the MDG-Plus agenda is reflected in its Tenth Malaysia Plan, 2011–2015, with 30 percent of development expenditure allocated to the social sector. From 2009 to 2014, the real average household income of the poorest 40 percent of the population grew at 11.9 percent per year, thus helping to reduce income disparities.

Despite some risks, Malaysia's near-term economic outlook remains broadly favorable, which is reflected in a well-diversified economy. Several reforms have been adopted, with the fiscal deficit target of 3 percent of the Gross Domestic Products (GDP) for 2017.

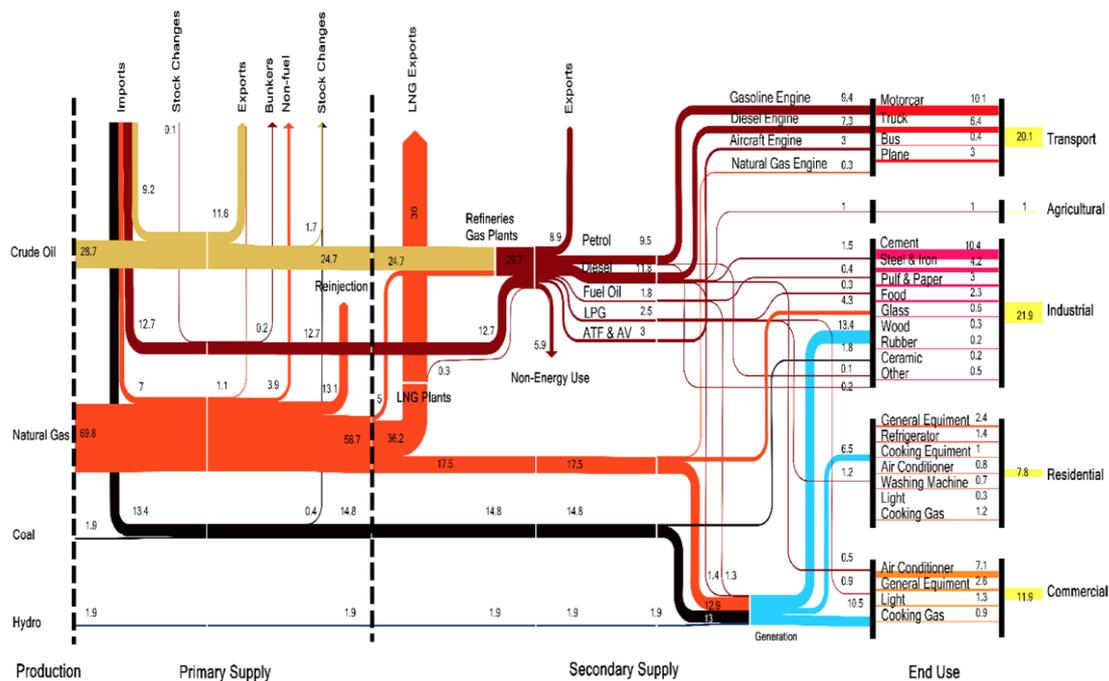
The Tenth Malaysia Plan reflected climate-resilient growth strategies. However, the country faces several challenges such as complex federal-state relations in natural resources management, policy implementation, comprehensive legislative framework for climate change and biodiversity conservation, limited institutional capacities to coordinate, monitor and evaluate, and inadequate financing.

Despite the positive achievements, Malaysia's productivity growth over the past 25 years has been below those of several global and regional competitors. To ensure it maintains its rank among the high-income economies, the country needs to accelerate implementation of productivity-enhancing reforms that create more competition in the economy and enhance the quality of human capital.

## 2.2 Sector-specific Issues and Important developments

Malaysia's energy flow diagram for 2011 is presented in Figure 1. Crude oil, natural gas, coal and hydropower are the main sources of energy supply. Electricity, which accounts for almost half of all the energy end-uses, is generated from natural gas (approximately 74% of the total supply of natural gas), coal (approximately 88% of the total supply of coal) as well as the entire supply of hydropower.

Figure 1. Malaysia's energy flow diagram for 2011 (units shown in Mtoe)<sup>1</sup>



Malaysia's growing population and expansion of economic activities, especially in the manufacturing sector, have been the major drivers for the increasing demand in energy supply. Historically, the nation's energy demand growth rates were higher than the growth rates of its GDP. The disproportional ratio between energy demand and GDP is indicative of the more energy-intensive economic activities that are driving growth.

<sup>1</sup> *Energies* 2015, 8(4), 2828-2866; doi:[10.3390/en8042828](https://doi.org/10.3390/en8042828)

The industrial sector was the largest energy consumer with a share of 35% of energy end-use, followed by the transportation sector, which mainly consumed oil products. The medium-sized industries have ignored EE in the past and have not procured more energy-efficient equipment to reduce energy consumption. Large industries, which have more technical expertise to manage energy, also did not adopt any structured approach to achieve EE.

As far as the climate change issue is concerned, Malaysia faces three major challenges: (1) increased share of coal in energy generation; (2) inadequate development of renewable energy (RE); and (3) low energy price. EE offers an effective and efficient energy policy instrument to address the energy supply security issue as well as energy-related environmental issues. However, the lower price of fossil fuel resulted in a lack of energy-saving awareness and poor uptake of EE, especially by the industrial sector.

In 2008, as the fiscal burden on energy subsidies rose dramatically due to the spike in energy prices, the Government of Malaysia (GoM) felt the unsustainable level of energy subsidies adversely affecting the developmental budgetary allocations and realized the importance of managing the energy use to ensure optimal productivity and competitiveness of the country's economic activities. As a result, the GoM started looking at EE as a key strategy towards the gradual removal of energy subsidies and reviewed policies to promote EE in order to mitigate the impact of increased energy cost burden on consumers.

Under the Subsidy Rationalization Program (SRP) launched in 2010, the GoM decided to increase the electricity prices at regular time periods. In 2011, electricity tariffs were increased by 7% and then in 2014, incentive-based regulation was implemented that contained a mechanism for Imbalance Cost Pass-Through (ICPT), which includes Fuel Cost Pass-Through and other generation specific cost adjustments, as well as a base tariff. The GoM also announced an upward revision of the price of gas for the power sector in July 2015. Gas prices supplied to commercial and industrial sectors were also increased by an average of 10.27%.

Formally established on 31 December 2015, the ASEAN Economic Community (AEC) is a major milestone in the ongoing regional economic integration agenda of **ASEAN**. AEC is characterized as a single market and production base, a highly competitive economic region of equitable economic development, and fully integrated into the global economy. A harmonized customs system among ASEAN countries offers opportunities for unhindered movement of goods between member states. EE and management provide a good opportunity for Malaysia's energy intensive industries to produce cost-effectively and to remain relevant in this new context of ASEAN economic integration.

## 2.3 Project summary

### 2.3.1 Fact sheet of the project

The Fact Sheet of the Project is presented in Table 1.

**Table 1. Project Fact Sheet**

Project Title	Industrial Energy Efficiency for Malaysian Manufacturing Sector (IEEMMS)
UNIDO project ID	103042
GEF project ID	3908
Region	EAP
Country	Malaysia
GEF focal area & operational programme	GEF-4: Climate Change, CC-4
GEF implementing agency	UNIDO
GEF executing partners	Ministry of International Trade & Industry (MITI); Ministry of Energy, Green Technology & Water (KeTTHA); Department of Standards Malaysia; Federation of Malaysian Manufacturers (FMM); Ministry of Natural Resources and Environment (MNRE)
Project size	FSP
Project CEO approval date	13 May 2011
Project implementation start date	29 June 2011
Implementation end date	Proposed: 30 June 2016; Actual: 30 April 2017
GEF project grant (excluding PPG)	4,200,000 USD
GEF PPG	75,000 USD
UNIDO co-financing	67,231 USD (EUR 61,449)
Total co-financing at CEO endorsement	16,670,000 USD (cash + in-kind)
Materialized co-financing	19,173,000 USD (cash + in-kind) (excluding PPG)
Total project cost at endorsement	20,870,000 USD
Total project cost at completion	23,377,796 USD (excluding PPG)
Mid-term review date	November 2015
Terminal evaluation date	April 2017

### 2.3.2 Brief description of the project

The “Industrial Energy Efficiency for Malaysian Manufacturing Sector” Project (herein referred to as the “IEEMMS” or the “Project”) is designed to promote energy efficiency improvements in Malaysian manufacturing sector. The Project’s goal is to reduce greenhouse gas emissions by establishing a policy environment that enables and supports sustainable adoption of energy efficient technology and management as an integral part of industries’ business practices.

The Project was a follow-up of the “Malaysian Industrial Energy Efficiency Improvement Project” (MIEEIP) that was funded by the GEF, the United Nations Development Programme (UNDP) as well as the GoM and the private sector. While MIEEIP contributed to creating greater awareness on EE, it faced challenges to impart a culture of EE, which the industry traditionally gave low priority to due to low energy prices supported by subsidies. To address some of the barriers identified by MIEEIP, the focus of the Project was on developing national industrial energy efficiency (IEE) policies and plans, creating awareness and building capacity on Energy Management System (EnMS) and Systems Optimization (SO), and improving access to finance for industrial EE improvements.

The Project is supported by GEF with UNIDO being accountable for maintaining the oversight of the project implementation, and with the Ministry of International Trade and Industry (MITI) taking the overall responsibility for the Project’s execution (SME Corp. under the MITI is serving as the local executing partner). The Project was approved in May 2011 and commenced operations in June 2011; it was scheduled for completion on 30 June 2017.

### 2.3.3 Counterpart organizations

Table 2 provides a snapshot of the key stakeholders of the project and their expected contribution to the project.

**Table 2. Snapshot of the key project stakeholders**

Stakeholders	Classification	Responsibility/Role	Engagement
Ministry of Energy, Green Technology and Water (KeTTHA)	Government	- Component 1 (Policy development)	In-kind (USD 300,000)
Energy Commission (ST)	Government	- Component 1 (Policy development) - Component 2 (Energy awareness) - Component 3 (Energy management)	In-kind (USD 750,000)
EPU	Government	- Component 1 (Policy development)	In-kind (USD 200,000)
SME Corp.	Government	- Component 2 (Energy awareness) - Component 5 (Financing)	In-kind (USD 150,000)
SIRIM	Government	- Component 3 (Energy management) - Component 4 (System optimization)	In-kind (USD 150,000)
Federation of Malaysian Manufacturers (FMM)	Industries	- Component 2 (Energy awareness) - Component 3 (Energy management) - Component 4 (System optimization)	In-kind (USD 1,000,000)
Industry Green Technology Financing Scheme (GTFS)	Private	- Component 5 (Financing)	In-kind (USD 1.53 million) and cash (USD 11.39 million)

IEEMMS is financed by a GEF project grant of USD 4.2 million and co-financed by various private sector industrial enterprises/Green Technology Financing Scheme (GTFS) with a total financial contribution of USD 11.39 million and in-kind contributions of USD 5.28 million from SME Corporation (SME Corp.), Standards and Industrial Research Institute of Malaysia (SIRIM), the Ministry of Energy, Green Technology and Water (KeTTHA), the Energy Commission (Suruhanjaya Tenaga, or ST), the Economic Planning Unit (EPU), the Federation of Malaysian Manufacturers (FMM).

### **2.3.4 Project implementation arrangements**

The Project is managed by a UNIDO HQ-based Project Manager, and the PMU housed at SME Corp. in Kuala Lumpur. The PMU, consisting of 4 full-time staff and 2 part-time staff, is led by the National Project Manager (NPM) who is supported by the Assistant National Project Manager.

The PMU gets strategic guidance from the Project Steering Committee (PSC) that consists of representatives from KeTTHA (Chair), MITI (Co-Chair), Ministry of Natural Resources and Environment (MoNRE), Ministry of Finance (MoF), Malaysian Investment Development Authority (MIDA), Department of Standards Malaysia (DSM), Energy Commission (ST), Sustainable Energy Development Authority (SEDA), Federation of Malaysian Manufacturers (FMM), Malaysian Green Technology Corporation (MGTC), Malaysian International Chamber of Commerce and Industry (MICCI), Center for Environment, Technology and Development Malaysia (CETDM), SME Bank, SME Corp. Malaysia, the PMU (Secretariat), and a UNIDO representative. A Technical Advisory Committee (TAC) chaired by the NPM provides support for continuous project design improvement.

## 3. Project assessment

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### 3.1. Project identification and formulation

The Malaysian Industrial EE improvement Project (MIEEIP), implemented by the GoM from 1999 to 2006 with support from the GEF and UNDP, initiated capacity building for EE in industry and contributed to creating higher awareness on EE. However, difficulties were faced to impart a culture of EE, which traditionally has been a low priority for the industry due to low energy prices supported by subsidies. The IEEMMS Project took into consideration the recommendations of the MIEEIP project on the action needed to address some of the existing barriers to IEE in Malaysia, namely:

- Lack of industrial EE policy formulation;
- Inadequacy in corporate decision-making and management;
- Lack of awareness; and
- Lack of capacity to design, evaluate and implement EE management and optimization

Following the assessment of the barriers, the Project was designed with a two-pronged approach involving supply- and demand-side activities:

- Adoption and promotion of a national energy management standard in accordance with the Energy Management System (EnMS) of the International Standards Organization (ISO); and
- Capacity building of enterprises and institutions by means of showcasing SO and EE improvements through demonstration projects that will be very cost effective in transforming the industrial EE markets.

The Project mapped the key institutional stakeholders in Malaysia related to the industrial EE and standardization. The main target groups of the Project were identified as the industrial decision makers (managers), engineers, vendors and other professionals (industrial EE policy-making and implementing institutions).

Since the activities were targeted towards small and medium enterprises in the manufacturing sector, the Investment Policy and Trade Facilitation Division under the MITI was entrusted with the overall responsibility to oversee the Project implementation, whereas SME Corp was identified as the local implementing agency that would host the PMU. The sponsors and partners were identified and their roles and responsibilities defined for each of the Project's components. However, there is no reference in the document to the involvement of country representatives or any stakeholder consultations being held to discuss the critical problem areas and the technical cooperation strategy.

The ISID-related issues and priorities are considered when citing the reason for UNIDO assistance in the project document and describing the UNIDO

approach in supporting sustained energy management and efficiency practices in industry.

### **3.2. Project design**

The project document contains a PRF, outlining the results hierarchy, performance indicators, means of verification and assumptions and risks. The “Theory of Change (ToC)” approach has been used as the framework for the analysis of the quality of the project design. In contrast to the PRF, the ToC approach allows for the consideration of multiple pathways and foresees the actions needed as well as the possible risks at various stages along the causal pathway from activities towards the intended impacts. It is composed of causal chains depicting the changes occurring from outputs and outcomes towards intermediate states and beyond, as well as impacts.

Two important aspects of ToC are “impact drivers” and “assumptions”. Impact drivers are critical factors that are necessary, though not sufficient, for contributing to the ultimate realization of the project impacts that are within the ability of the Project to influence. Assumptions, on the other hand, define the surrounding external conditions under which the Project will operate, and which can influence certain elements in the ToC.

The ToC analysis allowed the evaluators to examine:

- If there was something missing in the logic chain that should be considered for the strategy to function according to plan;
- What impact drivers are needed for the Project to achieve the intended impacts? Is the presence of these impact drivers ensured in the Project’s planning and implementation?
- What assumptions are most critical and can adversely affect the entire logic chain? Were these assumptions identified in the Project and were adequate risk management strategies put in place during project planning and implementation?

The intervention logic in the project document and the PRF has been carefully studied to establish the Project’s ToC which has been assessed for consistency. A reconstructed ToC (see Figure 2) has been elaborated to ensure that there is a clear and conceptual understanding of the Project’s impact pathways that can guide the TE.

The project document is drafted in a way that is easy to comprehend. Though the design of the Project defines a specific objective as well as indicators to assess the relevance and effectiveness, a few of the output indicators do not meet the SMART (Specific, Measurable, Achievable, Relevant and Time-bound) criteria. For example, there is no quantifiable indicator to enhance access to technical and financial assistance for implementing EE Projects. Barring a few cases, the output targets set in the Project’s result framework were sufficiently clear for the project team to plan most of the activities. However, the PRF excluded quantifiable indicators to assess the outcomes which happen to be the key deliverables resulting from the outputs and contributing to the attainment of the project objective. Monitoring and Evaluation (M&E) was considered during the project design phase.

The Project had a clear thematically focused development objective. The intervention logic and the causal links from activities to outputs presented in the Project and the results framework are coherent, and thus remain unchanged in the reconstructed ToC. The activity level is not covered under the Review of Outcomes to Impacts (ROtI) methodology, which focuses on results. Moreover, the activities are too many to include in the ToC diagram. Project outcomes are the key deliverables resulting from the outputs and contributing to the attainment of the objectives. However, **unlike the indicators presented for the outputs, no indicators have been developed for the outcomes**. The design of the project management organogram was clearly defined, showing the leading role played by the various institutional stakeholders according to their mandate. However, this was not really followed up during the Project's execution due to the lack of commitment of the concerned stakeholders. Gender issues were not considered in the Project design.

