Independent Terminal Evaluation

Promoting Industrial Energy Efficiency through system optimization and energy management standards in Indonesia

UNIDO Project No.: 103031

GEF Project No.: 3595

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

INDEPENDENT EVALUATION DIVISION

OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

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The evaluation team is composed of Mr. John Newman, international evaluation consultant and team leader, and Mr. Triyono Adiputra, national evaluation consultant.

We hope that some of the proposed recommendations will contribute to the continuous improvement of future Projects.

List of acronyms and abbreviations

Abbreviation	Meaning
APKENDIDO	Association of Energy Conservation Services Companies
BCA	Bank Central Asia
BPPT	Badan Pengkajian dan Penerapan Teknologi (Agency for the Assessment and Application of Technology)
BSN	Badan Standardisasi Nasional (National Standardization Agency)
CASO	Compressed Air System Optimization
CO2	Carbon dioxide
DG NREEC	Directorate General for New Energy, Renewable Energy and Energy Conservation
DJEBTKE	Direktorat Jenderal Energi Baru, Terbarukan dan Konservasi Energi (Directorate General for New Energy, Renewable Energy and Energy Conservation)
EE	Energy efficiency
EnMS	Energy Management System
EnPI	Energy Performance Indicator
ESCO	Energy service company
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
GJ	Giga Joule
GW	Gigawatt, 1000 MW
GWh	Gigawatt-hours
GEF	Global Environment Facility
HQ	Headquarters
IDR	Indonesian rupiah
IEE	Industrial Energy Efficiency
ISO	International Organization for Standardization
KAN	Komite Akreditasi Nasional
KESDM	Kementerian Energi dan Suber Daya Mineral (Ministry of Energy and Mineral Resources)

Abbreviation	Meaning
ktoe	Kiloton of oil equivalent
kW	Kilowatt
kWh	Kilowatt-hour
M&E	Monitoring and evaluation
M&V	Measurement and verification
MJ	Mega Joule
MASKEE	Indonesia Energy Conservation and Efficiency Society
MEMR	Ministry of Minerals and Energy Resources
MOEF	Ministry of Environment and Forests
MOFI	Ministry of Finance and Investment
MOI	Ministry of Industry
mtoe	Million tons of oil equivalent
MTR	Mid-Term Review
MW	Megawatt
MWh	Megawatt hours
NGO	Non-governmental organization
NPC	National Project Coordinator
NPD	National Project Director
ODS	Ozone Depleting Substances
OJK	Otoritas Jasa Keuangan (Financial Services Authority)
P2P	peer-to-peer
PIP	Pusat Investasi Pemerintah (Government Investment Unit)
PIR	Project Implementation Review
PLN	State Electricity Company
PPG	GEF project preparation grant
PMU	Project Management Unit
PSC	Project Steering Committee
PSO	Pumping System Optimization
PUSDIKLAT	MEMR Training Centre for Electricity
RE	Renewable energy

Abbreviation	Meaning
RECP	Resource Efficient and Cleaner Production
SEU	Significant Energy Use
SKKNI	Indonesia National Competency Standards
SMART	Specific, Measurable, Achievable, Relevant and Time-bound criteria for indicators and targets
SME	Small and Medium Enterprise
SO	System optimization
SSO	Steam System Optimization
TA	Technical Assistance
tCO2	Tons of carbon dioxide (equivalent)
TE	Terminal evaluation
toe	Tons of oil equivalent
ToR	Terms of reference
TWh	Terawatt hours
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
USD	United States dollar
YEI	Yayasan Energi Indonesia (Indonesia Energy Foundation)

Glossary of evaluation-related terms

Term[1]	Definition
Activity	Actions taken, or work performed through which inputs, such as funds, technical assistance and other types of resources are mobilized to produce specific outputs.
Assumptions	Hypotheses about factor or risks which could affect the progress or success of a development intervention.
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Beneficiaries	The individuals, groups, or organizations, whether targeted or not, that benefit, directly or indirectly, from the development intervention.
Conclusions	Conclusions point out the factor of success and failure of the evaluated intervention, with special attention paid to the intended and unintended results and impacts, and more generally to any other strength or weakness. A conclusion draws on data collection and analyses undertaken, through a transparent chain of arguments.
Data collection tools	Methodologies used to identify information sources and collect information during an evaluation.
Effect	Intended or unintended change due directly or indirectly to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Evaluation	The systematic and objective assessment of an ongoing or completed Project, programme or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact and sustainability.
External evaluation	The evaluation of a development intervention conducted by entities and/or individuals outside the donor and implementing organizations.

[1] For more related terms and definitions see also:

- OECD-DAC Glossary of Key Terms in Evaluation and Results Based Management (2010); http://www.oecd.org/development/peer-reviews/2754804.pdf.
- UNDG Results-based management handbook; https://undg.org/document/undg-results-based-management-handbook/
- UNIDO e-learning course on: Results-based Management and the Logical Framework Approach; http://intranet.unido.org/training/rbm/#home

Term[1]	Definition
Finding	A finding uses evidence from one or more evaluations to allow for a factual statement.
Goal	The higher-order objective to which a development intervention is intended to contribute.
Impacts	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
Independent evaluation	An evaluation carried out by entities and persons free of the control of those responsible for the design and implementation of the development intervention.
Indicator	Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor.
Inputs	The financial, human, and material resources used for the development intervention.
Lessons learned	Generalizations based on evaluation experiences with Projects, programs, or policies that abstract from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design, and implementation that affect performance, outcome, and impact
Logical framework (Log frame)	Management tool used to improve the design of interventions, most often at the Project level. It involves identifying strategic elements (activities, outputs, outcome, impact) and their causal relationships, indicators, and assumptions that may affect success or failure. Based on RBM (results-based management) principles.
Mid-term Review	Evaluation performed towards the middle of the period of implementation of the intervention.
Monitoring	A continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds.
Outcome	The likely or achieved short-term and medium-term effects of an intervention's outputs.
Outputs	The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Project or program objective	The intended physical, financial, institutional, social, environmental, or other development results to which a Project or program is expected to contribute.

Term[1]	Definition
Quality assurance	Quality assurance encompasses any activity that is concerned with assessing and improving the merit or the worth of a development intervention or its compliance with given standards.
Recommendations	Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at their allocation of resources. Recommendations should be linked to conclusions.
Relevance	The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities, and partners' and donors' policies.
Reliability	Consistency or dependability of data and evaluation judgments, with reference to the quality of the instruments, procedures and analyses used to collect and interpret evaluation data.
Results	The output, outcome or impact (intended or unintended, positive and/or negative) of a development intervention.
Results chain	The causal sequence for a development intervention that stipulates the necessary sequence to achieve desired objectives-beginning with inputs, moving through activities and outputs, and culminating in outcomes, impacts, and feedback.
Results framework	The program logic that explains how the development objective is to be achieved, including causal relationships and underlying assumptions.
Review	An assessment of the performance of an intervention, periodically or on an ad hoc basis.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target	Specifies a particular value that an indicator should reach by a specific date in the future.
Target groups	The specific individuals or organizations for whose benefit an intervention is undertaken.

Project factsheet

Project title	Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia
UNIDO Project ID	103031
GEF Project ID	3595
Project donor	GEF
Project CEO Endorsement/ Project approval date:	4 February 2011
Project implementation: Planned start date Actual start date	 1 March 2011 11 April 2011
Project implementation: Planned end date Revised end date 1 Revised end date 2 Revised end date 3	 31 August 2016 (planned duration: 66 months) 31 December 2017 (actual duration: 81 months) 30 June 2018 (actual duration: 87 months) 30 September 2018 (actual duration: 90 months)
Implementing agency: National Executing Partner: National Project Director: Co-operating partners:	UNIDO Ministry of Energy and Mineral Resources (MEMR) Directorate General of New, Renewable Energy and Energy Conservation (DG NREEC), MEMR Ministry of Industry (MOI) - Centre for Assessment and Development of Green Industry and Environment (CADGIE) National Standardization Agency (BSN) Ministry of Finance - PIP Government Investment Unit under Fiscal Policy Unit (BKF) Financial Services Authority (OJK), since 2013
Donor funding budgeted: expenditures:	 USD 2,235,927 (GEF-4 replenishment cycle) USD 2,224,876
Co-financing expected: actual, government: actual, private: actual, BCA loan:	 USD 14,175,000 (at CEO endorsement) USD 964,660 (cash and in kind) USD 4,880,522 (cash) USD 3,043,435 (loans, to one demonstration company)
Total Project cost expected: actual:	 USD 16,355,380 (at CEO endorsement) USD 11,068,997
GEF Project preparation grant	USD 80,000
Mid-term review date	April 2015

Source: IEE Indonesia (2011) and IEE Indonesia (2018).

Executive Summary

This report presents the findings of the Independent Terminal Evaluation of the **"Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia"** project (herein referred to as **"the Project"**) implemented by the United Nations Industrial Development Organization (UNIDO) with a financing grant provided by the Global Environment Facility (GEF). The Project was a full-sized GEF project having the objective of promoting industrial energy efficiency through the system optimization approach and introduction of ISO energy management standards.

The Project had four components – the first three focused on capacity building, the fourth involving direct implementation of IEE projects in partner facilities for demonstration purposes.

1. Introduction of energy management system and capacity building
2. Capacity building on system optimization
3. Financial capacity development to support energy efficiency project in industry
4. Implementation of energy management and system optimization projects

This terminal evaluation was conducted as a standard process, to assess the Project's performance (in terms of relevance, effectiveness, efficiency, sustainability and progress to impact), to develop a series of findings, lessons and recommendations for enhancing UNIDO's design of new projects and its implementation of ongoing projects. In addition, it serves as a case study for the "Independent Impact Evaluation of UNIDO's Industrial Energy Efficiency-Related Programmes".

The evaluation took place from June to December 2018, with a field mission during 20-31 August 2018. Preliminary findings were discussed with staff at UNIDO HQ in Vienna in November 2018, leading to a final report in January 2019. The evaluation covered the whole duration of the project from its implementation start on 11 April 2011 to its completion on 30 September 2018.

The evaluation team is composed of Mr. John Newman, international evaluation consultant and team leader, and Mr. Triyono Adiputra, national evaluation consultant.

Key Findings

A) Impact (or progress toward impact)

Direct Impacts. The Project's achievements for GHG emission reductions (988.6 ktCO2/5 years), electricity saved (271.7 MWh/5 years) and fuel saved (4,096 TJ or 1,137.8 MWh/5 years) greatly exceeded the respective targets.

Capacity Building. The Project increased industrial top management's interest in having in-house EnMS and SO expertise. It then developed that expertise in industrial energy managers, EE service providers and equipment vendors. It also developed EE project financing expertise in bankers and industrial energy managers. However, the Project did not measure or estimate the GHG-emission reduction and energy savings impacts of this increased interest and expertise.

B) Project design: The project design is rated with respect to overall design and the logframe.

1. **Overall design.** The Project's overall design was very similar to that of UNIDO IEE projects in other countries. Overall, the Project was well designed. The establishment of the Indonesia Energy Foundation (YEI) was an important mid-project adaptation.
2. **Logframe.** The Project logframe has a clear logic and is consistent with a realistic theory of change. The wide margin of overachievement of direct impact calls into question the project target-setting exercise. All output level indicators in the project document logframe were Specific, Measurable, Achievable, Relevant and Time-bound (SMART). There were too few outcome indicators – only some of which were fully SMART. The logframe could have benefited from additional SMART outcome indicators.

C) Project performance

1. **Relevance.** The Project was well aligned to government requirements and targets promoting EnMS and energy managers. The Project is fully relevant to UNIDO and policies and relevant to the GEF focal area of climate change.
2. **Effectiveness.** The Project achieved all but one of its output-level targets and all its SMART outcome-level targets. It greatly exceeded its direct impact-level targets for the implementation of EnMS and SO projects (GHG emission reductions, electricity savings and fuel savings) and met its SMART outcome-level targets, in that it yielded:
    - Greenhouse gas (GHG) emission reductions: 988.6 ktCO2 / 5 years of project duration (target: 67.4 ktCO2 / 5 years of project duration)
    - Electricity savings: 271.7 GWh/ 5 years of project duration (target: 37.5 GWh/ 5 years of project duration)
    - Fuel savings: 4,096 TJ (or 1,137.8 GWh) / 5 years of project duration (target: 404 TJ (or 112.2 GWh) / 5 years of project duration)
    - Factories completing energy management plans: 159 factories (target: 150 factories adopting energy management plans and completing operational improvement projects)
    - Factories adopting full cycle of ISO 50001: 28 factories (target: 25 factories adopted and implemented ISO 50001)
    - System optimization assessments conducted (Output): 49; resulting in implemented projects (Outcome): 67 (targets: 60 systems assessments conducted (Output); leading to 35 completed systems optimization projects (Outcome))
    - Adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers
    - Adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors
3. **Efficiency.** The Project carried its work within budget. The implementation period was extended three times, with the project duration being 2 years greater than planned.

4. **Sustainability.** The resilience of the Project's outcomes and the pathways to their broader adoption to financial, socio-political, institutional framework and governance, and environmental risks are all likely.

D) Cross-cutting performance criteria

1. **Gender mainstreaming**. UNIDO's gender policy was issued after the Project began and was not included in the logframe retrospectively. Women comprised 7% of the participants in the EnMS and SO trainings.
2. **Monitoring and Evaluation.** The Project's M&E system adequately tracked all the SMART indicators in the logframe. All output-level indicators/targets were SMART; 5 of the 9 outcome-level indicators/targets were SMART; all impact-level indicators/ targets were SMART. Two follow-up surveys monitored progress on a SMART outcome-level indicator and several SMART impact-level indicators.
3. **Results-based Management.** The Project was well managed, with good oversight by the Project Steering Committee (PSC) and carried out several adaptive initiatives not planned for in the project document.

E) Performance of partners

1. **UNIDO**. UNIDO provided excellent supervision and support to the Project.
2. **National counterparts.** National cooperating partners were well engaged in Project supervision via the PSC.
3. **Donor.** GEF disbursed funds as planned.

F) Overall assessment: Overall, the Project was relevant, effective, efficient, and well monitored and managed. It was relevant to Indonesia's industry and government – aligning with several Indonesian policies and initiatives that promote energy management and sustainable finance – as well as to UNIDO and GEF. Indonesia has adopted policies and initiatives that promote industrial energy managers and EnMS in recent years. These instruments were strengthened by the Project's work on establishing ISO 50001/50002 as national personnel competence standards (SKKNI) for energy managers/auditors. The Project also increased industry's technical capacity for implementing EnMS and SO through its training of energy managers and national experts. However, too few EE professionals, especially national experts, were trained given the potential needs of Indonesian industry. Additional national experts will need to be recruited and trained – in a market where few candidates have the necessary combination of education and skills to become national experts. The sustainability of the Project's benefits is assessed as likely.

Recommendations

The following lessons learned derived from this Terminal Evaluation:

- **To Government of Indonesia: *Project sustainability.*** Indonesia should establish a repository of the Project's peer-to-peer database, course materials and case studies, so that they are readily accessible to companies, institutions and trainers who might benefit from them.

- **To Government of Indonesia:** ***Project sustainability.*** Indonesia should institutionalise large scale training and education – using the Project's training materials and methods on EnMS, SO and IEE project financing – of energy managers, energy auditors, EE equipment suppliers/vendors and EE consultants. It should also develop materials and courses on investment grade audits (IGA) and energy savings verification, as well as adopt SKKNI national personnel competence standards for professionals working in these fields.
- **To Government of Indonesia:** ***Project sustainability.*** Indonesia should strengthen – through greater stringency and coverage and better compliance enforcement – its policies and initiatives that promote EnMS in large energy-consuming industrial facilities. For example, it could follow through on the proposal to lower the threshold for the mandatory implementation of EnMS (under the Ministry of Energy Regulation No. 14/2012 on Energy Management) from 6,000 to 4,000 toe/year. It should also explore ways to realistically adapt the EnMS concept to industrial SME's and commercial and institutional buildings. It should also, through its work on sustainable finance, improve the availability and terms of external financing for those companies lacking sufficient internal budgets for their IEE improvements.
- **To Government of Indonesia:** ***Project sustainability.*** The market for ISO 50001 certification is growing very slowly in Indonesia. To the extent that full ISO certification is a government priority, Indonesia should work with the certification bodies to strengthen their promotion of ISO 50001 certification by industrial companies.

