

Mid-term Review



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO INDEPENDENT EVALUATION DIVISION

Mid-term Review

UNIDO project:

Improvement of Industrial Energy Efficiency in Myanmar

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GEF Project ID: 5321



**UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION**

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Abbreviations and acronyms

AR	Assessment Reports
CASO	Compressed Air System Optimization
CO ₂	Carbon-di-oxide
ECD	Environment Conservation Department, MoNREC
EE	Energy Efficiency
EnMS	Energy Management Systems
ET	Evaluation Team
FERD	Foreign Economic Relations Department
FI	Financial Intermediary
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GID	Green Industrial Development
HDI	Human Development Index
HQ	Headquarters
IED	Inclusive Economic Development
IEE	Industrial Energy efficiency
KWh	Kilo Watt hour
LED	Light Emitting Diode
M&E	Monitoring and Evaluation
MES	Myanmar Engineering Society
MIA	Myanmar Industries Associatoin
NAMA	Nationally Appropriate Mititgation Actions
MMK	Myanmar (or Burmese) Kyat

MoNREC	Ministry of Natural Resources and Environmental Conservation
MOE	Ministry of Education
MOEE	Ministry of Electricity and Energy
MOECAP ¹	Ministry of Environment Conservation and Forestry
MOI	Ministry of Industry
MoM	Minutes of Meetings
MOST ²	Ministry of Science and Technology
MTR	Mid-Term Evaluation
MTR-R	Mid-Term Review Report
Mtoe	Million tons of oil equivalent
NAMA	Nationally Appropriate Mitigation Action
NAPA	National Adaptation Programme of Action
NPD	National Project Director (in PMU)
ODG/EVQ/IEV	UNIDO Independent Evaluation Division
OECD-DAC	Organisation of Economic Cooperation and Development - Development Assistance Committee
OVI	Objectively Verifiable Indicators
PMU	Project Management Unit
PSC	Project Steering Committee
RE	Renewable Energy
RECP	Resource Efficiency and Cleaner Production
SDGs	Sustainable Development Goals
SIA	Social Impact Assessment
SME	Small and Medium-Sized Enterprises

1 Name has been changed to MoNREC

2 MOST has been merged into Ministry of Education (MOE)

SO	System Optimization
SOE	State Owned Enterprise
SSO	Steam System Optimization
TA	Technical Assistance
TOC	Theory of Change
TOR	Terms of Reference
UMFCCI	Union of Myanmar federation of Chamber of Commerce and Industries
UN	United Nations
UNDAF	United Nations Development Assistance Framework
UNIDO	United Nations Industrial Development Organization
UNSDF	United Nations Sustainable Development Framework
USD	United States Dollars
VFD	Variable frequency drive
W	Watt
WB	World Bank

Glossary of evaluation-related terms

<i>Term</i>	<i>Definition</i>
<i>Assumptions</i>	<p><i>Hypotheses about factors or risks which could affect the progress or success of a development intervention.</i></p> <p><i>Necessary conditions for the achievement of results at different levels. These are conditions that must exist if the project is to succeed but which are outside the direct control of the project management. This is called the external logic of the project because these conditions lie outside the project's accountability and can be related to laws, political commitments, political situation, financing, etc.</i></p>
<i>Baseline</i>	<i>The situation, prior to an intervention, against which progress can be assessed.</i>
<i>Effect</i>	<i>Intended or unintended change due directly or indirectly to an intervention.</i>
<i>Effectiveness</i>	<i>The extent to which the development intervention's objectives were achieved or are expected to be achieved.</i>
<i>Efficiency</i>	<i>A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.</i>
<i>Impact</i>	<i>Positive and negative, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.</i>
<i>Indicator</i>	<i>Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.</i>
<i>Gender mainstreaming</i>	<i>The process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality</i>
<i>Lessons learned</i>	<i>Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.</i>

<i>Project Result Framework (logical framework approach)</i>	<i>Management tool used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcome and impact) and their causal relationships, indicators, and assumptions that may affect success or failure. Based on RBM (result based management) principles.</i>
<i>Outcome</i>	<i>The likely or achieved (short-term and/or medium-term) effects of an intervention's outputs.</i>
<i>Outputs</i>	<i>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.</i>
<i>Recommendations</i>	<i>Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at the reallocation of resources. Recommendations should be linked to conclusions.</i>
<i>Relevance</i>	<i>The extent to which the objectives of an intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.</i>
<i>Review</i>	<i>An assessment of the performance of an intervention, periodically or on an ad hoc basis.</i> <i>Note: Frequently "evaluation" is used for a more comprehensive and/or more in-depth assessment than "review". Reviews tend to emphasize operational aspects. Sometimes the terms "review" and "evaluation" are used as synonyms</i>
<i>Risks</i>	<i>Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.</i>
<i>Sustainability</i>	<i>The continuation of benefits from an intervention, after the development assistance has been completed.</i>
<i>Target groups</i>	<i>The specific individuals or organizations for whose benefit an intervention is undertaken.</i>
<i>Theory of change</i>	<i>Theory of change or programme theory is similar to a logic model, but includes key assumptions behind the causal relationships and sometimes the major factors (internal and external to the intervention) likely to influence the outcomes.</i>

Executive summary

This is the Mid-Term Review of the project “**Improvement of Industrial Energy Efficiency in Myanmar**”, being executed by the Ministry of Industry (MOI) and UNIDO. It aims to promote sustained GHG-emissions reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial energy efficiency (IEE) and the implementation of energy management systems (EnMS), based on ISO 50001 and optimization of energy systems (ESO) in industry.

This Mid-Term Review (MTR) is covering the project activities in the first 43 months of implementation of the project from 03/12/2014 – 30/07/2018, including all 3 technical components plus the project management and monitoring component. The current project end date is 03/12/2019.

The MTR has the following objectives:

- (i) Assess the project’s performance and progress towards the achievement of the expected results
- (ii) Assess remaining barriers in project design, project management and performance of partners to identify the necessary changes to set the project on-track to achieve its expected results
- (iii) Develop recommendations and a follow-up plan on necessary corrective actions

The review has been conducted according to the UNIDO evaluation policy and the UNIDO Evaluation Manual. The evaluation includes a desk review of existing project documents, interview of a cross section of project stakeholders in Vienna, Yangon and Nay Pyi Taw in Myanmar, and field visits to two participating industries (one is a battery plant and the other a paint plant in Yangon).

The project design, through close partnership with Ministry of Industry (MOI) and the location of the Project Management Unit (PMU) within MOI premises, while posing challenges for fast implementation, supports incorporating learnings into government programmes and plans like the 20% energy reduction by 2030 plan. The project is highly relevant to the existing thinking and planning at the national level, it is also relevant to targeted industries, though not fully recognized by them. The national government has now an increasing focus on IEE and climate change and is also encouraging energy efficiencies in industries. It is visible that this focus was triggered by the project and did not exist (as assumed in endorsement document) already at project start. This seems to be the root cause for delays in project implementation.

Project implementation and management is functioning on a high level. M&E procedures are in place as well as efficient, and cooperation with stakeholders is working well. Annual reporting (PIR) is carried out and results are regularly traced against overall objectives and discussed with the main stakeholders. The Project Steering Committee (PSC) meets biannually³ and takes decisions as mandated; this is well documented in meeting minutes.

³ In the 3rd PSC in December 2017 it was decided to change from meetings once a year to biannually

Project efficiency: The overall efficiency is good, but variable. Apart from initial delays due to the lack of awareness and basic knowledge of IEE in Myanmar, there have been and still are delays in project implementation with only 14 months of project time left. However, in terms of achievements, the project has performed well, with around 60 % of funds remaining; although, a fair number of expected outcomes have been achieved and targets met. The empowerment and impact at the national level, to inform policy and to ensure coordination with stakeholders and capacity building at all levels (component 1 and 2) is successful. The implementation and upscaling of IEE in industries is lagging behind and major indicators on CO₂ reduction will most likely not be met during the planned project period.

Conclusion: Overall, this project is well designed⁴ and caters to the needs of all stakeholders; addressing issues of policy, awareness, capacity building and best practices, and creating systems for long term uptake of IEE activities among industries. The close cooperation with ministries to support regulatory framework has worked well and created visibility of project activities.

What became visible was, that some of the assumptions made during Project planning/design phase, did not reflect the actual situation on Myanmar, hence the strong focus on implementation of Energy Management Systems (EnMS). When the project started, there was not only a lack of awareness about energy management as an important efficiency measure, there was also a lack of proper monitoring/controlling and furthermore no or little connection between energy consumption and costs reflected in existing controlling tools.

Key Findings: The project outputs and activities are in line with Myanmar Government priorities as well as with UNIDO's focus on SDG 7 and 9 and GEF strategies on GHG reduction. Outcomes of the project are already used to formulate the Energy Efficiency and Conservation (EE&C) act and the ISO 50,001 norm as Myanmar standard. The PMU is supporting the respective ministries and the cooperation is very much appreciated by ministries.

Progress:⁵

Progress on Component 1:

- Output 1.1: National Energy Efficiency & Conservation Policy, Strategy and Roadmap for Myanmar have been approved by Government on 4/2/2016.
- Output 1.2: MM ISO 50001:2011 (Myanmar version) has been adopted by the Government in July 2018; The Energy Efficiency Training Centre has been established (including Compressed Air Demo System, training material and measurement equipment), Incentive schemes are pending
- Output 1.3: Database framework was developed with the assistance of an international expert. Follow up to be done by EECD in MOI, but due to delays in providing energy information by the ministries, the second expert mission is still pending.
- Output 1.4: Promotional material in IEE prepared and awareness events have been conducted as planned (see also Output 2.1). There are no specific activities for NAMA in Myanmar.

⁴ ET sees critical flaws on basic assumption, which caused the wrong priorities (see chapter 4 Lessons Learnt); and an exit strategy to secure project sustainability is missing.

⁵ actual status of project indicator against targets) is mentioned in chapter 3.1.2 in detail

Progress on Component 2:

- Output 2.1: 1 set of training materials (each), user training translated to Myanmar language, trainings conducted as planned, and number of participants exceeds targeted number.
- Output 2.2: Each set of training material prepared, user training in Myanmar available, trainings conducted as planned, number of participants exceeds targeted number. Vendor training as such is pending, but several trained experts can also be seen as vendors, as they sell equipment on EE products.
- Output 2.3: Training material translated to local language, PMU is searching for trainers on project financing, training is planned to start in the beginning of 2019.

Progress on Component 3:

- Output 3.1: 10 EnMS in the process of being implemented. It was discussed during last PSC to reduce the target from 50 to 15-25, but no final agreement is stated in the protocol.
- Output 3.2: 6 CASO assessments and 7 SSO assessments have been carried out.

Progress on Component 4:

- Output 4.1: 4 PSC meeting conducted to date, which means yearly from project start. In 2018, this was changed to biannually; 5th PSC will take place in December.
- Output 4.2: Mid-Term Review was conducted in October 2018 only - one year later than planned

Impact and Sustainability: Although the Energy Efficiency and Conservation Division already existed under the Department of Industrial Collaboration (DIC) of Ministry of Industry, very limited EE&C programs were initiated before project start. It was very timely and a great positive impetus for the DIC and particularly EE&C Division, when the IEE in Myanmar Project started.

After 43 months of implementation, the IEE in Myanmar Project has paved the way for increased results on the area of EE in industrial sector. In particular, the IEE Project has also engaged private sector industries by providing awareness and user as well as expert EE training to the managers, technical experts and engineers who otherwise would not gain knowledge, awareness and expertise on the EE areas.

Project Management Unit located close to MOI and cooperation with concerned ministries and associations will support the IEE activities after funded project period. During the MTR mission it was mentioned several times by multiple stakeholders that project activities are contributing towards better communication between ministries and departments (within the same ministry). A network of the involved persons is evolving, which will further ensure sustainability of outcome. Upcoming Regulations and Standards will foster IEE in Myanmar and will increase the demand for trained IEE/EnMS experts (energy manager) and support market creation for IEE services. EECD at MOI is preparing “Standard Curriculum for Energy Manager” and is utilizing inputs from the Project and experts trained by the Project will most likely fulfil the requirements to become “Energy Managers”. EECD will also use/reference content of UNIDO EnMS, CASO, and SSO training material. Additional awareness creation and capacity building in industries by credible and easy to implement showcases is key to sustainability, so the Project needs more visibility and has to focus on additional marketing activities in the remaining project duration.

Recommendations:

Based on the finding of this MTR and the discussions during the country visit and in UNIDO HQ, the involved project partners should have a planning meeting as soon as possible to come up with a joint revised project plan⁶. Today it is not clear whether a no cost extension will be granted; therefore two workplans have to be prepared, to cover both options.