### 3.2.1 Reconstructed theory of change

The reconstructed ToC of the Project shows how the IEEMMS Project focuses on three aspects:

- Providing technical assistance to develop and facilitate market-oriented policy instruments needed to support the sustainable development of Malaysian manufacturing industries towards international best energy performance and stimulate the creation of a market for EE products and services;
- Build knowledge and in-depth technical capacity for industrial EE, with an emphasis on SO and EnMS for industry, energy professional and relevant institutions; and
- Support a limited number of pilot IEE projects with high replication potential through coordinated access to technical and financial assistance. These are the direct expected outcomes from the Project against which the Project's effectiveness was assessed.

Outputs to outcomes: The activity level is not considered in the ROtI analysis; hence, the activities are not included in the ToC diagram. The intervention logic and the causal links from activities to outputs presented in the project document and the PRF are coherent. The PRF identifies several assumptions at the objective/intermediate state and outcome levels. Given the GoM's approval of the Project in their role as partners of the Project, some of the assumptions can be influenced by the Project. Hence, following the ROtI methodology, such assumptions can be considered as impact drivers. There are also some assumptions and impact drivers that have not been identified in the PRF; these have been reflected in the reconstructed ToC.

To achieve the objective set, the project activities are proposed to ensure five concrete outcomes. Table 3 shows the strategy proposed by the Project for achieving the outputs that would lead to the five main outcomes.

**Table 3. Project strategy and objectively verifiable indicators**

Outcome	Output	Quantified and time-bound indicators
<p><b>Outcome 1</b> Enhanced regulatory framework facilitating increased implementation of energy efficiency (EE) in the industrial sector in both large and medium industries</p>	1.1 Support provided for implementation of the National Energy Efficiency Action Plan (NEEAP)	- Proposed policy and regulation instruments to facilitate the implementation of the NEEMP and NEEA, those for the implementation of ISO 50001 accepted and implemented
	1.2 Improved reporting of data on energy use and energy intensity	- Systematic data recording mandatory in large enterprises and voluntary in SMEs - Database established
	1.3 Action plan for EE implementation in industry	- Final report consolidating the results and lessons learned from the implementation of the project, as well as post-project strategy
	1.4 Project M&E	- Monitoring (quarterly and annually) - Mid-term and final evaluation - Audit reports - Number of case studies, lessons learned from (inter) national sources and number of brochures and booklets
<p><b>Outcome 2</b> Widespread awareness amongst SMEs and larger industries of the benefits of EE</p>	2.1 National information dissemination and awareness creation campaign developed and implemented	- Peer-to-peer network established (to assist companies in information exchange, energy management plan design and implementation) - Number and quality of information materials developed and type of media (radio, TV, documentaries, newspaper, leaflets, booklets)
	2.2 Strengthened information bureau at the ST	- Information campaign developed on energy management, SO and EE in industry in general - Recognition scheme established for 150 participating companies - Decision makers are informed through 10 events on EE in industry (workshops, seminars, meetings) attended by at least 300 policy makers, industry owners and managers

Outcome	Output	Quantified and time-bound indicators
<b>Outcome 3</b> Availability of a cadre of highly specialized energy management experts from the public and private sectors	3.1 Energy management training materials developed 3.2 Strengthened capacity of SIRIM and SIRIM Quality Assurance System(QAS) 3.3 Trained expertise on EnMS 3.4 Implementation of EnMS at factory level	<ul style="list-style-type: none"> <li>- Training materials and software available on EM adapted to Malaysian context</li> <li>- SIRIM is acknowledged as lead auditor for ISO 50001 certification</li> <li>- SIRIM QAS is recognized to certify ISO 50001 compliance</li> <li>- 40 national experts trained</li> <li>- Energy managers and technical staff are trained at 15 training sessions of 500 factories</li> <li>- 10 follow-up training sessions for 300 factories</li> </ul>
<b>Outcome 4</b> Availability of a cadre of highly specialized systems optimization experts from the public and private sectors	4.1 Systems training materials developed 4.2 Strengthened capacity of FMM 4.3 Trained expertise on SO 4.4 Suppliers participating 4.5 Implementation of energy SO at factory level	<ul style="list-style-type: none"> <li>- Training materials and software available on systems optimization</li> <li>- GreenTech M. is providing training at expert and factory level</li> <li>- 50 national experts trained</li> <li>- 12 training sessions for staff of 350 factories on steam, pump, motor/fan and compressed air systems</li> <li>- 12 follow-up training sessions for 150 factories</li> <li>- Trained staff on process heating as needed</li> <li>- About 4-5 training and info events on the market opportunities in which at least 60 vendors/suppliers participate</li> </ul>
<b>Outcome 5</b> SMEs and larger industries have coordinated access to technical and financial assistance for implementing EE projects	5.1 Awareness raised, and capacity built on EE financing for EE financing institutions 5.2 Industries supported for preparing EE project proposals and financing schemes and institutions supported for technical evaluation of industrial EE projects	<ul style="list-style-type: none"> <li>- At least 10 information and consultation events on financial mechanisms supported by the project attended by 200-300 people</li> <li>- Harmonized set of criteria for techno-economic evaluation of industrial EE projects</li> <li>- Assistance given to SME Corp to provide EE-related soft loans, either in setting up or supporting existing systems</li> </ul>

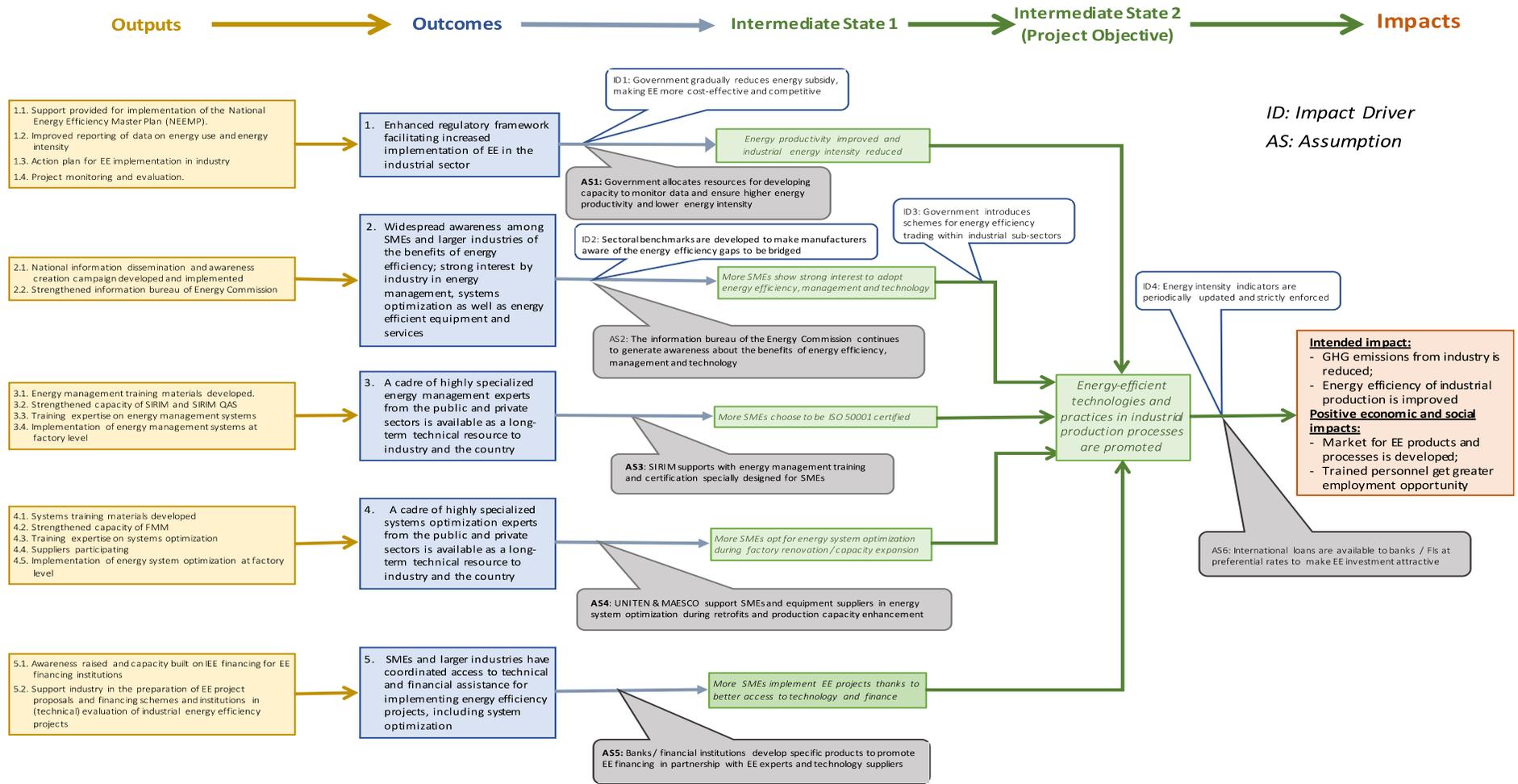
Outcomes to intermediate state to impacts: The Project's experience shows the reluctance of the industrial enterprises to move beyond the implementation of low-cost EE measures. ISO 50001 helps to adopt a management approach and the systems optimization approach allows the industries to understand the cascading nature of energy losses and how small actions at the downstream can result in big savings upstream. While the project outcomes have been largely achieved, further interventions may be needed to ensure the ultimate impact.

Two intermediate states have been identified, which are likely to serve as bridges between the project outcomes and the intended impacts. The intermediate state 2 refers to the project objective as defined in the PRF. Government can play as impact driver to move from the project outcomes towards the intermediate state 1. Energy subsidy can be gradually lowered to render EE cost-effective and competitive. While each industry makes efforts to reduce energy intensity, it is important to introduce sectoral benchmarking to make the manufacturers aware of the EE gap to be bridged. In the absence of any sectoral benchmarking, an industry is incapable of comparing its energy performance against others in the same class / category. Further, to progress from intermediate state 1 to 2, the GoM may consider adopting EE trading schemes for the industrial sub-sectors, like the Emissions Trading mechanism adopted by the European Union or the "perform, Achieve and Trade" introduced by the Indian Government. This will oblige the industry to replace energy-inefficient devices and processes by more efficient alternative through capital investments cost-effectively.

Finally, to progress from the intermediate step 2 to the intended impacts, the GoM needs to ensure effective compliance of the EE trading scheme along with the periodic updating of the energy intensity indicators for industries as new technologies penetrate the market and market transformation results in the lowering of the cost of such technologies.

The impacts have been split into two categories: the intended impacts and the unintended positive impacts. The intended impacts are very much in line with the Project's overall goal of reducing global greenhouse gases (GHG) emissions through improved EE of industrial production. The unintended positive impacts are the market transformation favoring EE and the social benefits in the form of trained personnel getting better employment opportunity.

Figure 2. Reconstructed theory of change for the project



## **3.3. Implementation performance**

### **3.3.1 Relevance and ownership**

The Malaysian industrial sector accounts for the highest share of commercial energy and a high annual growth rate. The GoM is concerned about increased fossil energy demand in the industrial sector, particularly amongst small and medium industries for whom the share of energy cost in production is the highest. EE has traditionally been a low priority for the industry due to low energy prices, supported by subsidies. As a result, several barriers were encountered for financing EE options. The Malaysian Industrial EE Improvement Project was initiated in 1999 by GoM with support from GEF and UNDP in order to overcome some barriers to EE and adopt rational use of energy in the industrial sector. KETTHA and ST have been working on the promotion of EE and RE.

The 11<sup>th</sup> Malaysia Plan provides strategies to establish an enabling environment for green growth through strengthened governance, enhanced awareness and sustainable financial mechanisms. The IEEMMS Project provides valuable inputs to the 11<sup>th</sup> Malaysia Plan through its support for ensuring EE in industries. Malaysia has been involved in implementing ISO standards, including industrial management standards for quality and the environment. Keeping in line with the need to implement good energy management and SO, the Project intends to support Malaysia's efforts to promote ISO50001 as a framework for EnMS for industries.

The Project is aimed at reducing environmental impacts of economic growth through reduced energy and production costs and GHG emissions. The Project is aligned with the strategic objective 2 of GEF-4: the promotion of energy efficient technologies and practices in industrial production and manufacturing processes to tackle climate change. The IEEMMS Project is fully aligned with UNIDO's mandate to promote industrial EE. UNIDO is widely recognized as a leading advocate of industrial energy management standards and industrial energy systems optimization. With support from GEF, UNIDO has been playing a pioneering role of promoting in a large number of developing countries energy management standards as a key market-based policy tool, making EE an integral part of industrial best practice.

The Project retains its relevance in the changing environment as the GoM seeks to gradually reduce energy price subsidy which was an important barrier to the industrial EE. With the formal establishment of AEC, Malaysia is faced with the challenge of the vanishing borders with the neighboring countries and fiercer industrial competition. This is a major boost for the Project which aims at reducing the energy and production costs. The GoM has reaffirmed its commitment to fight climate change by signing the COP21 agreement at the end of 2015. The Project continues to be relevant from this perspective as it will support Malaysia's commitment to reduce the GHG intensity of GDP by 35% by 2030, relative to the emissions intensity of GDP in 2005.

### 3.3.2 Effectiveness

Achievement of Expected Outputs: The evaluation of the achievement of outputs is based on the PRF and the reconstructed ToC developed for this Project. A review of the PRF shows that the two-pronged approach adopted by the Project and the logical steps followed towards the achievements of outputs and outcomes make sense, especially to ensure long-term impacts. Experiences around the world has shown that appropriate policy framework, regulatory and incentive measures help to accelerate the adoption of EE in the different economic sectors, especially when one considers small and medium industries. Accordingly, the first two components were aimed at the concerned institutional stakeholders, namely ST, KeTTHA and EPU. The key beneficiaries of the third and the fourth components are the players from the private sector, including SIRIM and FMM. The last component was essentially targeted towards the banks and financial institutions but also the GoM for providing subsidies and promoting innovative financing mechanisms such as Energy Services Company (ESCO) and Energy Performance Contract (EPC).

The Project was successful in creating a cadre trained EE professionals in industrial facilities, public and private sector experts and suppliers of technology to provide services on EnMS and optimization of industrial systems. This has motivated the participating factories to opt for ISO50001 certification or to adopt ISO50001 compatible energy management plans, and to optimize the systems providing energy services in the industry, such as steam, compressed air, pumps and fan systems. Training assessments and meetings held during evaluation with the involved stakeholders demonstrate very high levels of satisfaction with the training provided by the experts mobilized by the Project.

The beneficiaries interviewed during the evaluation appreciated the quality of training materials and the hands-on training provided by trainers with excellent practical experiences. Based on the feedback received from the trainees, the project team worked with the trainers to adopt the training materials to better suit the Malaysian context. The use of test-beds and appropriate measuring instruments allowed the participants to enhance their understanding of the relevance of adopting systems approach for the optimization of steam, compressed air, pumping and fan systems. More detailed comments can be found in Tables 6 and 7.

The numbers that were set as targets in terms of training and capacity building were not met in some cases while in others, targets were exceeded. Factories that have adopted ISO50001 and implemented concrete EE measures appreciate the monetary savings accrued for their actions. Electricity saving measures through compressed air, pump and fan systems adopted by 49 factories have resulted in annual electricity savings of about 4.865 million MWh which is equivalent to about RM51.6 million and 3.37 million tons of CO<sub>2</sub> reduction. Likewise, the annual thermal energy savings through steam system optimization amount to 0.95 million GJ which is equivalent to over 53 thousand tons of CO<sub>2</sub> reduction. Financial analyses show that the capital investment made for reducing the electricity bills can be recovered in 3.8 years.

By the end of the Project, another 20 factories were in the process of implementing EE measures. Assessment done for these factories show that another 14,126 MWh of electricity can be saved every year, contributing to the reduction of another 9.8 thousand tons of CO<sub>2</sub> reduction, and there is potential to save 193 thousand GJ of thermal energy every year, and reduce 10.8 thousand tons of CO<sub>2</sub> emissions.

The Project also met with reasonable success in implementing outcome 2, specifically in making small and large industries aware of the benefits of EE. The peer-to-peer network established, and the various innovative approaches adopted to enhance communication among national experts, international consultants and the project team are very effective for information dissemination and awareness creation. Other supporting tools for creating awareness included workshops, information pamphlets, brochures, project case studies, etc. The project team has been very conscious to ensure that the awareness programs geographically are well spread out over the whole country, with support from both government agencies and business associations. However, no initiatives were taken to strengthen the information bureau at the ST. More detailed comments are given in Table 5.

However, the project team was not quite successful in achieving the Outcomes 1 and 5, mainly due to the lack of active engagement and contribution of the Project's institutional partners. Though the project team tried their best to mobilize highly experienced international experts to sensitize the public decision makers and share international experiences (e.g. study tour of government officials to Austria and Denmark to learn about EnMS), the final outputs and outcomes were far from being optimal. As pointed out, the NEEAP document is found to be highly unambitious, setting a target of only 6% savings over a 10-year period (2016-2025), and not highlighting the need for adopting EnMS and SO. Detailed comments can be found in Table 4.