- **To UNIDO:** ***Theory of Change, logframe and M&E.*** UNIDO projects should:
  - Develop an explicit Theory of Change – including stakeholders; outputs; intended immediate, intermediate and higher-level outcomes; broader adoption pathways; and intended impacts – underlying the interventions.
  - Develop their logframes in a manner consistent with the Theory of Change.
  - Pay more attention to SMART outcome indicators (and the supporting M&E systems) in the logframe to better assess sustainability factors, broader adoption pathways and potential impacts, and to inform adaptive management.
- **To UNIDO:** ***EnMS user-level training.*** UNIDO should consider delivering EnMS user-level training in two-parts:
  - first session on introductory EnMS concepts and the energy reviews (data collection/ analysis) needed for EnMS planning, followed by period of users' data collection/analysis and EnMS planning in their facilities,
  - second session on EnMS implementation.
- **To UNIDO:** ***Broader adoption.*** Demonstration/pilot facilities should be selected, not only for their interest, commitment and potential GHG and energy impacts, but also for their ability and willingness to share their experiences publicly and through networks and to influence other companies in their company group, sector or supply chain.
- **To UNIDO:** ***Broader adoption.*** National experts should be recruited and trained as "on-the-ground" IEE champions and conduits for broad adoption of IEE practices and technologies in the post-project period. Their training should develop their technical skills, but also equip them

to run sustainable advisory businesses, to teach others EnMS and SO skills, and to influence top industrial managers on IEE issues.

- **To UNIDO: Broader adoption.** Efforts to mainstream the cadre of national experts should start early, while the Project's organizational capabilities are still in place.
- **To UNIDO: *Gender mainstreaming.*** UNIDO should increase its efforts to deploy female international experts into partner countries.

Lessons learned

- Demonstration/pilot facilities have greater impact if they have the ability and willingness to share their experiences publicly and through networks and to influence other companies in their company group, sector or supply chain.
- Efforts to mainstream the cadre of national experts should start as early as is feasible given market conditions, while the Project's organizational capabilities are still in place – as did the Project's timely support for the establishment of the independent Indonesia Energy Foundation (YEI) network of national experts.
- Local language and local success stories in briefings and trainings are important for widespread engagement of energy professionals and companies. National experts should be used as trainers and local success stories should be presented at briefings for top managers as early as possible in the project cycle.
- Strict control of the training conditions for national experts helps maximize the success of this activity. Training of national experts represents a great investment, and conditions that jeopardise candidates' successful completion of the courses are costly. The Project found that lax rules concerning candidates' assessment work and lining up field work sites led to low success rates in the first batch of SO training. Tighter rules yielded better results in the second batch.
- The real and perceived needs, and corporate predisposition, for external finance for IEE projects vary among enterprises in Indonesia. The Project observed that smaller, no-cost, low-cost EE projects – such as the early projects emanating from EnMS and SO assessments. – can often be funded from internal company budgets, i.e. without external financing.

Good practices

- The Project's establishment and support of the Indonesia Energy Foundation (YEI) to mainstream the cadre of national experts not only nurtured the nascent market for commercial EE services, but developed an institution that could provide post-project training services and serve as a repository for the Project materials and resources.
- The Project's monitoring of several SMART outcome indicators/targets raised the attention to the sustainability of benefits, and informed important adaptive management.
- The Project helped establish the national personnel competence standards for energy managers (ISO 50001) and energy auditors (ISO 50002) to give the market confidence in the quality of the experts' skills.

Project ratings

#	Evaluation criteria	Rating in the Terminal Evaluation	Rating in the Midterm Review
A	**Impact (or progress toward impact)**	Satisfactory	
B	**Project design**		
1	**Overall design**	Satisfactory	Highly Satisfactory
2	**Logframe**	Moderately Satisfactory	
C	**Project performance**		
1	**Relevance**	Satisfactory	Highly Satisfactory
2	**Effectiveness**	Satisfactory	Satisfactory – Highly Satisfactory
3	**Efficiency**	Satisfactory	
4	**Sustainability**	Likely	Likely
D	**Cross-cutting performance criteria**		
1	**Gender mainstreaming**	Moderately Satisfactory	
2	**M&E:** - **M&E design** - **M&E implementation**	Design: Satisfactory Implementation: Satisfactory	Satisfactory
3	**Results-based Management (RBM)**	Highly Satisfactory	
E	**Performance of partners**		
1	**UNIDO**	Highly Satisfactory	
2	**National counterparts**	Satisfactory	
3	**Donor**	Satisfactory	
F	**Overall assessment**	Satisfactory	Satisfactory – Highly Satisfactory

1. Introduction

Arepo Consult was commissioned by UNIDO to conduct the Independent Impact Evaluation of UNIDO's Industrial Energy Efficiency-Related Programmes. To serve as case studies for this impact evaluation at programme level, Arepo Consult carried out Terminal Evaluations of four projects: IEE-Egypt, IEE-Indonesia, IEE-Iran and IEE-Thailand. This report forms the Independent Terminal Evaluation of the "Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia" project, and was carried out by Mr. John Newman, international evaluation consultant and team leader, as a subcontractor to Arepo Consult, and Mr. Triyono Adiputra, national evaluation consultant.

1.1 Evaluation objectives and scope

The objective of this Independent Terminal Evaluation is to assess the relevance, effectiveness, efficiency, sustainability and progress to impact of UNIDO's "Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia" project (UNIDO Project ID 103031 / GEF ID 3595), referred to from here onwards as **"the Project"**. The evaluation assesses the Project based on the following criteria:

A) Impact/progress toward impact,
B) Project design,
C) Project performance with the sub-criteria relevance, effectiveness, efficiency and sustainability of benefits,
D) Cross-cutting performance criteria, and
E) Performance of partners.

The second purpose of the evaluation is to draw on findings and lessons learned, provide recommendations for future Projects, and to help UNIDO improve upon the identification, preparation and implementation of the industrial energy efficiency-related programmes.

The key evaluation questions are the following:

a) What are the key drivers and barriers to achieve the long-term objectives? To what extent has the Project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long-term objectives?
b) How well has the Project performed? Has the Project done the right things? Has the Project done things right, with good value for money?
c) What have been the Project's key results (outputs, outcome and impact, if possible)? To what extent have the expected results been achieved or are likely to be achieved against the Project design? To what extent the achieved results will sustain after the completion of the Project?
d) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the Project?

The third purpose of the evaluation is to inform the "Independent Impact Evaluation of UNIDO's Industrial Energy Efficiency-Related Programmes" as a case study.

The terms of reference of the terminal evaluation are detailed in Annex I.

1.2 Overview of the project context

Country background

Indonesia is endowed with abundant natural resources. The country spread across a chain of approximately 17,000 islands between two continents (Asia and Australia) and two oceans (Indian Ocean and Pacific Ocean). Indonesia is the largest archipelago in the world with a total area of 9.8 million square kilometres (7.9 million km2 Sea and 1.9 million km2 Land). Being the fourth longest coastline country in the world, Indonesia could potentially benefit from marine current and fisheries sector. Indonesia is the largest producer of fishery products in South East Asia. Located along the Pacific Ring of Fire, Indonesia is gifted with fertile soil, but remains prone to natural disaster including earthquakes and tsunami.

Indonesia is the fourth most populous nation in the world after China, India and the United States. Based on the National Survey on Population in 2010, the population in Indonesia is 237 million people of which 49.79% reside in urban areas and 50.21% in rural areas. The population growth is 1.49% per annum. The World Bank projected that the population will grow to 282 million people by 2025.

The poverty ratio has decreased, however Indonesia failed to reach some Millennium Development Goals (MDG) targets reflected in the poor achievements of health and infrastructure related indicators. Based on World Bank data, Indonesia continues to post significant economic growth.

As a newly industrialized country, Indonesia's industrial sector must develop the following characteristics:

- Increased contribution to GDP and economic activity,
- SME development with a focus on Large Industry,
- Strong industrial structure,
- Advanced technology for development and market creation,
- Strengthened industry sector to achieve international competitiveness, and
- Ability to face full liberalization within APEC countries.

It is expected that by the year 2020, the contribution of non-oil and gas industry to the GDP will reach 30%. This is to be achieved by contributions from small industry (IK), medium industry (IM) and large industries (IB) During the period of 2010- 2020, the industry should grow at a growth average of 9.43% with IK, IM, and IB respectively contributing a minimum of 10.00%, 17.47%, and 6.34%.

The government of Indonesia has identified three main targets to achieve in its Industry Roadmap 2010. Those goals are (i) to maintain the country’s economic growth at above 7%; (ii) improve the attractiveness of investment and domestic competitiveness; and (iii) create employment and reduce the number of people living below the poverty line by 2020. In this regard, several incentives are being offered to businesses, while some laws are being revised to encourage economic development. Improvements of all aspects of the country’s infrastructure are being planned, including modernizing and restructuring various industries. In order to realize these targets, the Ministry of Industry has announced two approaches in order to build competitiveness of national industry and synergized integrated relation between central and local governments. The first is a top-down approach for the development of 35 priority industrial clusters which are planned by the Central Government and followed by

local/regional participation. The selection is based on international competitiveness and potential of the economy. The second approach is a bottom-up approach for the determination of core competencies of local industries that become hallmarks of regional industries. In this framework, central government helps to build related development centres.

Field level consultations were organized by the UNIDO Field Office in Jakarta for the development of the new UNIDO CP 2016-2020. UNIDO's work has been based on the plans and priorities of the government of Indonesia and in line with Indonesia's long-term development plan (2005-2025), which is segmented into 5-year medium-term plans, each with different development priorities. The National Medium-Term Development Plan (RPJMN, 2015-2019) is the third phase of implementation of Indonesia's National Long-Term Development Plan (RPJPN 2005-2025) promulgated through Law 17/2007. UNIDO CP 2016-2020 is aligned with RPJMN 2015-2019 as well as the Indonesia UNPDF, especially outcomes 1&3.

Energy in Indonesia

Indonesia transitioned from a robust energy exporter to an importing nation that, for the first time, is concerned with growing domestic demand, rising production costs and inadequate infrastructure, energy subsidies and a complex regulatory framework as well as local and global environmental concerns. Indonesia ranked as the 24th-largest crude oil producer in the world in 2013, and the country both imports and exports crude oil. Growing internal demand for energy, declining production (most notably in mature fields), and limited investment to increase capacity has led to a situation in which Indonesia currently imports crude oil and refined products to meet demand. Indonesia remains the world's largest exporter of coal by weight and exports about 75% of its production (standing at 452 million tons in 2012). Indonesia was the fourth-largest LNG (liquefied natural gas) exporter in 2012, about 870 billion cubic feet (ft3), while domestic consumption of gas was 1,329 billion ft3 in 2012.

Indonesia's total primary energy consumption grew by 44% between 2002 and 2012. The petroleum share, although decreasing, continues to account for the highest portion of Indonesia's energy mix at 36% in 2012. In the past decade, coal consumption nearly tripled and surpassed natural gas as the second most consumed fuel (20% and 17% of primary energy consumption in 2012). Indonesia is also a significant consumer of traditional biomass and waste in its residential sector, particularly in the more remote areas that lack connection to the country's energy transmission networks.

PLN3 is the most significant company in the electric power sector. It owned and operated about 85% of the country's generating capacity through its subsidiaries as of 2012 and maintains an effective monopoly over distribution activities. Indonesia had an estimated 44 gigawatts (GW) of installed capacity in 2012 and generated 200 billion kilowatt-hours (kWh), according to BPS-Statistics and IHS EDIN. In 2011, roughly 88% of the power generation came from fossil fuel sources, with the rest coming from hydroelectric (7%) and geothermal (5%). Coal accounted for just over half of the power generated from fossil fuels. Oil-fired generation capacity has declined along with Indonesia's oil production. Total electricity sales by PLN grew to about 174 billion kWh in 2012, increasing 10% from the 2011 level. Average annual growth rates have been 7% since 2002.

Table 1: Key targets for the energy sector in Indonesia

Sector	Policies and targets
Climate change	- Reduce GHG emissions 26% and 29% from BAU level by 2020 and by 2030, respectively, and 41% by 2020 with international support.
New and renewable energy	- Increase share of new and renewable energy in primary energy supply to reach 23% by 2025 and 31% by 2050
Electrification	- Achieve electrification ratio of 99.7% by 2025.
Efficiency	- Reduce energy intensity by 1% per year to 2025.

* New energy includes nuclear, hydrogen, coalbed methane, liquefied coal and gasified coal. Traditional use of biomass is excluded.
Source: OECD/IEA (2017).

1.3 Overview of the project

The Project's design was similar to those of UNIDO Industrial Energy Efficiency (IEE) projects in other countries. It had four components – the first three focused on capacity building, the fourth involving direct implementation of IEE projects in partner facilities (called pilots in the project documentation) for demonstration purposes. The Project Logframe (revised after the Mid-term evaluation) is shown in Table 2. Each component has an individual outcome target and encompasses several activities summarized by expected outputs.

Table 2: Project Components, Outputs and Outcome Targets

Component 1:	**Introduction of energy management system and capacity building**
Outputs: 1.1 Reinforced capacity of government institution on energy management 1.2 EnMS Training Material and Tools Developed 1.3 National Awareness Campaign launched on ISO 50001 1.4 Trained national experts and factory personnel on energy management 1.5 Peer to peer network established between industrial enterprises 1.6 Adoption of ISO 50001/50002 as SKKNI (national personnel competence standard of energy managers/auditors) [requested by Indonesian government, not included in the project document logframe.] 1.7 EnMS ISO 50001 goes to campus and knowledge management hand over to universities [requested by Indonesian government, not included in the project document logframe.]	**Target Outcome 1:** Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness

Component 2: Capacity building on system optimization	
Outputs: 2.1 SO Training material and tools developed 2.2 Trained national expert on system optimization 2.3 Equipment vendors/suppliers trained on system optimization	**Target Outcome 2:** A cadre of energy efficiency professionals created both within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively for providing industrial system optimization (SO) services
Component 3: Financial capacity development to support energy efficiency project in industry	
Outputs: 3.1 Project evaluation criteria developed and harmonized 3.2 Training material developed, and capacity of industry enterprises built on bankable energy efficiency project development 3.3 Capacity of financial institutions and local banks built to promote and invest in industrial energy efficiency projects 3.4 Establishment of EE Financing Guidelines by OJK as part of sustainable finance road map guideline series [requested by Indonesian government, not included in the project document logframe.]	**Target Outcome 3:** Increased availability of financial and institutional support for industrial energy efficiency initiatives
Component 4: Implementation of energy management and system optimization projects	
Outputs: 4.1 Energy Management System Implemented 4.2 Documented industry SO demonstration projects 4.3 Recognition program developed and implemented	**Target Outcome 4:** Demonstrable energy saving in participating factories through system optimization and energy management standard and increase adoption of energy management standard by industry

Source: IEE Indonesia (2011), IEE Indonesia (2018).