The Project Logical Framework and Workplan should be reviewed and adapted to the actual situation especially focusing on the remaining time for project work:

- Specific focus could be on more direct support (handholding for CASO and SSO) for industries to foster implementation. It would also be helpful to expand the scope from SSO only, to any kind of furnaces/combustion processes, including those industries, where no steam is utilized
- Additional (in house) trainings on SO (CASO and SSO) could be offered to new companies, but also to officials from ministries.
- Fast implementation on IEE to create locally, credible success stories will increase even more interest and awareness of IEE. Additional resource allocation for implementation on the ground and dissemination of best practices is therefore needed.
- Creation and publication of ‘easy to copy’ success stories will foster implementation in other companies; medium-sized companies could be invited
- Success stories from SOE’s will create even more awareness
- Seek support from concerned Ministries to get SOE’s on board (e.g. Fertilizer, LPG and Gas Turbine Plant)
- Start training on project financing soon (2.1.3)

⁶ UNIDO HQ has already requested for project extension, but decision will most likely be taken next year only. The next PSC meeting is already planned beginning of December UNIDO HQ and PMU is working to prepare this accordingly.

- Focus on professional marketing of project results to create more awareness. Presentation at trade fairs, World Standard Day and others. Utilize Social Media, television, etc.
- Plan and work towards creating a self-sustaining model for the *“Energy Efficiency Training Centre”*, as this will be core for long term IEE in Myanmar
- Involved project partners should utilize upcoming PSC to come up with a joint decision how to modify the project to create more impact, especially regarding achievable GHG reduction
- **Request for project extension for minimum 1,5 - 2 years.** It has become obvious that some of the assumptions stated in endorsement document and reconstructed by the Evaluation Team (ET) in the Theory of Change (TOC) have not been correct (as explained in 4.1) and therefore some project outcome is delayed and impact on the ground is just building up. As there is sufficient budget available **project extension** – including the above given recommendations - can be **strongly recommended by ET**.

1. Introduction

1.1 Scope and objective of the evaluation

This Mid-Term Review (MTR) of the Project covers the project activities in its first 43 months of implementation; notionally from 4th December 2014 to August 2018, covering all 3 technical plus the management component in a balanced manner.

The purpose of the MTR is to independently assess the project to help UNIDO improve performance and achieve the expected outcomes as foreseen in the project documents.

The MTR had the following objectives:

- Assess the project's performance and progress towards the achievement of the expected results
- Assess remaining barriers in project design, project management and performance of partners to identify the necessary changes to set the project on-track to achieve its expected results
- Develop recommendations and a follow-up plan on necessary corrective actions

The evaluation mainly focused on the achievement of the expected results indicated in the project logical framework, and in particular on the aspects of relevance, effectiveness, efficiency, impact, sustainability, and management as well as cross-cutting issues such as gender.

The main geographical areas in Myanmar are Yangon, where the PMU is located and beneficiaries (companies, associations, trainees/experts) could be met, and Nay Pyi Taw, where the ministries are located.

The evaluation team interviewed a cross section of stakeholders involved in the project, which included:

- National UNIDO team in PMU,
- Team in UNIDO Headquarters,
- National Experts trained by the Project
- Ministry of Industry (Mol), Ministry of Natural Resources and Environmental Conservation (MoNREC), Ministry of Electricity and Energy (MoEE), Ministry of Education (MoE)
- Companies /beneficiaries in various sectors
- Local providers of products and services on IEE

1.2 Evaluation methodology and team

The MTR has been conducted in accordance with the UNIDO Evaluation Policy⁷, the UNIDO evaluation Manual⁸, utilizing Annex 2: 'Definition of evaluation criteria including key evaluation questions'. The evaluation has been carried out using a participatory approach seeking to inform and consult with all key parties associated with the project. This evaluation was conducted by an Independent Evaluation Team (ET) and consists of Mr. Stefan Melnitzky and Mr. San Shwe Aung, who closely cooperated with the UNIDO team in HQ to the conduct the evaluation and on methodological issues. The cooperation is defined in the TOR for this MTR⁹.

The ET adopted a TOC approach to assess the causal links between project activities, outputs and outcomes and to assess to which extent the project contributed to conditions necessary to achieve the results stated in the Project's logical framework. A mix of methods was used to deliver evidence-based qualitative and quantitative information: desk studies of project documentation, individual interviews, focus group meetings, surveys and direct observation.

In the inception phase, the ET reviewed the documentation of the Project provided by the UNIDO's Project team and interviewed UNIDO's Project Manager in Vienna. The details of the field work visits are given in Annex 4 and 5.

Data collection and analysis process

The evaluation team developed interview guidelines and applied the following methods: **Desk review** of project documents, including, but not limited to:

- a. The original project documents, monitoring reports, such as progress and financial reports to UNIDO and Donor(s)/Partners, annual Project Implementation Reports (PIRs), back-to-office mission report(s) and other project-related material produced by the project.
- b. The evaluation team checked the validity of the Project's results-chain in the project logframe and reconstructed the theory of change for the Project.
- c. Counterfactual / Missing information: In cases where baseline information for relevant indicators was not consistent (or not available), the evaluation team could discuss it with the project team and check other available sources.

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

⁸ UNIDO. (2017). Evaluation Manual Final – December 2017 by Independent Evaluation Division December 2017

⁹ UNIDO, JD 120264-130042_International Evaluator MTE_July 2018

1. **Interviews:** Discussions were held with a cross section of project stakeholders (see Annex 5):
2. **Company Visits:** The ET visited 2 companies from two different sectors (battery production and paint production)
3. **Presentation of preliminary findings:** At the end of the field mission, there was a presentation of preliminary findings, conclusions and recommendations to the key stakeholders: The presentation was followed by discussions on the findings. The meeting took place at MOI in Nay Pyi Taw and 9 people from multiple stakeholders attended the meeting. PMU prepared minutes for the outcome of the discussion including the list of participants.

Evaluation schedule: Below is the evaluation schedule for the MTR

Activity/deliverable	Indicative timing
Desk review	1 st August - 29 th September
Briefing with UNIDO headquarter (Vienna)	28 th June/ 14 th September
Briefing with PMU (Mr. Than OO)	14 th August
Evaluation Framework and Theory of Change of the project intervention, Inception report	August/September 2018
Fieldwork in Myanmar (Details see Annex 5)	1 st - 10 th October 2018
Debriefing meeting in UNIDO HQ	23 rd October
Preparation of the first draft of the report	1 st November 2018
Feedback from stakeholders	6 th February 2019
Final Report	18 th February 2019

1.3 Limitations

Some planned meetings with key stakeholders could not be undertaken due to unforeseen reasons during the evaluation mission. In the meeting with MoNREC, the Director General of the Directorate of Environmental Conservation Department being the appointed GEF Focal Point, could not be present and the persons met were not involved in the Project, nor in GEF activities.

1.4 Review criteria and key questions

The following are the key evaluation criteria to be addressed by the MTR.

A	Project design assessment
1	Project design
2	Project results framework/Logframe
B	Project performance and progress towards results
1	Relevance
2	Effectiveness and progress towards expected results
3	Efficiency
4	Gender mainstreaming
5	Sustainability
C	Project implementation management
1	Project management
2	Results-based work planning, monitoring and evaluation, reporting
3	Financial management and co-financing
4	Stakeholder engagement and communication
D	Performance of Partners

2. Project Background

2.1 Brief country context

Myanmar has one of the lowest per capita official development assistance (ODA) rates in South-East Asia. Current internal and international resources allocation is also not sufficient to provide basic social services. As such, Myanmar is classified as a least-developed country (LDC) due to its isolated economy hampered by macroeconomic imbalances and structural deficiencies. Poor investment climate has slowed the inflow of foreign direct investments and areas such as manufacturing struggle with inadequate infrastructure and unpredictable trade policy. The poor economic setting directly affects Myanmar's population. However, Myanmar is undergoing important and significant transformation at political, economic and social levels, with the aim of promoting a more inclusive, transparent and sustainable industrial development. Recently, with international sanctions being relaxed and/or lifted, Myanmar is re-engaging with the global economy and in particular is aiming at re-joining production and distribution regional chains in South East Asia.

In 2014 the country's President stated that "[...] the country needs higher competitiveness of SMEs through enhancing capacity and productivity, for SMEs are the core of the national economic growth [...]". SMEs account for approximately 95% of the overall economy according to 2013 projections. The Government is committed to pursue a "people centred" development approach; and has identified some short, medium to long term priorities and plans, setting industrialization as one of the key elements of its inclusive and sustainable industrial development strategy, along with youth and women employment. With reference to this, the following areas are particularly relevant to UNIDO: strengthening the private sector development including youth and women led-enterprises, enhancing foreign domestic investments, trade facilitation, food security, agricultural growth for job creation and poverty reduction.

The Myanmar Government has identified specific areas of intervention for the promotion of SMEs creation and development; UNIDO expertise and TA programmes can be aligned with the country's priorities and the strategic action plan for industrial development:

- Reduce administrative controls, improve access to credit (particularly for youth and women); build enterprise capacity at all levels
- SMEs incubation projects and research linkages
- Build the capacity of the Central Department of SMEs development (Ministry of Industry) and the Central Committee for SME development
- Cluster formation between the existing industrial zones across the country and regional technological schools and colleges
- Support FDI in SME sector, with incentives for higher use of local contents, transfer of skills, knowledge and technology.¹⁰

¹⁰ Fostering Pro-poor and inclusive MSME development in Myanmar -UNIDO

Myanmar Ministry of Industry Policies are:

- (1) To promote and broadly expand food processing industries, value-added farm-product industries with the aim of boosting the sectors of Agriculture, Livestock and Industry with equal balance, meanwhile encouraging Small and Medium Enterprises and remitting to establish Heavy Industrial Enterprises to promote import-substituted commodities and exports.
- (2) To ensuring the viability of State-Owned Enterprises and promote Private Sector and Private-Public Partnership by inviting technical know-how and investments to realize Industrial Sector Development.
- (3) To encouraging Research and Technology Innovation and Development of Industrial Human Resources in order to promote the quality and standard of industrial goods.
- (4) To promote the value added industries by utilizing the natural resources, raw materials and to implement green industries by utilizing energy efficiently and effectively.¹¹

Despite some impressive progress, Myanmar is still in the early stages of industrialization. Industrialization is underway, but the industrial base is still weak. Currently, around 57 percent, the majority of the total population is employed in the agricultural sector. Labour force statistics show that Myanmar is still an agrarian economy. Rice is the most important product. Other major crops include beans, pulses and sesame. Nonetheless, it is important to note that the agricultural sector has low value-added activities and low labour productivity. The primary sector had a 29.5 percent share of the total GDP in 2013-14. The industrial sector took up 32 percent during the same fiscal year, while the manufacturing sector trailed with a share of only 19 percent. It is evident that the manufacturing sector has grown rapidly till 2010/11. Since then, there has been stagnation of growth. Myanmar's industrial structure is not diversified.

Myanmar's current industry is highly focused on limited sectors such as agriculture, natural resources and some labour-intensive manufacturing industries. The majority of the manufacturing industries are labour-intensive, low-technology industries engaged in relatively low value-added activities like textiles/garments. Little has been invested in the manufacturing sector, partly because of import restriction and also due to the overall absence of a favourable climate for investment. Consequently, Myanmar shows significant import dependency in many industrial materials and parts. Clearly, Myanmar needs to produce higher-value commodities in order to eventually achieve industrial diversification in the manufacturing sector, which should stimulate long-term economic growth. Another aspect of the industrial structure that is hindering Myanmar's industrial development is the inefficiency of state-owned enterprises (SOEs).

Currently, SOEs cover a wide range of sectors including extraction of natural resources, power, telecommunications and industry and dominate the industrial sector in Myanmar. Most of them are inefficient, poorly managed and have low productivity. In addition to this, the development of small and medium-sized enterprises (SMEs) to complement the current SOEs-centred industrial structure also poses a big challenge. In contrast to the SOEs, the SMEs have a disadvantage in terms of receiving government support. Myanmar has a very weak business-enabling infrastructure due to the limited or absence of major supportive factors driving industrial development. Reasons for this are insufficient access to finance, poor logistics and electrical power infrastructures, limited human resources development and a lack of skilled workers, etc. These are significant deterrents for industrial development in the country and demand appropriate policy measures to be introduced immediately. In

¹¹ <http://www.industry.gov.mm/en/content/policies>

short, although the recent economic growth of Myanmar and the government efforts for its economic reforms are impressive, Myanmar is still entrenched in an agro-based economy.

The early stages of industrialization present quite a few challenges for industrial development. By successfully addressing these demanding tasks, Myanmar has the opportunity to transition to a more efficiently industrialized economy. Keeping all that in mind, the Myanmar Industrial Development Strategy 2017 has been formulated by the United Nations Industrial Development Organization (UNIDO) to provide comprehensive and detailed strategy directions and policy recommendations in different industrial priority sectors. And last, but not least, the fourth priority, in line with the development goal of private sector-led industrial development, is implementing a privatization policy to reform the SOEs in Myanmar that are mostly not profitable in spite of the better business environment that SOEs enjoy over private enterprises.

The “Privatization Commission” as an independent institution needs to be established to exhibit a political commitment of the government for undertaking reforms. The Commission should conduct objective evaluations for the feasibility of all SOEs and identify restructuring possibilities. To facilitate this, an inter-ministerial technical body under the Commission needs to be set up. It should look into all issues related to legal, financial and operational aspects, as well as come up with a process for restructuring of the SOEs. Privatization is primarily aimed at eliminating any incentives that insulate the SOEs from the impact of poor performance. However, successful privatization of SOEs requires fiscal and other incentives for the initial period of its operation including a tax holiday for a fixed period (e.g. for five years), secured access to finances, tariff relaxations over technology imports in the form of capital equipment and spare parts, and simplification of legal requirements.