The project team has carried out several activities to create awareness and build the capacity of financing institutions on IEE financing, however the response has been quite low: against a set target of mobilizing 200-300 people for the consultation on financial mechanisms to support IEE, only about 70 persons from factories, financial institutions and ESCOs could be mobilized. In spite of the efforts made by the project team and local IEE financing experts to propose innovative mechanism for financing medium-sized factories, the evaluation found that SME Corp was not convinced to adopt any specific measures to support investments in IEE by making changes to the existing tools (e.g. SME Competitive Rating for Enhancement or SCORE and Business Accelerator Program or BAP) employed for enhancing capabilities of SMEs through business advisory and financial support. Detailed comments for this component can be found in Table 8.

**Table 4. Assessment of the component 1: Development of national IEE policy and plans**

Planned Output and responsibility	Output target	Output achieved	Comments
<i>Outcome 1: Enhanced regulatory framework facilitating increased implementation of energy efficiency (EE) in the industrial sector in both large and medium industries</i>			
<p>1.1 Support provided for implementation of the National Energy Efficiency Action Plan (NEEAP)</p> <p><i>Responsibility: ST, KeTTHA, EPU</i></p>	<p>Policy and regulation instruments proposed to facilitate the implementation of the NEEAP, in particular those for the implementation of ISO50001 accepted and implemented</p>	<ul style="list-style-type: none"> <li>- The PMU participated in several workshops conducted during the drafting of the NEEAP</li> <li>- The 11th Malaysia Plan (2016-2020) mentions that measures will be taken to identify potential improvements and appropriate approaches to ensure efficient use of energy in industries</li> <li>- Availability of standards such as ISO50001 is mentioned in the Plan</li> </ul>	<p>Three government entities were expected to contribute to this output. The only activity that was undertaken was the participation of PMU in workshops for drafting of the NEEAP. The NEEAP document itself is highly unambitious. Only a meagre 6% saving target is set over a 10-year period, that too only considering electricity and not any other form of energy. There is no mention of EnMS (ISO50001) or SO in the document.</p>
<p>1.2 Improved reporting of data on energy use and energy intensity</p> <p><i>Responsibility: ST</i></p>	<p>Systematic data recording mandatory in large industries and voluntary in SMEs</p> <p>Database established</p>	<p>A report was submitted on the proposed new system based on requirements of stakeholders and taking into account best practices in other countries. The ST is implementing the recommendations in stages, beginning in mid-2016</p>	<p>Expertise was mobilized from the project resources to assist the ST, but the latter has decided to go ahead with another more comprehensive database to be supported by UNDP. Data recording in large industries has not been mandated.</p>

Planned Output and responsibility	Output target	Output achieved	Comments
1.3 Action plan for EE implementation in industry <i>Responsibility: KeTTHA, NRE</i>	Final project report consolidating the results and lessons learned from the implementation of the project as well as post-project strategy	The NEEAP is finalized and has been approved by the Cabinet in January 2016. Measures to improve EE in industries through EPC are being implemented	There is no specific action plan for EE implementation in industry in the NEEAP. There is no move to adopt any post-project strategy by consolidating this project's results and lessons learned.
1.4 Project M&E <i>Responsibility: MITI, NRE</i>	<ul style="list-style-type: none"> <li>- Monitoring quarterly and annually</li> <li>- Mid-term and final evaluation</li> <li>- Audit reports</li> <li>- Number of case studies and lessons learned and brochures and booklets</li> </ul>	<ul style="list-style-type: none"> <li>- Project outputs and impact are monitored on a regular basis and reported to project counterparts</li> <li>- The MTE was carried out in November 2015</li> <li>- The terminal evaluation was carried out in April 2017</li> <li>- Case studies/success stories of EnMS and SO have been documented</li> </ul>	The PMU has systematically monitored project outputs and impacts, and supporting documents are available. However, as commented on the Outputs 1.1, 1.2 and 1.3, the outputs achieved were not always in consonance with what was planned and targeted.

**Table 5. Assessment of the component 2: Awareness creation on energy management and systems optimization**

Planned Output and responsibility	Output target	Output achieved	Comments
<i>Outcome 2: Widespread awareness amongst SMEs and larger industries of the benefits of EE</i>			
<p>2.1 National information dissemination and awareness creation campaign developed and implemented</p> <p><i>Responsibility: SME Corp, FMM, KeTTHA, ST</i></p>	<ul style="list-style-type: none"> <li>- Peer-to-peer network established (to assist companies in info exchange, energy management plan design and implementation)</li> <li>- Number and quality of info materials developed and types of media (radio, TV, documentaries, newspaper, leaflets, booklets)</li> <li>- Info campaign developed on energy management, system optimization and EE in industry, in general</li> <li>- Recognition scheme established for 150 participating companies</li> <li>- Decision makers are informed through 10 events (workshops, seminars, meetings) attended by at least 300 policy makers, industry owners and</li> </ul>	<ul style="list-style-type: none"> <li>- The peer-to-peer network Basecamp has been established. GoTo Training/GoTo Meeting and Skype are used for ongoing communication between national experts, international consultants and the project team</li> <li>- A project website (<a href="http://www.ieemms.org">www.ieemms.org</a>) has been developed and is regularly updated</li> <li>- The information exchange, sample case studies and management plan design are being shared with each expert via Basecamp. All expert participants/teams are able to view, share and discuss project details and share information with each other for improvement opportunities</li> <li>- Awareness workshops are promoted</li> <li>- Information dissemination is carried out through User trainings, pamphlets, brochures, e-mail blasts and through project stakeholders' e-mail addresses, websites and newsletters</li> <li>- Companies which have agreed to be host sites and which have agreed to share information for case study purposes have been duly recognized and acknowledged for their contribution to the project.</li> </ul>	<p>The network established, and the various innovative approaches adopted to facilitate communication and exchanges between the project team, international consultants and national experts is an effective support mechanism for information dissemination and awareness creation.</p> <p>Similarly, the project website has been a good support disseminate inform and update the stakeholders on the activities undertaken and the results achieved.</p> <p>Other supporting tools including awareness workshops, information pamphlets, brochures, project case studies, etc. are very effective to spread the message regarding the</p>

Planned Output and responsibility	Output target	Output achieved	Comments
	managers on EE industry	<ul style="list-style-type: none"> <li>- Of the 80 companies that participated in the expert program, about 20 of them are presented with certificates during the Open Day held in 2014. During the Certificate Presentation ceremony held in October 2016 at MITI HQ, a total of 44 factories/facility representatives and 70 expert participants received certificates from the MITI Minister. Project updates and case studies were also presented during the ceremony.</li> <li>- A video on the project was presented during the Certificate Presentation ceremony held in October 2016</li> <li>- More than 39 awareness trainings have been carried out including training of municipal personnel. The total number of attendees for these trainings exceed 1,400, mainly industry personnel</li> </ul>	<p>tangible benefits of EE.</p> <p>Awareness programmes were well spread out over the whole country, conducted with support from government agencies and business associations.</p> <p>It will be a pity if all these supporting tools as well as the website are not maintained and updated, jeopardizing the sustainability of the project benefits.</p>
<p>2.2 Strengthened information bureau at the ST</p> <p><i>Responsibility: ST</i></p>	<ul style="list-style-type: none"> <li>- Upgraded and inter-linked website at GreenTech M. to provide integrated info on EE</li> <li>- Project newsletter with regular reporting on progress and results</li> </ul>	# project newsletters were prepared during the first 3 years of project implementation (2012, 2013 and 2014)	There is no initiative taken to strengthen information bureau at the ST. The project has brought out 3 newsletters during the first 3 years of project implementation but there has not been any follow-up.

**Table 6. Assessment of the component 3: Energy management systems**

Planned Output and responsibility	Output target	Output achieved	Comments
<i>Outcome 3: A cadre of highly specialized energy management experts from the public and private sectors is available as a long term technical resource to industry and the country</i>			
3.1 Energy management training materials developed <i>Responsibility: SIRIM, FMM</i>	Training materials and software available on EnMS adapted to Malaysian circumstances	EnMS training materials have been developed by UNIDO and local experts and adapted to the Malaysian context, with inputs from PMU and technical advisers. These training materials have been continuously developed and used extensively in the EnMS trainings conducted by UNIDO and the local experts. They have received positive feedbacks from industry.	The evaluation has received positive feedbacks from the industries visited and the experts met. Also, the EnMS training materials have been found to be of high quality, further adapted to the local context.
3.2 Strengthened capacity of SIRIM and SIRIM QAS <i>Responsibility: SIRIM</i>	SIRIM is acknowledged as lead auditor certifier for ISO50001, and SIRIM QAS is qualified to certify ISO50001 compliance	SIRIM staff have actively participated in EnMS User and Expert training: - An EnMS training specifically for SIRIM QAS (the accreditation body) personnel has been conducted - SIRIM QAS has certified almost 20 facilities for ISO50001 compliance.	Positive feedback has been received from SIRIM regarding the training received from international experts; also, SIRIM has also confirmed having ISO50001-certified a growing number of industrial facilities.
3.3 Trained expertise on EnMS <i>Responsibility: FMM</i>	- 40 national experts trained - Energy managers and technical staff are trained at 15 training sessions for 500 factories	- 401 personnel have attended EnMS User trainings; 16 EnMS trainings have been conducted with 97 industries participating - 77 have undergone EnMS expert	The report of the “Outputs and impact of the IEEMMS project” has well documented all the training activities offered by the project to the satisfaction of the

Planned Output and responsibility	Output target	Output achieved	Comments
	<ul style="list-style-type: none"> <li>- 10 follow-up training sessions for 300 factories</li> </ul>	<p>training. Of this number, 51 have been qualified as EnMS experts</p> <ul style="list-style-type: none"> <li>- More than 10 follow-up trainings have been conducted by local experts to more than 52 factories, sites and agencies (classroom and on-site trainings)</li> </ul>	<p>national experts, government officials and energy managers as well as the technical staff of the participating factories. The number of experts trained have exceeded the target though the number of factories participating in the training is 20% lower.</p>
<p>3.4 Implementation of EnMS at the factory level <i>Responsibility: FMM, SME Corp, ST</i></p>	<ul style="list-style-type: none"> <li>- 300 companies implement operational improvements</li> <li>- 100 companies implement ISO50001 compatible energy management plans</li> <li>- 30 companies reported as case studies</li> </ul>	<ul style="list-style-type: none"> <li>- 149 factories are in various stages of implementing EnMS and the associated operational improvements; 13 local EnMS consultants are assisting factories to implement the ISO50001 requirements</li> <li>- Around 38 companies are implementing ISO50001 compatible energy management plans</li> <li>- 31 case studies have been identified and their savings have been verified</li> <li>- An additional 10 factories are being assisted by local EnMS consultants towards ISO50001 certification. These factories plan to go for certification between 2017 and 2018.</li> </ul>	<p>The number of factories that are at various stages of implementing EnMS are about half of the initial target. The companies implementing compatible energy management plan are also about half of the initial target set. This is comprehensible as it takes longer for SMEs to grasp and take energy management actions.</p> <p>The target of the case studies, on the other hand, has been exceeded.</p>

**Table 7. Assessment of the component 4: Systems optimization**

Planned Output and responsibility	Output target	Output achieved	Comments
<i>Outcome 4: A cadre of highly specialized systems optimization experts from the public and private sectors is available as a long term technical resource to industry and the country</i>			
4.1 Training materials and software tools available on systems optimization  <i>Responsibility: FMM</i>	Training materials and software available on Systems Optimization adapted to Malaysian circumstances	Systems Optimization training materials have been developed by UNIDO and local experts and adapted to the Malaysian context. These training materials have been continuously developed and used extensively in the SO trainings conducted by UNIDO and the local experts. They have received positive feedbacks from industry.	The evaluation has received positive feedbacks from the industries visited and the experts met. Also, the SO training materials have been found to be of high quality, further adapted to the local context.
4.2 Strengthened capacity of FMM  <i>Responsibility: FMM, SIRIM</i>	FMM is able to provide User training and Expert Training to factory personnel	Trainers attached to FMM (15 trainers) at its various branches have attended the SO User and Expert trainings. They will be a resource to FMM when they conduct the SO trainings in future, utilizing the on-the-job experience gained	Trainers attached to FMM have been trained but there was no opportunity for them during the project implementation to demonstrate their capacity to serve as resources for future SO trainings.
4.3 Trained expertise on systems optimization  <i>Responsibility: FMM</i>	<ul style="list-style-type: none"> <li>- 50 national experts trained</li> <li>- 12 training sessions for staff of 350 factories on steam, pump, motor/fan, and compressed air systems</li> <li>- 12 follow-up training</li> </ul>	<ul style="list-style-type: none"> <li>- 502 have attended SO experts training – 87 have qualified as SO experts</li> <li>- 15 training sessions to 372 industries have been completed</li> <li>- More than 12 follow-up training sessions have been carried out during the</li> </ul>	Most of the targets set for develop expertise in SO have either been met or have been largely exceeded. Specialized sessions have been conducted to cover the different energy services adopted in different types of industries, such as compressed air systems, fan

Planned Output and responsibility	Output target	Output achieved	Comments
	sessions for 150 factories	assessments by local experts	systems, steam system and pump system.
<p>4.4 Suppliers participating</p> <p><i>Responsibility: FMM</i></p>	<ul style="list-style-type: none"> <li>- About 4-5 training and info events on market opportunities in which at least 60 vendors/suppliers participate</li> </ul>	<ul style="list-style-type: none"> <li>- 4 vendor trainings have been conducted with a total of 37 vendors/suppliers attending</li> <li>- 35 vendors/distributors have attended the SO User trainings</li> </ul>	<p>Though less number of equipment vendors, suppliers and manufacturers took part in the training, the trainees were satisfied with the knowledge gained on SO and how they could reshape their market offerings to reflect the knowledge gained.</p>
<p>4.5 Implementation of systems optimization at the factory level</p> <p><i>Responsibility: FMM, SME Corp</i></p>	<ul style="list-style-type: none"> <li>- Operational improvements in 100 companies</li> <li>- 75 completed systems assessments</li> <li>- 50 companies have implemented optimization activities</li> <li>- 20 companies reported as case studies</li> </ul>	<ul style="list-style-type: none"> <li>- About 58 companies have participated as host companies either during the expert training or as additional host sites</li> <li>- 49 systems assessments have been completed</li> <li>- 31 case studies on SO and EnMS have been compiled</li> </ul>	<p>Though the number of companies who have completed systems assessment fall short of the target quite a bit, the results achieved are satisfactory. Moreover, those companies interviewed during the evaluation were particularly happy with the knowledge gained and monetary savings accrued.</p>

**Table 8. Assessment of the component 5: Access to finance for industrial EE improvement**

Planned Output and responsibility	Output target	Output achieved	Comments
<i>Outcome 5: SMEs and large industries have coordinated access to technical and financial assistance for implementing EE projects, including systems optimization</i>			
<p>5.1 Awareness raised, and capacity built on IEE financing for financing institutions</p> <p><i>Responsibility: SME Corp, Development Banks</i></p>	<p>At least 10 information and consultation events on financial mechanism supported by the project attended by 200-300 people</p>	<ul style="list-style-type: none"> <li>- 4 information meetings have been conducted with SME Bank and 5 other banks by PMU and local financial expert</li> <li>- Discussions with financial institutions, energy service companies, SME Corp, Ministry of Finance and stakeholders carried out</li> <li>- Workshop on “Financing Scheme and Options for industries” were conducted and participated by over 70 persons (factory representatives, financial institutions, local banks and ESCOs) in July 2016</li> </ul>	<p>The project team has not been able to meet the set target number of people from banks and financial institutions in terms of raising awareness and building capacity on IEE financing</p>
<p>5.2 Strengthened capacity of FMM</p> <p><i>Responsibility: SME Corp, FMM</i></p>	<ul style="list-style-type: none"> <li>- Harmonized criteria for techno-economic evaluation of industrial EE projects</li> <li>- Assistance given to SME Corp to provide EE-related soft loans, either in setting up or supporting existing systems</li> </ul>	<ul style="list-style-type: none"> <li>- Workshop report prepared by local financial expert highlights unreadiness of industries to implement EE</li> <li>- Brochure on information regarding EE incentives and available access to financing prepared</li> <li>- Local financial expert prepared a paper on SME competitive Rating for</li> </ul>	<p>Though workshops have been conducted, information disseminated, and green financing document have been prepared for SME Corp, they do not meet the outputs targets set by the project. The project has not undertaken any activity to strengthen the capacity of FMM by developing</p>