Project partners

The national co-operating partners of the project are:

- Ministry of Energy and Mineral Resources (MEMR) - Directorate General of New, Renewable Energy and Energy Conservation (DGNREEC) – National Executing Partner
- Ministry of Industry (MOI) - Centre for Assessment and Development of Green Industry and Environment (CADGIE)

- National Standardization Agency (BSN)
- Ministry of Finance - PIP Government Investment Unit under Fiscal Policy Unit (BKF)
- Financial Services Authority (OJK), stakeholder of Project since 2013

Ministry of Energy and Mineral Resources (MEMR) - Directorate General of New, Renewable Energy and Energy Conservation (DGNREEC) – National Executing Partner

Mandate: MEMR is the main policy maker in the energy sector. Within MEMR, the DGNREEC (Directorate General for New Energy, Renewable Energy and Energy Conservation – DJEBTKE (Direktorat Jenderal Energi Baru Terbarukan,dan Konservasi Energi) DGNREEC has the function of preparing and implementing the policies in the fields of new, renewable energy and energy conservation, as well as preparing the standards, norms, guidelines, criteria, and procedures in the fields of new, renewable energy and energy conservation, providing technical guidance and evaluation.

Ministry of Industry (MOI) - Centre for Assessment and Development of Green Industry and Environment (CADGIE)

Mandate: The Ministry of Industry oversees developing and monitoring the government policies and strategies in the industrial sector. The MOI has the mandate to implement the Presidential Decree No. 28/2008 on the National Industrial Development Policy, which primarily aims at improving the industrial competitiveness by strengthening and developing core industrial clusters including food and beverages, textile, pulp and paper, and petrochemical industries. Regarding energy efficiency, tasks include: establish guideline to implement energy conservation in the industry sector; develop Ministerial initiatives to increase industrial energy efficiency and product competitiveness, and manufacture energy efficient products; establish energy intensity benchmarks,

National Standardization Agency (BSN)

Mandate: The BSN was established in 1997 under the Presidential Decree No. 13/1997 and reinforced by the Presidential Decree No. 166/2000. BSN is a government institution, having the responsibility to develop and promote national standardization in Indonesia. Tasks include: Developing Indonesian National Standards (SNI); Developing a system of standards and conformity assessment; Improving public perception and participation of stakeholders in the field of standardization and conformity assessment; Developing policies and legislation of standardization and conformity assessment; Providing standardization information and training services and promoting the application of the SNI.

Ministry of Finance - PIP Government Investment Unit under Fiscal Policy Unit (BKF)

Mandate: PIP is a sovereign wealth fund managed by the country's Ministry of Finance and invests in a variety of asset classes such as equity, debt, infrastructure and direct investments.

Financial Services Authority (OJK), stakeholder of Project since 2013

Mandate: OJK is an autonomous government agency which regulates and supervises the financial services sector. The agency was established in 2011 to replace the role of Bapepam-LK in regulating and supervising the capital market and financial institutions, as well as that of Bank Indonesia in regulating and supervising banks, and to protect consumers of financial services industry.

As members of the Project Steering Committee (PSC), these partners are expected to provide strategic guidance for the project, approval of progress reports, approval of major changes, ensuring sustainability, avoid duplication of activities, mobilize stakeholders and partners, and provide recommendations to the project in terms of specific priorities not foreseen in the original project document. In terms of responsibilities for Project activities, the partners had few responsibilities. The partners had formal responsibilities in only four of the 37 project activities listed in the project document, all the other activities were the responsibilities of the PMU, UNIDO, national and international experts, financial institutions and industrial enterprises.

Table 3: Partner responsibilities for Project activities

Activities	Responsibilities
Component 1 • Production of promotional/media material to promote the ISO 50001 standard • Production of articles to introduce ISO 50001 in standard newspapers, journals, and magazines • Event launch of the standard ISO 50001 • Organisation of seminar road shows in the country to introduce ISO 50001 to entrepreneurs/members of Indonesia industry associations/organizations	UNIDO, international experts, PMU, MEMR, MOI, and BSN
Component 1 • Exchange information with industries and establish a peer-to-peer network	PMU, MEMR, MOI
Component 2 • Select trainees to become national experts on energy management and systems optimization based on agreed criteria	UNIDO, international experts, PMU, and MEMR
Component 4 • Set up energy performance indicators for recognizing improvement on energy efficiency in the peer-to-peer networks • MEMR recognizes industries through the awards based on the energy saving performance indicators	MEMR and PMU

Positioning of the Project

The energy efficiency (EE) programme in Indonesia was initiated in 1982 with the enactment of the President's Instruction No. 9/1982 on Energy Conservation. In 1993, the country put forward the National Energy Conservation Masterplan. In 2007, Law No. 30/2007 on Energy, referred to as the Energy Law, mandated the creation of the National Energy Council (DEN – Dewan Energi Nasional) to establish the National Energy Policy and that the Government establish a National Energy General Master Plan based on the National Energy Policy. National energy conservation is by law obligatory under Government Regulation No. 70 (2009) regarding Energy Conservation. This was followed by Presidential Instruction No. 13 (2011) concerning on energy and water saving. The instruction mandates that national and local government institutions save water and energy, with the goal of saving 20% of electricity, 10% of water and 10% of gasoline.

Further measures on EE were established in 2013 with the MEMR Minister Regulation No. 01/2013 on Fuel Saving and Catur Dharma Energy through MEMR decision. In effort to support ESCOs as a sustainable mechanism for delivering EE (particularly SO), the government released MEMR Minister Regulation No. 14/2016 on ESCOs. However, it was annulled in 2017 due to legal uncertainty about financial practices (MEMR, 2018).

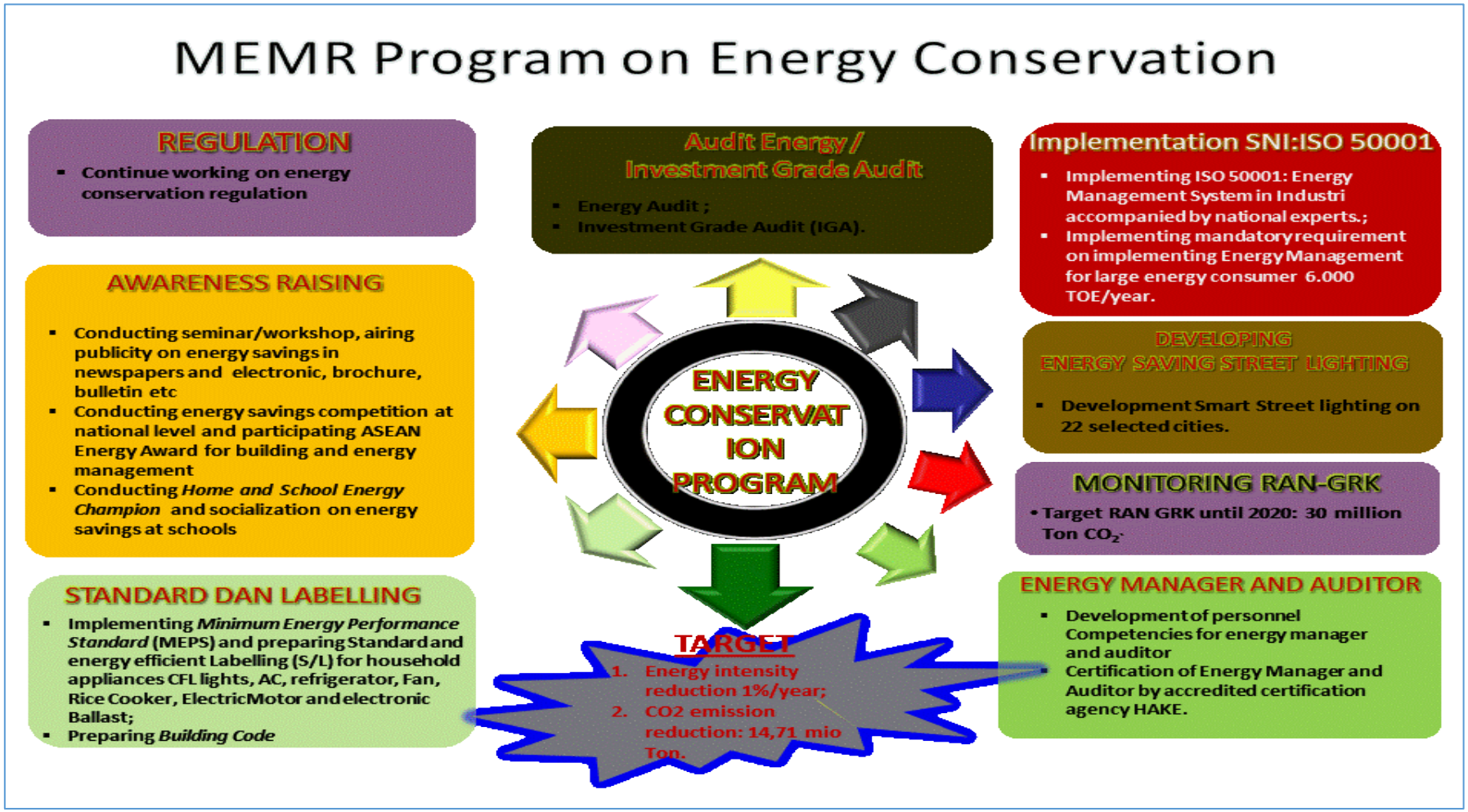
Table 4: Timeline of Indonesian Energy Efficiency Policies and Initiatives

Year	Policies and initiatives
1982	President Instruction No. 9/1982 on Energy Conservation
1993	National Energy Conservation Masterplan
2007	Law No. 30/2007 On Energy
2009	Government Regulation No.70/2009 on Energy Conservation
2011	Presidential Instruction No. 13/2011 on electricity and water savings Presidential decree No. 61/2011 on National action plan for GHG emission reduction
2012	MEMR Minister Regulation No. 13/2012 on electricity savings. MEMR Minister Regulation No. 14/2012 on Energy Management MEMR Minister Regulation No. 15/2012 on water savings
2013	MEMR Minister Regulation No. 01/2013 on Fuel Saving MEMR Ministry Decision No. 4051K/07/MEM/2013 tentang on energy Catur Dharma
2014	MEMR Minister Regulation No. 18/2014 tentang Labeling for CFL Lighting MEMR Minister Regulation No. 19/2014 on electricity tariff Government regulation No. 79/2014 on energy policy
2015	Presidential Decree No. 38/2015 on Government Cooperation with business entity on infrastructure provision. MEMR Minister Regulation No. 7/2015 HVAC labelling Labor Minister Decision No. 80/2015 on Energy Manager Competencies on Industry and Buildings
2016	MEMR Minister Regulation No. 14/2016 on ESCO

Source: Triyono Adiputra, National evaluation consultant

Energy conservation policy implementation in Indonesia is currently based on the initiatives shown in Figure 1.

Figure 1: MEMR Energy Conservation Initiatives



Source: MEMR

1.4 Evaluation methodology

The terminal evaluation was conducted in accordance with UNIDO Evaluation Policy.[2] The evaluation was carried out using a participatory approach that sought to inform and consult key stakeholders of the Project.

The evaluation team adopted a theory of change approach to assess the causal links between Project activities, outcomes and outputs. The team assessed the extent to which the Project contributed to the conditions necessary to achieve the broad adoption of energy efficiency management systems based on ISO 50001 and more widespread incorporation of a systems optimization to maximize energy efficiency. A combination of methods was used to deliver evidence-based qualitative and quantitative information, from diverse sources including: desk studies and literature review, individual and group interviews and feedback review.

In preparing for the interviews and country visit, the evaluation team carried out a desk review of programme and Project documents available at that point, including the Mid-term Review of the Project.

The evaluation took place from June to November 2018, with a field mission during 20-31 August 2018. The evaluation covered the whole duration of the project from its implementation start on 11 April 2011 to the completion of the project activities on 31 December 2017.

The desk review involved a review of the original Project document (IEE Indonesia, 2011), monitoring reports (such as progress and financial reports, Mid-term Review (IEE Indonesia, 2015), and final report and presentation (IEE Indonesia, 2018) and notes from the meetings of the Project Steering Committee. The full document list can be found in Annex III.

During the country mission, the evaluation team interviewed 45 stakeholders in 23 organizations, listed in Annex III.

1.5 Limitations of the evaluation

The team was only able to visit a limited number of demonstration partner companies for interviews – seven in total – when compared to the large number of demonstration companies involved. To collect the feedback from a more representative sample of Project participants would require a more quantitative form of data collection via surveying Project participants.

1.6 Reconstructed theory of change

The project document does not describe the Theory of Change underlying the Project's activities. The evaluation team reconstructed a Theory of Change – consistent with the project logframe – that outlines the logic chain connecting the Project's **planned outputs** to its principal **stakeholders** and **implicit intended outcomes** and then to its **intended impacts** (see Figure 2). This reconstructed Theory of Change seeks to align the Project's elements in a way that reflects the impact logic from direct outputs to the ultimate goals.

This Theory of Change is intended to:

[2] UNIDO (2015)

- Uncover the unstated outcome-level elements implicit in the Project design,
- Frame the “progress to impact” analysis, and
- Inform the Independent Impact Evaluation.

The logic chain portrayed in Figure 2 flows from left to right. The **intended outputs** (on the left) lead to immediate, intermediate and higher-level **implicit intended outcomes** – first among stakeholders and later in factories – which in turn lead to **intended impacts** (on the right) – GHG emission reductions, energy cost savings and EE technology investment. The various levels of **implicit intended outcomes** (in the centre) are coherent with the Project’s structure, but not fully specified in the project logframe.

The first type of output (top) – **direct technical assistance (TA)** in implementing energy management plans, conducting detailed assessments and implementing demonstration projects in partner enterprises – leads most directly to measurable impacts. At the impact level, as soon as factories have implemented energy efficiency measures, they achieve GHG emission reductions, energy savings, resource consumption reductions, air quality improvements, and industrial competitiveness gains.

However, these interventions are costly and donor projects can typically only do them in limited instances. They typically serve as demonstration/pilot projects, filling several important roles in the market change pathway to broad IEE adoption and impact:

- Raising industrial motivation and confidence in IEE technologies/practices through recognised industrial leadership, demonstrated/documented technical and financial results, and published case studies,
- Acting as practical training venues for national experts,
- Implementing additional IEE projects within their plants,
- Influencing other facilities within their industrial groups, industrial parks and supply chain network to implement IEE projects.

Other outputs of the Project are related to **capacity building**, and include general awareness raising, information dissemination, technical/financial training, institutional arrangements for further training, and policy/financing development. Their intended outcomes are sustained policy/market framework conditions that motivate/enable industry to implement IEE practices and technologies as an integral part of their business practices, without direct UNIDO assistance. The intended impacts of capacity building activities are energy savings, GHG emissions reductions, etc. – the same as for direct assistance in adoption/implementation activities. As it takes more time for capacity building interventions to result in implemented IEE projects, there can be significant delays (often after project closure) before actual impacts are apparent.