Short-Term Priority Industries

The following ten industries were selected as short-term priority industries by the Ministry of Industry of Myanmar:

1. Textile & garment industry
2. Food processing & packaging industry
3. Plastic processing industry
4. Construction material industry
5. Labour intensive industry
6. Machine tools & parts industry
7. Chemical industry
8. Tire & rubber industry
9. Pulp, paper & paper product industry
10. Pharmaceutical industry

Power & Energy

Myanmar is planning to double its electric power capacity by 2021 by building natural gas-fired power plants, in an ambitious move to tackle chronic power shortages in the energy-starved country. With only one-third of the country’s 60 million people connected to the electrical grid and cities experiencing blackouts, Myanmar needs to boost its power supply to attract much-needed foreign investment. A total of 62 hydropower projects and 11 coal-fired power plants, as well as several gas-fired and renewable power projects, were approved by the previous government. In April 2017, the current government issued a statement saying that a further 6,270 MW of electricity will be generated by 20 new hydropower projects. Currently, Myanmar has 3,033 MW of installed hydropower capacity, out of an

estimated potential of over 100,000 MW. Decreases in hydropower and natural gas in these two major sources make way for increases in solar PV and coal power.

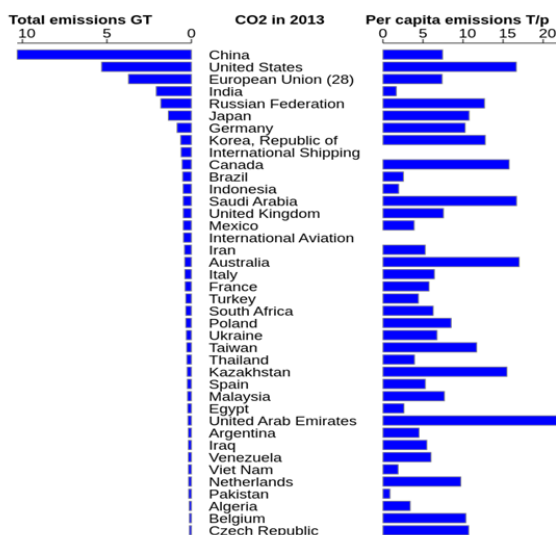
The role of solar PV as a contributor to electricity production in Myanmar was minimal until 2012, but it is projected to reach 5% of total electricity production by 2030. It is also envisioned that the role of coal-fired power plants in electricity provision will undergo a drastic increase, from 2% to 30%.

European Chamber of Commerce in Myanmar reported in Energy Guide 2018 as follow¹².

	<u>2012</u>		<u>2030</u>
Hydro power	70%	Hydro power	57%
Coal power	2%	Coal power	30%
Natural gas	28%	Natural gas	8%
Solar PV	0%	Solar PV	5%

Myanmar - CO2 emissions

In accordance with world CO₂-emissions figures, Myanmar is geographically situated between world largest CO₂-emission countries China and India.



However, Myanmar was even not listed in the top 40 world most CO₂ emission¹³. But World Data Atlas reported that in 2016 Myanmar emitted 16,701.8 kt which is increasing annually.

¹² Energy Guide 2018- by European Chamber of Commerce in Myanmar

¹³ https://en.wikipedia.org/wiki/List_of_countries_by_carbon_dioxide_emissions

Electric Power Tariff

Myanmar has some of the lowest electricity rates in the world. However, connecting and supplying power to the millions of people who will drive Myanmar's development is a huge endeavour, one that requires the commitment of tremendous financial resources from the state, companies and international donors. Residential prices in Myanmar are MMK 35 (0.021 USD¹⁴) per kilowatt-hour for the first 100 units, MMK 40/kWh (0.021 USD) for the next 100 units, and MMK 50/kWh (0.031 USD) for all units after that.

With an average tariff of roughly USD 0.03/kWh, these are the lowest residential prices in ASEAN, and among the lowest in the world. In fact, Myanmar's highest, "luxury" tariff is lower than the lowest price in the rest of ASEAN. Prices for commercial and industrial customers are much higher, ranging from MMK 75 to MMK 150/kWh (0.046 – 0.093 USD). This is more in line with ASEAN standards, and this kind of cross-subsidization mechanism is not uncommon. However, while many firms are willing to pay more for a better quality of supply, the financial viability of supplying power to millions of people cannot rest entirely on a few thousand businesses.

There are arguments in favour of subsidising part of the electricity consumption, such as: electricity is a prerequisite for almost all other aspects of development. Without electric light, schools cannot stay open late and students cannot study at home. Villages without any electricity struggle to attract teachers. Farmers have to use costly diesel pumps for irrigation, and cannot communicate with markets or food-processing factories without cell phones. Economic research has also shown that access to affordable electricity can have surprising effects, such as lowering worker absenteeism and birth rates, while increasing female employment. Also, access to affordable electricity is necessary for new businesses to emerge, attract investment, and raise productivity. Since electricity is so central to our modern economy and lifestyle, it is a key determinant of whether development is inclusive. For those who have it, it opens a world of possibilities, of new opportunities to improve their quality of life, income, education, health and, in a way, their freedom. Keeping electricity cheap, at least initially, helps to ensure a level playing field.

Energy Efficiency in Myanmar

Most of the SMEs in Myanmar are not aware of potential energy savings in the industrial operations due to low energy (electricity) and labor costs, which have sustained their business profitability. However, energy prices, particularly the electricity tariff, will increase sooner or later and the government has already the policy to reduce the energy consumption by 20% till 2030.

IEE in Myanmar - the first project to raise awareness about energy saving - will maintain the same productivity and is making considerable business gain. The IEE in Myanmar project is gaining momentum in the first 43 months of implementation and it is envisaged to achieve even more impact in the industrial sector.

¹⁴ Calculation rate is taken from <https://www.oanda.com/lang/de/currency/converter/> and rate from 2.11.2018 is used

2.2 Project Factsheet and Background

Project factsheet¹⁵

Project Information	
Project Title	Improvement of Industrial Energy Efficiency in Myanmar
Implementing Agency(ies)	UNIDO
GEF Phase	GEF-5
Focal Area	CC (CCM)
Region	ASIA
Country	Myanmar
Trust Fund	GET
Project Size	FSP
CEO Endorsement Date	14/10/2014
Project Launching	26/03/2015
Proposed Implementation End	03/12/2019
PPG Amount	\$100,000.00
Grant Amount	\$2,730,000.00
Confirmed Co-finance at CEO Endorsement	\$13,800,000.00

Changes in Project

The project work on the ground started with an inception workshop (“National Workshop for the IEE Project in Myanmar” on 8th August 2014) and the establishment of the PSC on 30 November 2015 and the official project launch on 26 March 2015. The planned end date is December 2019.

Up until today, the Project Result Framework has never been revised/amended, the OVs and assumptions are still valid. During last PSC meeting (June 2018), reducing the target number of companies implementing EnMS (from 50 to 15-25) was discussed, but no final decision was documented in the meeting minutes.

¹⁵ UNIDO, 2018, PPT - presentation at 4th PSC 21 June 2018

2.3 Project Objectives

This 5 year project aims to promote sustained GHG-emission reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial EE and the implementation of energy management systems, based on ISO 50001 and optimization of energy systems in industry.

The project objectives are to result in improved regulations and financial incentive mechanisms, grant and non-grant instruments and strengthen technical and institutional capabilities for the development, financing and implementation of EnMS and EE improvements in various industries on a sustainable basis:

Component 1: Improvement of policy and regulatory frameworks, incentive schemes, support programmes

Component 1 will support the Government's efforts in improved policy and regulatory frameworks, incentive schemes, support programmes. An energy consumption data base will be developed and together with awareness creation this will facilitate sustainable energy efficiency improvement in industry.

Component 2: Capacity Building

In this component strengthened or built capacity of institutions, industries, consultants and equipment suppliers on energy management system, energy system optimization and EE project financing will assist industries in the implementation of EE improvements.

Training on EE (e.g. steam system or compressor improvements) will be given at the plant manager, user and expert levels and will focus on system optimization (SO, e.g. steam system or compressor improvements) and Energy Management Systems (EnMS - ISO 50001).

Training will also be provided to develop bankable project proposals to apply for various funding and incentives schemes, as well as training to financial institutions in the evaluation of funding applications.

Component 3: Demonstration and up-scaling

This component will focus on demonstration projects on energy management systems and energy system optimization in selected plants and sub-sectors and widely usable case studies result in direct GHG emissions reductions and leverage the interest and belief in investment in IEE projects.

Up to 50 plants will be supported to implement EnMS and to achieve significant savings through improved EE. It is expected that some 20 will work towards obtaining ISO 50001.

Component 4: Monitoring and Evaluation

This component will ensure an ongoing Monitoring and Evaluation mechanism including regular monitoring exercises conducted, PIRs prepared; tracking tools prepared according to GEF requirements. In addition, ongoing measurement of energy savings and GHG emission reductions based on GEF will be conducted.

2.4 Project Implementation Mechanism

The project implementation arrangements were designed to embed the project in the normal operations of the responsible ministries and established institutions in Myanmar. The responsibilities for project implementation were as follows:

- **Ministry of Industry (MOI)** is the Executing Agency for this project and will act as the Chair of the PSC, will appoint the National Project Director (NPD) and will chair the Project steering Committee (PSC). MOI is responsible for the production of consumer products and light industrial goods; and (ii) concentrates on developing not only heavy industry, but also small and medium enterprise; and (iii) facilitates private industries.
- **Ministry of Natural Resources and Environment Conservation (MONREC)** is responsible for the forest, biodiversity and environmental conservation, ecotourism, time harvesting & wood processing, conservation, international cooperation and surveying activities. In the project they are representing the GEF Focal Point in Myanmar and are a PSC member.
- **Ministry of Electricity and Energy (MOEE)** has the responsibility to carry out: (i) exploration and production of crude oil and natural gas; (ii) refining; (iii) manufacturing of petrochemicals and transportation; and (iv) distribution of petroleum products. Their role in the Project: to be responsible for and participate in the policy and regulatory frameworks component, as well as an active member of the PSC.
- **Ministry of Education (MOE)** has the objectives: Major objective MOE is to plan & implement all educational programmes covering all primary, middle, high schools and universities. The National Standards and Quality Department is now under the MOE and its objectives are (i) to carry out research and development works for national economic and social development; (ii) to utilize natural resources (iii) to distribute the results of research and development works in industrial and agricultural sectors to enhance production; (iv) to plan and carry out human resources development (v) to analyse and test raw materials and finished products, implement quality control and standardization of industrial products; and (vi) to coordinate research, development and use of atomic energy. Role in the Project: The National Standards and Quality Department (MOE) - Standards Institute is responsible for policy and implementation activities relating to ISO 50001, EnMS.

In addition, three Civil Society Organizations (CSO), namely, the Union of Myanmar Federation of Chambers of Commerce and Industries (**UMFCCI**), Myanmar Industries Association (**MIA**), Myanmar Engineering Society (**MES**) are involved and are participating in PSC meetings.

Banks and Financial Institutes are joining and supporting this project.

Financing plan summary - Outcome breakdown

<i>Project outcomes</i>	<i>Donor (GEF/other) (\$)</i>	<i>Co-Financing (\$)</i>	<i>Total (\$)</i>
1) Improvement of policy and regulatory frameworks, incentive schemes, support programmes, and awareness raising	400,000	1,000,000	1,400,000
2) Capacity Building	700,000	2,400,000	3,100,000
3) Demonstration and upscaling	1,370,000	9,600,000	10,970,000
4) Monitoring and Evaluation	125,000	300,000	425,000
Project Management Cost (PMC)	135,00	500,000	635,000
Total (\$)	2,730,000	13,800,000	16,530,000