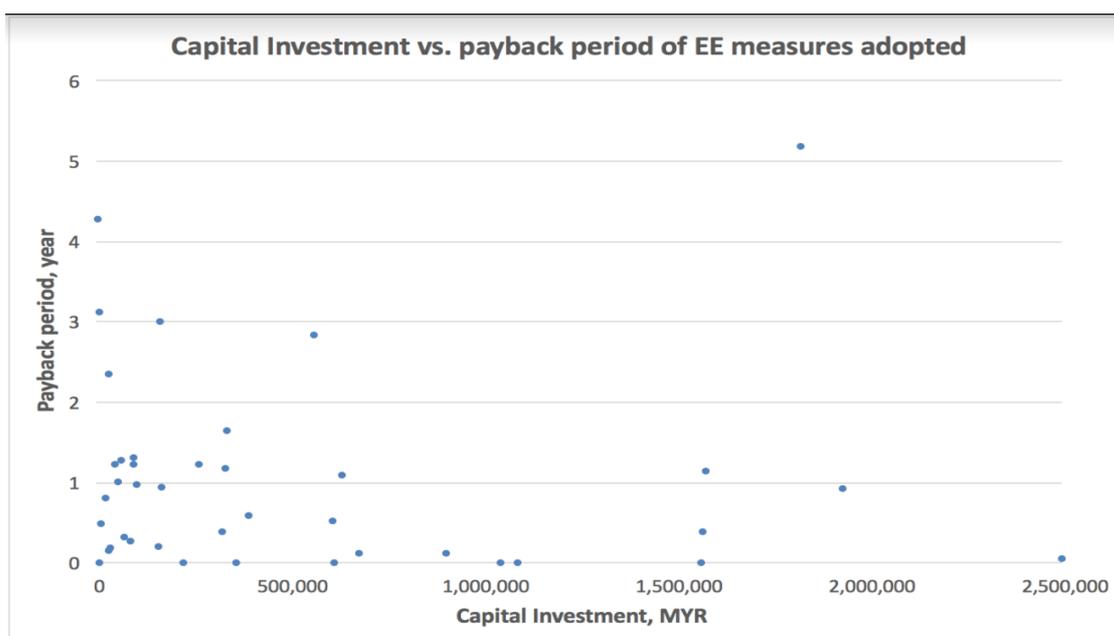
Planned Output and responsibility	Output target	Output achieved	Comments
		<p>Enhancement (SCORE) system for financing medium-sized factories</p> <ul style="list-style-type: none"> <li>- A proposal paper to SME Corp to have a separate section on Green Financing submitted</li> <li>- 9 investment projects on compressed air system, steam and pump systems have been completed</li> <li>- Other assessments of investment projects on compressed air, pump, fan and steam systems being developed and verified</li> <li>- Industries continue to be supported on implementation of investment projects at factory level</li> </ul>	<p>harmonized criteria for techno-economic evaluation of IEE projects.</p> <p>Discussion held with SME Corp during the evaluation led to the conclusion that SME Corp has its own specific products such as SCORE and BAP that can be linked with the EE-related soft loan that the project is promoting. Moreover, the GTFS applies different eligibility criteria to obtain finance for the adoption of green technologies. There is a mismatch between the outputs delivered against the targets set.</p>

Catalytic or replication effects: UNIDO and GEF are working together to create widespread awareness among industries about the benefits of EE and support the creation of a cadre of specialized experts to propagate EnMS and SO. The Project has undoubtedly created an enabling environment for strengthening the capacity of public and private players in the provision of EnMS and SO services to industrial enterprises. It has also trained experts who in turn can train others and accompany industries in the implementation of concrete measures that guarantee lower dependence on fossil fuels and monetary as well as environmental benefits. The Project has catalyzed behavioral changes through case studies, in both industrial decision makers as well as technology providers. Feedbacks from the trained experts confirm that they are now providing training and assisting more industrial enterprises to replicate activities that were documented as case studies.

Longer-term impact: The ROtI approach is employed to assess the likelihood of impact by building upon the concept of ToC, as elaborated in Section 3.2.1. Two intermediate states have been identified before the final impact. The Project’s direct outcomes contribute to move towards these intermediate states. Some of the key factors identified in the reconstructed ToC are “drivers” whom the Project can influence, whereas others are “assumptions” which are beyond the control of the Project.

Intermediate state 1: Two drivers need to be in place to move from the outcomes towards this intermediate state: (1) The GoM gradually reduces energy subsidy, making EE more cost-effective and competitive; (2) Sectoral benchmarks are developed to make manufacturers aware of the EE gaps to be bridged. This is important because analysis of the data from case studies shows that in spite of getting exposed to EnMS and SO, industries have mostly adopted no cost/low cost measures with very short payback periods (see Figure 3).

**Figure 3. Capital investment versus payback periods of EE measures**



Most of the measures adopted are in the energy utility areas and not the process itself, which normally provides considerable upstream savings from the SO perspective. Also, industries have no way to know if the energy consumption of their factory is high, low or just alright in comparison with the specific energy consumption (SEC) of similar industries (same industrial sub-sector). The energy performance indicator (EPI) is a key indicator that enables energy managers and corporate executives to evaluate how efficiently the factory is using energy relative to similar facilities. The EPI can be derived from facility-level production and energy data and then normalized for key factors that drive energy use (such as plant utilization, weather, product mix, and facility and product characteristics) to ensure a meaningful comparison among the factories of the same sub-sector. Benchmarking allows to know: (a) the state-of-art performance in a given (sub-) sector; (b) how a given factory compares against the state-of-art; and (c) how it compares with the majority of factories in the (sub-)sector. A benchmarking covenant can be a multi-year agreement between the GoM and the industry to achieve top energy performance. A good example of energy covenant is that adopted by the Netherlands, encouraging Dutch industries to achieve a level of EE equal to the top 10% of the world.

The transition from the outcomes to intermediate states 1 is dependent on several assumptions:

- The GoM allocates resources for developing capacity to monitor data and ensure higher energy productivity and lower energy intensity in the industrial sector;
- The information bureau of the ST continues to generate awareness about the benefits of EE, management and technology;
- SIRIM supports the energy management training and certification that is specially designed for SMEs;
- Universiti Tenaga Nasional (UNITEN) and Malaysian Association of Energy Service Companies (MAESCO) support SMEs and equipment suppliers in energy SO during retrofits and production facilities enhancement in industries; and
- Banks / financial institutions develop specific products to promote EE financing in partnership with EE experts and technology suppliers.

The following driver needs to be in place to move towards the next intermediate state, which also happens to be the objective of the Project: the GoM introduces schemes for EE trading within industrial sub-sector. This concept is similar to the European Emission Trading Scheme (ETS) or the Perform, Achieve and Trade (PAT) scheme adopted for large industries in India.

Impact: One more driver needs to be in place to move from the intermediate state 2 to the impacts (GHG emissions from industry is reduced and EE of industrial production is improved). As technologies evolve and industries undergo behavioral changes to adopt good management practices, the GoM puts in place mechanism to periodically update the energy intensity indicators and ensure their strict enforcement.

This transition to achieve the impacts is dependent on another assumption: international loans are available to banks / financial institutions at preferential rates to make EE investment attractive.<sup>2</sup>

### **3.3.3 Efficiency**

As stated in the project document, the MIEEIP implemented by UNDP had contributed to creating greater awareness on EE. However, several barriers were identified as the key reason for EE being a low priority for the industry; the Project was designed to address the barriers by providing institutional, organizational and technical assistance to the key project partners. The Project was expected to be closely coordinated with national initiatives to promote EE, and with similar projects UNIDO was undertaking in South East Asia as well as with Jakarta-based ASEAN Energy Centre which had established an accreditation scheme for energy managers and was delivering training on energy management in the ASEAN countries.

Among the major factors contributing to the Project's efficiency were:

- Efforts made by the PMU to coordinate with and provide support to KeTTHA and EPU on long-term demand management programs;
- Establishment of an information exchange network and communication platform to share case studies and best practices with experts and industry representatives;
- Mobilization of experienced international experts to raise energy management awareness among industrial stakeholders and the GoM personnel;
- Strengthening the capacity of national expert trainers who are already conducting training for industrial enterprises

As elaborated in Section 3.3.2, the project team was successful in achieving the expected outcomes within budget, particularly in the utilization of resources for awareness, training and capacity building programs, ensuring a good geographical coverage over the whole country. While the Project took a little longer time to complete all activities, this has not affected adversely the Project's effectiveness.

The Evaluation team was made aware of some of the factors that reduced the Project's efficiency. Better results could have been obtained for outcomes 1 and 5 if the Project's key institutional partners had been more active and

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<sup>2</sup> Malaysia intends to reduce its greenhouse gas (GHG) emissions intensity of GDP by 45% by 2030 relative to the emissions intensity of GDP in 2005. This consists of 35% on an unconditional basis and a further 10% is conditional upon receipt of climate finance, technology transfer and capacity building from developed countries.

committed in their engagement with the Project. While EE promotion was the key focus of the Project, EE is not in the mandate of the principal project executing agency (MITI) or the agencies under MITI (MIDA and SME Corp). On the other hand, those Government agencies with mandate to promote EE did not play a very active role and failed to make adequate use of the opportunity given by the Project to conceive more ambitious EE policies for achieving demand management targets in line with the country's commitment to reduce its GHG emissions by 2030.

While the creation of a training center dedicated to energy and water efficiency was discussed in 3 consecutive years by the PSC, no progress was made in this direction. As a result, the PMU was obliged to take the lead in managing and conducting the training program without the involvement of any agency which could sustain the training programmes in future by learning through its active participation during project implementation.

As stated in the terminal report, the amount granted for the Project was fully utilized and the co-financing has been higher than that confirmed in the project proposal. However, the co-financing from the Government agencies has been less than a quarter of what had been committed. Since all the GoM commitment was in kind, this is a good indication of the lack of involvement and participation of the institutional stakeholders in managing and leading some of the key components.

Lastly, though an outcome-based budget was submitted to GEF in the project document, outcome-level expenditures are not available for the Project. Based on the feedback received from UNIDO, though the SAP (Systems, Applications and Products) enterprise resource planning system was introduced in 2012, project expenditures were not fully applied across the output-based budget until late 2014.

### **3.3.4 Assessment of risks to sustainability or project outcomes**

Sustainability is understood as the likelihood of continued benefits from the project implementation after the Project ends. The four aspects of risks that may affect project sustainability include financial risks, socio-political risks, institutional framework and governance risks and environmental risks. These risks are assessed in this section.

Financial risks: As demonstrated in the Project, financial resources are necessary to transform policy, plan, expertise, etc. into action. Industries that have participated in the Project have demonstrated their ability and capacity to mobilize resources both for capacity building and investing in EE improvement measures. By sharing knowledge and suitable tools, the Project has strengthened the capacity of the national experts to impart EE training to industries and support them in developing long-term energy management plans.

As far as the GoM is concerned, budget has been allocated for the implementation of the National EE Master Plan, including the action to be taken to promote EE and management in industries. Also, GTFS has been

established to support the adoption of green technology in business, including energy generation and utilization in industries.

Analysis of the EE measures adopted by the industries shows they have mostly gone for options that require low capital investment and guarantee fairly quick returns on investments. Secondly, most of the enterprises that have participated in the Project are large industries. More efforts would be needed to engage small and medium industrial enterprises and more innovative financial schemes need to be conceived and proposed to suit the concerned industries.

The other points of concern are the FMM's lack of resources to support EnMS and SO training, and the lack of commitment by any of the project stakeholders to facilitate coordinated access to technical and financial assistance for EE investments.

Socio-political risks: A key socio-political risk that may jeopardize the sustainability of project outcomes is the lack of ownership by key institutional and private players. The Project has focused on creating awareness and building capacity of both institutional and other stakeholders. The private sector has demonstrated its intention to reap the benefits of EE through capacity building activities and investing in improvement measures, the key institutional partners have been less than forthcoming in this regard. The national experts who have been trained by the Project are already assisting industries in conducting training and developing energy management plans.

Discussions held during the evaluation, the key institutional stakeholders have confirmed their support in favor of the Project's long-term objectives and the importance of the Project's benefits to continue to flow. However, there appears to be some gap between the rhetoric and the reality, and this needs to be bridged for the sustainability of project outcomes.

Institutional framework and governance risks: The activities undertaken in the Project have created the necessary awareness and strengthened the technical capacity to provide expertise in EnMS and energy systems optimization. The Project was successful in imparting training to personnel of SIRIM (the ISO 50001 accreditation body) which in turn has been certifying a growing number of industrial facilities.

Though the integration of ISO 50001 energy management standard is not explicitly mentioned in the NEEAP, the document specifies that EnMS will be improved for continuously implementation and tracking the EE measures and practices.

There is, however, some minor risk in terms of legal frameworks, policies and governance structures and processes. Both KeTTHA and ST have a narrow mandate to deal with electricity alone and there is no clear indication as to

which agency should also look after thermal energy, particularly in the industrial sector<sup>3</sup>. This is reflected in the NEEAP which only considers reducing electricity usage and avoiding the need for the construction of new thermal power plants.

Environmental risks: The adoption of EE in the industrial sector through the various activities initiated by the Project such as the adoption of EnMS and systems optimization combined with measures to invest in EE measures will undoubtedly result in reducing dependence on fossil fuels and reaping the benefits in terms of GHG emissions. The choice of suitable technology and fuel will help to abate the environmental impacts considerably. Hence, there is no perceived environmental risks to the sustainability of project outcomes.

As pointed out earlier, the emission reduction targets set in the NEEAP are very conservative, more so because they do not account for the GHG emission reduction from the avoided fuel demand associated with thermal energy savings.

### **3.3.5 Assessment of Monitoring and Evaluation (M&E) systems**

M&E design: The M&E design followed UNIDO's standard M&E procedures and GEF guidance on project monitoring. The M&E plan in the project document included chronological steps to monitor results and track progress towards achieving project objectives. These include project inception followed by semi-annual and annual reviews, an independent mid-term and a terminal evaluation. The section on project management described the parties responsible for monitoring the performance indicators.

The PRF included objectively verifiable indicators and means of verification for the Project's objective and outputs. The expected direct and indirect reduction of emissions is estimated, making reasonable assumptions. However, no specific indicators were included to determine the progress of the Project towards project outcomes.

M&E plan implementation: The M&E implementation has been very systematic, following the M&E plan rigorously, thus making it easier to track the timely progress by the Project. Apart from the report schedule outlined in the M&E plan, monthly and quarterly progress reports were prepared, allowing to further refine the activities to meet the expected milestones.

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<sup>3</sup> The two main primary forms of energy are fossil and non-fossil. Neither electricity nor thermal energy is primary energy, and both these energies can be converted from both fossil and non-fossil energy sources.

All key outputs of the Project such as reports, brochures, pamphlets, materials for awareness, training and capacity building activities have been delivered. The mid-term review was discussed, and action taken to address the issues raised in it. Project final report as well as the impact study were prepared and shared with key stakeholders. The Project's terminal evaluation has been conducted in accordance with the project M&E plan and GEF guidelines.

Budgeting and funding for M&E activities: To achieve the expected outputs and outcomes, the project document specified budget lines only at the outcome level but not at the activity level. However, adequate budget was allocated in the project document to carry out M&E activities, including the organization of inception workshop, measuring project impact indicators, and conducting mid-term and final evaluations.

### **3.3.6 Monitoring of long-term changes**

The Project has assessed the impact of the activities undertaken to save energy and reduce CO<sub>2</sub> emissions; it has however not contributed to the establishment of a long-term monitoring system. Though the intention of the Project was to make systematic data recording mandatory in large industries and voluntary in SMEs, it did not succeed in achieving this output, mainly because of the inadequacy in the GoM's commitment.

Moreover, no concrete institutional structure was envisioned along with the financing needed to sustain the Project's activities after project completion.

The Project had procured equipment for training and instruments for measuring parameters needed for energy analysis. These were transferred to a national university just a few months before the project closure with the understanding that the university will be responsible for not only managing the equipment and instrument but also capacity building. Incidentally, the university does not have the required expertise to carry out the assigned tasks as it had not participated in the training and capacity building activities undertaken by the Project.

### **3.3.7 Assessment of processes affecting achievement of project results**

Preparation and readiness: The project document presents the intervention logic in a structured manner, taking into account what had been achieved in the MIEEIP Project and identifying the hurdles yet to be overcome for the implementation of EE in Malaysia.

The Project's objectives and components were clear, practicable and feasible within the proposed timeframe; this has been proven well by the outputs and outcomes attained by the Project. As stated earlier, indicators were developed for the outputs and objectives, but not for the outcomes in the PRF.

The project document was prepared in consultation with the relevant stakeholders and the capacities of the executing institution and counterparts were considered during the project design. This is reflected well in the project implementation management organogram that mentions clearly which

component would be led by which organization. As the main focus of the Project was the industrial sector, MITI was rightly chosen as the executive agency for the Project. Co-financing for the Project was secured in cash and kind from both institutional stakeholders as well as the key private sector players.

Country ownership/drivenness: As the industry sector accounts for the highest energy use in Malaysia and its energy demand is expected to rise, the project concept is in line with the sectoral and development priorities of the country. The Project was designed in consultation with the key institutional stakeholders who have been actively engaged in improving EE in industry. It takes into consideration the past learning and the identified barriers to the adoption of EE in industry.

During the implementation of the Project, most institutional partners displayed their intent to support the Project but failed to demonstrate ownership and commitment in terms of managing project implementation. Financial commitments were made by stakeholders from the GoM as well as the industry. Government agencies participating in the Project were expected to contribute financially to the Project in kind through the involvement of their staff and provision of facilities.

The terminal report shows that the in-kind contribution of these organizations was very small compared to what was initially committed, showing the limited involvement of the GoM in the Project. This can be partly attributed to the shortage of staff with adequate knowledge of the subject in the GoM institutions and frequent changes of personnel assigned to contribute to the Project.

The PSC met, but played a very limited role in providing strategic guidance and oversight to project implementation. As individuals representing the various stakeholders in the PSC meetings were rarely the same, they could not contribute effectively due to the lack of continuity and limited institutional memory of the various activities undertaken by the Project. This could also be the principal reason for the GoM not taking up the adoption of specific policies and regulatory frameworks in line with the Project's objectives.