The evaluation team identified nine different target (sub)groups, which the Project is addressing, depending on the group, different outcomes follow. To better guide the reader through the Theory of Change, colour and pictograms are used for the different target groups:

- Primary stakeholder: Energy-using enterprises (with varying degrees of intervention depth by the project) (), with the subgroups:
  i. Wider economy ()
  ii. Light-intervention companies ()
  iii. Deep-intervention companies ()

- Technical services and equipment supply chain (), with the subgroups:
  iv. Independent consultants and service professionals (),
  v. Equipment supply chain ()
  vi. Academics and trainers ()
- Finance community ():
  vii. Banks and financial institutions ()
- Policy and standards communities ():
  viii. Technical standards community ( )
  ix. Government regulators/agencies ()

Project Outputs

Analysing the outputs, these were clustered in the Theory of Change diagram as follows (on the left of Figure 2:

- *Direct technical assistance:*
  - Implementing Energy Management System (EnMS) pilot/training projects (Output 4.1)
  - Implementing Systems Optimization (SO) implementation pilot/training projects (Outputs 4.2)
  - Locating/arranging external financing for IEE investments (Output 4.2)

- *Capacity Building:*
  - *Awareness, information, networks & recognition:*
    - General IEE awareness raising (Output 1.3)
    - IEE information dissemination (Outputs 1.3, 1.7)
    - Peer-to-peer networks (Outputs 1.5, 4.1)
    - Recognition (Output 4.3)

  - *Technical training*
    - EnMS training (materials) – users (Outputs 1.1, 1.2, 1.4, 1.7)
    - SO training (materials) – users (Outputs 2.1, 2.2, 2.3)
    - EnMS training (materials) – experts (Outputs 1.2, 1.4)
    - SO training (materials) – experts (Outputs 2.1, 2.2, 2.3)

  - *Financing development:*
    - Financial awareness and capacity (Output 3.2)
    - Financial training (materials) (Outputs 3.2, 3.3)
    - Harmonized project evaluation criteria (Output 3.1)
    - Financing mechanisms (Output 3.4)

  - *Standards development:*
    - Focused on performance of plants (Output 1.2)
    - Focused on competence of energy managers/auditors (Output 1.6)

  - *Policy development:*
    - Policies/strategies (with incentives/penalties to motivate IEE actions) (Output 1.1)
    - Institutional arrangements for continued work on Capacity Building activities (i.e. information & awareness, training, and financing, standards, and policy development) (Output 1.1)

Project Outcomes

Stakeholder group I: Energy-using enterprises

While the project works with many different target groups, only the primary group (), the energy-using enterprises can achieve actual energy efficiency savings. On intermediate outcome level, the project improves the inhouse capacity of the companies it engaged with. On a higher outcome level, the underlying project logic of the IEE project is that all targeted audiences multiply their knowledge to other factories and actors. Energy-using enterprises themselves are an important multiplicator too. They might spread their experience and knowledge to other factory sites, within their company group or even with outside companies.

Outcomes of the interventions targeting the energy-using enterprises
Intermediate outcomes:

- ① Partner enterprises (deep-intervention companies) apply EE approaches and implement EE measures – with direct impacts, and share the results within their company group, companies in the sector, companies in the supply chain and the wider economy. They also boost concept demonstration/confidence and provide practical training venues for experts.
- ② Industry top management (in light-intervention companies) are aware, informed, motivated and committed to implementing EnMS/SO/IEE activities through approving the: training of staff, hiring of consultants, investing in better equipment, and applying for financing based on improved business and financial proposal if needed.
- ③ Sufficient factory engineers/technicians (in light-intervention companies) are qualified (at user level) to implement EnMS/SO/IEE activities carrying out: training staff, hiring consultants, investing in better equipment, and applying for financing based on improved business and financial proposal.

Higher-level outcome:

- Outside of the deep- and light-intervention companies in contact with UNIDO, other companies copy the show cases and replicate them in their own facilities. Industrial enterprises implement EnMS / implement SO/ train staff / hire consultants / invest in better equipment / apply for financing based on improved business plans and financial proposals if needed.

All other stakeholders addressed by the UNIDO project either create framework conditions, such as regulatory work, offer credit lines; or they directly offer their services to industrial consumers.

Stakeholder group II: Technical services and equipment supply chain

Some target groups such as independent consultants () will not carry out energy efficiency measures directly, but merely work as knowledge disseminators. The same applies to equipment suppliers () who are more likely to promote new (energy efficiency-related) services and equipment to their customers. Academics, researchers, and lecturers () work as multipliers of information since they train students or factory personnel.

Outcomes of the interventions targeting the technical services and equipment supply chain

- ④ Sufficient independent consultants ( ) qualified (at expert level) to offer EE services to factories implementing EnMS/SO/IEE activities, and also to serve as champions/ influencers for IEE issues.
- ⑤ Sufficient equipment supply vendors ( ) qualified (at expert level) to offer/service equipment to factories implementing SO/IEE activities, and also to serve as champions/ influencers for IEE issues.
- ⑥ Academics and educators ( ) teach EnMS/SO/IEE topics, in stand-alone courses or as part of university or technical school curricula.

Stakeholder group III: Finance community

If banks and financial institutions offer better conditions to energy-using enterprises these can more easily access financing.

Outcomes of the interventions targeting the finance community

- ⑦ The finance community ( ) offers IEE-appropriate credit lines, guidelines and analytical capacity to offer sufficient external financing – easily-accessible at attractive terms – to factories implementing EE activities

Stakeholder group IV: Policy and standards communities

Within the technical standards community improved accreditation and certifications bodies improve the quality of services supplied to energy-using enterprises.

Outcomes of the interventions targeting the policy and standards communities

- ⑧ Technical standards community or government regulators have authority/capacity to certify energy auditors and energy managers.
- ⑨ The technical standards community ( ) has the capacity to market/maintain EnMS standards.
- ⑪ Government regulators/agencies ( )have capacity and political will to implement effective – sufficiently ambitious and motivating – EnMS/SO/IEE policies/strategies.
- ⑫ Institutionalised ( ) maintenance and expansion of replication pathways – education/ training, communications channels, peer networks, etc. – for IEE champions/influencers.

Summary of project outcomes

Due to improved inhouse expertise and an improved supportive framework, energy-using enterprises to carry out EE works, implement EnMS / SO, train staff, hire consultants, invest in better equipment apply for financing (intermediate outcomes). The improved knowledge base replicates in the market via replication pathways and reaches more companies that had not been directly involved with the UNIDO project (higher-level outcome).

Project impacts

On the impact level, as soon as energy-using enterprises ( ) have implemented energy efficiency measures, they achieve GHG emission reductions, resource consumption reductions, improved air quality, create income effects, increased industrial competitiveness and economic growth.

These impacts may not be completely attributable to UNIDO's intervention though. Projects in all enterprises (i.e. deep-intervention companies , light-intervention companies and the wider economy) will be influenced by **external market factors** (e.g. energy prices, government policies and other donor programmes) in addition to UNIDO-generated impacts.

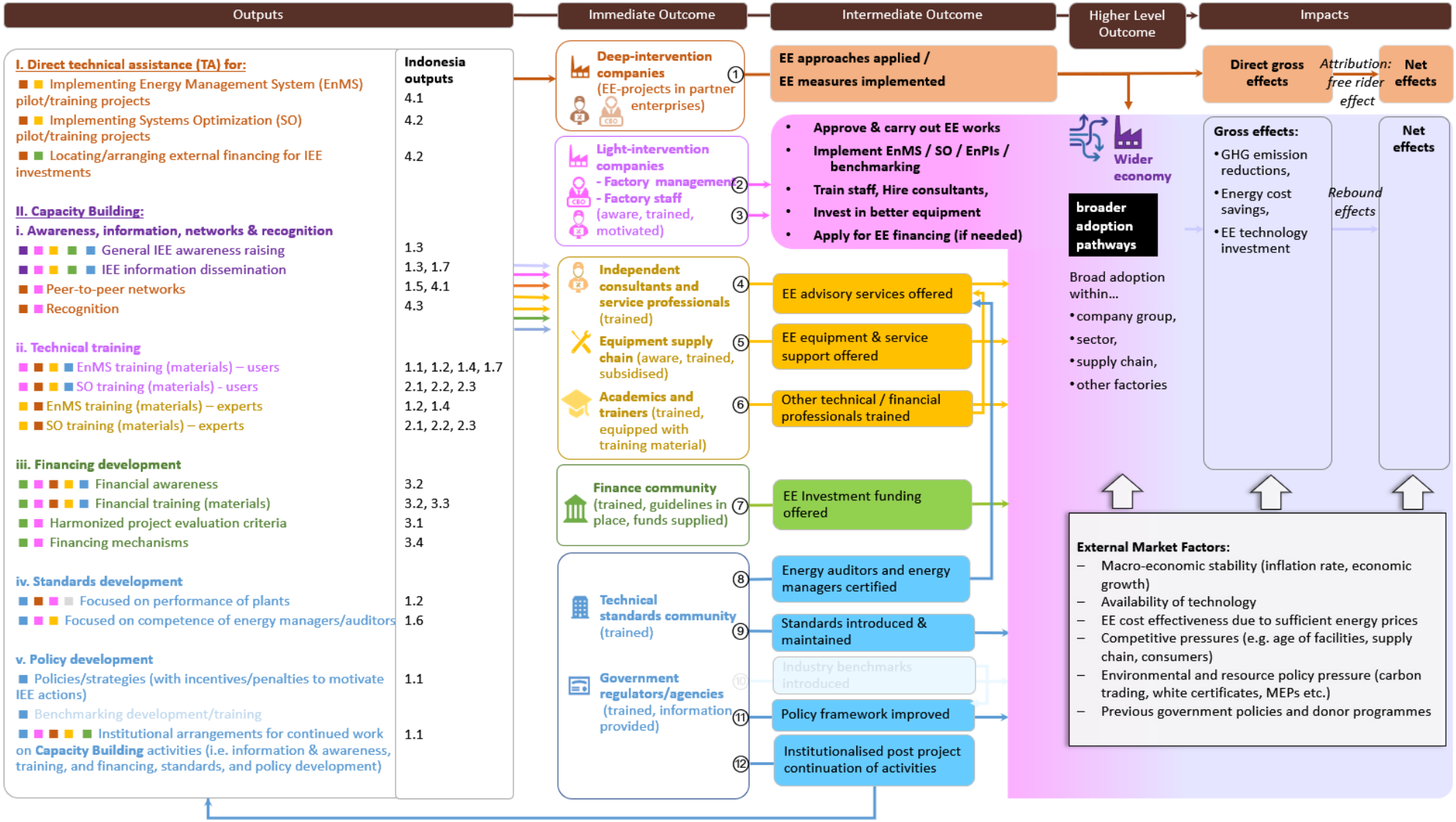
Further, the impacts of projects may be smaller than ex-ante estimates suggest they should be. Different types of **rebound effects**, such as increase in production and income effects (see textbox 1), may reduce that economy-wide effect of EE interventions.

Lastly, the EE-projects implemented in partner enterprises (i.e. deep-intervention companies) may embody **free rider effects** (i.e. impacts reported from interventions that would have been done regardless of Project assistance).

Textbox 1: Rebound Effects

Improved energy efficiency can have multiple unintended consequences that have the potential to erode much of the anticipated energy savings. Efficiency increases oftentimes reduces product or service prices, which can in turn ramp up consumption, thus partly cancelling out the original savings. This is known as **direct rebound effect**. To give an example if product prices for plastic products decreases, use of plastic packaging material might increase negating the energy savings by increased production. **Indirect** or **second-order effects** are resulting from the fact that lower production costs have an economic growth effect. Consumers can invest the savings in new, possibly even more energy-intensive consumer goods, e.g. a plane ticket, in this case the efficiency gains backfire via the economic growth effect and net emissions increase.

Figure 2: Theory of Change of the IEE project: Output to Impact level



Source: Own diagram.

2. Project's contribution to development results – Effectiveness and Impact

2.1 Project's achieved results and overall effectiveness

Effectiveness refers to the extent to which the development intervention's objectives (outputs and outcomes) were achieved, or are expected to be achieved, taking into account their relative importance (UNIDO 2018). This section discusses the Project's objectives in terms of ***outputs*** – the degree to which output targets were achieved. The progress on short- to medium-term ***outcomes*** and longer-term ***impact***, including global environmental benefits, replication effects, and other local effects, was discussed in section 2.2.1.

The Project set out to achieve the 14 outputs – having 21 output targets and seven outcome targets – summarised in the logframe (Table 8). The Project achieved or exceeded all but one of its output targets. The unachieved output targets were in Component 4.2, Documented industry demonstration projects: 1) achieved 49 of targeted 60 SO assessments, 2) achieved 13 of targeted 20 case studies showing GHG emission reductions. At the request of the Indonesian government, the Project carried out four additional tasks – having two output targets and two outcome targets. These were not included in the project document logframe but are included in Table 5.

2.1.1 Awareness and technical capacity on EnMS (Component 1)

This component encompassed activities – government engagement, an awareness campaign (i.e. executive briefings), user and expert-level trainings with materials in Bahasa for factory managers and national experts, and a peer to peer network – to establish a policy instrument that encourages industrial enterprises to adopt ISO 50001-compatible EnMSs. In addition to establishing the awareness and technical foundations for the implementation of ISO compatible EnMSs, the Project sought to develop a market for locally provided EnMS services.

At the request of the Indonesian government, the Project worked to further the sustainability of the EnMS expertise and services market by helping the government adopt ISO 50001 as SKKNI (national personnel competence standard) for energy managers and ISO 50002 as SKKNI for energy auditors. The adoption of ISO 50001 as SKKNI for energy managers significantly strengthens Ministry of Energy Regulation No. 14/2012 on Energy Management, in that it brings the regulation in line with international standards concerning what constitutes an energy manager.

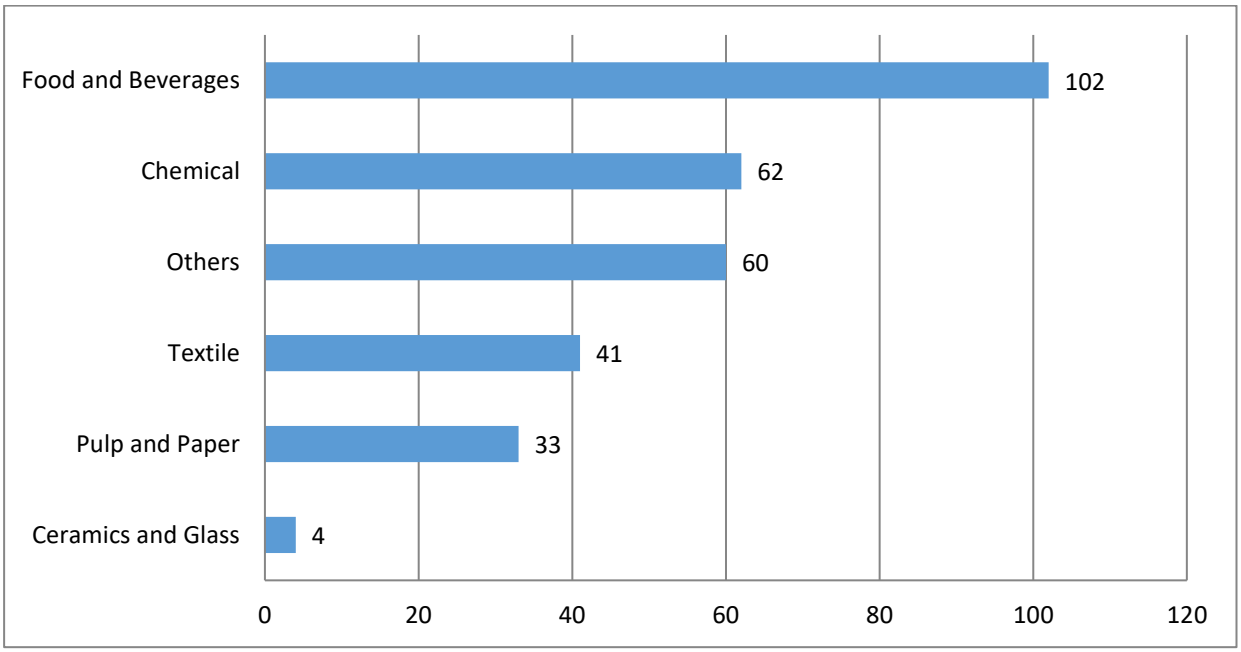
The Project also worked to integrate EnMS into university curricula by arranging for MEMR personnel to make EnMS presentations on college campuses and handing over EnMS materials to engineering faculties.