2.5 Project Theory of Change

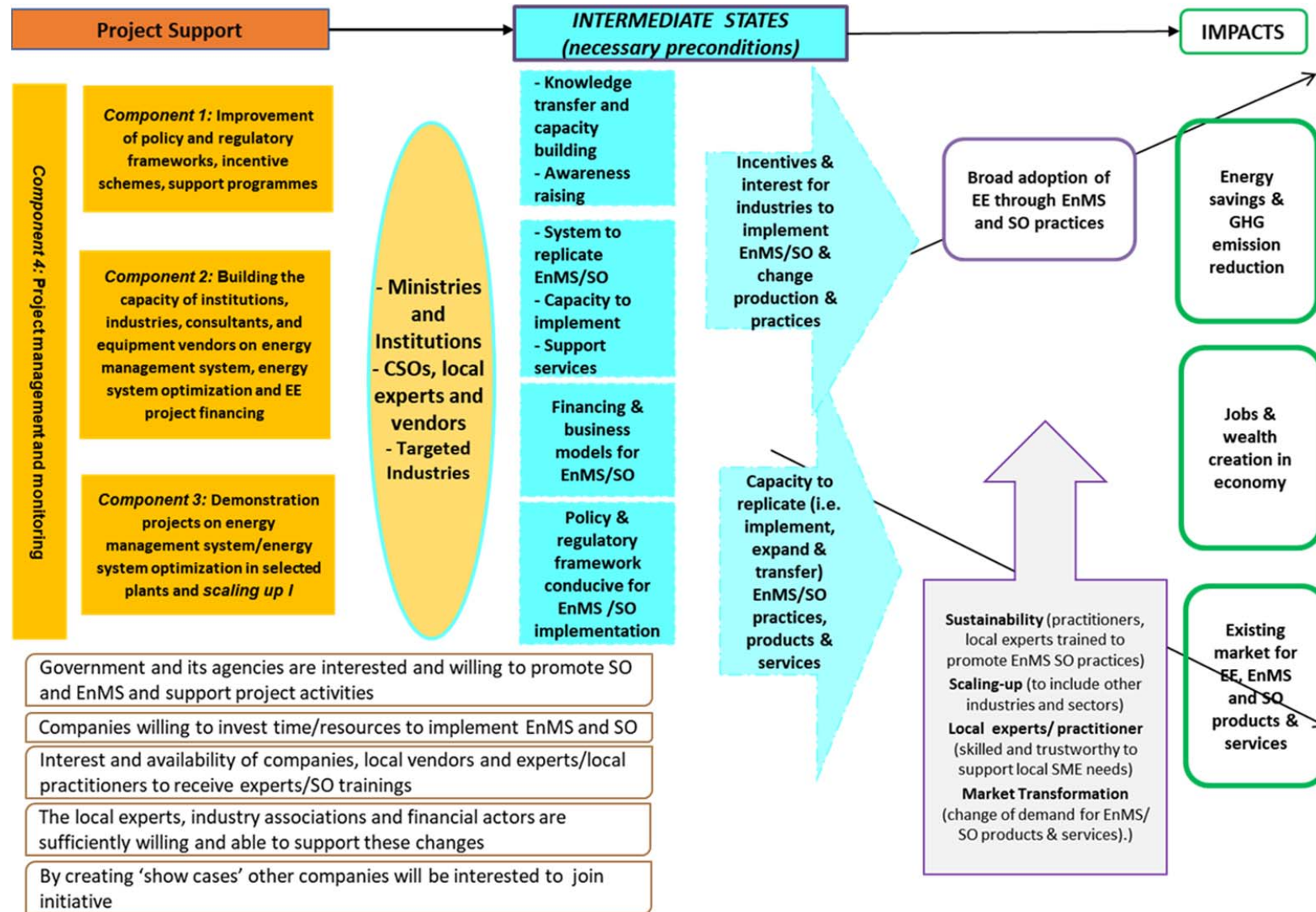
Theory of change (TOC) is a heuristic approach to help clarify the links between project activities and long-term objectives. Key in the development of a TOC is the identification of the conditions likely to bring about the behavioral changes required to achieve the long term goal of the project (Chen 1990; Mayne 2008). TOCs also support the identification of key elements that should – in due course – be evaluated. As such, TOCs are frequently used as the starting point for developing evaluation approaches and for identifying evaluation questions.

There was no explicit theory of change developed for this project, but the project documents and the logical framework provide information to ‘re-engineer’ a theory of change indicating how the project was expected to “...promote sustained GHG emissions reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial EE and the implementation of energy management systems, based on ISO 50001, EnMS and optimization of energy systems in industry.....”.

The main conditions leading to the changes needed, to achieve the project goals are:

- (i) A policy and regulatory frameworks for EE in Myanmar can be established and institutional capacity can be built.
- (ii) By creating an enabling policy and regulatory framework the EE and SO, approach can be mainstreamed and a conducive environment for EE implementation can be created.
- (iii) SMEs choose to implement EnMS and SO measures and are willing to make investments and to reduce overall carbon emissions, if:
 - sufficient awareness is created;
 - training and support is given by international and local EE/EnMS experts; attractive support programmes and incentive schemes are given
 - ROI for EE measures and STS investments is proven and within a certain timeframe
- (iv) By successfully showcasing EnMS in 50 and CASO/SSO in 20 selected companies, other companies are willing to follow these examples

Reconstructed Theory of Change – Improvement of Industrial Energy Efficiency in Myanmar



There were several important assumptions made during project development. Given that the objective of the project is to promote sustained GHG emissions reduction in the Myanmar industry, it was assumed that¹⁶:

1. Government, involved Ministries and agencies are interested and willing to promote EE, SO and EnMS and support project activities
2. Companies are willing to invest time and resources to implement EnMS and SO
3. Interest and availability of companies, users and experts/local practitioners to receive experts trainings
4. The local experts, industry associations and financial actors are sufficiently willing and able to support these changes
5. Interest and availability of local vendors/equipment vendors to receive SO trainings
6. Implementation of project activities will foster industrial EnMS and SO investments and reduce CO₂-emissions
7. Macroeconomic conditions do not drastically alter prices/outputs from the industry
8. By creating 'showcases', other companies will be interested to join the initiative
9. There is continued governmental support for this effort

During ET it was very much visible that these assumption (2-5) have not been correct, as there was only very limited interest and willingness from industries at the beginning of the project, due lack of awareness and knowledge before project started. This may also be one of the main reasons for the short fall in component 3.1.1. (EnMS implementation in 50 industries). EnMS is not an appropriate starting point to raise awareness, as a broad knowledge within the company is needed to implement any Management Schemes (MS). Regular monitoring/controlling of resources and the reflection of energy cost in accounting is a precondition for implementation of MS.

¹⁶ UNIDO (25th September 2014) 130042_CEO Endorsement_GEF_Unido Myanmar, Annex A Project Results framework

3. Key Findings

3.1 Project Design Assessment

3.1.1 Project Design and Relevance

Focus of the original design on awareness and capacity building on EE is highly relevant to the country context and to create awareness and capacity for IEE. All stakeholder met, stressed the need to create more awareness on IEE and to support government and industries to become more efficient. Focus of the Project on Energy Management Implementation has emerged as to far a stretch. It did not meet the local reality which is not yet at a point where EnMS can act as a major driver for EE. Awareness and knowledge in this field have to be build up first. This has partly been done by the other activities and it does not seem enough yet for systematically implementing and maintaining EnMS in a significant number of industries. More time during the design phase before Project start and Inception Phase at the beginning of project work should have been spent into assessment of the prevailing ground realities in Myanmar.

The project outputs and activities are in line with Myanmar Government priorities as well as with UNIDO's focus on SDG 7 and 9 and GEF strategies on GHG reduction. Outcomes of the Project are already used to formulate the EE&C act and ISO 50001 norm as Myanmar standard. PMU is supporting the respective ministries.

IEE is especially relevant for industries in Myanmar, as their efficiency (on resource use in general, including human resources) is rather low. Efficiency is a major challenge to become competitive and to participate in national and international market. However, awareness is still low, so the relevance for industries is not fully recognized yet.

Project components and activities are well targeted, clear and consistent, but the project design lacks a sustainability strategy; there is no component to ensure further use of the training centre, training material and measurement equipment after the funded project period.

3.1.2 Results Framework and Progress, Reflections on the Theory of Change

The Project has been monitoring and documenting its achievements against the project results framework. In a presentation during the last PSC meeting (June 2018), component-wise results were shared by the UNIDO team with key stakeholders. PMU could supply ET with an updated version of the so called "Project Progress Update Report" including all details on actual project status

Under activity 1.1.4, "Awareness raising on NAMA and IEE..." is mentioned and it seems not clear how to relate to Nationally Appropriate Mitigation Actions (NAMA) in Myanmar. The topic was discussed during the 3rd PSC meeting and it seems there is no local activity on NAMA, nor an entity responsible for NAMA, as priority is on the upcoming Energy and Conservation Law. This should be discussed in the upcoming PSC and clarified soon, to modify this activity accordingly.

Progress on Component 1¹⁷:

Output 1.1: Energy efficiency (EE) strategy developed based on experience and lessons learned from other countries

Objective: 1 EE strategy developed for industries

Status: National Energy Efficiency & Conservation Policy, Strategy and Roadmap for Myanmar was approved by Government on 4/2/2016.

Output 1.2: Incentive schemes, e.g. tax breaks or exemptions, grant and nongrant instruments, etc. and support programmes, e.g. consultancy services, training, etc. developed.

Objective: 1 set of schemes and support programmes developed

Status: MM ISO 50001:2011 (Myanmar version) was adopted by the Government in July 2018; Energy efficiency training centre established (including Compressed Air Demo System, training material and measurement equipment), Incentive schemes pending

Output 1.3: Energy consumption data by large and medium sized industry establishments collected and managed

Objective: 1 data bank

Status: Database frame was developed with Assistance of International Expert (see visit report...), follow up to be done by EECD in MOI. Second expert mission is pending as there are some delays from the ministries in providing the relevant energy data.

Output 1.4: Awareness raising activities on Nationally Appropriate Mitigation Actions (NAMA) and IEE conducted.

Objective: At least about 15 half day awareness workshop, with about 40 – 60 participants each

Status: Promotional material in IEE and awareness events have been conducted as planned (see also Output 2.1). There are no specific activities for NAMA in Myanmar.

Progress on Component 2:

Output 2.1: Introductory, user and expert training on energy management systems based on ISO 50001, EnMS conducted;

Objective: 1 set of EnMS training materials in English and local language
300 managers trained on awareness and EnMS implementation
150 practitioners trained on EnMS implementation
at least 40 experts trained on EnMS implementation

Status: 1 set of training material (each), user training in Myanmar translation available,
113 participants in EnMS awareness WS
386 participants in EnMS User training
39 participants in EnMS expert training (to become certified soon)

¹⁷ figures in Project Progress Update Report, could be affirmed with actual documents (visit reports, attendance sheets, training material, feedback forms,...) during interviews

Output2.2: User and Expert training on energy system optimization conducted

Objective: 1 set of SO training materials in Myanmar language
300 managers trained on awareness and EnMS implementation
30 - 50 user/practitioners trained on SO for each selected energy system
10 -15 experts trained on SO
Energy system vendors receive 3 half-day vendor trainings

Status: Each set of training material (each), user training in Myanmar translation available,
202 participants trained on CASO user training
213 participants trained on SSO user training
18 participants trained on CASO expert training
20 participants trained on SSO expert training
vendor training as such is pending, but several trained experts can be seen
as vendors also, as the sell equipment on EE products

Output 2.3: Training on EE project financing provided to industry and financial provided

Objective: 100 technical personnel of industries and manager trained on development
of bankable EE project proposals to get access to finance
at least 30 personnel from banks trained on appraisal of EE project proposals

Status: Training material translated to local language, PMU is searching for trainers
training has not started yet and is planned for beginning next year

Progress on Component 3:

Output 3.1: Energy management systems implemented in 50 industrial establishments, case
studies prepared

Objective: 50 projects in EnMS implemented in industries

Status: 10 EnMS implemented, it was discussed during last PSC to reduce number to 15-25,
but no final agreement is stated in protocol. As implementation of proper EnMS takes
min one Year this target will be very difficult to achieve

Output3.2: At least 20 optimization projects implemented on energy; systems: pump, compressed
air, fan, and steam, case studies prepared

Objective: 20 projects in SO implemented in industries

Status: 6 CASO assessments and 7 SSO assessments have been carried out. Industries have
implemented multiple measures each as recommended in assessment reports.

Achievements for component 4

Output 4.1: Regular monitoring exercises conducted, PIRs prepared; tracking tools prepared
according to GEF requirements

Status: So far 4 PSC meeting conducted, that means yearly from project start. In 2018 this
is changed to biannually; 5th PCS will take place in December

Output 4.2: Mid-term and final project evaluation conducted

Status: Mid-term review was conducted in October 2018;
about one year later than planned

Reflection on TOC

It is visible that the reconstructed TOC reflects change already taking place in some of the project components. A number of locally available EnMS, CASO and SSO experts are in place and eager to work, a few service providers or vendors have started their business and technologies are adapted to local needs. Together, through networking with project stakeholders, awareness creation has started, but the demand for IEE products and services is still very low.

While presently the project is only covering a few industries, awareness and actions to reduce energy consumption has been started by a small number of industries. Furthermore, there is increasing understanding, demand and interest among the individual industries on IEE. Most of the requirements of the intermediate state are in place (at low level), though some, like the capacity and interest of FIs in supporting IEE actions, did not start yet. However, as Industries have no specific focus to absorb and take up actions beyond their immediate needs of production and profit, it is obvious outcomes might take longer to be completely visible.

3.2 Project Implementation and Management

3.2.1 Project Management

Monitoring and evaluation design is included in the Project Results Framework with OVIs at outcome and output levels. There are achievable indicators provided for the main outputs and are regularly monitored. Sufficient resources allocated to this task.

Most of the targets¹⁸ provided are consistent with the activities described, but the Logframe has not been revised/adapted since project start in 2014. It is not seen as a management tool, but more as a 'rigid, binding document' and part of the contract.

The cooperation between the local UNIDO PMU team and Project team in HQ is running effectively, reporting is done on a regular basis and timely follow up actions.

PMU is well linked to all stakeholders, maintains a good relationship with experts and industries and showed flexibility to adapt to local needs. During the MTR mission, several of the discussed findings were already addressed.

3.2.2 Results based monitoring, evaluation and reporting

The Project has a functioning M&E system, all activities are monitored, minutes, workplans and attendance sheets are available. Most attendance sheets include a separate column to monitor gender of participants and PMU could calculate the ration of female participation as given in the OVIs.