Stakeholder involvement and consultation: Most of the stakeholders identified during the Project's formulation showed interest and enthusiasm in the execution of the Project and collaborated in the conduct of project activities. The Project achieved reasonable success in collaborating with FMM and SIRIM for creating greater awareness, enhancing knowledge, implementing ISO 50001 and demonstrating the tangible benefits of EE in industry.

Project beneficiaries recognize the support provided by the Project to build technical capacity related to EnMS and SO, and have reciprocated by contributing financially for user and expert training, and investing in EE measures. Many of the members of MAESCO have benefitted from training imparted by international experts during the Project; as a result, the responsibility of conducting EnMS training has been entrusted to MAESCO by transferring the training materials developed and fine-tuned during the Project.

As explained in the earlier section, lesser involvement of some of the GoM organizations led to deficiencies in the delivery of some of the outputs and outcomes related to policy formulation and coordinated access to technical and financial assistance. This is also the prime cause for some of the uncertainties looming over the sustainability of project initiatives.

Though the PSC raised several times the importance and benefits of creating an EE and Water Training Centre for Malaysia, there has been no progress in this regard, reflected by the fact that a decision was taken prior to the project closure to transfer the project equipment to UNITEN and making it responsible for conducting the System Optimization courses though UNITEN had no history of collaboration during the project execution.

Financial planning: The Project's financial plan presented in the project document and approved by GEF only included budget at the component level. The Project's financial management was ensured by UNIDO HQ staff who developed the Annual Work Plan (AWP) jointly in consultation with PMU. The AWP was approved in the PSC meetings before its execution.

On the basis of the AWP, UNIDO HA staff selected and mobilized international experts for the various activities in collaboration with the PMU. On the basis of the budget prepared by PMU, funds were allocated by UNIDO HQ for covering the monthly local expenses (salaries, office operation, hiring of local consultants, organization of workshops and training sessions, preparation of awareness and promotional materials, etc.).

Annual expenditure statements shared by UNIDO HQ show that the project activities have been completed within GEF-allocated budget, demonstrating the timely flow of funds to complete the planned activities (see Table 9).

**Table 9. GEF budget disbursement and status after project completion**

Year	Budget (US\$)	Expenditure (US\$)
2012 and before	964,435	965,168
2013	886,776	886,592
2014	1,153,855	1,153,766
2015	919,375	920,345
2016	335,552	335,673
Up to April 2017	93,924	93,251
<b>TOTAL</b>	<b>4,353,917</b>	<b>4,354,796</b>

Source: <https://open.unido.org/projects/MY/projects/103042>

As for the co-financing, it has been leveraged by the counterpart government agencies and the industry (see Table 10).

**Table 10. Sources of co-financing for the project**

	Classification	Co-financing (USD)		Total (USD)
		Cash	In kind	
SME Corp	Government	300,000	180,000	480,000
KeTTHA	Government		208,000	208,000
ST	Government		106,000	106,000
EPU	Government		106,000	106,000
FMM	Industry		600,000	600,000
Industry	Private	5,257,000	12,350,000	17,607,000
<b>TOTAL</b>		<b>5,557,000</b>	<b>13,550,000</b>	<b>19,107,000</b>

Source: Terminal Report, March 2017

Since the Project's financial plan did not include budget at activity level, no breakdown of final actual project costs is available by activities. Even the actual project expenditures are not available at the component level.

UNIDO supervision and backstopping: UNIDO HQ staff have provided continuous support for the smooth execution of the Project over the whole duration of the Project. They were able to finance activities in a timely manner and mobilize competent and experienced experts to carry out training and capacity building activities. This is reflected by the positive feedback received from beneficiaries from industries and the local experts who participated and benefitted from the EnMS and SO training sessions.

The UNIDO Project Manager travelled as frequently as necessary, in some cases combining project activities with other UNIDO initiatives in Malaysia. UNIDO was represented by either the Project Manager or the Director of UNIDO's regional office in Bangkok in 4 out of 6 PSC meetings held between 2012 and 2016. The two times that UNIDO was not represented in the PSC meetings was mainly due to last-minute changes of dates on the Malaysian side.

There were regular and effective coordination between UNIDO HQ staff and PMU team. Engagement of qualified and competent key personnel at the PMU has helped to achieve satisfactory results despite facing issues related to the limited counterpart support from the key stakeholders and the difficulty in getting right candidates with expertise and skill to fill up the positions in the PMU. The PMU made considerable efforts to ensure that the training and capacity building activities were carried out all over Malaysia, with frequent field missions of PMU along with international and national experts to ensure continuity and effectiveness.

Co-financing, project outcomes and likelihood of sustainability: The level of co-financing mobilized by the Project's stakeholders was presented in Table 10. Much of the co-financing came from the industry/private sector, thanks to the adoption of EnMS and cost-effective EE measures by several large industries.

However, the co-financing from institutional partners was meagre compared to what was committed at the time of CEO endorsement. This is predominantly due to the limited involvement of their staff in the Project.

The sustainability of all that was initiated during the implementation of the Project is in question due to the lack of vision to pursue the pathway in order to achieve the intended impacts. In the absence of strong policies and innovative financing in place, the Project has demonstrated that even the large industries will mostly opt for the so-called “low-hanging” EE measures. Financing itself does not appear to be an issue; what is lacking is a targeted allocation of funds to support action needed to move from project outcomes to the intended impacts, as elaborated in the ToC section.

Delays, project outcomes and sustainability: As it is often the case, it took a little while for the Project to take off as it required some lead time to get all partners and beneficiaries on board and set up the PMU. This has, however, not jeopardized the expected outputs mainly due to the credible efforts made by the PMU with the close collaboration of the key institutional and industry partners.

The documented case studies highlight the fact that the Project has done well to convince industrial enterprises to build their capacities and benefit from the concrete EE measures implemented by them. Also, the SO training imparted to manufacturers, vendors and suppliers of EE technologies has helped them to better serve their industrial clients by adopting a more integrated approach. As expected, large industries with high energy costs have been more enthusiastic to take part in the Project, whereas the participation of medium-sized industries has been limited. If the awareness raising and capacity building initiatives are sustained, the documented success stories combined with the market transformation for EE technologies are likely to have trickle-down effect, thus benefitting medium-sized industries in the long run.

Implementation and execution approach: As outlined in the project document, the intent during the Project’s design stage was clearly to involve the key stakeholders in an active manner so as to ensure adequate engagement of national counterparts and strengthening of their capacities to sustain project initiatives. In reality, UNIDO had to take over the responsibility of implementing all project activities through the PMU which was fully staffed by the Project, mainly due to the inability of the counterpart organizations in mobilizing the necessary support to manage the components, as proposed in the project document.

Staffing issue seems to be serious concern not only for the Project but also for the institutional stakeholders, as demonstrated by the frequent change of the nominated representatives in the PSC. Due to the prevailing circumstances, UNIDO was less successful in striking a fine balance between engaging sufficiently and giving enough responsibility to the national stakeholders so that they assume full ownership of the Project. In this context, it may be pointed out that UNIDO had to even hire a space to store all the equipment and testing facilities acquired for conducting practical training activities. It is only during the last phase of the Project that the PSC made the decision to hand over all these

assets to UNITEN which was nowhere in picture during the implementation of the Project.

Environmental and social safeguards: As environmental and social risks considerations were not a requirement for GEF-4 Project, they were not incorporated in the project design.

### **3.3.8 Project coordination and management**

Management and coordination of the Project has been efficient and effective, especially if one takes into consideration the local eco-system in which there is a shortage of competent human resources in government organizations. According to the project document, the lead project partners were expected to depute their staff to manage the 5 components and will be supported by Technical Advisers appointed by UNIDO in consultation with NPD. In reality, no Component Manager was deputed by the key project stakeholders to manage the component. As a result, the onus of managing the components fell on the PMU. In coordination with the key counterpart entity (MITI), UNIDO created the PMU which was housed in the SME Corp and was responsible for handling all the project components and performing all the tasks planned to achieve the expected outputs. UNIDO faced some challenges initially to hire qualified staff to fill up all the positions for the full-scale operation of the PMU, it was however resolved later.

The enterprises interviewed during the TE showed their genuine appreciation for the type of support provided by UNIDO in mobilizing highly competent and experienced trainers for capacity building and the hard work and dedication of the PMU in reaching out to them and addressing their specific needs. This was mainly possible because of the deep commitment and involvement of 2 key players in the PMU complimenting each other. The NPM retained by UNIDO has long years of professional experience and very good understanding of how the Project's institutional partners function. The Assistant Project Manager ably supported the NPM thanks to her technical capacity and personal dynamism and was able create an excellent relationship with the local beneficiaries (participating experts and industries).

### **3.3.9 Assessment of gender mainstreaming**

As gender mainstreaming was not a requirement for GEF-4 Project, this dimension was not incorporated in the project design. However, during the project implementation, measures were taken to raise awareness on gender dimensions relevant to project management and execution.

Limited participation of women in the Project is mainly due to the ground realities. Much of the project activities involved training and capacity building of local experts and staff of industries who are active in the technical and management issues of energy. There are very few women in Malaysia who choose to take up a profession in such fields of specialization.

Nevertheless, women were involved in several project activities and benefited from the Project. Women outnumbered the men among the staff hired by

UNIDO for the PMU. Many of the staff of the key project partners met during the TE happened to be women. However, no women participated in the meetings held during factory visits.

Based on the findings, the summary assessment and ratings by evaluation criterion is presented in Table 11.

**Table 11. Summary assessment and ratings by evaluation criterion**

Criterion	Summary comments	Rating
Attainment of project objectives and results	The overall rating is based on the ratings for Effectiveness and Relevance	S
Effectiveness	The Project was successful in creating awareness among small and large industries all over Malaysia of the benefits of adopting EE, and in developing a cadre of trained EE professionals who are capable of providing services on EnMS and SO. International experts were mobilized to sensitize the public decision makers and share international experiences, but the results have not been so evident in terms of enforcing policies and proposing action plans that can serve as important drivers for sustainable EE improvements in industries. Also, though innovative EE financing mechanisms have been proposed for medium-sized industries, SME Corp has neither adopted any specific measures nor made any tangible alterations to the existing eco-system for supporting EE investments in SMEs.	S
Relevance	The Project relevant to Malaysia's energy and environmental priorities. It supports GoM's commitment to fight climate change by reducing GHG intensity of GDP. It is consistent with UNIDO's industrial EE mandate to reduce environmental impacts of economic growth through reduced energy and production costs and GHG emissions. It is aligned with GEF's objective of promoting EE technologies and practices in the manufacturing sector. The Project is designed to address the key existing barriers and contribute to the diffusion of energy efficient technologies and practices in the manufacturing sector.	HS
Efficiency	The Project has established partnership with key GoM organizations and private sector players for executing the Project.  Thanks to the efficient operation and management of the Project by a small but dedicated PMU, most of the project outputs and outcomes have been achieved successfully within the planned time frame and budget. Adequate measures have been taken to ensure good geographical coverage over the whole country.	S

Criterion	Summary comments	Rating
Sustainability of project outcomes	The overall rating for this criterion is based on the lowest rating of the individual sub-criteria	ML
Financial risks	Case studies developed by the Project shows that large industries have mostly opted for low capital investment with quick returns. The GoM has allocated budget for the implementation of the EE master plan, including action to promote EE and management in industries. Also, GTFS has been established to support businesses. But the GoM has yet to conceive more targeted financing mechanisms to support capital-intensive investments for large industries and engage small and medium enterprises.	ML
Socio-political risks	The key institutional stakeholders have shown their political will in favour of the Project's long-term objectives. Nevertheless, there is a gap between the rhetoric and the reality, which needs to be bridged to ensure the sustainability of the Project's outcomes. This includes demonstrating greater ownership, laying more concrete policies and mobilizing resources to facilitate capital investment in favour of EE.	ML
Institutional framework and governance risks	Activities undertaken by the Project have raised awareness and strengthened the capacity of GoM agencies and private enterprises, and energy management certifying body. The NEEAP also gives importance to improving EnMS in enterprises. On the flip side, the key institutional players (KeTTHA and ST) have a narrow mandate to deal with electricity alone, and not energy as a whole. The GoM needs to integrate more proactive legal framework, policies and governance structure that encourage a more holistic approach to energy management in industries.	ML
Environmental risks	The adoption of EnMS and systems optimization approaches by industries combined with investments to continuously reduce the energy intensity in the industry will undoubtedly result in reduced dependence on fossil fuels and abatement of GHG emissions. Hence, there is no perceived environmental risks to the sustainability of project outcomes.	HL
Monitoring and evaluation	The overall rating for the M&E systems is based on the ratings for M&E plan implementation	S
M&E design	The M&E design followed UNIDO's standard procedures and GEF guidance on project monitoring. Parties responsible for monitoring the performance indicators were identified. However, no specific indicators were included for determining the progress of the Project towards expected outcomes.	S
M&E plan	The M&E implementation was very systematic, following	S

<b>Criterion</b>	<b>Summary comments</b>	<b>Rating</b>
implementation	the M&E plan rigorously, thus making it easier to track the timely progress of the Project. All key outputs of the Project were delivered. The MTR was discussed, and action taken to address the issues raised. In the absence of clear indicators at the outcome level, reporting of progress towards outcomes could not be verified.	
Budgeting and funding for M&E activities	The project document specified budget lines only at the outcome level but not at the output or activity level. Adequate budget was allocated to carry out M&E activities.	S
Project management	UNIDO specific ratings	
Quality at entry / preparation and readiness	The project document presents the intervention logic in a structured manner, and the Project's objectives and components are feasible and practicable within the proposed timeframe. The Project was designed in consultation with the relevant stakeholders and the capacities of the executing institutions and counterparts were duly considered to propose the project implementation management organogram. Institutional stakeholders as well as private sector players demonstrated their keen interest in the Project by committing co-financing in cash and kind.	S
Implementation approach	The intent at the Project's design stage was to involve the key stakeholders in an active manner so that their capacities are strengthened to sustain the project initiatives. However, the institutional stakeholders were unable to mobilize the human resources needed for implementing project components. Hence, UNIDO had to take the responsibility of implementing the project activities through the PMU which was fully staffed by the Project.	MS
UNIDO supervision and backstopping	UNIDO provided continuous support for the smooth execution of the Project. There was regular and effective coordination between UNIDO HQ staff and PMU team. Field missions were undertaken as frequently as necessary to assess the progress and interact with project stakeholders. Activities were financed in a timely manner and experienced international experts were mobilized to conduct training and capacity building activities.	S
Gender mainstreaming	This was not a requirement for GEF-4 projects, hence this dimension was neither incorporated in the Project design nor during its execution.	
<b>Overall rating</b>		<b>S</b>

## 4. Conclusions, recommendations and lessons learned

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### 4.1 Conclusions

The IEEMMS Project was developed to promote EE improvements in Malaysia's manufacturing sector through the implementation of the national energy management standard (EnMS) based on the internally recognized ISO 50001 standard and application of system optimization (SO). To make EE an integral part of industrial corporate management systems, the Project employed a combination of market push via policy, regulatory and financial interventions in partnership with the key institutional partners, and market pull through awareness raising and capacity building of a large number of public and private stakeholders, including GoM officials, industrial engineers and decision makers, equipment suppliers and distributors, energy professionals and service companies, etc.

The evaluation concludes that the Project was relevant to national development and environmental priorities and received strong support of the key national stakeholders during its formulation. The Project was built upon the experience of the previous MIEEIP and addressed the barriers identified after its completion: the lack of corporate decision making and management of energy use in industrial establishments, limited knowledge and experience of implementing energy management and system optimization, and absence of clear industrial EE policy and action plan. The Project's focus on EE is well within the mandate of UNIDO which is widely recognized as a pioneer in promoting energy management standards as a key market-based policy tool, making EE an integral part of industrial best practice. The Project is also consistent with the strategic objective 2 of GEF-4: tackling climate change through the promotion of energy efficient technologies and practices in industrial production and manufacturing processes.

The evaluation of the Project's effectiveness is based on the outputs and outcomes achieved by the Project in its pursuit of promoting industrial EE through EnMS and SO. Taking into consideration all the awareness raising and capacity building activities undertaken by the Project, this evaluation concludes that the Project's objective has been largely achieved, though some shortfalls were noted in terms of enforcing policies and proposing action plan as important drivers for sustainable EE improvements in industries, and making tangible changes to the existing eco-system that support EE investments in SMEs.

The Project was successful in creating an enabling environment for the adoption of energy management and system optimization practices in industrial establishments by raising awareness among industrial enterprises of the benefits of adopting EE, and in mobilizing experienced international experts for developing a cadre of trained EE professionals who are capable of providing services on EnMS and SO. The Project has established an information

exchange network and communication platform for sharing best practices and case studies with experts and industrial representatives.

Fourteen user training sessions were organized on EnMS, benefitting 534 participants. Thirty-one user training sessions were organized on compressed air, pump, fan and steam system optimization, benefitting 1,061 participants from public and private sector, including equipment vendors. Thanks to the targeted hands-on expert training sessions organized by the Project, 51 engineers from industrial facilities and national experts are equipped with knowledge and skill to assist industrial enterprises in adopting EnMS, and another 88 are certified as SO experts with the ability to assist industries in compressed air, pump, fan and steam systems optimization. The personnel of SIRIM QAS (the accreditation body) strengthened their capacities by actively participating in the EnMS user and expert training sessions. When the Project ended, SIRIM QAS had certified close to 20 facilities for ISO 50001 compliance.