The core of the component were the executive briefings and the user and expert level training sessions. After the Project found that top managers were reluctant to attend to sessions on awareness raising on EnMS ISO 50001, the awareness sessions were promoted as executive briefings to help top management save energy costs. Ten executive briefings, with 388 management and 270 government participants, were conducted. Half were delivered by international experts; half were led by national experts, after completion of their training. The briefings provided information on the reason and benefit to adopt ISO 50001 and encouraged top

management to send their energy managers or teams to the 2-day user trainings on EnMS. The main topics were the opportunities to improve energy performance and the cost of inefficient energy use. Success stories of energy management system implementation from UNIDO industrial energy efficiency projects were presented, including those from South Africa and Moldova. Starting with the fifth briefing, the success stories were presented by the top management of Indonesian companies participating in the Project's demonstration/pilot component. *It became clear that the presentations of local Indonesian top management on their success achievement in implementing EnMS ISO 50001 brought about significant interest from other industries, which attracted more industries to become pilot companies in the 2nd batch of Expert training.* (IEE Indonesia, 2018).

As the executive briefings generated management interest in ISO 50001, the Project conducted 2-day, user-level training session on EnMS for their energy managers. In total, the Project conducted 12 user-level EnMS sessions, attended by 524 personnel from 302 companies, predominately from the food and beverages, chemicals, textiles and pulp and paper industries (see Figure 3) and 214 government personnel. As with the briefings, the early sessions were delivered by international experts (in English) and the later sessions were delivered by national experts (in Bahasa).

Figure 3: EnMS Trained Participants, by sector



Source: IEE Indonesia (2016).

The participating industries are expected to initiate the adoption of energy management system planning after the training, and those interested in adopting the full cycle of energy management system ISO 50001 could apply it to be later considered as pilot companies. (IEE Indonesia, 2018).

The Project conducted a follow-up survey of EnMS user trainees to understand how their factories were progressing on implementing EnMSs. The results indicated that many facilities, though motivated, had difficulties establishing their energy baselines and constructing EnMS plans (an early stage of implementing an EnMS). Based on this finding, the Project designed and offered 2-day follow-up trainings on EnMS planning. Companies could bring in their real energy data and

work with experts to construct an energy review and develop an energy plan and begin identifying energy conservation opportunities. “A complete energy review, including the significant energy use (SEU) list was produced in the training. Appropriate baseline and energy performance indicators (EnPI) were developed using advanced regression method. The companies were required to start listing their energy conservation opportunities as part of their energy planning” (IEE Indonesia, 2018). The project conducted four EnMS-planning training sessions, with 90 company participants. Ultimately, 159 factories adopted EnMS plans – 28 demonstration/pilot plants; 41 user-trainee facilities without the follow-up course; 90 facilities whose trainees participated in the follow-up EnMS planning implementation sessions.

From the pool of user-level trainees, the Project screened and selected potential candidates for expert-level training. The expert-level training consisted of three modules – each having classroom instruction and practical fieldwork with demonstration/pilot companies – on EnMS planning, implementation and monitoring and verification. Following the third module, the national expert candidates were required to submit reports on their implementation of EnMSs in the demonstration/pilot companies, including the energy savings. And after that, they had to take a final examination. Successful national experts had to complete all the modules, submit the implementation report and pass the exam. The course was offered twice. Each was conducted by international experts and involved around 26 working days over an eight-month period.

The project targeted 25 national experts trained during the project period, and successfully graduated 38 in two batches. After their training, some national experts were involved in leading executive briefings and conducting user-training sessions. However, because there was too little time during the Project cycle for national experts to gain enough experience in EnMS implementation and confidence in teaching, they were not involved in the training of additional national experts.

The Project Final Report mentions that: *the availability of good quality, interested national expert candidates is the main challenge in achieving this indicator. The interview selection process showed that out of 70 interested candidates, only a maximum of 25 candidates would qualify as potential experts. Strong energy background and sufficient knowledge in management system is a rare combination in Indonesian market…. This issue remains today, when more expert training programs are proposed as scaling up activities are planned.* (IEE Indonesia, 2018).

This points to the need for systematic approach to developing IEE talent. *The expert training could accommodate junior expert candidates, who are fresh graduates from engineering faculty. It can be a follow up action of the Goes to Campus activities by MEMR. The junior experts will provide the necessary support during consultation process for adopting ISO 50001, such as in data gathering and analysis.* (IEE Indonesia, 2018)

The Project established a peer-to peer network where 200 companies shared their progress on EnMS and SO project energy savings. The network also included a recognition programme, implemented in close cooperation with MEMR.

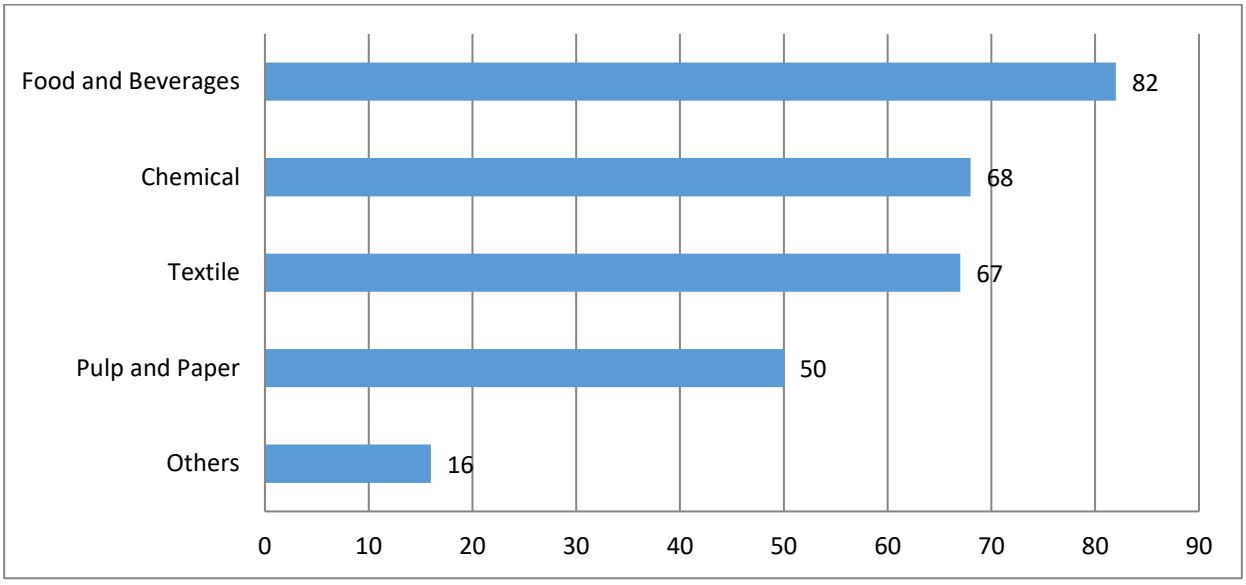
2.1.2 Technical capacity on SO (Component 2)

This component encompassed activities – user and expert-level trainings with materials in Bahasa for factory managers, national experts and equipment vendors/suppliers – to develop a cadre of EE professionals to initiate a process to transform local markets as to provide industrial SO services.

The Project offered 2-day user-level training, 6 to 8-month expert level training and 1-day vendor briefings in steam system optimization (SSO), compressed-air system optimization (CASO) and pump system optimization (PSO).

In total, the Project conducted 14 user-level SO sessions, attended by 402 personnel from 323 companies, predominately from the food and beverages, chemicals, textiles and pulp and paper industries (see Figure 4) and 248 government personnel. The training explained the concept of SO and described the potential SO measures that apply in the various industries. The first 10 sessions were delivered by international experts (in English) and the final four sessions were delivered by national experts (in Bahasa). There were six sessions on SSO, having 289 industry and government participants; three sessions on CASO, having 182 participants; and five sessions on PSO, having 179 participants. An additional two trainings, offered commercially by two national experts, were given to about 100 energy personnel of the Indofood Group.

Figure 4: SO Trained Participants, by sector



Source: IEE Indonesia (2016).

The Project conducted five expert-level SO training courses – two for SSO, two for CASO and one for PSO – each having 15 to 20 participants. The trainees in each batch had to complete three days of training on SO assessment in a host company as a group, and then carry out an assessment and prepare an assessment report in a demonstration/pilot company individually. They also had to pass an examination. The courses, which each took 6 to 8 months to complete, were all led by international experts. There were 74 candidates who participated in the 3-days expert training classes, but only 46 – 18 for SSO, 23 for CASO and 5 for PSO – completed the course and were certified as national experts on SO. Most of the those failing the course did not complete the assessment and the assessment report. Some of the candidates were unable to find a demonstration/pilot company to be assessed.

The Project conducted three 1-day briefings – one each for SSO, CASO and PSO – for equipment vendors/suppliers. The trainings, which were all led by international experts, sought to introduce UNIDO's SO approach and its potential impacts and to provide information on the latest EE technology available and their market potential in Indonesia. There were 84 vendors who participated in the briefings – 22 for SSO, 25 for CASO and 37 for PSO.

2.1.3 Financial capacity on IEE (Component 3)

This component encompassed activities – establishing and adopting EE investment guidelines, training financial institution staff and industrial energy managers on EE financing, training for trainers, and adoption of EE investment guidelines into OJK Sustainability Finance Roadmap – to increase the availability of financial and institutional support for industrial EE initiatives. The heart of the guidelines and training are harmonized criteria for evaluating the investment prospects of EE projects.

With oversight by a working group on EE financing – having representatives on MEMR, OJK, MOI and UNIDO and energy financing experts – the Project prepared reference criteria for EE investment, based on a proposal prepared by PT. Tiga Pilar Sejahtera for Exim Bank. The criteria were adopted as a template of how energy audit results are to be converted into loan or investment proposals. The Project developed training materials based on the agreed criteria.

Two types of trainings were developed; one for banks and financial institution staff, the other for industrial energy managers. The trainings were delivered by the National Project Coordinator (NPC) and a local consultant.

The financial institution version – a 3-day course, delivered nine times to 190 staff of eight first-mover banks – focused on the potential market size of EE in Indonesia and the type of investment needed by industry. It included information about the possible financial structures of EE financing including loans, ESCOs and bonds. This also presented the role of the energy audit, especially the Investment Grade Energy Audit (IGA), in financial evaluation and risk management. However, the Project did not provide training in investment grade auditing and energy savings verification for potential IGA experts. The Project final report states that: *the absence of competent IGA and energy saving verification experts might become a hindrance to significant increase in EE project implementations in Indonesia.* (IEE Indonesia, 2018)

Government support for this activity was demonstrated by MEMR's co-financing of seven of the nine courses, the presence of OJK's Sustainability Finance Director, and OJK's (as Indonesia's Financial Services Authority) issuance of the invitations to banks to participate in the course.

The third day of the bank training was a factory visit to view a successful EE project, and to discussing if the banks were interested in funding similar projects. Discussion in the 3rd day also included: 1) regulations and schemes needed to facilitate EE investment by banks, 2) the potential of EE investment as a new portfolio on sustainable finance, and 3) the importance of project financing, rather than corporate financing for EE investment.

The industrial energy managers version of the training – a 2-day course, delivered three times to 88 participants – focused on how bank staff would evaluate EE investment proposals. The managers were introduced to different schemes that could be used to finance EE projects. To help energy managers with financial feasibility evaluations, the training material included financial modelling spreadsheets. Based only on input of the investment needed, the cash flow generated from the energy saving, the hurdle rate and loan rate, and the assumption of loan ratio versus internal capital expenditure, the model would generate the financial feasibility information, such as net cash flow, the ROI, the IRR, and the NPV.

MEMR and OJK expected that the EE financial training for banks and energy managers would continue after the project. The Project delivered two training of trainers (TOT) courses to 25 participants from the banks training and the energy managers trainings.

Since 2015, OJK had been committed to develop the road map of sustainability finance. USAID provided support to integrate strategic environmental assessment into the bank's assessment matrix of loans and investments. OJK actively participated in the Project's EE financial trainings and found that the training material and guidelines were useful for the banks and financial institutions. OJK requested the project to establish industry sector EE investment guidelines for banks and financial institution. The guidelines were handed over to the eight first mover banks on sustainable finance during in November 2015. No information was reported on the extent to which the training led to increased financing of IEE projects.

2.1.4 Direct Implementation of EnMS and SO (Component 4)

The indicators and targets associated with the Direct Implementation of EnMS and SO component are defined at the outcome and impact levels. The achievements for this component are discussed in section 2.2.

2.1.5 Achievements summary

Table 5 shows the expected outputs, targets and reported achievements for each of the Projects components and activities.

Table 5: Project's expected outputs, targets and reported achievements

Expected Output	Targets	Indicator status (SMART | Output, Outcome, Impact)	Achievement (Reported)	Target Achieved
Project Objective: Promote industrial energy efficiency through systems optimization and ISO energy management standards				
Quantitative Outcome 1 Measurable reductions in electricity and fuel consumption by industry	• Electricity savings: 37,484 MWh during the Project duration (5 years)	• SMART | Impact	• Electricity savings: 271,740 MWh during the Project duration (5 years) from demonstration/ pilot projects	• ✔
	• Fuel savings of 404,000 GJ (112,222 MWh eq) during the Project duration (5 years)	• SMART | Impact	• Fuel savings of 4,096,000 GJ (1,137,736 MWh eq) during the Project duration (5 years) from demonstration/pilot projects	• ✔
	Indirect fuel savings are estimated to be on the order of 3,057,000 GJ. [mentioned in the text of the Project document, but not in the logframe]	• SMART | Impact	• Indirect energy savings: 89,300 MWh eq during the Project duration (5 years) from replication projects	
	Indirect electricity savings are estimated to be on the order of 297,540 MWh. [mentioned in the text of the Project document, but not in the logframe]		• Indirect energy cost savings: USD 65.4 million during the Project duration (5 years) from demonstration/pilot and replication projects	
Quantitative Outcome 2 Calculated GHG emissions reductions	• Emissions reduction of 67,442 tCO2 during the Project duration (5 years)	• SMART | Impact	• Emissions reduction of 938,358 tCO2 during the Project duration (5 years) from demonstration/ pilot projects	• ✔
	Indirect emission savings are estimated to be on the order of 522,960 tCO2. [mentioned in the text of the Project document, but not in the logframe]	• SMART | Impact	• Emissions reduction of 50,289 tCO2 during the Project duration (5 years) from replication projects	

Expected Output	Targets	Indicator status (SMART | Output, Outcome, Impact)	Achievement (Reported)	Target Achieved
Component 1: Introduction of energy management system and capacity building				
Outcome 1: Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness		• SMART | Outcome	• Achievement reported only for underlying output targets	
1.1 Reinforced capacity of government institution on energy management	• PMU created and operational with staff from the government • Key government institutions participating in workshops/meetings • Replication and scaling up plan handed to the government	• SMART | Output • SMART | Output • SMART | Output	• PMU operated in the MEMR office. • 200 government staff trained. • The Plan handed over and discussed.	• ✔ • ✔ • ✔
1.2 EnMS Training Material and Tools Developed	• Comprehensive training material and tools specifically supporting the development and implementation of energy management compatible with ISO 50001.	• SMART | Output	• Training material on EnMS ISO 50001 available in Bahasa.	• ✔
1.3 National Awareness Campaign launched on ISO 50001	• Training material on EnMS ISO 50001 available in Bahasa.	• SMART | Output	• Fact sheet and case study was distributed to over 1,400 training participants.	• ✔
1.4 Trained national experts and factory personnel on energy management	• Training on energy management in line with ISO 50001 of 25 national experts; • 300 factory managers receive briefing (out of which 200 will be trained in energy management system implementation)	• SMART | Output • SMART | Output	• 38 National experts graduated as UNIDO EnMS National experts. • 912 industries personnel have been trained on EnMS in which 524 trained on EnMS implementation.	• ✔ • ✔
1.5 Peer to peer network established between industrial enterprises	• All participating enterprises share their implementation plan on energy management on the network and learn from others' experience and results	• SMART | Output	• 4 peer-to-peer network meetings were conducted, participated by 200 industry personnel.	• ✔