¹⁸ Under 1.1.4 ,Awareness WS' on NAMA are mentioned, but it seems no NAMA activities are existing in Myanmar. So PMU was focusing on EE awareness and is recording EE activities under 1.1.4 also.

The annual reporting on PIR is carried out at outcome and output level. Results are regularly traced against overall objectives and discussed with the main stakeholders. The PSC met annually till 2017 and changed to biannual meeting in 2018 and takes decisions as mandated, this is documented in meeting minutes. In these meetings, project extension and budget allocations have been discussed and jointly agreed among all PSC members. Calculations for CO2/GHG reductions are reasonable and traceable.

Metering of 'real' savings in the field is not yet done.

3.3 Gender Mainstreaming

In the CEO endorsement document¹⁹ it is mentioned: "...the project will actively seek to make gender a key dimension of project execution, including a gender analysis to be implemented under Component 1 of the project. Based on this analysis, gender mainstreaming of other project outputs and activities, notably in awareness raising and capacity building, will take place..."

This activity is not visible, but indicators that include gender figures (ration of female participation) are monitored and targets will be met (e.g. at 20% women in training workshops). The female participation is mostly derived from government officials. Typical industrial sectors have very limited female participation.

The UNIDO-revised gender policy has not been included as a part of project activities retrospectively.

3.4 Project performance towards results

3.4.1 Efficiency

In terms of cost-efficiency, it can be stated, that the Project has already achieved a fair number of the expected outcomes with around 60% of the funds remaining.

At the current stage of the Project, the cost efficiency is excellent.

Timeliness of Inputs/outputs

Although the Project is behind schedule, most of the objectives on outcome level are likely to be met. Only the number of industries implementing EnMS (target is 50) will be not met within the planned project duration.

¹⁹ UNIDO (25. Sept 2014) 130042_CEO Endorsement, B.2, page 5 Gender Dimension

Further delays have to be avoided, especially in the implementation and Case Study (success story) creation. With an increased focus and additional resources on CASO and SSO, the actual target (20) is still achievable. As of now, the output targets in GHG reduction are out of range, a revised strategy and workplan is strongly advised.

Level of finance

Around 58 % of funds are still available, thus project funds are sufficient for remaining and even additional activities (e.g. more direct support for implementation or incentives to implement.)

Budget Line Summary						
Budget Line	Type of Expense	2015	2016	2017	2018	BL Total
1100	International Expertise	92.232	173.504	242.066	162.401	670.203
1500	Local Travel	12.221	4.902	6.628	9.103	32.855
1700	National Expertise	28.049	51.080	69.430	87.893	236.451
2100	Contractual Arrangement	813	1.357	2.263	26	4.459
3000	Training/Workshops	8.987	9.946	13.171	10.168	42.271
3500	International Meetings/Workshops	0	0	8.877	0	8.877
4500	Equipment	2.500	84.692	23.105	1.507	111.805
5100	Miscellaneous	3.811	8.195	3.655	12.347	28.007
Total Expenditure		148.614	333.676	369.194	283.444	1.134.928

Table: Status of Project Expenditure, all figures in USD (dated from 2.11.2018)²⁰

Co – Financing

In-kind contribution from involved ministries (human resources, room for office and training center), associations and UNIDO is significant, but not monitored in detail. PMU started this activity during MTR mission and could provide the evaluation team with the figures.

In-kind contributions from industries (HR in form of company teams working on EnMS and IEE implementations) are also visible, but financial investments are lagging behind, as only a few have started implementation on IEE and most of companies start with no-cost and low-cost implementations. At this stage of the Project, it seems very unlikely that the amount of co-financing envisaged from industries in the endorsement document can be achieved within the planned project time.

²⁰ Deducted from UNIDO SAP system and shared from UNIDO Headquarters Vienna

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Co-financing Value (in MMK)	Co-financing Value (in US\$)
National Government	Ministry of Industry	In-kind	188.640.000	120.923
National Government	Myanmar (Other) Ministries	In-kind	8.115.000	5.202
Private Sector	Myanmar Industries	Cash	29.820.000	19.115
Private Sector	Myanmar Industries, including Myanmar Industries Association	In-kind	105.560.000	67.667

Calculated Cofinancing Value (Status 2nd November 2018); 1 US\$ = 1560 MMK

The detailed calculation sheet for Co-Financing is shown in Annex

3.4.2 Impact

General Impact:

Although the Energy Efficiency and Conservation Division (headed by a director) existed under the Department of Industrial Collaboration (DIC) of Ministry of Industry, due to insufficient budget & staffing, very limited EE & C programs were initiated before project start. It was a very timely and a great positive impetus for the DIC and particularly EE & C Division, when the IEE in Myanmar Project started its implementation in 2015. The IEE in Myanmar Project, after 43 months of implementation, has actually paved the way for increased results on the area of EE in industrial sector. The IEE Project also engaged particularly private sector industries by providing awareness & user as well as expert EE training to the managers, technical experts & engineers, who otherwise would not be aware of and gain knowledge, awareness and expertise on the EE areas.

Direct Impact:

During the IEE in Myanmar Project, EE & C Division of DIC has drafted the Energy Efficiency and Conservation Law and already 3 consultation meetings involving all government ministries have been conducted and it is expected the law could be enacted in early 2019. To support the EE & C Law, national Energy Efficiency & Conservation Policy, Strategy and Roadmap for Myanmar was approved by the government in February 2016.

MM ISO 50001: 2011 Energy Management Systems (Myanmar Version)-Requirement with guidelines for use, has been adopted by the Government in July 2018. National Standards & Quality Department of Ministry of Education has approved ISO-50001 Energy Management Systems as one of Myanmar Standards in 2017 August.

MOI has established in collaboration with IEE in Myanmar Project “The Energy Efficiency Training Center” which the addition of a Compressed Air Demonstration System in 2018. 10 partner plants are in the process of implementing EnMS systems in their respective factories,

while 6 Compressed Air System Optimization (CASO) and 7 Steam System Optimization (SSO) assessments have been completed. 113 EnMS awareness participants, 386 EnMS users level trainees, 39 EnMS expert level trainees, 202 CASO user level trainees, 213 SSO user level trainees, 18 CASO expert level trainees and 20 SSO expert level trainees were trained by international experts.

The majority of the engineers and trainees are from private industries, but some are from SOEs (for more details see 3.1.2, Progress on components).

Indirect Impact:

The IEE in Myanmar Project has also disseminated energy efficiency messages to potential industrial and factory owners, managers and engineers about the importance of EE, reduction of CO₂ emission and the adverse effects of releasing Green House Gases into the atmosphere, through participation in national, regional and local events, festivals and other outlets. The messages are also disseminated via websites, social media and printed media, but visibility is still poor and dissemination needs more focus in the remaining project period.

3.4.3 Sustainability

As already mentioned, a specific component on Sustainability is missing. Nevertheless, project structure and design – located at MOI with close cooperation with concerned ministries and associations – will support the IEE activities after the funded project period. During the MTR mission, it was mentioned several times by multiple stakeholders that project activities are contributing towards better communication between ministries and departments (within the same ministry). A network of involved persons is evolving, which will further ensure sustainability of outcomes.

Upcoming Regulations and Standards will foster IEE in Myanmar and will increase the demand for trained IEE/EnMS experts (energy manager) and support market creation for IEE services. EECD at MOI is preparing “Standard Curriculum for Energy Managers” and is utilizing inputs from the Project and experts trained by the Project will most likely fulfill the requirements to become “Energy Managers”. EECD will also use/reference some content of UNIDO EnMS, CASO, and SSO training material.

Additional awareness creation and capacity building in industries by credible and easy to implement showcases is key to sustainability, so the project needs more visibility and has to focus on additional marketing activities.

Main risks to sustainability

The continuation of the IEE Training Centre including measurement equipment and awareness activities after funded project period has to be secured, as it will be one of key factors for project sustainability.

At present, companies are reluctant to pay for similar (metering and monitoring, assessments) services (‘Funded services’ versus Business Case). Experts trained during this Project are trying to create a market for IEE consultancy services and an accepted fee for this work. As of now, without additional support from this Project, it is unlikely that they will succeed.

A demand-driven market for IEE will not grow drastically with upcoming laws, without adequate awareness creation and law enforcement.

3.5 Performance of Partners

PMU:

The UNIDO Myanmar team is regularly reporting to HQ in Vienna and sufficient support is given from the Project Manager and his team. The cooperation within UNIDO, the National Project Manager, his team and other involved experts is fully functioning. At present only one technical expert is working on a full-time basis for the Project and one is working on a part-time basis. International experts are hired as per actual needs.

Good communication and relationship between UNIDO and involved stakeholder in clusters is assured by regular emails, phone calls and visits, but there is not much interaction between main stakeholders from ministries.

PMU team is very much committed to work for IEE, but right now there are not sufficient resources allocated to close all planned activities within the upcoming 14 months, even though there is sufficient budget left.

MOI:

The ministry has taken strong ownership of the Project and is supporting project activities. The cooperation to bring up the EEC (this includes the obligation to hire Energy Managers in bigger industries) shows success, the law is already formulated and it is expected to come up by next year. Unfortunately, the Director who strongly supported the Project since the start has recently been transferred to another department and will not be able to participate, e.g in PSC meetings, any longer.

MOI has also shown strong interest to house the Training Centre after the funded project period, but as of now, there is no budget allocated to run the Centre.

GEF Focal Point:

The GEF Focal Point is informed about the existing status of project results on a regular basis. However, there is limited active participation in the planning and implementation of the Project. A meeting with responsible person was not given during the MTR.

MoNREC:

The ministry is participating to represent the GEF focal point, but not to present its own interest. MoNREC and the Project could support each other, as the environment conservation act was put in place in 2012 and ECD has been established in all states. IEE training could be given to ECD personnel from the Project.²¹

²¹ This information was deducted from different discussion with MoNREC personal, as interviewees from MoNREC ET could meet during MTR mission, have not been involved in the project.

During meeting with ET, members from MoNREC became aware of project activities and realized ways to support each other.

MIA/UFCCMI:

The responsible person is working in the field of renewable energy and IEE for a long time and is reporting (e.g. outcome of PSC meetings) to the chairman and executive committee of the Association on regular basis. The PMU was invited to present the Project to the executive committee and the Association is also informing their members about IEE and this Project. However, the responsible person himself is not satisfied with the response and strongly recommends the enforced use of social media and even television.

PSC:

Since this year, PSC meetings take place biannually and decisions are made as mandated. It is visible that participants support the Project, but there is a high turnover among the participants from ministries. For this reason, continuous engagement cannot be fully ensured.

4. Conclusions

Major reflections and lessons learnt

When the project started there was only very basic understanding on IEE in Myanmar, so the Project had to start from scratch and this is a very time-consuming procedure. Given the actual knowledge, one can state that the timeline was unrealistic as working with industries to understand IEE and energy management, to create awareness, and to bring implementations to the ground, may require a longer gestation period. This seems to be a flaw in the project design (see also Theory of Change); the assumption that multiple stakeholders are interested to support the project from the beginning was not correct. There was little knowledge about the need for EnMS and IEE, so e.g. almost no experts or service vendors existed in the country.

With the low awareness within industries, they are most likely not proud to share their success with others, are hesitating to share data, and are therefore not willing to display their showcases (case studies). This is again a reason why the creation of case studies and local best practice examples is delayed.

EnMS may not be an adequate starting point to create awareness. There is preparatory work to be done upfront, like raising the awareness on energy topics in general, pointing out the influence of energy consumption and costs/revenue, easy to implement energy measures, implementing energy in the material flow of the industry and the like.

During the MTR and discussions with involved stakeholders (ministries and associations), it was stated several times that stakeholders are willing to give even more support during the remaining project period and the National Project Manager could already fix additional activities (e.g. Executive lunch with support from MIA). This is a strong sign that awareness finally has been created and is building up now.

As of now, there is only a very limited number of available local vendors for IEE products and no local standards on EE equipment exists. There is also low demand for IEE products and services from industries. Market creation has not yet started.

These lessons learnt gave a strong indication during MTR that a project extension is feasible and will ensure stronger impact and achieve those objectives that will be out of reach within the planned project period (December 2019).

Commitment starts with top management/company owners. Once committed, industries appreciate support from the Project and are willing to implement and can achieve significant savings. Thus, one of the main tasks (selection criteria for participating industries) is to find 'committed managers/owners'.

There are several upcoming opportunities to promote IEE (e.g. SME trade fairs in Regional and State cities all over the country, World Standard Day 14 October 2018) and the PMU will utilize them to further promote IEE in Myanmar.

Participating industries do not have enough resources/knowledge to decide about investments/implementations for SSO/CASO and they need more technical support. At the moment, only a few local experts are available. Together with these experts, the Project should offer technical support to them²².

²² One local expert on IEE is already hired by UNIDO on part time basis

5. Recommendations

5.1 Areas of immediate action

Based on the findings of this MTR and the discussions during the country visit and in UNIDO HQ, the involved project partners should have a planning meeting as soon as possible to come up with a joint revised project planning²³. Today it is not clear whether a no cost extension will be given; therefore two workplans have to be prepared, to cover both options.