With the support extended by international and local experts, 49 medium and large industries carried out EnMS and Systems Optimization implementation. As reported in the output and impact report of the Project, the annual savings accrued from the action taken by the 49 industrial establishments amount to 4,865 GWh of electricity and 949,701 GJ of thermal energy. Considering the appropriate emission factors for converting electricity and thermal energy, there is close to 3.4 million tons of CO<sub>2</sub> emission reduction. With a cumulative capital investment of RM 27.55 million in electricity saving measures alone, the factories have reported to be saving RM 51.6 million in electricity bill annually, with a simple payback period of a little over half a year! There is reason to celebrate success of the Project which has managed to leverage high investment for a project with the GEF grant of US\$ 4.2 million. This is comparable to the Energy Audit Conditional Grant (EACG) for industry under the 11<sup>th</sup> Malaysia Plan approved by EPU, with the key difference that the Project has aimed to address several barriers whereas the EACG is geared towards supporting ESCO development.

Thanks to the efficient operation and management of the Project by a small but dedicated PMU, most of the project outputs and outcomes were achieved successfully within the planned timeframe and budget. Adequate measures were taken to ensure good geographical coverage of the awareness and training activities all over the country. UNIDO HQ staff had a very good understanding and interaction with the PMU and provided timely advice and service for the completion of project activities. As the Project did not keep track of the outcome-wise disbursements and project expenditures, it is not possible to comment if these were in line with budgets. Nevertheless, the fact that most project outputs were achieved within the budget vouches for the efficiency of Project's execution. It should however be noted that had greater participation of the key counterpart agencies been assured, it would have helped to use the project budget in even more productive manner.

The ToC analysis shows that the Project has created awareness and an enabling environment for strengthening the capacity of public and private players in the provision of EnMS and SO services to industrial enterprises. Taking into consideration the political will to progress towards greater energy

sustainability, the ToC analysis has identified the “drivers” needed for the likelihood of progress towards achievement of impacts. The GoM is well aware of the need to gradually reduce the subsidy on fossil fuels in order to render the EE actions more cost-effective. The GoM also needs to develop sectoral benchmarks to make manufacturers better aware of the EE gaps to be bridged and opt for solutions that go beyond the measures that have low-costs and short paybacks. Furthermore, to match with the GoM’s intention to reduce GHG emissions intensity of GDP by 45% by 2030, a mechanism needs to be evolved to periodically update the energy intensity indicators and ensure their strict enforcement.

The evaluation analysis shows that large industries have mostly opted for low-capital investment with quick returns. While the GoM has allocated budget for the EE master plan, including action to promote EE and management in industries (e.g. EACG), more targeted financing mechanisms are crucial to support capital-intensive investments for large industries and engage small and medium enterprises.

While there is clearly a political will to progress towards the Project’s long-term objectives, the gap between the rhetoric and the reality needs to be bridged through greater ownership and engagement. This can be achieved through more targeted policies and financing mechanisms in favor of EE, especially in small and medium industries.

The evaluation has noted that the key energy-related institutional players have a narrow mandate to deal with electricity alone, and not energy as a whole. For instance, the EACG for industries approved by EPU and executed by KeTTHA and ST, and implemented by GreenTech only considers industries with high electricity consumption. The GoM needs to integrate more proactive legal framework, policies and governance structure for encouraging a more holistic approach to energy management in industries.

The adoption of EnMS and SO approaches by industries combined with investments to lower the industrial energy intensity is bound to result in reduced energy needs and abatement of GHG emissions. Hence, the project activities do not have any negative consequences on the environment.

The key factors contributing to the success of the Project are the strong collaboration of UNIDO and PMU with the key national public and private organizations, establishment of the peer-to-peer network to exchange information, design and implement energy management plan for industrial enterprises, and a dynamic and proactive PMU that is well guided and supported by the UNIDO HQ staff.

## **4.2 Recommendations**

The following recommendations are made on the basis of the findings of the evaluation:

Recommendation 1 (GoM): Appoint an entity with the mandate and legitimacy to ensure better coordination at the institutional level

- The IEEMMS Project is focused on the promotion of EE in industry, which is presently not the mandate of any specific organization in Malaysia. There are several entities under the GoM which are concerned with this topic. Efforts were made to bring these different stakeholders closer so that the sum total of their efforts would be greater than what can be achieved through the measures taken by each of the stakeholders in isolation. While UNIDO took the lead in implementing activities aimed at addressing specific barriers, no specific efforts were made by the different stakeholders to come together in terms of developing common policies and financing mechanisms that would help promote industrial EE. The key reason appears to be the lack of mandate/legitimacy of any organization to take up such a coordinating effort. It is recommended that GoM allocate this responsibility to an entity with the mandate and legitimacy to deal with EE in industry by involving all concerned stakeholders. Such an entity could be hosted by the Economic Planning Unit (EPU) under the Prime Minister's Department as it has a mission to manage the country's socio-economic development in a strategic and sustainable manner.

Recommendation 2 (GoM): Sustain the outcomes of IEEMMS through sectoral benchmarking and setting up sectoral energy performance targets

- The Project has played a catalysing role of creating awareness, strengthening capacities of the public and private players and demonstrating the financial attractiveness of industrial EE investments. The project proponents achieved less success in adopting suitable policies and strategies to sustain the outcomes of the Project. The long-term sustainability of the project outcomes will be jeopardized if there are no efforts made by the various public and private partners to sustain the Project's initiatives. As pointed out by the ToC analysis, apart from the need to continue raising awareness and capacity building efforts and to facilitate ease of access to EE finances, there is a need to develop sectoral EE benchmarking and conduct cost-benefit analyses to assess the extent to which industrial enterprises can be mandated to improve their energy performance within the prevailing economic context. Further, GoM may contemplate setting up sectoral energy performance targets (through cap and trade mechanism, for example) so that Malaysia's GHG emission reduction commitments can be met. ST is well positioned to take up this task.

Recommendation 3 (GoM): Eliminate the ambiguity regarding what exactly does the energy encompass

- During the evaluation, it was observed there is no clear understanding among the different stakeholders as what exactly does the energy encompass. When EPU, KeTTTHA and ST refer to energy, be it fossil or renewable, they only consider electricity. This is also reflected in the various policy documents (e.g. The target of Malaysia EE Action Plan (MEEAP) is to save electricity and reduce electricity demand growth; similarly, ST has introduced Efficient Management of Electrical Energy Regulations (EMEER) 2008 but there is no specific regulation

regarding thermal energy). Also, all reference to renewable energies mean electricity from renewable sources. Since the use of thermal energy is quite common across many industries as well as buildings, this aspect should be clarified at the national level and appropriate measures taken to ensure that thermal energy is taken into consideration in a systematic manner along with other forms of energies.

Recommendation 4 (UNIDO): Monitor GEF-funded projects' outcome- and output-wise delivery and financial aspects simultaneously in order to take appropriate corrective measures when deviations/ discrepancies are noted.

- The project balance sheet shows that the project has been completed by making full use of the budget. However, as the project did not keep track of the outcome-wise disbursements, it is not possible to conclude if the less than satisfactory performances of Outcomes 1 and 5 are in any way due to the lower level of disbursements. UNIDO should consider monitoring a project's outcome- and output-wise delivery and financial aspects simultaneously so that appropriate corrective measures can be taken if deviations/discrepancies are found.

Recommendation 5 (UNIDO): For GEF-funded projects, remind the project's institutional partners that apart from contributing additional resources to achieve GEF objectives, co-financing also demonstrates country ownership.

- The project has fared poorly in terms of co-financing contribution from the institutional partners. As the GEF implementing agency, UNIDO should have insisted that the institutional partners fulfil their in-kind co-financing commitments not only for the sake of mobilizing additional resources to achieve the outputs and outcomes but also improve their engagement in the project and increase the likelihood that follow-up activities receive their support after the completion of the project.

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### **4.3 Lessons Learned**

Lesson 1: Develop good performance indicators to facilitate monitoring against the targets set for the outcomes and progress towards the intended impacts

- Thanks to its good designing and execution, the Project has benefitted both public and private players associated with it and has contributed to very tangible results, in terms of awareness raising, knowledge creation, technology advancement, financial and environmental gains for the project beneficiaries. However, in the absence of sectoral benchmarking, the industrial enterprises who have opted for EE investments seem content with mostly aiming for the so-called "low hanging fruits". This is mainly due to the fact that there is no clear benchmark for the industries to compare their energy performances with the best practices in Malaysia or elsewhere in the world. Unless such sectoral benchmarks are evolved, industrial enterprises may not feel the compulsion and the strong motivation to continuously improve their energy performances as expected by the EnMS. There is

therefore a need to develop such performance indicators to facilitate monitoring against the targets set for outcomes and progress towards the global GHG reduction commitment made by Malaysia.

Lesson 2: To reap long-term benefits, mobilize resources for developing qualified human resources rather than prioritizing capital subsidy

- Interviews with the representatives of industries led to the conclusion that industries have no hesitation in paying for training and capacity building activities as long as the quality of delivery is of high standard, as it was case for the IEEMMS Project. They appreciated the mobilization of the highly qualified experts with international experience in the Project. Similarly, the quantum of capital investment made by the 49 industries which have gone ahead with the implementation of measures proposed by qualified experts proves that industries will feel confident to make investments based on the recommendations of reports that are prepared by qualified experts. The GoM may take note of this to design programs and mobilizing resources that are aimed at developing more qualified national experts than to focus more on providing subsidies for energy audits conducted by industrial enterprises.

Lesson 3: UNIDO should play a role such that the Project is satisfactorily executed without jeopardizing the sustainability of the outcome

- The evaluation has noted that a substantial part of the Project's success can be attributed to the proactive and dynamic role played by the PMU team. Being familiar with the manner in which the official system works, the Project has taken upon itself much of the responsibilities that were expected to be fulfilled by the key project partners. While this approach has guaranteed very satisfactory results during the execution of the Project, it may have adverse impact on the long-term sustainability of project initiatives as it creates a big vacuum in the execution arena when the Project comes to an end. UNIDO needs to be cautious in this regard while implementing the Project and play more of a catalysing role than take up the full responsibility of project execution at the cost of jeopardizing the sustainability of the outcomes beyond the Project's life.

Lesson 4: Co-financing is important not only to mobilize additional resources to achieve GEF objectives, but it also demonstrates country ownership.

- The Project has fared poorly in terms of co-financing contribution from the institutional partners. As the GEF implementing agency, UNIDO should have insisted that the institutional partners fulfil their in-kind co-financing commitments not only for the sake of mobilizing additional resources to achieve the outputs and outcomes but also improve their engagement in the Project and increase the likelihood that follow-up activities receive their support after the completion of the Project.

# Annexes

## **A.1. Evaluation TORs (without annexes)**

**Independent Terminal Evaluation of the UNIDO Project:**

**Industrial Energy Efficiency for Malaysian Manufacturing Sector (IEEMMS)**

UNIDO Project ID: 103042

GEF ID: 3908

**DECEMBER 2016**

### **CONTENTS**

- I. Project Background and Overview
- II. Scope and Purpose of the Evaluation
- III. Evaluation Approach and Methodology
- IV. Evaluation Team Composition
- V. Time Schedule and Deliverables
- VI. Project Evaluation Parameters
- VII. Deliverables and Reporting
- VIII. Quality Assurance

## I. Project Background and Overview

### 1. Project factsheet

Project Title	Industrial Energy Efficiency for Malaysian Manufacturing Sector (IEEMMS)
UNIDO project No.	Project ID: 103042
GEF project ID	3908
Region	EAP
Country(ies)	Malaysia
GEF focal area(s) and operational programme	GEF-4: Climate Change, CC-4
GEF implementing agency(ies)	UNIDO
GEF executing partner(s)	Ministry of International Trade and Industry (MITI); Ministry of Energy, Green Technology and Water (KeTTHA); Department of Standards Malaysia; Federation of Malaysian Manufacturers (FMM); and Ministry of Natural Resources and Environment (MNRE)
Project size (FSP, MSP, EA)	FSP
Project CEO endorsement date	13 May 2011
Project implementation start date (First PAD issuance date)	29 June 2011
Original expected implementation end date (indicated in CEO endorsement/Approval document)	30 June 2016
Revised expected implementation end date (if applicable)	31 March 2017
Actual implementation end date	31 March 2017
GEF project grant (excluding PPG, in USD)	4,200,000
GEF PPG (if applicable, in USD)	75,000
UNIDO co-financing (in USD)	67,231 <sup>4</sup>
Total co-financing at CEO endorsement (in USD)	16,670,000 (cash+in-kind)
Materialized co-financing at project completion (in USD)	
Total project cost (excluding PPG and agency support cost, in USD)	20,870,000
Mid-term review date	November 2015 (report April 2016)
Planned terminal evaluation date	January-February 2016

(Source: Project document)<sup>5</sup>

<sup>4</sup> EUR 61,449

## 2. Project background and context

As one of the key member states of ASEAN, Malaysia has experienced healthy economic growth and social development over the past two decades; the average GDP growth of Malaysia between 1990 and 2013 has been 5.8%. The use of electricity, however, has grown from 19,945 GW hours in 1990 to 127,359 GW hours in 2013, a growth rate of 8.4% that exceeds the 5.8% GDP growth rate. While the Government of Malaysia (GoM) has made many attempts since 2000 to promote EE, the uptake of EE especially by the industrial sector has been poor. This has been primarily due to the subsidized rate of electricity and energy. Following the spike in energy prices in 2008, the GoM's fiscal burden of energy subsidies had risen dramatically. Moreover, the level of energy subsidies were reaching levels that were unsustainable and subtracting from other developmental budgetary allocations. The GoM views EE as a key strategy towards a gradual removal of energy subsidies.

The overall objective of the Project is to reduce greenhouse gas emissions by establishing a policy environment that enables and supports sustainable adoption of energy efficient technologies and management as an integral part of industries' business practices; an environment in which a cadre of well-trained and equipped experts in system optimisation and energy management assists industries in developing and implementing EE improvement projects.

The IEEMMS Project was approved by the GEF on May 13, 2011 and commenced operations on July 1, 2011, and has a set terminal date of 31 March 2017 (5.8 years after GEF approval).

The Project will be subject to GEF Monitoring and Evaluation rules and practices of the GEF and UNIDO. A mid-term review (MTR), as well as a terminal evaluation (TE), is foreseen in the project document. Within the frame of the Project's monitoring and evaluation plan, an MTR was carried out in November 2015 (MTR report, April 2016). The terminal evaluation is scheduled to take place from January-February 2017.

## 3. Project objective and structure

The objective of the IEEMMS Project is the promotion of EE improvements in Malaysian manufacturing sector through the development of a national energy management standard and the application of system optimization.

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<sup>5</sup> Project information data throughout these TOR are to be verified during the inception phase.

To achieve this objective, IEEMMS was designed to achieve 5 outcomes as follows:

1. Enhanced regulatory framework facilitating increased implementation of EE in the industrial sector in both large and small to medium enterprise (SME) industries;
2. Widespread awareness amongst SMEs and larger industries of the benefits of EE;
3. Availability of a cadre of highly specialized energy management experts from the public and private sectors;
4. Availability of a cadre of highly specialized systems optimization experts from the public and private sectors;
5. SMEs and larger industries have coordinated access to technical and financial assistance for implementing EE projects.

#### 4. Mid-Term Evaluation

The MTR was carried out by a team of independent reviewers between November 2015- January 2016. Project performance ratings are as follows (see MTR report, April 2016):

Relevance: Satisfactory

Efficiency: Satisfactory

Effectiveness: Satisfactory

Likelihood of Sustainability of Project Outcomes: Moderately likely

Monitoring and evaluation systems: Satisfactory

Project coordination and management: Satisfactory

Gender mainstreaming: NA

Further details can be referred to in the MTR report (April 2016).

#### 5. Project implementation and execution arrangements

This Project has been directly implemented by UNIDO with the Ministry of International Trade and Industry (MITI) serving as the executing agency. SME Corp. under MITI is serving as the local executing partner.

#### 6. Budget information

Project funding has been provided through a GEF Grant of USD 4.20 million with co-financing contributions estimated to USD 16.7 million (cash and in-kind) from SME Corp., Standards and Industrial Research Institute of Malaysia (SIRIM), the Ministry of Energy, Green Technology and Water (KeTTHA), the Energy Commission (ST), the Economic Planning Unit (EPU), the Federation of Malaysian Manufacturers (FMM), and various private sector industrial enterprises, which amount to total project budget of USD 20.9 million.