Expected Output	Targets	Indicator status (SMART | Output, Outcome, Impact)	Achievement (Reported)	Target Achieved
Extra activities requested by Indonesian government (not in project document logframe)	• Adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers • Adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors • EnMS ISO 50001 goes to campus and knowledge management hand over to Universities	• SMART | Outcome • SMART | Outcome • SMART | Output	•	• ✔ • ✔ • ✔
Component 2: Capacity building on system optimization				
Outcome 2: A cadre of energy efficiency professionals created both within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively for providing industrial system optimization (SO) services		• SMART | Outcome	• Achievement reported only for underlying output targets	
2.1 SO Training material and tools developed	• Availability of translated, comprehensive training material and tools on systems optimization	• SMART | Output	• Training materials in Bahasa is Available and used.	• ✔
2.2 Trained national expert on system optimization	• 45 national experts • 300 factory managers (out of which 200 will be trained in the use of UNIDO tools)	• SMART | Output • SMART | Output	• 46 national experts on SO trained. • 323 factory managers trained on the use of UNIDO tools.	• ✔ • ✔
2.3 Equipment vendors/suppliers trained on system optimization	• 50 Indonesian-based suppliers of energy-efficient products in systems optimization	• SMART | Output	• 84 Indonesia based supplier was trained on system optimization	• ✔

Expected Output	Targets	Indicator status (SMART | Output, Outcome, Impact)	Achievement (Reported)	Target Achieved
Component 3: Financial capacity development to support energy efficiency project in industry				
Outcome 3: Increased availability of financial and institutional support for industrial energy efficiency initiatives		• SMART | Outcome	• Achievement reported only for underlying output targets	
3.1 Project evaluation criteria developed and harmonized	• Criteria for evaluating EE projects are developed and harmonized by main financial institutions in Indonesia	• SMART | Output	• The criteria have been agreed and adopted in the guidebook	• ✔
3.2 Training material developed, and capacity of industry enterprises built on bankable energy efficiency project development	• Availability of translated, comprehensive material and guidelines specifically supporting the development of financial proposal for EE projects • Industrial facility managers/personnel have the capacity to analyse systems optimization and energy management projects and use energy and O&M costs reduction projects	• SMART | Output • SMART | Output	• Training material available in Bahasa and has been used in 2 trainings for energy managers. • 88 energy managers from industries trained on EE financing.	• ✔ • ✔
3.3 capacity of financial institutions and local banks built to promote and invest in industrial energy efficiency project	• Strengthened capacity of financial institutions and local banks on EE projects evaluation	• SMART | Output	• 190 personnel of banks and financial institution including OJK have been trained on EE financing. • 25 personnel have been trained as trainer.	• ✔ • ✔
Extra activities requested by Indonesian government (not in project document logframe)	• Establishment of EE Financing Guidelines by OJK as part of sustainable finance road map guideline series	• SMART | Output	•	• ✔

Expected Output	Targets	Indicator status (SMART | Output, Outcome, Impact)	Achievement (Reported)	Target Achieved
Component 4: Implementation of energy management and system optimization projects				
Outcome 4: Demonstrable energy saving in participating factories through system optimization and energy management standard and increase adoption of energy management standard by industry		• SMART | Outcome	• Achievement reported only for underlying output targets	
4.1 Energy Management System Implemented	• 150 factories adopted energy management plans and completed operational improvement projects • 25 factories adopted and implemented ISO 50001 • Participating factories registered with the peer-to-peer network report energy savings	• SMART | Outcome • SMART | Outcome • SMART | Output	• 159 factories completed the EnMS plan. • 28 factories adopted full cycle of ISO 50001. • 4 times peer to peer network was implemented participate by 200 factories personnel.	• ✔ • ✔ • ✔
4.2 Documented industry demonstration projects	• 60 systems assessments conducted of which 35 led to completed systems optimization projects • 20 case studies showing GHG emission Reductions	• SMART | Output/Outcome • SMART | Output	• 49 SO assessments were conducted, and 67 projects were implemented by the industries, reducing 526,755 tons CO2. Some companies implemented SO projects directly, bypassing the assessment stage. • 9 EnMS and 4 SO case studies published. Additional case studies were developed, but permission for their publication was refused by the companies.	• ✔ • ✗
4.3 Recognition program developed and implemented	• Formal recognition of factories achieving power/fuel consumption reductions reflected in government reports	• SMART | Output	• Pilots companies win the national energy conservation award in 2015, 2016 and 2017.	• ✔

Source: IEE Indonesia (2011), IEE Indonesia (2018).

2.1.6 Results on effectiveness

Evaluation Criteria C2) Effectiveness

Functioning of a development intervention: The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.

- What are the main results (mainly outputs and outcomes) of the project? What have been the quantifiable results of the project?
- To what extent did the project achieve their objectives (outputs and outcomes), against the original/revised target(s)?
- What are the reasons for the achievement/non-achievement of the project objectives?
- What is the quality of the results? How do the stakeholders perceive them? What is the feedback of the beneficiaries and the stakeholders on the project effectiveness?
- To what extent is the identified progress result of the project attributable to the intervention rather than to external factors?
- What can be done to make the project more effective?
- Were the right target groups reached?

Summary of findings

The Project achieved all but one of its output-level targets and all its SMART outcome-level targets. It greatly exceeded its direct impact-level targets for the implementation of EnMS and SO projects (GHG emission reductions, electricity savings and fuel savings) and met its SMART outcome-level targets, in that it yielded:

- Greenhouse gas (GHG) emission reductions: 988.6 ktCO2 / 5 years of project duration (target: 67.4 ktCO2 / 5 years of project duration)
- Electricity savings: 271.7 GWh/ 5 years of project duration (target: 37.5 GWh/ 5 years of project duration)
- Fuel savings: 4,096 TJ (or 1,137.8 GWh) / 5 years of project duration (target: 404 TJ (or 112.2 GWh) / 5 years of project duration)
- Factories completing energy management plans: 159 factories (target: 150 factories adopting energy management plans and completing operational improvement projects)
- Factories adopting full cycle of ISO 50001: 28 factories (target: 25 factories adopted and implemented ISO 50001)
- System optimization assessments conducted (Output): 49; resulting in implemented projects (Outcome): 67 (targets: 60 systems assessments conducted (Output); leading to 35 completed systems optimization projects (Outcome))
- Adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers
- Adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors

Rating

C2) Effectiveness	Satisfactory (S)

2.2 Progress to impact

2.2.1 Achievements on outcome and impact levels

The Project achieved five of its outcome-level targets and all three of its impact-level targets.

- Outcome: Adoption of ISO 50001 as SKKNI (national personnel competence standard) of energy managers
  (target: Adoption of ISO 50001 as SKKNI)
- Outcome: Adoption of ISO 50002 as SKKNI (national personnel competence standard) of energy auditors
  (target: Adoption of ISO 50002 as SKKNI)
- Outcome: 159 factories completed the EnMS plan
  (target: 150 factories adopted energy management plans and completed operational improvement projects)
- Outcome: 28 factories adopted full cycle of ISO 50001
  (target: 25 factories adopted and implemented ISO 50001)
- Outcome: 67 SO projects were implemented by the industries
  (target: 35 SO projects were implemented by the industries)
- Direct Impact: 988.6 ktCO2 / 5 years of GHG emission reductions
  (target: 67.4 ktCO2 / 5 years)
- Direct Impact: 271.7 GWh/ 5 years of electricity savings
  (target: 37.5 GWh/ 5 years)
- Direct Impact: 4,096 TJ (or 1,137.8 GWh) / 5 years of fuel savings
  (target: 404 TJ (or 112.2 GWh) / 5 years)

There were four additional outcome targets, each associated with one of the four components (see Table 2). The targets themselves did not fulfil all the criteria for good operational indicators targets (i.e. Specific, Measurable, Achievable, Realistic and Time-bound (SMART)) and achievement towards them was not measured or reported directly. However, the output-level achievements for the capacity building components (1,2 and 3), and the outcome- and impact-level achievements for the direct implementation component (4), suggest that the Project made progress to impact for these four outcome targets.

- Outcome, Component 1: Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness
- Outcome, Component 2: A cadre of energy efficiency professionals created both within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively for providing industrial system optimization (SO) services
- Outcome, Component 3: Increased availability of financial and institutional support for industrial energy efficiency initiatives

- Outcome, Component 4: Demonstrable energy saving in participating factories through system optimization and energy management standard and increase adoption of energy management standard by industry

Direct outcomes and impacts

The Project planned to achieve 67.4 ktCO2 of emission reductions, 37.5 MWh of electricity savings and 404 TJ (or 112.2 MWh) of fuel savings over the 5-year project period. The actual results were 988.6 ktCO2 of emission reductions, 271.7 MWh of electricity savings, 4,096 TJ (or 1,137.8 MWh) of fuel savings and 89.3 MWh of unspecified energy-type savings. These savings came from 19 EnMS and 35 SO implementation projects carried out in conjunction with the training of national experts. The Project's reported direct impact achievements greatly exceeded its targets – 26 times the GHG emission reduction target; 7 times the electricity saving target; 10 times the fuel saving target. There was no formal target for energy cost savings of the direct implementation projects, but the estimated achievement was USD 65.4 million during the Project duration (5 years).

In addition, there were several projects (considered to be "replication" projects) offered as commercial services by national experts, either individually or through the Indonesia Energy Foundation (Yayasan Energi Indonesia, YEI) – e.g. EnMS and Compressed Air SO (CASO) for Nike supply chain companies, EnMS and Pump SO (PSO) for Pupuk Kaltim Indonesia (a large fertilizer company) and CASO for Kwarsa Indah Murni (a glassware company). The Project's 54 implementation projects accounted for nearly 95% of the reported direct emission reductions and energy saving; the replication projects accounted for about 5% of the direct emissions and energy impacts.

The Project supported the establishment of the Indonesia Energy Foundation (Yayasan Energi Indonesia, YEI) to institutionalize the trained national experts' network. It helped YEI develop a detailed business plan, including the scope of the mandate, the websites, their services and budget and financing of their operation. The members of the YEI are the national experts, and YEI functions as an expert's pool, rather than a services provider competing against the member experts. The members finance the foundation through membership fees. YEI provides business-to-business services on energy management, system optimization and energy audits. It also acts as a legal institution for members' use in tender and procurement processes. YEI began marketing its services about one year before the Project's end. Its first project was a business-to-business scheme with a group of NIKE's suppliers. Another 2 new consulting companies have been set up by the trained national experts. In 2016 and 2017 at least USD 200,000 in contracts have been executed by the trained experts, and one contract was still on-going at the Project's end.

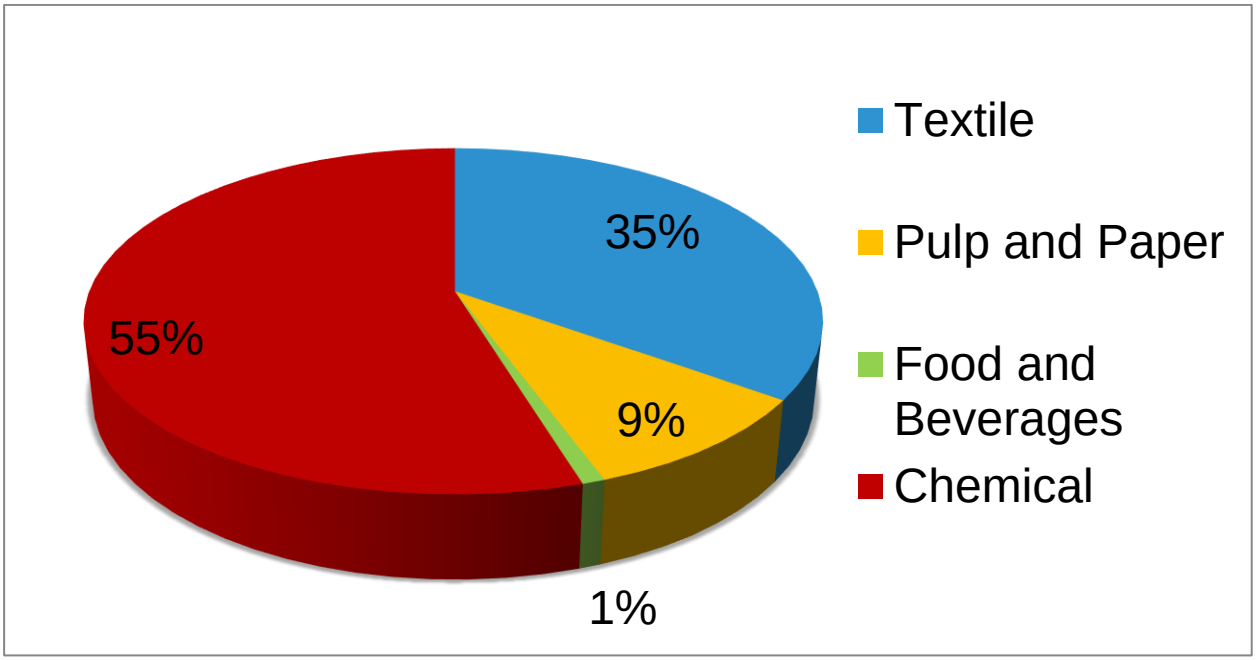
Taking the demonstration/pilot and replication projects together, just over half of the direct GHG emission reductions (53%) and the energy savings (52%) came from the SO projects. And the other half came from EnMS projects. Just over half of the GHG emission reductions came from projects implemented in the chemicals industry. The textiles sector accounted for 43% and 35% of the SO and EnMS emissions reductions respectively. The energy saved from the EnMS projects was mostly natural gas (49%), followed by electricity (39%). The profile from SO projects was considerably different, with 65% of the energy savings coming from natural gas, 32% from coal and only 3% from electricity.

Table 6: Number of demonstration projects, direct energy savings and GHG emission reductions

	Energy Management Systems (EnMS)	Steam System Optimisation (SSO)	Compressed Air System Optimisation (CASO)	Pumping System Optimisation (PSO)	Total
Demonstration/pilot projects					
Companies implementing project recommendations (number)	19	18	14	3	
Implemented GHG reductions (ktCO2/5year)	411.6	526.8			938.4
Implemented energy savings (GWh/5year)	635.7 (246.1 elec) (389.6 fuel)	773.8 (25.6 elec) (748.1 fuel)			1409.5 (271.7 elec) (1,137.8 fuel)
Implemented energy cost savings (USD million/5year)	34.4	26.2			60.6
Replication projects					
Companies implementing project recommendations (number)	14	1	8	2	
Implemented GHG reductions (ktCO2/5year)	50.3	10.2 (potential)			50.3
Implemented energy savings (GWh/5year)	89.3	19.5 (potential)			89.3
Implemented energy cost savings (USD million/5year)	4.8	1.2 (potential)			4.8
Total demonstration/pilot + replication projects					
Companies implementing project recommendations (number)	33	19	22	5	
Implemented GHG reductions (ktCO2/5year)	461.9	526.8 (actual) 10.2 (potential)			988.6
Implemented energy savings (GWh/5year)	725.0	773.8 (actual) 19.5 (potential)			1498.8
Implemented energy cost savings (USD million/5year)	39.3	26.2 (actual) 1.2 (potential)			65.4

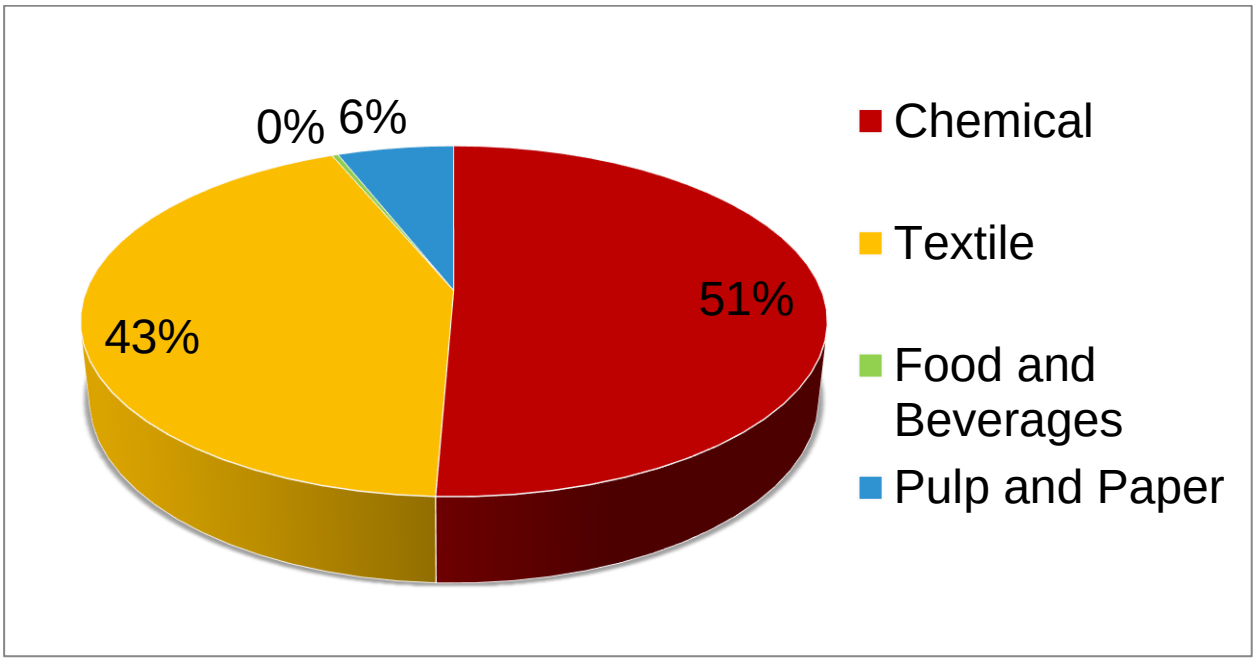
Source: IEE Indonesia (2018) and supporting spreadsheet.