The Project Logical Framework and Workplan should be reviewed and adapted to the actual situation, especially focusing on the remaining time for project work:

- Specific focus could be on more direct support (handholding for CASO and SSO) for industries to foster implementation. It would be also helpful to expand the scope from SSO only, to any kind of furnaces/combustion processes, including those industries, where no steam is utilized. Several industries (e.g. cement) have already shown interest to join the project.²⁴
- Additional (in house) trainings on SO (CASO and SSO) could be offered to new companies, but also to officials from ministries (e.g. ECD staff from MoNREC, staff from MOEE etc.)
- Fast implementation on IEE to create locally, credible success stories will increase even more interest and awareness of IEE
- Additional resources for implementation on the ground and dissemination of best practices needed
- Creation and publication of 'easy to copy' success stories will foster implementation in other companies
 - invite medium size companies to participate
- Success stories from SOE's will create even more awareness
 - Seek support from concerned Ministries to get SOE's on board (e.g. Fertilizer, LPG and Gas Turbine Plant)
- Start training on project financing soon (2.1.3)
- Focus on professional marketing of project results to create more awareness. Presentation at trade fairs, World Standard Day, etc. Actively utilize Social Media, television, etc.
 - Allocate additional resources for project marketing to increase visibility and update Project webpage
 - Organize 'public' awarding ceremonies for successful participants (industries, experts)

²³ Unido HQ has already requested for project extension, but decision will be most likely taken next year only. The next PSC meeting is already planned beginning of December UNIDO HQ and PMU is working to prepare this accordingly.

²⁴ This feedback/suggestion was given in a skype interview with Mr. Ven V. Venkatesan, International Expert for SSO, as it could lead to significant GHG reduction in relevant industries

- Clarify about NAMA activities in Myanmar; if no activities are there, focus on IEE awareness.
- Plan and work towards creating a self-sustaining model for the “*IEE Management and Training Centre*”, as this will be core for long term IEE in Myanmar.
 - This might include a network of EE experts (also product and service provider) to be utilized for promotion and experience exchange.
 - Create a system to encourage use of existing measurement equipment to foster assessments and implementations²⁵. Offer/advertise this service to the industries.
- Involved project partners should utilize upcoming PSC to come up with a joint decision on how to modify the project to create more impact, especially regarding achievable GHG reduction.
 - PMU to prepare revised workplan to be agreed upon by stakeholders in upcoming PSC in December 2018
- Request for project extension for a minimum of 1,5 -2 years. As there is sufficient budget available and (as explained in 4.1), it is obvious that several of the assumptions stated in the endorsement document and reconstructed by ET in the TOC have not been correct.

5.2 Other required actions

- PMU

With the decision on the remaining time period, the project work plan has to be revised and the Project Logical Framework²⁶ (Outcomes, outputs and / or OVIs) should be reviewed and adapted to the actual situation, especially focusing on the remaining time for project implementation. In case the decision for an extension is taken next year only, it is strongly advised to prepare two workplans (with/without extension) to be discussed and agreed upon in upcoming PSC meeting.

After finalizing an updated project plan (either for remaining or an extended period), a meeting with all stakeholders should be organized to ensure a common understanding and smooth execution of the revised project workplan²⁷. If there is no extension, the focus should quickly shift from EnMS implementation to CASO and SSO work (target figures 50/20 should be jointly revised). EnMS implementation takes more time and GHG-reduction becomes visible only after the first PDCA circle is finished (normally one to one and a half year). In the short run (14 months project period), it is more likely to contribute towards CO₂ reduction by supporting industries to optimize existing operations (SO).

One specific focus could be on more direct support (handholding) for SMEs to foster implementation on CASO and SSO. Fast implementation of the success stories needs to be considered as this will further increase interest in the project by other industries.

²⁵ It is visible that measurement tools are hardly used in the field. Without a proper system (including insurance for the tools) local experts will hesitate to take the risk to utilize the expensive equipment.

²⁶ The Project Logical Framework is a strong management tool and should be used during project meeting to increase ownership for project objectives.

²⁷ The 5th PCS meeting is planned in December 2018

It is strongly recommended to plan and work towards creating a self-sustaining model for the “IEE Management and Training Centre”, as this will be core for long term IEE in Myanmar after the funded project period. This would include allocation of additional funds, to ensure use of training centre and training material. Additionally, a system to encourage experts and industries to take advantage of the existing measurement equipment (including insurance) to foster assessments and implementations should be introduced.

The Project may also consider linking to other projects on Resource Efficiency and Cleaner Production (RECP) in general, not only in Myanmar, but also other South Asian Association for Regional Cooperation (SAARC) or ASEAN countries, e.g. initiating an experience sharing event.

Given the limited visibility of project activities and results, it is suggested that one person could be specifically hired for communication and project visibility. The webpage should be updated urgently.

- UNIDO

Additional (human) resources should be allocated to the Project, to make sure that remaining funds can be utilized efficiently in the remaining project time.

- MOI

As MOI is the key counterpart government ministry of the project and the chair of PSC, more proactive cooperation and coordination in speedy decision making together with the IEE in Myanmar Project PMU are needed to realize the outputs and outcome of the Project. At the national level, further efforts should be made by MOI to move forward the draft Energy Conservation Law to be enacted as planned. More focus should be given to collect data for the database to be able to continue with support from UNIDO international expert.

Joint effort (with other stakeholders) is needed to work towards the self-sustaining model for the “IEE Management and Training Centre”. Additional funds are needed to run it after IEE project closure.

- MOE

MOE mentioned its interest to run the “IEE Management and Training Centre”, but also lacks the funds to do so. This activity has to be aligned with MOI and planned properly.

- PSC

ET realized the fluctuation of involved persons during the project period that always comes along with a loss of knowledge and engagement²⁸. Partner ministries (MoNREC, MOEE, MOE) should assign senior officials (Director and above) on a permanent basis to the IEE Project Steering Committee so that commitment and knowledge is strong and actions can be implemented effectively.

The PSC meeting should discuss and agree on the needed changes at the earliest in order for the PMU to implement the decisions efficiently in the remaining period of the project.

²⁸ E.g. Ms. Naing Naing Lin was supporting the project from the very beginning and was recently promoted to another department. This department and Ms. Lin in her new function should definitively given time to support the project further for the remaining project period.

6. Annexes

Annex 1. Terms of Reference (Project Results Framework) ²⁹

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Project Objective: To promote sustained GHG emissions reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial energy efficiency and the implementation of energy management system, based on ISO 50001, EnMS and optimization of energy systems in industry.	Direct electricity and fuel savings over equipment lifetime (15 years; project duration and post-project lifetime); Economic gains, for example from energy savings, for industries and Government as a result of energy subsidies reductions; Number of EE jobs created and registered; (these two last indicators will be monitored throughout project implementation)	Inefficient use of energy in industry and rapid industrial growth resulting in growing amounts of emissions: Policy: Lack of (or insufficient) policies and strategies; low-cost pricing of grid electricity Energy and energy inefficiency: Insufficient grid supply hence expensive and polluting gensets back-up; lack of awareness; insufficient capacity building and training of EnMS/SO institutions and experts	Direct electricity savings (MWh): 2015-19: 26,090 2020-39: 138,677 Direct fuel savings (MWh): 2015-19: 114,482 2020-39: 620,540 Grand total direct energy saving: 899,789 MWh	Validated energy savings from project reports	Willingness of state, industry and financial institutions to support the programme and invest time and money in its implementation

²⁹ UNIDO (25. Sept 2014) 130042_CEO Endorsement, Annex A; Project Results Framework

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
	Direct GHG emission savings over the project duration and post-project lifetime (15 years) Indirect bottom-up and top-down emission savings	Industry: Mostly SMEs; low MVA sectors/low output; high cost of credit; difficult to finance EE investments	Direct GHG (lifetime) emission savings (tCO₂): 2015-19: 30,242 2020-39: 162,962 Total: 193,204 Indirect emission savings (tCO₂): 2020-39: Bottom-up: 772,817 Top-down: 4,497,899	Validated GHG emission savings from project reports	
Component 1: Improvement of policy and regulatory frameworks, incentive schemes, support programmes					
Outcome 1.1 Improved policy and regulatory frameworks, incentive schemes, support programmes, energy data and awareness will facilitate sustainable energy efficiency improvement in industry.	Status of EnMS/ISO 50001 application	ISO 50001 not adopted as a national standard	ISO 50001 adopted as national standard	Government and government institutions	Willingness of the Government of Myanmar to promote EE and EnMS as a priority for industry
	Status of energy efficiency strategy and regulations	No detailed policy /strategy to promote EE and EnMS in place	EE policy and accompanying strategy adopted		
	Status of accreditation and certification schemes	No proper accreditation and certification available	Accreditation and certification scheme in place		
	MRV (measurement-reporting-verification) methodology status	No MRV methodology in place	1 MRV methodology in place		
	National award scheme(s)	No widely acclaimed recognition of EE/EnMS achievements	1 national award scheme in place		
1.1.1 Energy efficiency (EE) strategy developed based on experience and lessons learned from other	Status of EE strategy	Policy makers not aware of the best practices of other countries. Until now, policy makers have not received much training on EnMS and	1 EE strategy developed (for industry)	Adopted laws, decrees, directives	Government and its agencies are supportive of the

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
countries;		standards			project
1.1.2 Incentive schemes, e.g. tax breaks or exemptions, grant and non-grant instruments, etc. and support programmes, e.g. consultancy services, training, etc.	Number of schemes and support programmes proposed or in place	No clear incentive schemes and support programmes	1 set of schemes and support programmes developed	Adopted schemes and programmes	
1.1.3 Energy consumption data by large and medium sized industry establishments collected and managed;	Availability and quantity, quality and reliability of industrial energy data	Very poor or unavailable data on industrial energy	1 data bank: industrial energy data collected, compiled, analysed and presented in a retrievable format	Databank website, documentation	Full cooperation of government agencies and industry
1.1.4 Awareness raising activities on Nationally Appropriate Mitigation Actions (NAMA) and EE conducted.	Number and type of awareness training programmes carried out targeted at experts, managers and concerned government officials	Lack of awareness on NAMA and associated EE projects EnMS	At least 15 half day awareness training workshops, with about 40 to 60 participants each (at least 20% are women) carried out targeted at experts, managers and concerned government officials; national and regional awareness raising activities conducted, project website fully operational. 20 case studies prepared and widely distributed and used.	Interviews with participants post project	Participants available, government and industry support the activity
Component 2: Capacity building					

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Outcome 2.1 Strengthened or built capacity of institutions, industries, consultants and equipment suppliers on energy management system, energy system optimization, and EE project financing will assist industries in the implementation of EE improvements.	Number of awareness training programmes on EE carried out targeted at organization managers, plant owners, concerned government officials	Lack of awareness on EnMS, SO and EE project financing of organization managers, plant owners and concerned government officials	At least 15 half day awareness training workshops carried out targeted at organization managers, plant owners, concerned government officials	Interviews with participants post project	Participants available, government and industry support the activity
	Number and type of expert level training programmes on EnMS based on ISO 50001	No training available on EnMS	At least 2 rounds of expert level training on EnMS with adequate numbers of 2-day users training courses carried out	Interviews with participants post project	Participants available, government and industry support the activity
	Number and type of SO training	No SO training available	At least 1 round of expert training carried out for each of the selected energy systems with adequate numbers of 2-day user training courses conducted.	Interviews with participants post project	Participants available, government and industry support the activity
2.1.1. Introductory, user and expert training on energy management systems (EnMS), based on ISO 50001, conducted;	Availability of EnMS training material available in English and local language	EnMS Training material is not available in the local language	1 set of EnMS Training material available in English and translated into the local language	Project website and training material documentation	Translation and publication services arranged
	Number of managers trained on awareness and implementation of EnMS	No managers trained on awareness and implementation of EnMS to ISO50001	300 managers trained on awareness and implementation of EnMS	Interviews with trainees post project	Local managers available and interested in training
	Number of professional user/ practitioners trained on implementation of EnMS	No user/ practitioners trained in EnMS implementation to ISO50001	150 practitioners (at least 15% are women) trained on implementation of EnMS	Interviews with trainees post project	Local personnel available and interested in training

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
	Number of experts trained on implementation of EnMS	No experts trained on implementation of EnMS to ISO 50001	At least 40 Experts (at least 10% are women) trained on implementation of EnMS	Interviews with companies post project	Local experts available and interested in training
2.1.2. User and Expert training on energy system optimizations (SO) conducted;	Availability of SO training material available in Myanmar language	SO training material is not available in Myanmar language	1 set of SO training material available in Myanmar language	Project website and training material documentation	Translation and publication services arranged
	Number of users/practitioners trained SO in industry	No users/practitioners trained SO in industry	30-50 users/practitioners trained SO for each of the selected energy systems in industry	Interviews with trainees post project	Local user practitioners available and interested in training
	Number of local experts trained on SO in industry	No local experts trained on SO	10-15 local experts trained on SO for each of the selected energy systems in industry	Interviews with trainees post project	Local experts available and interested in training
	Number of energy system equipment vendors that received half-day vendor training on SO	No energy system equipment vendors trained on SO	Energy system equipment vendors receive 3 half-day vendor trainings on SO	Interviews with trainees post project	Local vendors available and interested in training