Some financial details as per the MTR are shown below:

## Project Framework - Financing

Project component	Activity type	GEF Financing (in USD)		Co-financing (in USD)	
		Approved	Actual <sup>6</sup>	Promised	Actual
1. Development of a national industrial energy efficiency policy and plans	Technical assistance	373,480	n/a	700,000	680,000
2. Awareness creation on energy management and systems optimization	Technical assistance	340,450	n/a	950,000	950,000
3. EnMS	Technical assistance	1,211,755	n/a	4,620,000	4,586,000
4. Systems optimization	Technical assistance	1,500,295	n/a	9,500,000	9,500,000
5. Access to finance for industrial EE improvement	Technical assistance	358,270	n/a	450,000	400,000
6. Project management	Technical assistance	415,750	n/a	450,000	450,000
<b>Total</b>		<b>4,200,000</b>	<b>3,690,978</b>	<b>16,670,000</b>	<b>16,566,000</b>

(Source: MTR, April 2016)

## Project Co-financing

Source of co-financing	Type	Project preparation		Project implementation		Total	
		Expected	Actual	Expected	Actual	Expected	Actual
Host gov't contribution	In-kind	40,000	20,000	2,750,000	1,500,000	2,790,000	1,520,000
GEF Agency(ies)	Cash	100,000	65,560		66,000	100,000	131,560
	In-kind		34,440				34,440
Bilateral aid agency(ies)							
Multilateral agency(ies)							
Private sector	Cash	10,000	30,000	11,390,000	15,000,000	11,400,000	15,030,000
	In-kind			1,530,000		1,530,000	
NGO	In-kind			1,000,000		1,000,000	
Other	In-kind						
<b>Total co-financing</b>		<b>150,000</b>	<b>150,000</b>	<b>16,670,000</b>	<b>16,566,000</b>	<b>16,820,000</b>	<b>16,716,000</b>

(Source: MTR, April 2016)

<sup>6</sup> As UNIDO did not transition to an enterprise resource planning system (SAP) and Output-based Budgeting until 2012/13, actual Project expenditures were not fully applied across the output-based budget until late 2014. By that time, budget reports by Output for the entire duration of the Project/project period could not be extracted.

## II. Scope and Purpose of the Evaluation

The terminal evaluation (TE) will cover the whole duration of the Project from its starting date in July 2011 to the estimated completion date in March 2017. It will assess project performance against the evaluation criteria: relevance, effectiveness, efficiency, sustainability and impact.

The TE has an additional purpose of drawing lessons and developing recommendations for UNIDO and the GEF that may help improve the selection, enhance the design and implementation of similar future projects and activities in the country and on a global scale upon project completion. The terminal evaluation report should include examples of good practices for other projects in the focal area, country, or region.

The terminal evaluation should provide an analysis of the attainment of the Project's objective(s) and the corresponding technical components or outputs. Through its assessments, the terminal evaluation should enable the Government, the national GEF Operational Focal Point (OFP), counterparts, the GEF, UNIDO and other stakeholders and donors to verify prospects for development impact and promoting sustainability, providing an analysis of the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators, and management of risks. The assessment includes re-examination of the relevance of the objectives and other elements of project design according to the project evaluation parameters defined in chapter VI.

The key question of the terminal evaluation is whether the Project has achieved or is likely to achieve its main objective of promoting EE improvements in the Malaysian manufacturing sector through the development of national energy management standards and application of system optimization, as evidenced through direct and in-direct emission reductions and energy savings.

## III. Evaluation approach and methodology

The terminal evaluation will be conducted in accordance with the UNIDO Evaluation Policy<sup>7</sup>, the UNIDO Guidelines for the Technical Cooperation Programme and Project Cycle<sup>8</sup>, the GEF Guidelines for GEF Agencies in

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<sup>7</sup> UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)

<sup>8</sup> UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAL.17/Rev.1, 24 August 2006)

Conducting Terminal Evaluations<sup>9</sup>, the GEF Monitoring and Evaluation Policy<sup>10</sup> and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies<sup>11</sup>.

It will be carried out by an independent evaluation team, as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the Project are kept informed and regularly consulted throughout the evaluation. The evaluation team will liaise with the UNIDO Independent Evaluation Division (ODG/EVQ/IEV) on the conduct of the evaluation and methodological issues.

The evaluation team will be required to use different methods to ensure that data gathering and analysis deliver evidence-based qualitative and quantitative information, based on diverse sources, as necessary: desk studies and literature review, statistical analysis, individual interviews, focus group meetings, surveys and direct observation. This approach will not only enable the evaluation to assess causality through quantitative means but also to provide reasons for why certain results were achieved or not and to triangulate information for higher reliability of findings. The specific mixed methodological approach will be described in the inception report.

The evaluation team will develop interview guidelines. Field interviews can take place either in the form of focus-group discussions or one-to-one consultations.

The methodology will be based on the following:

1. A desk review of project documents, including, but not limited to:
  - a) The original project document, monitoring reports (such as progress and financial reports to UNIDO and UNIDO-GEF annual Project Implementation Reports (PIRs)), mid-term review (MTR) report, output reports (case studies, action plans, sub-regional strategies, etc.), back-to-office mission report(s), end-of-contract report(s) and relevant correspondence.
  - b) If applicable, notes from the meetings of committees involved in the Project (e.g. approval and steering committees).
  - c) Other project-related material produced by the Project.
2. The evaluation team will use available models of (or reconstruct if necessary) theory of change for the different types of intervention (enabling,

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<sup>9</sup> GEF. (2008). Guidelines for GEF Agencies in Conducting Terminal Evaluations (Evaluation Office, Evaluation Document No. 3, 2008)

<sup>10</sup> GEF. (2010) The GEF Monitoring and Evaluation Policy (Evaluation Office, November 2010)

<sup>11</sup> GEF. (2011). GEF Minimum Fiduciary Standards: Separation of Implementation and Execution Functions in GEF Partner Agencies (GEF/C.41/06/Rev.01, 3 November 2011, prepared by the Trustee)

capacity, investment, demonstration). The validity of the theory of change will be examined through specific questions in interviews and possibly through a survey of stakeholders.

3. Counterfactual information: In those cases where baseline information for relevant indicators is not available, the evaluation team will aim at establishing a proxy-baseline through recall and secondary information.
4. Interviews with project management and technical support including staff and management at UNIDO HQ and in the field and – if necessary - staff associated with the Project’s financial administration and procurement.
5. Interviews with project partners and stakeholders, including, among others, government counterparts, GEF OFP, project stakeholders, and co-financing partners as shown in the corresponding sections of the project documents.
6. On-site observation of results achieved by demonstration projects, including interviews of actual and potential beneficiaries of improved technologies.
7. Interviews and telephone interviews with intended users for the project outputs and other stakeholders involved in the Project. The evaluation team shall determine whether to seek additional information and opinions from representatives of any donor agency(ies) or other organizations.
8. Interviews with the relevant UNIDO Regional Office in Thailand, to the extent that it was involved in the Project, and members of the project management team and the various national and sub-regional authorities dealing with project activities as necessary. If deemed necessary, the evaluation team shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.
9. Other interviews, surveys or document reviews as deemed necessary by the evaluation team and/or UNIDO, ODG/EVQ/IEV for triangulation purposes.
10. The inception report will provide details on the methodology used by the evaluation team and include an evaluation matrix.

#### IV. Evaluation team composition

The evaluation team will be composed of one international evaluation consultant acting as the team leader and one national consultant(s). The consultants will be contracted by UNIDO. The tasks of each team member are specified in the job descriptions annexed to these terms of reference.

The evaluation team might be required to provide information relevant for follow-up studies, including terminal evaluation verification on request to the GEF partnership up to three years after completion of the terminal evaluation.

Members of the evaluation team must not have been directly involved in the design and/or implementation of the projects/programme under evaluation.

The UNIDO Project Manager and the project teams in the participating countries will support the evaluation team. The UNIDO GEF Coordinator and the GEF OFP will be briefed on the evaluation and provide support to its conduct. GEF OFP will, where applicable and feasible, also be briefed and debriefed at the start and end of the evaluation mission.

## V. Time schedule and deliverables

The evaluation is scheduled to take place from January to March 2017. The evaluation mission is planned for February 2017. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project/programme in the participating country.

At the end of the evaluation field mission, a debriefing should also be conducted inviting local stakeholders (incl. government and parties involved in the evaluation). After the evaluation mission, the international evaluation consultant will come to UNIDO HQ for debriefing and presentation of the preliminary findings of the terminal evaluation.

The draft TE report will be submitted 4 to 6 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO PM, ODG/EVQ/IEV, the UNIDO GEF Coordinator and the GEF OFP and other relevant stakeholders for receipt of comments. The ET is expected to revise the draft TE report based on the comments received, edit the language and form and submit the final version of the TE report in accordance with UNIDO ODG/EVQ/IEV standards.

## VI. Project evaluation parameters

The evaluation team will assess the project performance guided by the parameters and evaluations questions provided in this section. In addition to the qualitative assessment based on the evidence gathered in the evaluation, the evaluation team will rate the Project on the basis of the rating criteria for the parameters described in the following sub-chapters, A to I.

Ratings will be presented in the form of tables with each of the criteria / aspects rated separately and with brief justifications for the rating based on the findings and the main analyses presents the template for summarizing the overall ratings.

For GEF projects: As per the GEF's requirements, the evaluation report should also provide information on project identification, time frame, actual expenditures, and co-financing in the format, which is modelled after the GEF's project identification form (PIF).

### A. Project identification and design

Project identification assessment criteria derived from the logical framework approach (LFA) methodology, establishing the process and set up of steps and analyses required to design a project in a systematic and structured way, e.g. situation, stakeholder, problem and objective analyses.

The aspects to be addressed by the evaluation include inter alia the extent to which:

- a) The situation, problem, need / gap was clearly identified, analyzed and documented (evidence, references). The project design was based on a needs assessment
- b) Stakeholder analysis was adequate (e.g. clear identification of end-users, beneficiaries, sponsors, partners, and clearly defined roles and responsibilities in the project(s)).
- c) The Project took into account and reflects national and local priorities and strategies
- d) ISID-related issues and priorities were considered when designing the Project
- e) Relevant country representatives (from government, industries, gender groups, custom officers and civil society - including the GEF OFP for GEF projects), were appropriately involved and participated in the identification of critical problem areas and the development of technical cooperation strategies.

Project design quality assessment criteria derive from the logical framework approach (LFA) methodology, leading to the establishment of LogFrame Matrix (LFM) and the main elements of the project, i.e. overall objective, outcomes, outputs, to defining their causal relationship, as well as indicators, their means of verification and the assumptions. The evaluation will examine the extent to which:

- a) The Project's design were adequate to address the problems at hand;
- b) The Project had a clear thematically focused development objective;
- c) The Project's outcome was clear, realistic, relevant, addressed the problem identified and provided a clear description of the benefit or improvement that will be achieved after the Project's completion;
- d) Outputs were clear, realistic, adequately leading to the achievement of the outcome;
- e) The attainment of overall development objective, outcome and outputs can be determined by a set of SMART verifiable indicators;
- f) The results hierarchy in the LFM, from activities to outputs, outcome and overall objective, is logical and consistent.
- g) Verification and Assumptions were adequate, identifying important external factors and risks;
- h) All GEF-4 and GEF-5 projects have incorporated relevant environmental and social considerations into the project design / GEF-6 projects have followed the provisions specified in UNIDO/DGAI.23: UNIDO Environmental and Social Safeguards Policies and Procedures (ESSPP).

## B. Implementation Performance

Implementation assessment criteria to be applied are shown below and correspond to DAC criteria, as well as to good programme/project management practices.

a) Relevance and ownership

The evaluation will examine the extent to which the Project is relevant to the:

1. National development and environmental priorities and strategies of the Government and the population, and regional and international agreements. See possible evaluation questions under “Country ownership/drivenness” below.
2. Target groups: relevance of the Project’s objectives, outcomes and outputs to the different target groups of the interventions (e.g. companies, civil society, beneficiaries of capacity building and training, etc.).
3. GEF’s focal areas/operational programme strategies: In retrospect, were the Project’s outcomes consistent with the GEF focal area(s)/operational program strategies? Ascertain the likely nature and significance of the contribution of the Project’s outcomes to the wider portfolio of climate change.
4. Does the Project remain relevant taking into account the changing environment?

b) Effectiveness

i. Achievement of expected outcomes:

- What outputs and outcomes has the Project achieved so far (both qualitative and quantitative results)?
- To what extent have the expected outcomes, outputs and long-term objectives been achieved or are likely to be achieved?
- Has the Project generated any results that could lead to changes of the assisted institutions?
- Have there been any unplanned effects?
- Are the Project’s outcomes commensurate with the original or modified Project’s objectives?
- If the original or modified expected results were described as merely outputs/inputs, were there any real outcomes of the Project and, if so, were these commensurate with realistic expectations from the Project?
- If there was a need to reformulate the Project’s design and results framework, given changes in the country and operational context, were such modifications properly documented?

- ii. How do the stakeholders perceive the quality of outputs? Were the targeted beneficiary groups actually reached?
- iii. Longer-term impact: Identify actual and/or potential longer-term impacts or at least indicate the steps taken to assess these (see also below “monitoring of long term changes”). Wherever possible, evaluators should indicate how findings on impacts will be reported in future.
- iv. Catalytic or replication effects: Describe any catalytic or replication effects: the evaluation will describe any catalytic or replication effect both within and outside the Project. If no effects are identified, the evaluation will describe the catalytic or replication actions that the Project carried out. No ratings are requested for the Project’s catalytic role.

c) Efficiency

The extent to which:

- i. The project cost was effective? Was the Project using the most cost-efficient options?
- ii. Has the Project produced results (outputs and outcomes) within the expected time frame? Was project implementation delayed, and, if it was, did that affect cost effectiveness or results? Wherever possible, the evaluator should also compare the costs incurred and the time taken to achieve outcomes with that for similar projects. Are the Project’s activities in line with the schedule of activities as defined by the project team and annual work plans? Are the disbursements and project expenditures in line with budgets?
- iii. Have the inputs from the donor, UNIDO and Government/counterpart been provided as planned, and were they adequate to meet the requirements? Was the quality of UNIDO inputs and services as planned and timely?
- iv. Was there coordination with other UNIDO and other donors’ projects, and did possible synergy effects happen?
- v. Were there delays in project implementation and if so, what were their causes?

d) Assessment of risks to sustainability of project outcomes

Sustainability is understood as the likelihood of continued benefits after the GEF project ends. Assessment of sustainability of outcomes will be given special attention but also technical, financial and organization sustainability will be reviewed. This assessment should explain how the risks to project outcomes will affect continuation of benefits after the GEF project ends. It will include both exogenous and endogenous risks. The following four dimensions or aspects of risks to sustainability will be addressed:

- i. **Financial risks.** Are there any financial risks that may jeopardize sustainability of project outcomes? What is the likelihood of financial and economic resources not being available once GEF assistance ends? (Such resources can be from multiple sources, such as the public and private sectors or income-generating activities; these can also include trends that indicate the likelihood that, in future, there will be adequate financial resources for sustaining project outcomes.) Was the Project successful in identifying and leveraging co-financing?
- ii. **Sociopolitical risks.** Are there any social or political risks that may jeopardize sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that project benefits continue to flow? Is there sufficient public/stakeholder awareness in support of the Project 's long-term objectives?
- iii. **Institutional framework and governance risks.** Do the legal frameworks, policies, and governance structures and processes within which the Project operates pose risks that may jeopardize sustainability of the Project's benefits? Are requisite systems for accountability and transparency and required technical know-how in place?
- iv. **Environmental risks.** Are there any environmental risks that may jeopardize sustainability of project outcomes? Are there any environmental factors, positive or negative, that can influence the future flow of project benefits? Are there any project outputs or higher level results that are likely to have adverse environmental impacts, which, in turn, might affect sustainability of project benefits? The evaluation should assess whether certain activities will pose a threat to the sustainability of the project outcomes.

e) Assessment of monitoring and evaluation (M&E) systems

- i. **M&E design.** Did the Project have an M&E plan to monitor results and track progress towards achieving project objectives? The evaluation will assess whether the Project met the minimum requirements for the application of the Project M&E plan (see annex 3).
- ii. **M&E plan implementation.** The evaluation should verify that an M&E system was in place and facilitated timely tracking of progress toward project objectives by collecting information on chosen indicators continually throughout the project implementation period; annual project reports were complete and accurate, with well-justified ratings; the information provided by the M&E system was used during the Project to improve performance and to adapt to changing needs; and the Project had an M&E system in place with proper training for parties responsible for M&E activities to ensure that data will continue to be collected and used after project closure. Was monitoring and self-evaluation carried out effectively, based on indicators for outputs, outcomes and impacts? Are there any annual work plans? Was any steering or advisory

mechanism put in place? Did reporting and performance reviews take place regularly?

- iii. **Budgeting and Funding for M&E activities.** In addition to incorporating information on funding for M&E while assessing M&E design, the evaluators will determine whether M&E was sufficiently budgeted for at the project planning stage and whether M&E was adequately funded and in a timely manner during implementation.

f) Monitoring of long-term changes

The M&E of long-term changes is often incorporated in GEF-supported projects as a separate component and may include determination of environmental baselines; specification of indicators; and provisioning of equipment and capacity building for data gathering, analysis, and use. This section of the evaluation report will describe project actions and accomplishments towards establishing a long-term monitoring system. The evaluation will address the following questions:

- i. Did the Project contribute to the establishment of a long-term monitoring system? If it did not, should the Project have included such a component?
- ii. What were the accomplishments and shortcomings in establishment of this system?
- iii. Is the system sustainable — that is, is it embedded in a proper institutional structure and does it have financing? How likely is it that this system continues operating upon project completion?
- iv. Is the information generated by this system being used as originally intended?

g) Assessment of processes affecting achievement of project results

Among other factors, when relevant, the evaluation will consider a number of issues affecting project implementation and attainment of project results. The assessment of these issues can be integrated into the analyses of project design, relevance, effectiveness, efficiency, sustainability and management as the evaluators deem them appropriate (it is not necessary, however it is possible to have a separate chapter on these aspects in the evaluation report). The evaluation will consider, but need not be limited to, the following issues that may have affected project implementation and achievement of project results:

- i. **Preparation and readiness / Quality at entry.** Were the Project's objectives and components clear, practicable, and feasible within its time frame? Were counterpart resources (funding, staff, and facilities), and adequate project management arrangements in place at project entry? Were the capacities of executing institution and counterparts properly considered when the Project was designed? Were lessons from other relevant projects properly incorporated in the Project's

design? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to the Project's approval?