Figure 5: CO2 emissions reduction of EnMS, by sector



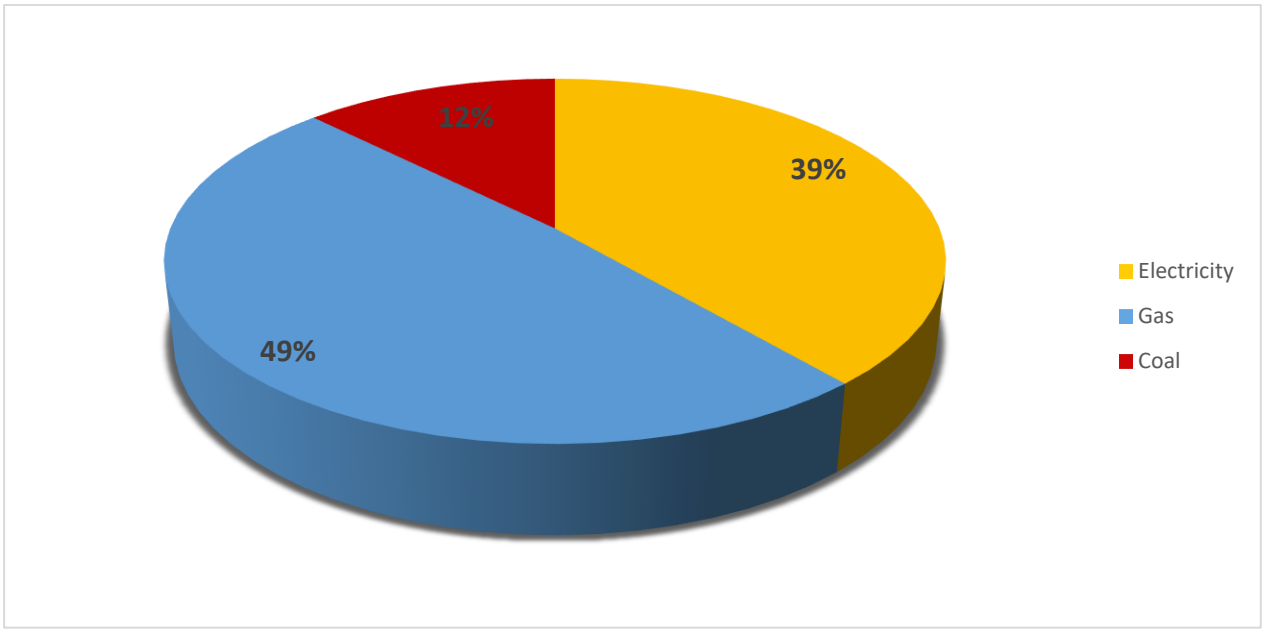
Source: IEE Indonesia (2016).

Figure 6: CO2 emissions reduction of SO, by sector



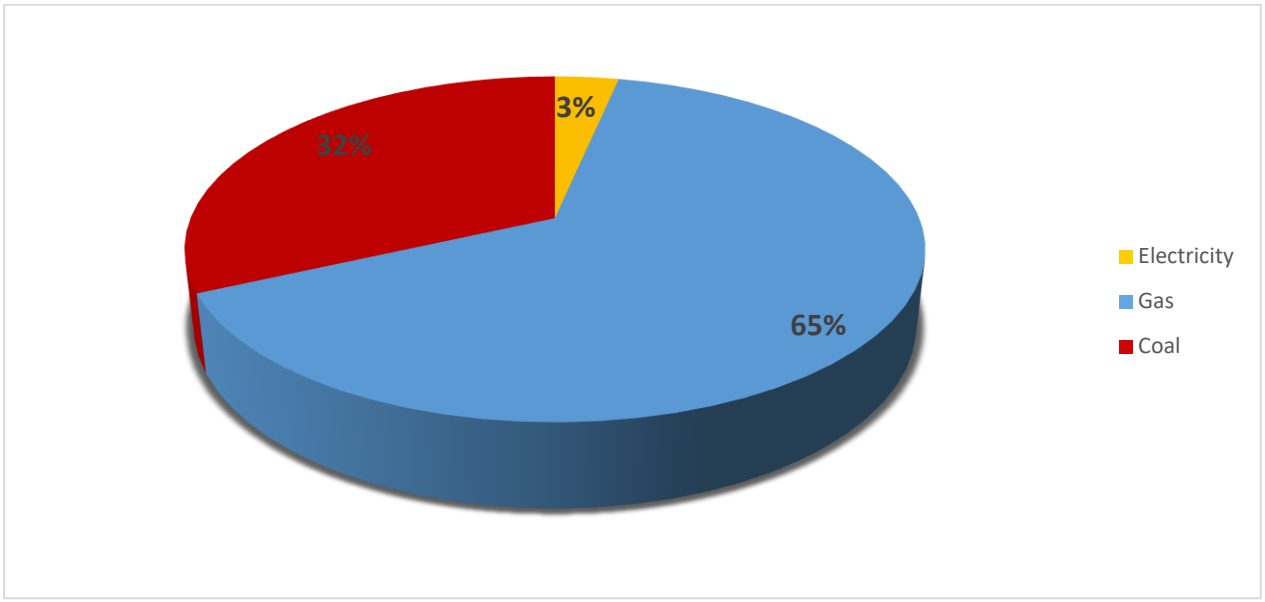
Source: IEE Indonesia (2016).

Figure 7: Energy savings from EnMS, by energy type



Source: IEE Indonesia (2018) and supporting spreadsheet.

Figure 8: Energy savings from SO, by energy type



Source: IEE Indonesia (2018) and supporting spreadsheet.

2.2.2 Behavioural change

The Project advanced **economic competitiveness** mainly through the reduction of energy use and costs. The desire to reduce costs was mentioned by interviewees and cited in the Project final report (IEE Indonesia, 2018) as the primary reason for industry's interest in implementing EnMS and SO projects. In some cases (e.g. the YEI replication work with NIKE supply chain companies), company reputation was also cited as a motivation for implementing EnMS and IEE projects.

The Project helped **safeguard the environment** through the reduction of energy use and the associated GHG emission reductions and the reduced environmental degradation (e.g. water use, air pollution, and land, vegetation and habitat disturbance) from the energy supply system. In addition, SO practices seek to improve general resource efficiency – leading to reductions in the use of materials, chemicals and water, as well as energy.

Though **gender mainstreaming** was not a part of the Project design at the outset, efforts were made to encourage female participation in the trainings and other project activities. According to project sex-disaggregated monitoring women comprised 7% to 20% of the participants in the various training sessions – 13% of the trained experts and 7% on the trained users (see Table 9).

2.2.3 Broader adoption

The Project seeks broader adoption and impact of IEE practices – primarily EnMS and SO implementation, and external IEE financing – after Project closure, through the pathways described in Table 7

Table 7: Pathways to broad adoption and impact

Pathway name	Pathway description
Mainstreaming	Information, lessons learned, or specific results of UNIDO are incorporated into broader stakeholder mandates and initiatives such as laws, policies, regulations, and programs. This may occur through governments and/or through development organizations and other sectors.
Replication	UNIDO-supported initiatives are reproduced or adopted at a comparable administrative or ecological scale, often in another geographical area or region.
Scaling-up	UNIDO-supported initiatives are implemented at larger geographical scale, often expanded to include new aspects or concerns that may be political, administrative or ecological in nature
Market change	UNIDO-supported initiatives help catalyse market transformation by influencing the supply of and/or demand for goods and services that contribute to global environmental, economic and social benefits. This may encompass technological changes, policy and regulatory reforms, and financial instruments.

Source: UNIDO (2018)

The **replication and scaling up pathways** could be followed through continued training of EnMS and SO users and IEE financing professionals by government and/or academic institutions. MEMR's Training Centre for Electricity (PUSDIKLAT ESDM) has the expertise and facilities to provide the EnMS and SO user-level training. In addition, the Project developed relationships with universities, which could offer EnMS and SO education and training. The Project used EnMS or SO national experts to teach user-level courses. However, it did not use them to teach expert-level courses, because it was thought that there was too little time between the two batches of training for the first batch of experts to gain enough experience in EnMS implementation and

confidence in teaching to be qualified trainers for the second batch. Also, using relatively inexperienced local trainers might have sent signals to the market that the two batches – one trained by international experts; one trained by national experts – were of different quality. It is conceivable that in the near future the national experts would have gained enough experience and confidence to train additional EnMS and SO experts. For EE financing, the Project trained 25 bank and financial institution personnel as trainers. With the proper incentives, these personnel could provide training to additional financial personnel throughout the country.

The Project's work on industrial EE policy mostly involved the adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers and the adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors. The adoption of ISO 50001 as SKKNI for energy managers significantly strengthens Ministry of Energy Regulation No. 14/2012 on Energy Management, in that it brings the regulation in line with international standards concerning what constitutes an energy manager. In addition, the Project maintained a close working relationship with MEMR / NREEC allowing to it informally advise on relevant policy matters. There are several existing policies and initiatives that are already broadening the Project's impact – and if made more stringent or enforced more strongly could broaden the impact further still – through the **mainstreaming pathway.**

- Ministry of Energy Regulation No. 14/2012 on Energy Management
  - Mandatory implementation of energy management system for large energy consumers, those using more than 6,000 tons of oil equivalent (toe) per year. Discussions about lowering the threshold are underway. Lowering the threshold to 4,000 toe would expand the number of companies subject to the regulation from about 250 to about 1,250.
  - Designate energy managers, develop an energy conservation program, perform periodic energy audits, implement energy audit recommendations, and report yearly on energy conservation implementation to the government.
- DG NREEC target to have 1,000 certified energy managers and 1,000 certified energy auditors by 2020.
- Ministry of Environment and Forestry's (MOEF) PROPER environmental performance rating program
  - Since 2018, energy manager certification compliant with ISO 50001 and energy audits are mandatory criteria for compliance with PROPER.

The Project's seeks to broaden its impact through the **market change pathway** via the training of the cadre of national EnMS and SO experts. The existing national experts act as champions and advisors for the implementation of EnMS and SO practices in industry. They will also play a key role in training the additional personnel that will be necessary for full implementation of EnMS and SO by Indonesian industry.

To fulfil these roles, the existing experts (and the additional ones that will be necessary for full implementation of these practices by Industry) need a strong market for their services. The market for EE services depends on energy prices and policy incentives (both of which are uncertain, but generally moving towards support of increased attention to EnMS and IEE), and also on the willingness of industry to pay for EE services. The Project's "replication" work demonstrated that there is a willingness among Indonesian industry to pay commercial rates for EE services.

The Project helped establish the SKKNI (national personnel competence standards) for energy managers (ISO 50001) and energy auditors (ISO 50002) to give the market confidence in the quality of the experts' skills.

2.2.4 Results on progress toward impact

Evaluation Criteria A) Impact (or progress toward impact)
Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.

- *Mainstreaming:* To what extent information, lessons or specific results of the project are incorporated into broader stakeholder mandates and initiatives such as laws, policies, regulations and project?
- *Replication:* To what extent the project's specific results (e.g. methodology, technology, lessons and etc) are reproduced or adopted
- *Scaling-up:* To what extent the project's initiatives and results are implemented at larger geographical scale?
- What difference has the project made to the beneficiaries?
- What is the change attributable to the project? To what extent?
- What are the social, economic, environmental and other effects, either short-, medium- or long-term, on a micro- or macro-level?
- What effects are intended or unintended, positive or negative?

The three UNIDO impact dimensions are:

- *Safeguarding environment:* To what extent the project contributes to changes in the status of
environment?
- *Economic performance:* To what extent the project contributes to changes in the economic performance (finances, income, costs saving, expenditure and etc) of individuals, groups and entities?
- *Social inclusiveness:* To what extent the project contributes to changes in capacity and capability of individuals, groups and entities in society, including vulnerable groups, and hence generating employment and access to education and training?

Summary of findings

Direct Impacts. The Project's achievements for GHG emission reductions (988.6 ktCO2/5 years), electricity saved (271.7 MWh/5 years) and fuel saved (4,096 TJ or 1,137.8 MWh/5 years) greatly exceeded the respective targets.
Capacity Building. The Project increased industrial top management's interest in having in-house EnMS and SO expertise. It then developed that expertise in industrial energy managers, EE service providers and equipment vendors. It also developed EE project financing expertise in bankers and industrial energy managers. However, the Project did not measure or estimate the GHG emission reduction and energy savings impacts of this increased interest and expertise.

Rating

Impact (or progress toward impact)	Satisfactory (S)

3. Project's quality and performance

This section assesses the quality and performance of the Project according to: project design, relevance, effectiveness, efficiency, sustainability of benefits and gender mainstreaming.

3.1 Design

3.1.1 Overall design

The Project's design was similar to those of UNIDO Industrial Energy Efficiency (IEE) projects in other countries, with the core work being: 1) raising general IEE awareness, 2) technical training on Energy Management Systems (EnMS) and Systems Optimization (SO) for users and experts, 3) improving financing capacity for IEE investments and 4) implementing EnMS and SO in select industrial facilities to demonstrate the concepts and to provide practical training for the experts.