2.1.3. Training on EE project financing provided to industry and financial institutions.	Number of technical personnel of industry and managers trained on the development of bankable EE project proposals to improve their chances of accessing financing	No technical personnel of industry and managers trained on the development of bankable EE project proposals to improve their chances of accessing financing	100 (at least 25% are women) technical personnel of industry and managers trained on the development of bankable EE project proposals to improve their chances of accessing financing	Interviews with trainees post project	Local technical personnel of industry and managers available and interested in training
	Number of personnel of financing institutions trained on the appraisal of EE project proposals	Financing institutions lack the capacity to appraise EE project proposals of industry	At least 30 personnel of financing institutions trained on the appraisal of EE project proposals	Interviews with trainees post project	Local personnel of financing instit. interested in training

Component 3: Demonstrations and Upscaling					
Outcome 3.1 Demonstrated projects on energy management system, and energy system optimization in selected plants and sub-sectors and widely used case studies result in direct GHG emissions reductions and leverage the interest and belief in investment in IEE projects.	Number of companies with EnMS and resulting energy savings	As of yet, no EnMS projects implemented; no case studies prepared and hence no investments recorded for EE; subsequently no associated energy savings and direct GHG emission reductions reported.	EnMS implemented in 50 companies, resulting in lifetime energy savings of 403,263 MWh and direct emission reduction of 89,292 tCO ₂	Interviews with project participants, documentation of MRV process, records of the government agencies	Willingness of industry to invest time and resources to implement EnMS to ISO50001, government support and determination
	Number of companies with SO carried out and resulting energy savings	As of yet, no SO projects implemented; no case studies prepared and hence no investments recorded for EE; subsequently no associated energy savings and direct GHG emission reductions reported.	SO implemented in 20 companies, resulting in lifetime energy savings of 496,525 MWh and direct GHG emission reduction of 103,913 tCO ₂	Interviews with project participants, documentation of MRV process, records of the government agencies	Willingness of industry to invest time and resources to implement EnSO, government support and determination
3.1.1. Energy management systems implemented in 50 industrial establishments, case studies prepared;	Number of EnMS projects implemented in selected industrial establishments	At present there is no implementation of EnMS projects to ISO 50001 (and EnMS) and no certification in Myanmar	50 projects on EnMS implemented in selected industrial establishments		
3.1.2. At least 20 optimization projects implemented on energy systems: pump, comp. air, fan, and steam, case studies prepared.	Number of SO projects implemented in selected industrial establishments	Up to now, no SO projects in Myanmar	20 projects on SO implemented in selected industrial establishments	Interviews with project participants Documentation of MRV process	Willingness of industry to invest time and resources to implement SO

Annex 2: Evaluation questions

Key evaluation questions	Sub-questions
RELEVANCE	
1. How relevant is the programme to the needs and priorities of the participating individuals and institutions?	1.1 To what extent is the programme's work relevant to the needs of participants and beneficiaries?
	1.2 To what extent is the programme relevant to Myanmar national priorities and strategies?
	1.3 To what extent is the programme relevant to UNIDO's mandate?
EFFICIENCY	
2. How efficient is programme delivery?	2.1 How cost-effective was the programme so far and is there enough budget for remaining project work?
	2.2 Was the originally anticipated co-financing secured till date?
	2.3 Were and are programme roles, responsibilities and accountabilities sufficiently clear?
	2.4 How efficient and effective was and is the programme's management arrangements? What alternative operating models could be implemented?
EFFECTIVENESS	
3. To what extent and likeliness is the programme achieving its planned outputs and outcomes?	3.1 What is the profile of participating companies, experts (number, sector, gender-disaggregated staff base and region) and associations
	3.2 To what extent are the programme participants benefiting?
	3.3 To what extent were institutional and local capacities (institutes, experts) capacitated to support ongoing, post-implementation delivery of the programme's work??
	3.4 What are the remaining main tasks and activities, the means to fulfil them?
	3.5 How efficient and effective are programme's monitoring/evaluation processes?
	3.6 What contributions did the programme make to GEF Focal Area objectives?
IMPACT	
4. What direct and indirect impact did the programme deliver?	4.1 To what extent did the programme so far contribute to improved environment for EE and EnMS implementation in industries and the overall reduction in GHG emissions
	4.2 What type and level of investment did participants secure as a direct result of the programme?
	4.3 What standards (EnMS), technologies (product and services for SO) and financial support did the programme help to bring to market?
	4.4 What did the programme contribute towards mainstreaming EE and EnMS into national policies and programmes?
	4.5 To what extent did the programme contribute to CO ₂ /GHG emission reductions?
	4.6 Did the programme contribute to any unintended impacts, positive or negative?
SUSTAINABILITY	
5. To what extent are the programme's results likely to be sustained in the long term?	5.1 What are the key factors that will affect (negatively or positively) the sustainability of the programme's results?
	5.2 What arrangements have been made so far and will be planned to continue the programme's work beyond project implementation period?

Annex 3: Calculated Cofinancing Values (Details)³⁰

Government									
No.	Items	in-cash (MMK)				in-kind (MMK)			
		Amount	unit	cost/unit	total	Amount	unit	cost/unit	total
1	Personnel								
	Management (Project Negotiation Activities)								
	- DG					10	men-days	65.000	650.
	- DDG					14	men-days	65.000	910.
	- Director					35	men-days	65.000	2.275.
	- Deputy Director 1					35	men-days	65.000	2.275.
	- Deputy Director 2					15	men-days	65.000	975.
	- Assistant Director 1					15	men-days	65.000	975.
	- Assistant Director 2					10	men-days	65.000	650.
	- Assistant Director 2					5	men-days	65.000	325.
	- Assistant Director 3					5	men-days	65.000	325.
	- Participants from Government Officers (in abroad events by MOI)					34	men-days	150.000	5.100.
	- Participants from other Ministries (in PSC meeting)					16	men-days	65.000	1.040.
	- Participants from Government Officers (in abroad events by other Ministries)					6	men-days	150.000	900.
	- MOI Contribution for renovation of Energy Efficiency Training Centre				45.000.000				
2	Office								
	Office space (+ service)					2.030	sq.ft	1.500	109.620.
	Utilities cost								
	- Electricity								
	- Water								
	- Phone and fax								
	Other services								
	- Cleaning service								
	- Events (for various meetings) space provided					10	Event-days	100.000	1.000.
	- Parking					365	days	8.000	8.760.
3	Other events (space provided)								
	National Workshop & Project Launching					2	Event-days	1.000.000	2.000.
	Total				45.000.000				

³⁰ Excel sheet was prepared by PMU and reflects the status from 2.11.2018

Private Sector(Myanmar Industry)

No.	Items	in-cash				in-kind			
		Amount	unit	cost/unit	total	Amount	unit	cost/unit	total
1	Awareness workshop								
	Government Participant's time								
	Ministry of Industry					24	man-days	65.000	1.560.000
	Other Ministries					7	man-days	65.000	455.000
	Private factory personnel's time								
	Class 1 MD/Owner/Director					28	man-days	100.000	2.800.000
	Class 2 GM/CE/Senior Engineer					47	man-days	70.000	3.290.000
2	EnMS User Training								
	Government Participant's time								
	Ministry of Industry					52	man-days	65.000	3.380.000
	Other Ministries					52	man-days	65.000	3.380.000
	Private factory personnel's time								
	Class 1 MD/Owner/Director					43	man-days	100.000	4.300.000
	Class 2 GM/CE/Senior Engineer					62	man-days	70.000	4.340.000
	Class 3 Manager/Engineer					143	man-days	30.000	4.290.000
	Class 4 Operator					33	man-days	10.000	330.000
3	System Optimization (CASO) User Training								
	Government Participant's time								
	Ministry of Industry					18	man-days	65.000	1.170.000
	Other Ministries					11	man-days	65.000	715.000
	Private factory personnel's time								
	Class 1 MD/Owner/Director					27	man-days	100.000	2.700.000
	Class 2 GM/CE/Senior Engineer					36	man-days	70.000	2.520.000
	Class 3 Manager/Engineer					92	man-days	30.000	2.760.000
	Class 4 Operator					20	man-days	10.000	200.000
	System Optimization (SSO) User Training								
	Government Participant's time								
	Ministry of Industry					26	man-days	65.000	1.690.000
	Other Ministries					25	man-days	65.000	1.625.000
	Private factory personnel's time								
	Class 1 MD/Owner/Director					22	man-days	100.000	2.200.000
	Class 2 GM/CE/Senior Engineer					38	man-days	70.000	2.660.000
	Class 3 Manager/Engineer					80	man-days	30.000	2.400.000
	Class 4 Operator					22	man-days	10.000	220.000
4	Expert Training								
		1	lumsun		60.000				
	EnMS								
	- Representative (attend exp training)				2.340.000	507	man-days	85.000	43.095.000
	- Representative (implement EnMS)					195	man-days	85.000	16.575.000
	- Energy team					40	man-days	85.000	3.400.000
	- EnMS Implemenation (@Anawa Davi)				20.000.000				
	System Optimization								
	- Representative (attend exp training)				420.000	42	man-days	85.000	3.570.000
	- Representative (part of the assessment)					14	man-days	85.000	1.190.000
	- Energy team					32	man-days	85.000	2.720.000
	- SO Implementation(@Proven Technology)				7.000.000				
	- SO Implementation(@Young Ni Distillery)								
			40						
	Total				29.820.000				

Annex 4. List of documents reviewed

PMU - UNIDO project and programme documents

- CEO endorsement Myanmar GEF 130042
- Annual Project Implementation Reports (PIRs) 2015 -2017
- Project progress Report (June – Dec 2015) and update FY2017
- Project progress Report latest update 1st October
- Project steering committee Meeting minutes and presentation 2015 – 2017
- Presentation PPT PSC 8 Dec 2017 and PPT 4th PSC meeting, 21st June 2018
- Project promotion material, leaflet
- Project webpage - <https://www.ieemyanmar.com/>
- Case Studies; CASO,SSO and EnMS Poster (partially in local language), C and S assessment reports
- Final Report_Energy Data Base Myanmar by Bruno Lapillonne; October 2017
- IEE Project-Capacity Building activities summarized.xlsx
- Standard training materials for CASO, EnMS and SSO user trainings

Relevant UNIDO evaluation reports

- Final draft UNIDO evaluation Manual,18 Dec 2017
- Job - Description 120264-130042_International Evaluator MTE_July
- TOR - National Evaluation Consultant - IEE Midterm Evaluation_Sep Oct 2018_ACTUAL

Evaluation information:

- UNIDO Evaluation Policy (May 2015)
- UNIDO gender policy. April 2009
- DAC Evaluation Quality Standards (2006)
- DAC Glossary of Key Terms in Evaluation and Results Based Management (2002)

Annex 5: Field Visit Programme

Date	Time & Place	Institutions	Person to meet	Contact Person/ Remark
Day 1 (1-10-2018) Monday Morning				Arrival, pick up at Airport by and Mr. Than Oo; Ph: 09 5190979 and San Shwe Aung
Day 1 Morning (1-10-2018) Monday	9:30 AM; Efficiency Training Centre, No (192) Gabaraye Pagoda Road, Bahan Township, Yangon	Project Management Unit	Mr. Than Oo & PMU Team Ph: 09 5190979 Email: T.OO@unido.org	
Evening (1-10-2018) Monday	2:00 PM; Myanmar Engineering Society Office, Hlaing University Campus, Hlaing Township, Yangon	Myanmar Engineering Society (MES)	Mr. Aung Thet Paing Ph: 09 43049835 Email: atpaing@gmail.com	
Day 2 Morning (2-10-2018) Tuesday				Move to Nay Pyi Taw Air KBZ K7234 0630-0705 (YGN-NPT)
Day 2 Morning (2-10-2018) Tuesday	10:00 AM; Office No (30), Ministry of Industry, Nay Pyi Taw	Ministry of Industry (MOI), Directorate of Industrial collaboration	Dr. Soe Naing Email: directoratplanning@gmail.com ; enexer@gmail.com	Ms Aye Kay Khaing Soe; Phone: 09 420702055
Day 2 Evening (2-10-2018) Tuesday	12:30 PM; Office No (53), Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation, Nay Pyi Taw,	Ministry of Natural Resources and Environmental Conservation (MoNREC)	Dr. San Oo, DDG, GEF FP Office; Phone: 067 431326; 09 976833198	Mr. Hal Maung Thein Ph: 09 567431326 Email: hlamaungthein.env@gmail.com Office staff: 067 3431490