- ii. **Country ownership/drivenness.** Was the project concept in line with the sectoral and development priorities and plans of the country—or of participating countries, in the case of multi-country projects? Are project outcomes contributing to national development priorities and plans? Were relevant country representatives from government and civil society involved in the Project? Was the GEF OFP involved in the Project's design and implementation? Did the recipient government maintain its financial commitment to the Project? Has the government—or governments in the case of multi-country projects—approved policies or regulatory frameworks in line with the Project's objectives?
- iii. **Stakeholder involvement and consultation.** Did the Project involve the relevant stakeholders through continuous information sharing and consultation? Did the Project implement appropriate outreach and public awareness campaigns? Were the relevant vulnerable groups and powerful supporters and opponents of the processes involved in a participatory and consultative manner? Which stakeholders were involved in the Project (e.g., NGOs, private sector, other UN Agencies) and what were their immediate tasks? Did the Project consult with and make use of the skills, experience, and knowledge of the appropriate government entities, nongovernmental organizations, community groups, private sector entities, local governments, and academic institutions in the design, implementation, and evaluation of project activities? Were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process taken into account while taking decisions?
- iv. **Financial planning.** Did the Project have appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds? Was there due diligence in the management of funds and financial audits? Did promised co-financing materialize? Specifically, the evaluation should also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co-financing.
- v. **UNIDO's supervision and backstopping.** Did UNIDO staff identify problems in a timely fashion and accurately estimate their seriousness? Did UNIDO staff provide quality support and advice to the Project, approve modifications in time, and restructure the Project when needed? Did UNIDO provide the right staffing levels, continuity, skill mix, and frequency of field visits for the Project?
- vi. **Co-financing, project outcomes and sustainability.** Did the Project manage to mobilize the co-financing amount expected at the time of CEO Endorsement? If there was a difference in the level of expected co-financing and the co-financing actually mobilized, what were the reasons for the variance? Did the extent of materialization of co-

financing affect project outcomes and/or sustainability, and, if so, in what ways and through what causal linkages?

- vii. **Delays, project outcomes and sustainability.** If there were delays in project implementation and completion, what were the reasons? Did the delays affect project outcomes and/or sustainability, and, if so, in what ways and through what causal linkages?
- viii. **Implementation and execution approach.** Is the implementation and execution approach chosen different from other implementation approaches applied by UNIDO and other agencies? Does the approach comply with the principles of the Paris Declaration? Is the implementation and execution approach in line with the GEF Minimum Fiduciary Standards: Separation of Implementation and Execution Functions in GEF Partner Agencies (GEF/C.41/06/Rev.01) and the relevant UNIDO regulations (DGAI.20 and Procurement Manual)? Does the approach promote local ownership and capacity building? Does the approach involve significant risks? In cases where Execution was done by third parties, i.e. Executing Partners, based on a contractual arrangement with UNIDO was this done in accordance with the contractual arrangement concluded with UNIDO in an effective and efficient manner?
- ix. **Environmental and Social Safeguards.** If a GEF-5 project, has the Project incorporated relevant environmental and social risk considerations into the Project's design? What impact did these risks have on the achievement of project results?

#### h) Project coordination and management

The extent to which:

- i. The national management and overall coordination mechanisms have been efficient and effective? Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfil its role and responsibilities (e.g. providing strategic support, monitoring and reviewing performance, allocating funds, providing technical support, following up agreed/corrective actions)?
- ii. The UNIDO HQ-based management, coordination, monitoring, quality control and technical inputs have been efficient, timely and effective (e.g. problems identified timely and accurately; quality support provided timely and effectively; right staffing levels, continuity, skill mix and frequency of field visits)?

#### i) Assessment of gender mainstreaming

Gender mainstreaming assessment criteria are provided in the table below. Guidance on integrating gender is included in Annex 4.

The evaluation will consider, but need not be limited to, the following issues that may have affected gender mainstreaming in the Project:

- Did the project/programme design adequately consider the gender dimensions in its interventions? If so, how (at the level of project outcome, output or activity)?
- Was a gender analysis included in a baseline study or needs assessment (if any)?
- How gender-balanced was the composition of the Project management team, the Steering Committee, experts and consultants and the beneficiaries?
- Have women and men benefited equally from the Project's interventions? Do the results affect women and men differently? If so, why and how? How are the results likely to affect gender relations (e.g., division of labor, decision-making authority)?
- Are women/gender-focused groups, associations or gender units in partner organizations consulted/ included in the Project?
- To what extent were socioeconomic benefits delivered by the Project at the national and local levels, including consideration of gender dimensions?

## VIII. Deliverables and Reporting

### **Inception report**

These terms of reference (TOR) provide some information on the evaluation methodology, but this should not be regarded as exhaustive. After reviewing the project documentation and initial interviews with the project manager, the evaluation team will prepare a short inception report that will operationalize the TOR relating to the evaluation questions and provide information on what type of and how the evidence will be collected (methodology). It will be discussed with and approved by the responsible in the UNIDO Independent Evaluation Division.

The inception report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework ("evaluation matrix"); division of work between the international evaluation consultants; mission plan, including places to be visited, people to be interviewed and possible surveys to be conducted and a debriefing and reporting timetable<sup>12</sup>.

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<sup>12</sup> The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by the UNIDO Independent Evaluation Division.

## **Evaluation report format and review procedures**

The draft report will be delivered to UNIDO Independent Evaluation Division (the suggested report outline is in annex 1) and circulated to UNIDO staff, the GEF OFF, and national stakeholders associated with the Project for factual validation and comments. Any comments or responses, or feedback on any errors of fact to the draft report provided by the stakeholders will be sent to UNIDO ODG/EVQ/IEV for collation and onward transmission to the project evaluation team who will be advised of any necessary revisions. On the basis of this feedback, and taking into consideration the comments received, the evaluation team will prepare the final version of the terminal evaluation report.

The evaluation team will present its preliminary findings to the national stakeholders at the end of the field visit and take into account their feedback in preparing the evaluation report. A presentation of preliminary findings will take place at UNIDO HQ after the field mission.

The terminal evaluation report should be brief, to the point and easy to understand. It must explain the purpose of the evaluation, exactly what was evaluated, and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Findings, conclusions and recommendations should be presented in a complete, logical and balanced manner. The evaluation report shall be written in English and follow the outline given in annex 1.

## **Evaluation work plan and deliverables**

The “Evaluation Work Plan” includes the following main products/deliverables:

### **INCEPTION PHASE:**

1. Desk review, briefing by project manager and development of methodology: Following the receipt of all relevant documents, and consultation with the Project Manager about the documentation, including reaching an agreement on the methodology, the desk review could be completed.
2. Inception report: At the time of departure to the field mission, all the received material has been reviewed and consolidated into the Inception report.

## FIELD MISSION:

1. Field mission: The principal responsibility for managing this evaluation lies with UNIDO. It will be responsible for liaising with the project team to set up the stakeholder interviews, arrange the field missions, coordinate with the Government. At the end of the field mission, there will be a presentation of preliminary findings to the key stakeholders in the country where the Project was implemented.
2. Preliminary findings from the field mission: Following the field mission, the main findings, conclusions and recommendations would be prepared and presented in the field and at UNIDO Headquarters.

## REPORTING:

1. Data analysis/collation of the data/information collected
2. A draft terminal evaluation report will be forwarded electronically to the UNIDO Independent Evaluation Division and circulated to main stakeholders.
3. Final terminal evaluation report will incorporate comments received.

## IX. Quality assurance

All UNIDO terminal evaluations are subject to quality assessments by the UNIDO Independent Evaluation Division. Quality assurance and control is exercised in different ways throughout the evaluation process (briefing of consultants on methodology and process by the UNIDO, ODG/EVQ/IEV, providing inputs regarding findings, lessons learned and recommendations from other UNIDO evaluations, review of inception report and evaluation report by UNIDO, ODG/EVQ/IEV). The quality of the evaluation report will be assessed and rated against the criteria set forth in the Checklist on evaluation report quality, attached as Annex 4. The applied evaluation quality assessment criteria are used as a tool to provide structured feedback. UNIDO, ODG/EVQ/IEV should ensure that the evaluation report is useful for UNIDO in terms of organizational learning (recommendations and lessons learned) and is compliant with UNIDO's evaluation policy and these terms of reference. The draft and final terminal evaluation report are reviewed by the UNIDO Independent Evaluation Division, which will submit the final report to the GEF Evaluation Office and circulate it within UNIDO together with a management response sheet.

## A.2. List of interviewees

Date	Time	Meeting	Attendees
April 10, 2017 (Monday)	9.00 a.m.	Meeting with National Project Manager - Documentation - Logistics	Dr. K.S. Kannan
	11.30 a.m.	Meeting with officers of Ministry of Energy, Green Technology and Water (KeTTHA), Energy Commission (ST) and Sustainable Energy Development Authority (SEDA) Chair: Abdul Rahim Ibrahim, Director, Energy management and Service Quality Development (ST) <i>Meeting Room, Level 5, ST</i>	<ol style="list-style-type: none"> <li>1. Ir Abdul Rahim Ibrahim <ul style="list-style-type: none"> <li>• Director, Energy Management &amp; Service Quality Development, ST</li> </ul> </li> <li>2. Zulkiflee Umar <ul style="list-style-type: none"> <li>• Deputy Director, Demand Side Management, ST</li> </ul> </li> <li>3. Hamizan Husain <ul style="list-style-type: none"> <li>• Principal Assistant Secretary, Sustainable Energy Division, Energy Sector, Ketha</li> </ul> </li> </ol>
	1.30 p.m.	Discussions with PMU	
April 11, 2017 (Tuesday)	11.30 a.m.	Meeting with Energy Division, EPU Dr. Mohd Shaharin Umar, Head. Energy Division	<ol style="list-style-type: none"> <li>1. Dr. Mohd Shaharin Umar <ul style="list-style-type: none"> <li>• Director, Energy Section, EPU</li> </ul> </li> <li>2. Ahmad Zuhairi Muzakir <ul style="list-style-type: none"> <li>• Principal Assistant Director, Energy Section, EPU</li> </ul> </li> </ol>
April 12, 2017 (Wednesday)	10.00 a.m.	Meeting with FMM Dr. Yeoh (CEO), FMM Energy Committee and FMM Institute	<ol style="list-style-type: none"> <li>1. Dr. Yeoh Oon Tean <ul style="list-style-type: none"> <li>• CEO, FMM</li> </ul> </li> <li>2. Sia Chooi Leng <ul style="list-style-type: none"> <li>• GM, FMM Institute</li> </ul> </li> <li>3. Wan Haslina Wan Hussin <ul style="list-style-type: none"> <li>• Manager, Energy, Utilities &amp; Infrastructure Unit, Business Environment Division, FMM</li> </ul> </li> </ol>



Date	Time	Meeting	Attendees
April 15, 2017 (Saturday)	a.m.	Meeting with Uniten	<ol style="list-style-type: none"> <li>1. Prof Ir Dr Kumaran Palanisamy <ul style="list-style-type: none"> <li>• Head, Uniten R&amp;D</li> </ul> </li> <li>2. Dr. Marayati Marsadek <ul style="list-style-type: none"> <li>• Head, Institute of Power Engineering</li> </ul> </li> <li>3. Dr. Goh Chin Hock <ul style="list-style-type: none"> <li>• Head, IT Unit, College of Engineering</li> </ul> </li> <li>4. Dr. Ker Pin Jern <ul style="list-style-type: none"> <li>• Research Consultant, Uniten R&amp;D</li> </ul> </li> <li>5. Savithry Thangaraju <ul style="list-style-type: none"> <li>• Senior Lecturer, Dept of Electronics &amp; Communication</li> </ul> </li> <li>6. Dr. Hassan Mohamed <ul style="list-style-type: none"> <li>• Head, EE Project</li> </ul> </li> </ol>
	p.m.	Meeting with NRE	<ol style="list-style-type: none"> <li>1. Jaya Singam Rajoo <ul style="list-style-type: none"> <li>• Division Secretary, Ministry of Natural Resources and Environment</li> </ul> </li> <li>2. Dr. Gary Theseira <ul style="list-style-type: none"> <li>• Deputy Undersecretary Environment Management &amp; Climate Change Division</li> </ul> </li> <li>3. Yusmazy Md Yusup <ul style="list-style-type: none"> <li>• Principal Assistant Secretary Environment Management &amp; Climate Change Division</li> </ul> </li> </ol>
April 16, 2017 (Sunday)	a.m. p.m.	Report Preparation	
April 17, 2017 (Monday)		Factory Visit – CSC Steel @ Melaka	

Date	Time	Meeting	Attendees
April 18, 2017 (Tuesday)		Factory Visit - IOI Palm Oil Mill, Johor Bahru	
April 19, 2017 (Wednesday)		Factory Visit – Proton @ Shah Alam	
April 20, 2017 (Thursday)	9.00 a.m.  3.00 p.m.	Workshop/ PSC Meeting Energy Commission building  Debriefing with PMU	

### A.3. Documents reviewed

Document Title	Author	Date
IEEMMS Project Document for CEO Endorsement/ Approval	UNIDO	May 2011
IEEMMS Independent Mid-Term Review		2016
Quarterly Progress Reports	PMU	2014-2016
Monthly Progress Reports	PMU	2012-2016
Minutes of Project Steering Committee Meetings	PMU	2013-2016
User Training Courses and Training Evaluation Summaries	PMU	2013-2016
Project Equipment and Assets leasing forms	PMU	
Project Implementation Reports	UNIDO	2013-2016
Project Inception Report	PMU	2012
IEEMMS Project Newsletter Issues 1, 2 and 3	PMU	
IEEMMS Project Brochure	PMU	
Mission Reports		Feb. 2015
Project case Studies	UNIDO	
Reports of Energy Savings Assessment (PSO, CASO, FSO, SSO)	UNIDO	
11 <sup>th</sup> Malaysia Plan		
SME Master Plan 2012-2020		
SME Annual Report 2014-2015		
Economic Census 2011: Profile of SMEs		
Malaysia Energy Statistics Handbook, 2016		
UNDP GEF Final Evaluation MIEEIP, 2008		
IEEMMS: Mid-term Evaluation Report		
Peer Review on Energy Efficiency in Malaysia, Report for APEC Energy Working Group	APEC	
Enhancing Energy Efficiency in Malaysia Through Legislation and Policy	ST	
MIEEIP Financial Measures		
National Energy Efficiency Action Plan for Malaysia, 2014		
Terminal Evaluation of UNDP MIEEIP Project	UNDP	Jan. 2008

## A.4. Project financial data

### Project Framework - Financing

Project component	Activity type	GEF Financing (in USD)		Co-financing (in USD)	
		Approved	Actual <sup>13</sup>	Promised	Actual
1. Development of a national industrial energy efficiency policy and plans	Technical assistance	373,480	NA.	700,000	NA
2. Awareness creation on energy management and systems optimization	Technical assistance	340,450	NA	950,000	NA
3. EnMS	Technical assistance	1,211,755	NA	4,620,000	NA
4. Systems optimization	Technical assistance	1,500,295	NA	9,500,000	NA
5. Access to finance for industrial EE improvement	Technical assistance	358,270	NA	450,000	NA
6. Project management	Technical assistance	415,750	NA	450,000	NA
<b>Total (excluding PPG)</b>		<b>4,200,000</b>	<b>4,204,796</b>	<b>16,670,000</b>	<b>19,173,000</b>

### Project Co-financing

Source of co-financing	Type	Project preparation		Project implementation		Total	
		Expected	Actual	Expected	Actual	Expected	Actual
Host gov't contribution	Cash				300,000		300,000
	In-kind	40,000	20,000	2,750,000	600,000	2,790,000	620,000
GEF Agency(ies)	Cash	100,000	65,560		66,000	100,000	131,560
	In-kind		34,440				34,440
Bilateral aid agency(ies)							
Multilateral agency(ies)							
Private sector	Cash	10,000	30,000	11,390,000	5,257,000	11,400,000	5,287,000
	In-kind			1,530,000	12,350,000	1,530,000	12,530,000
Industries	In-kind			1,000,000	600,000	1,000,000	600,000
Other	In-kind						
<b>Total co-financing</b>		<b>150,000</b>	<b>150,000</b>	<b>16,670,000</b>	<b>19,173,000</b>	<b>16,820,000</b>	<b>19,503,000</b>

<sup>13</sup> As UNIDO did not transition to an enterprise resource planning system (SAP) and Output-based Budgeting until 2012/13, actual Project expenditures were not fully applied across the output-based budget until late 2014. By that time, budget reports by Output for the entire duration of the Projectperiod could be extracted.