Day 3 Morning (3-10-2018) Wednesday	10:00 AM; Office No (32), Ministry of Industry, Nay Pyi Taw	Ministry of Industry (MOI)	Ms. Naing Naing Linn Ph: 09 250390012 Email: nnainglinn.mm@gmail.com	
Day 3 Evening (3-10-2018) Wednesday	2:00 PM; Office No (44), Myanmar Petrochemical Enterprise, Ministry of Electricity and Energy, Nay Pyi Taw	Ministry of Electricity and Energy (MOEE)	Ms. Khin Pa Pa Myaine Ph: 09 254554420 Email: khinpapamyaing83@gmail.com	Ms Khin Chaw Sanda; Ph: 09253118252
Day 3 Evening (3-10-2018) Wednesday				Back to Yangon Myanmar Airways UB121 1750-1825 (NPT-RGN)
Day 4 Morning (4-10-2018) Thursday	9:30 AM; No (137), Lone Thwe Street, Thuwuna VIP II, Ward 29, Thingangyun Township, Yangon, 11072	Macro tech Co., Ltd	Mr. Daniel Sai Ph: 09 421156800 Email: kosai@macrotech- asia.com ;	
Day 4 Evening (4-10-2018) Thursday	2:00 PM; Department of Research and Innovation No. (6), Gabaraye Pagoda Road, Yankin Township, Yangon	Ministry of Education, National Standards & Quality Department	Dr. Zar Ni Aung Ph: 09 402511627 Email: znaung579@gmail.com	
Day 5 Morning (5-10-2018) Friday	10:00 AM; No. 29, UMFCCI Building, Min Ye Kyaw Swar Road, Lanmadaw Township, Yangon	Myanmar Industries Association (MIA) and Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI)	Mr. Tun Naing Aung Ph: 09 5183517 Email: mgy@ytp.com.mm ; eengmia@gmail.com	

Day 5 Evening (5-10-2018) Friday	2:00 PM; Toyo Battery Plant, Shwe Pyi Thar Industrial Zone, Shwe Pyi Thar Township, Yangon	Proven Technology Co., Ltd	Mr. Myo Nyunt Aung Ph: 09 454848420 Email: mnaung@toyobatterymyanmar.com	
Day 6 (6-10-2018) Saturday	9:30 PM; United Paints Group (UPG) Plant, No. 133, Seik Kan Thar Road, Haling Tharyar Industrial Zone (1), Haling Thar Yar Township, Yangon		Mr. Zaw Win Ph: 09 5040974 Email: zawwin@upgpaint.com	
Day 7 (7-10-2018)	Sunday			
Day 8 Morning (8-10-2018) Monday	9:30 AM;) IEE Training Center ,No (192, Gabaraye Pagoda Road, Bahan Township, Yangon	EnMS expert candidates, Some EnMS, CASO SSO USER level candidates		Half day workshop with 20 experts and candidates
Day 8 Evening (8-10-2018) Monday				Move to Nay Pyi Taw UB121 1800-1835 (YGN-NPT)
Day 9 Morning (9-10-2018) Tuesday	10:00 AM; Office No (30), Ministry of Industry, Nay Pyi Taw			- Present finding & discuss feedback from stakeholders @ <u>MOI, Nay Pyi Taw</u>
Day 9 Evening (9-10-2018)Tuesday				Back to Yangon UB-122 1915-1950 (NPT-YGN)
Day 10 (10-10-2018) Tuesday	8:30 closing meeting at Energy Efficiency Training Centre, Yangon			MTR Team ready to back

Annex 6. List of persons interviewed / met

No	Name	Gender	Designation	Organisation	Date
1	Mr. Sanjaya Shrestha	Male	National Project Director	UNIDO, Vienna	14-9-2018
2	Ms. Marlene Sayer	Female	Project Associate	Energy Systems and Infrastructure Division Department of Energy UNIDO, Vienna	14-9-2018
3	Ms. Tove Roosendaal Sahr	Female	Project Associate	Energy Systems and Infrastructure Division Department of Energy UNIDO, Vienna	14-9-2018 Ms. Tove Sahr joined the MTR mission
4	Mr. Than Oo	Male	National Project Manager	PMU. IEE in Myanmar Project. Yangon	1-10-2018
5	Mr. Soe Min Naing	Male	Project Technical Expert	PMU. IEE in Myanmar Project. Yangon	1-10-2018
6	Ms. Pwint Phyu Aung @ Sharon	Female	Project Administrative Assistant	PMU. IEE in Myanmar Project. Yangon	1-10-2018
7	Mr. Aung Thet Paing	Male	Central Committee member	Myanmar Engineering Society, Yangon	1-10-2018
8	Dr. Soe Naing	Male	Director General	Directorate of Industrial Collaboration, MOI, Nay Pyi Taw	2-10-2018
9	Ms. Tin Tin Htoo	Female	Deputy Director General	Directorate of Industrial Collaboration, MOI, Nay Pyi Taw	2-10-2018
10	Mr. Myat Zaw	Male	Director	Energy Efficiency & Conservation Dept, DIC, MOI, Nay Pyi Taw	2-10-2018
11	Ms. Aye Kay Khaing Soe	Female	Deputy Director	Energy Efficiency & Conservation Dept, DIC, MOI, Nay Pyi Taw	2-10-2018

12	Ms. Htay Htay Kyi	Female	Assistant Director	Energy Efficiency & Conservation Dept, DIC, MOI, Nay Pyi Taw	2-10-2018
13	Dr. San Oo	Male	Deputy Director General	Environmental Conservation Dept, MONREC, Nay Pyi Taw	2-10-2018
14	Mr. Min Maw	Male	Director	Pollution Control Division, Environmental Conservation Department, MONREC, Nay Pyi Taw	2-10-2018
15	Ms. Lae Lae Soe	Female	Ass: Director	International Relation Division Environmental Conservation Dept, MONREC, Nay Pyi Taw	2-10-2018
16	Ms. Thet Su Yee	Female	Staff Officer	International Relation Division Environmental Conservation Dept, MONREC, Nay Pyi Taw	2-10-2018
17	Ms. Naing Naing Linn	Female	Director	SMEs Investment & Cooperation Unit, Directorate of Industrial Supervision & Inspection (DISI), MOI, Nay Pyi Taw	3-10-2018
18	Ms.Khin Pa Pa Myaing	Female	DAD-Planning Division	Myanma Petrochemical Enterprise (MPE), Ministry of Electricity & Energy (MOEE), Nay Pyi Taw	3-10-2018
19	Ms.Khin Chaw Sandar	Female	DAD-Production Division	MPE, MOEE, Nay Pyi Taw	3-10-2018
20	Mr. Myint Thu	Male	Head Planning, Production Division	MPE, MOEE, Nay Pyi Taw	3-10-2018

21	Ms. Thet Myat Mon	Female	Production Officer, Production Division	MPE, MOEE, Nay Pyi Taw	3-10-2018
22	Mr. Hein Soe	Male	Production Officer, Production Division	MPE, MOEE, Nay Pyi Taw	3-10-2018
23	Mr. Myo Ko Ko Aung	Male	Production Officer, Production Division	MPE, MOEE, Nay Pyi Taw	3-10-2018
24	Mr. Sai Aung Min @ Daniel	Male	-Technical Expert -Director	-IEE in Myanmar Project Macro-Tech Co. Ltd. Yangon	4-10-2018
25	Dr. Zarni Aung	Male	Deputy Direction General,	National Standard & Quality Department, Ministry of Education, Yangon	4-10-2018
26	Mr. Tun Naing Aung	Male	Central Committee Member	Myanmar Industrial Association, UMFCCI, Yangon	5-10-2018
27	Mr. Myo Nyunt Aung	Male	Factory Manager	Proven Technology Industry Co Ltd., (TOYO Batteries) Yangon	5-10-2018
28	Ms. Khin Mar Soe	Female	Management Representative	Proven Technology Industry Co Ltd., (TOYO Batteries) Yangon	5-10-2018
29	Ms. Moe Myat Thengi	Female	Senior Engineer	Proven Technology Industry Co Ltd., (TOYO Batteries) Yangon	5-10-2018
30	Mr. Zaw Win	Male	General Manager	United Paints Group Co., Ltd., Yangon	6-10-2018
31	Mr. Kyaw Kyaw Aung	Male	Factory Manager	United Paints Group Co., Ltd., Yangon	6-10-2018

32	Ms. Yupa Aung	Female	Archivist	United Paints Group Co., Ltd., Yangon	6-10-2018
33	Mr. Myat Soe	Male	Senior Engineer	United Paints Group Co., Ltd., Yangon	6-10-2018
34	Mr. Myint Maung	Male	Executive Engineer	United Paints Group Co., Ltd., Yangon	6-10-2018
35	Mr. Soe Kyi	Male	Manager	United Paints Group Co., Ltd., Yangon	6-10-2018
36	Ms. Amy Lwin	Female	Manager	United Paints Group Co., Ltd., Yangon	6-10-2018
37	Mr. Ko Ko Htwe	Male	Executive Engineer	United Paints Group Co., Ltd., Yangon	6-10-2018
38	Mr. Myo Ko Oo	Male	Assistant Engineer	United Paints Group Co., Ltd., Yangon	6-10-2018
39	Mr Ven V. Venkatesan	Male	International Expert	Hudson Technologies Company	24-10-2018

Note:

During the presentation and follow up discussion at MOI, Nay Pyi Taw on 9 October 2018, Mr. Sein Htoon Linn from MoNREC attended, who has not participated in previous interviews and is therefore not listed in above table.

Contact detail:

Mr. Sein Htoon Linn, Deputy Director General, Environmental Conservation Department, MONREC, Nay Pyi Taw.

Mobile: +95-9-43035618, Email linn.ecd.myanmar@gmail.com

A separate list of the participants (18 male, 2 female) from Workshop held at IEE Training Center in Yangon, on Monday 8-10-2018, is attached (Annex 7).

Annex 7: Group discussion participants



List of Participants For Group Discussion on 8-10-2018 (Monday) ; 9:30 AM @ Energy Efficiency Training Center



NO.	NAME	POSITION	INSTITUTION	EMAIL ADDRESS	PHONE	Sign
1	U Aung Kyaw Soe	Director	Ngwe Sae Taw (999) Co., Ltd	gm.silverdam@gmail.com	09-5056309	
2	U Aung Min Thu	Senior Assistant Engineer	Shwe Taung Cement Co., Ltd, Pyl Nyaung	aungminthu99@gmail.com	09-784012281 09-977830964	
3	U Kyaw Nyein	Senior Process Engineer	Myanmar Distillery Company	kyawnyeimba7@gmail.com	09-5409642	
4	U Tay Zar Win	Deputy Manager	Asia General Transformer Co., Ltd	tayzarwin.ede.agt@ageholding.com	09-975504048	
6	U Htoon Nay Htoon	Commercial Manager	Sembcorp Myingyan Power Co., Ltd	htoon.nayhtoon@sembcorp.com	09-798457128	
7	U Aung Myint Myat	Founder	EduGate Training Center	andrewmyintmyat@gmail.com	09-422540237	
8	U Thaung Win	Member	Energy Development Committee (Myanmar National Energy Management Committee)	ctw12416@gmail.com	09-5196018	
9	U Htet Lwin Min	Electrical Engineer	Indochine Engineering Vietnam Ltd	htetlwinmin92@gmail.com	09-780858372	
10	U Kaung Htet Shinn	Mechanical Engineer	Mandalay Technology	kaungshinn93@gmail.com	09-974759453	
11	U Zaw Bo	Consultant	National Infrastructure	zawbo@national-infra.com	09 448004322	
12	Daw Moe Myat Theingi	Assistant System Auditor	Proven Technology Industry Co., Ltd	qmr@toyobatterymyanmar.com	09-250561142	
13	U Kyaw Hlaing Aye	Sub Assistant Engineer	Shwe Taung Cement Co.,Ltd	kyawhlaingaye.stc@gmail.com	09-97780954	

14	U Aung Paing	Senior Field Engineer	Schlumberger Oil Field Services	aungpaing@hotmail.com	09-787115106	
15	Dr. Soe Thiri Thandar	Technical Director	SolaRiseSys	sthirit5@gmail.com	09-799708888	
16	U Thein Aung	Managing Director	Thein Htoo Kyaw Public Co., Ltd	optimumnow@gmail.com	09-420313767	
17	U Tin Htut	Senior Production Manager	Unilever Myanmar Co.Ltd	tinhtut07@gmail.com	09-451243182	
18	U Ko Ko Gyi	Plant Manager	Golden Dowa Eco-System Myanmar Co., Ltd	kokogyi@golden-desm.com	09-261453036	
19	U Khin Maung Shwe	Port Engineer	Myanmar Integrated Port Limited, Thanlyin	ener.khinmaungshwe@gmail.com	09-421167771	
20	U Ngwe Min Zaw	Manager	Delight Co.,Ltd	nmz.caservice@joyanceintl.com	09-077100291	
21	U Nyi Nyi Win	Boiler Inspector	Ministry of Industry	nyinyiwin82@gmail.com	09-797392384	
22	Daw Chan Myae Htay	Sub Assistant Engineer	Apache Cement STC Co.,Ltd	chanmyahtay@gmail.com	09 - 789917419	
23	Dr.Min Thaw Tun	Assistant Professor	Yangon Technological University	thawmin@gmail.com	09 - 421022249	
24	U Myo Zar Htun	Sub Assistant Engineer	Apache Cement STC Co.,Ltd	myozarhtun87@gmail.com	09 - 977830956	
25	u Zaw Win	GM	UPA Co., Ltd.	zawwin@upspand.com	09-52409741	
26	U Kyaw ^U Tun	Utility Specialist	Heineken Myanmar	kyawkyawh200@gmail.com	09-782333307	
27	Sai Aung Min Dennis			kosai@macrotech-ariz.com		