3.1.2 Results on overall design

Evaluation Criteria B) project design **Formulation of the intervention, the plan to achieve a specific purpose: Assessment of the design in general.**	
- The problem, need or gap to be addressed by the project is clearly identified, with clear target beneficiaries? - The project design was adequate to address the problems at hand? - Is the project consistent with the Country's priorities, in the work plan of the lead national counterpart? Does it meet the needs of the target group? Is it consistent with UNIDO's Inclusive and Sustainable Industrial Development? Does it adequately reflect lessons learnt from past projects? Is it in line with the donor's priorities and policies? - Is the applied project approach sound and appropriate? Is the design technically feasible and based on best practices? Does UNIDO have in-house technical expertise and experience for this type of intervention? - To what extent the project design (in terms of funding, institutional arrangement, implementation arrangements…) as foreseen in the project document still valid and relevant? - Does it include M&E plan and adequate budget for M&E activities? - Risk management: Are critical risks related to financial, social-political, institutional, environmental and implementation aspects identified with specific risk ratings? Are their mitigation measures identified? Where possible, are the mitigation measures included in project activities/outputs and monitored under the M&E plan?	
Summary of findings	
The Project's overall design was very similar to that of UNIDO IEE projects in other countries. Overall, the Project was well designed. The establishment of the Indonesia Energy Foundation (YEI) was an important mid-project adaptation.	
Rating	
B) project design	Satisfactory (S)

3.1.3 Logframe

The Project logframe has a clear logic and is consistent with a realistic theory of change.

The Project logframe contains reasonably specific descriptions of the Project's ***intended outputs***[3] – with operational ***indicators*** and ***targets*** for setting ambition levels and later assessing effectiveness. Nearly all the output-level indicators and targets possess all the Specific, Measurable, Achievable, Realistic and Time-bound (SMART) criteria. For example, one target of Component 1 was "training 25 national experts on energy management in line with ISO 50001 [assumed by end of Project]". See Table 8.

The Project logframe is also clear about the ***intended direct impacts*** – stated in terms of GHG emission reductions, electricity and fuel savings – of the Project's component 4 work on direct implementation of EnMS and SO in partner facilities. The indicators and targets for these "Quantitative Outcomes" are all fully SMART. The logframe does not contain indicators/targets for the Project's ***intended indirect impacts***, but the project document mentions estimates of the indirect emission emissions, electricity and fuel savings of the Projects.

The presentation of the Project's ***intended outcomes*** is mixed. Some (i.e. those on numbers of implemented EnMS plans and EnMSs, and SO assessments and completed projects) are formulated in fully SMART terms. Others (i.e. those describing the goal of the components) are not SMART. Achievements for these outcomes were reported only in terms of the underlying output targets. Achievement towards the "Cumulative indirect emission reduction" targets were not reported.

The Project's reported direct impact achievements greatly exceeded its targets:

GHG emission reductions
- Achievement = 988.6 ktCO2 / 5 year
  (26 times the target = 67.4 ktCO2 / 5 year)

Electricity savings
- Achievement = 271.7 GWh/ 5 year
  (7 times the target = 37.5 GWh/ 5 year)

Fuel savings
- Achievement = 4,096 TJ (or 1,137.8 GWh) / 5 year
  (10 times the target = 404 TJ (or 112.2 GWh) / 5 year)

The wide margin of achievement was due to in large part to the GHG reductions and energy savings from the pilots in two large fertilizer companies, namely Pupuk Kalimantan Timur (PKT) and Pupuk Kujang Cikampek (PKC) that were added to the Project scope late in the cycle. Another reason for the greater-than-expected impacts was the commitment of the industries to put their capital investment on EE measures.

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[3] **Outputs** are the products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes. **Outcomes** are the likely or achieved short-term and medium-term effects of an intervention's outputs. **Impacts** are the positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended. **Indicators** are quantitative or qualitative factors or variables that provide simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor. **Targets** are the specified values that indicators should reach by a specific date in the future. See the Glossary for definitions of other evaluation-related terms.

Table 8: Profile of indicators and targets

	Output-level Indicators/Targets	Outcome-level Indicators/Targets	Impact-level Indicators/Targets
Capacity Building			**Indirect Impacts**
Component 1: Awareness and technical capacity on EnMS	• 9 indicators 8 [SMART] + 1 [SMART] indicator for an extra activity, not in project document logframe	• Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible EnMSs [SMART] (achievement reported only for underlying output targets) • Adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers [extra activity, not in project document logframe] [SMART] • Adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors [extra activity, not in project document logframe] [SMART]	• Indirect fuel savings are estimated to be on the order of 3,057,000 GJ • Indirect electricity savings are estimated to be on the order of 297,540 MWh • Indirect emission savings are estimated to be on the order of 522,960 tCO2 All three estimates are mentioned in the text of the project document, but not in the logframe All three are [SMART], and their achievements not reported
Component 2: Technical capacity on SO	• 4 indicators all [SMART]	• Cadre of professionals providing SO services [SMART] (achievement reported only for underlying output targets)	
Component 3: Financial capacity on IEE	• 6 indicators 5 [SMART] + 1 [SMART] indicator for an extra activity, not in project document logframe	• Increased financial and institutional support for IEE initiatives [SMART] (achievement reported only for underlying output targets)	
Direct Implementation			**Direct Impacts**
Component 4: Direct implementation of EnMS and SO	• 4 indicators all [SMART]	• Demonstrable energy saving through SO and EnMS, and increase adoption of EnMS, in participating factories [SMART] (achievement reported for underlying output/outcome/impact targets) • 150 factories adopted energy management plans and completed operational improvement projects [SMART] • 25 factories adopted and implemented ISO 50001 [SMART] • 60 systems assessments conducted (Output) of which 35 led to completed systems optimization projects (Outcome) [SMART]	• Electricity savings: 37,484 MWh during the Project duration (5 years) [SMART] • Fuel savings of 404,000 GJ (112,222 MWh eq) during the Project duration (5 years) [SMART] • Emissions reduction of 67,442 tCO2 during the Project duration (5 years) [SMART]

SMART = Specific, Measurable, Achievable, Realistic and Time-bound. A greyed-out letter indicates that the indicator/target lacks that criterion.

Source: IEE Indonesia (2018).

3.1.4 Results on logframe

Evaluation Criteria for B2) Logframe **Formulation of the intervention, the plan to achieve a specific purpose: Assessment of the logical framework aimed at planning the intervention.**	
- *Expected results:* Is the expected result-chain (impact, outcomes and outputs) clear and logical? Does impact describe a desired long-term change or benefit to a society or community (not as a means or process), do outcomes describe change in target group's behaviour/performance or system/institutional performance, do outputs describe deliverables that project will produce to achieve outcomes? Are the expected results realistic, measurable and not a reformulation or summary of lower level results? Do outputs plus assumptions lead to outcomes, do outcomes plus assumptions lead to impact? Can all outputs be delivered by the project, are outcomes outside UNIDO's control but within its influence? - *Indicators:* Do indicators describe and specify expected results (impact, outcomes and outputs) in terms of quantity, quality and time? Do indicators change at each level of results and independent from indicators at higher and lower levels? Do indicators not restate expected results and not cause them? Are indicators necessary and sufficient and do they provide enough triangulation (cross-checking)? Are they indicators sex-disaggregated, if applicable? Are the indicators SMART? - *Sources of verification:* Are the sources of verification/data able to verify status of indicators, are they cost-effective and reliable? Are the sources of verification/data able to verify status of output and outcome indicators before project completion? - *Assumptions:* Are key assumptions properly summarized and reflecting the proper level in the results chain in the logframe?	
Summary of findings	
The Project logframe has a clear logic and is consistent with a realistic theory of change. All output level indicators in the project document logframe were Specific, Measurable, Achievable, Relevant and Time-bound (SMART). There were too few outcome indicators – only some of which were fully SMART. The logframe could have benefited from additional SMART outcome indicators.	
Rating	
B2) Logframe	Moderately Satisfactory (MS)

3.2 Relevance

The Project addressed a need of the Indonesian government and the country's industrial companies.

In line with the Regulation No. 70/2009 directives for the application of the Energy Act No. 30/2007, the government established requirements for energy management systems and targets for energy managers in industry. In an ideal scenario, the Government should be able to provide the required expertise to enforce the regulation. However, this was not the case due to lack of funds and capacity, and why UNIDOs assistance was called upon.

- Ministry of Energy Regulation No. 14/2012 on Energy Management
  - Mandatory implementation of energy management system for large energy consumers, those using more than 6,000 tons of oil equivalent (toe) per year.
  - Designate energy managers, develop an energy conservation program, perform periodic energy audits, implement energy audit recommendations, and report yearly on energy conservation implementation to the government.
- DG NREEC target to have 1,000 certified energy managers and 1,000 certified energy auditors by 2020.
- Ministry of Environment and Forestry's (MOEF) PROPER environmental performance rating program
  - Since 2018, energy manager certification compliant with ISO 50001 and energy audits are mandatory criteria for compliance with PROPER.

Government support was demonstrated by the adoption of the Indonesia National Competency Standards (SKKNI) for energy managers and auditors, and by the OJK's active promotion of the of the EE financing training courses to the banking and financial sector.

The Project fit well with the UNIDO IEE Programme's approaches and goals for improving industrial energy efficiency (UNIDO IEE Unit flyer), in that it:

- combined policy and normative development support services with capacity-building for all relevant market players, demonstration and deployment of best-available technologies (more precisely, energy management systems and energy systems optimization techniques) with platforms for replication and scaling-up.
- aimed at removing key barriers to energy efficiency improvement in industries and ultimately transforming the market for industrial energy efficiency.

It encompassed two of the UNIDO IEE Programme's three thematic areas (UNIDO IEE Unit flyer):

- Policies and standards
  - Energy efficiency policies and instruments
  - Benchmarking
  - Energy efficiency standards and technical regulations
- Energy management and efficient operation
  - Energy management systems
  - Energy system optimization

The Project also fit with the strategic objectives and strategic programmes of GEF-4's Climate Change Focal Area: Strategic Program 2: Promoting Energy Efficiency in the Industrial Sector (GEF, 2007):

- GEF Strategic Objective and Program: To promote energy-efficient technologies and practices in industrial production and manufacturing processes
- GEF Expected Outcomes: Improved energy efficiency of industrial production

3.2.1 Results on relevance

Evaluation criteria for C1) Relevance **Functioning of a development intervention: The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor.**	
- How does the project fulfil the urgent target group needs? - To what extent is the project aligned with the development priorities of the country (national poverty reduction strategy, sector development strategy)? - How does project reflect donor policies and priorities? - Is the project a technically adequate solution to the development problem? Does it eliminate the cause of the problem? - To what extent does the project correspond to UNIDO's comparative advantages? - Are the original project objectives (expected results) still valid and pertinent to the target groups? If not, have they been revised? Are the revised objectives still valid in today's context?	
Summary of findings	
The Project was well aligned to government requirements and targets promoting EnMS and energy managers. The Project is fully relevant to UNIDO and policies and relevant to the GEF focal area of climate change.	
Rating	
C1) Relevance	Satisfactory (S)

3.3 Efficiency

The Project's expenditure USD 2,180,380 was in line with the total budget. Given that the Project achieved all but one of its output targets and all its SMART outcome and direct impact targets within budget and nearly within expected timeframes, the Project was satisfactorily efficient in its use of resources.

There was some inefficiency of effort in the first round of SSO training. The success rate of batch one was quite low compared to batch two. The batch one expert training allowed groups of expert candidates to conduct assessments, which led to free rider candidates, who had difficulty mastering the necessary knowledge and skills and ultimately failed the exam. In addition, the first batch allowed candidates who had no indicative potential pilot companies for their assessments to participate in the 3-day expert training. In the end the candidate experts failed to find pilot companies and could not completed the training process. Learning from the first batch experiences, the second batch decided to only allow candidates with potential pilot companies to participate in the experts training, and this resulted in more experts successfully completing the entire expert training course.

3.3.1 Results on efficiency

Evaluation Criteria C3) Efficiency **Functioning of a development intervention: A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.**	
- How economically are the project resources/inputs (concerning funding, expertise, time…) being used to produce results? - To what extent were expected results achieved within the original budget? If no, please explain why. - Are the results being achieved at an acceptable cost? Would alternative approaches accomplish the same results at less cost? - What measures have been taken during planning and implementation to ensure that resources are efficiently used? Were the project expenditures in line with budgets? - Could more have been achieved with the same input? - Could the same have been achieved with less input? - How timely was the project in producing outputs and outcomes? Comment on the delay or acceleration of the project's implementation period. - To what extent were the project's activities in line with the schedule of activities as defined by the project Team and annual Work Plans? - Have the inputs from the donor, UNIDO and government/counterpart been provided as planned, and were they adequate to meet the requirements?	
Summary of findings	
The Project carried its work within budget. The implementation period was extended three times, with the project duration being 2 years greater than planned.	
Rating	
C3) Efficiency	Satisfactory (S)

3.4 Sustainability of benefits

The Project basically achieved its short-term targets, but the outlook for its lasting benefits is less clear. The probability of long-term benefits is tied to the resilience of the Project's direct outcomes and their broader adoption pathways to financial, socio-political, institutional framework and governance, and environmental risks.

Resilience to financial risks – likely. No negative financial consequences of the Project's activities are foreseen.

Resilience to socio-political risks – likely. Though the continuation of some of the Project's work is unclear – e.g. the extent to which MEMR's Training Centre for Electricity (PUSDIKLAT ESDM) will be given the mandate and funds to continue EnMS and SO training and how much universities will incorporate EnMS topics into their curricula – there is an obvious IEE policy champion at the moment (the DG NREEC) and policy incentives appear to be getting stronger, albeit slowly. The current DG NREEC, Dr. Hariyanto, was trained as a national expert in EnMS and SSO.

There is risk that the pool of suitable candidates for becoming EnMS experts is too small for Indonesia's situation. *Strong energy background and sufficient knowledge in management system is a rare combination in Indonesian market.* (IEE Indonesia, 2018).

Resilience to institutional framework and governance risks – likely. Though there is frequent turnover of senior government officials – with the accompanying policy priority changes, institutional memory losses, and learning curve repetitions – DG NREEC is in an established institution that can act as a champion for IEE policies and initiatives. It is seeking to have 1,000 certified energy managers and 1,000 certified energy auditors in Indonesia by 2020, and is discussing possible revisions to the 6,000 toe/year threshold in the Ministry of Energy Regulation No. 14/2012 on Energy Management. Further, policies and initiatives being pursued by other parts of the government – on climate change, environmental performance, IEE financing – will strengthen the implementation of EnMS and SO in industry.

The Project's support of the adoption of ISO 50001/50002 as SKKNI (national personnel competence standard) for energy managers/auditors will strengthen the market's confidence in the skills of the EE professionals.

Resilience to environmental risks – likely. No negative environmental consequences of the Project's activities are foreseen.

3.4.1 Results on sustainability of benefits

Evaluation Criteria C4) Sustainability of benefits **Functioning of a development intervention: The continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.**	
- Will the project results and benefits be sustained after the end of donor funding? - Does the project have an exit strategy? C6: To what extent have the outputs and results been institutionalized? - *Financial risks:* What is the likelihood of financial and economic resources not being available once the project ends? - *Socio-political risks:* Are there social or political risks that may jeopardize the sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that project benefits continue to flow? Is there sufficient public/stakeholder awareness in support of the project's long-term objectives? - *Institutional framework and governance risks:* Do the legal framework, policies, and governance structures and processes within which the project operates pose risks that may jeopardize the sustainability of project benefits? Are requisite systems for accountability, transparency and required technical know-how in place? - *Environmental risks:* Are there environmental risks that may jeopardize the sustainability of project outcomes? Are there project outputs or higher level results that are likely to have adverse environmental impacts, which in turn might affect the sustainability of project benefits?	
Summary of findings	
The resilience of the Project's outcomes and the pathways to their broader adoption to financial, socio-political, institutional framework and governance, and environmental risks are all likely.	
Rating	
C4) Sustainability of benefits	Likely (L)

3.5 Gender mainstreaming

The Project design did not consider gender mainstreaming, neither did the monitoring framework include indicators to track gender, establish a baseline or a needs assessment. UNIDO's gender policy was issued in 2015 and has not been included as a part of Project activities retrospectively.

However, women comprised 7% to 20% of the participants in the various EnMS and SO training sessions – 13% of the trained experts and 7% on the trained users (see Table 9). In total, 7% of trainees were women.

Table 9: Gender profile of EnMS and SO training and qualification

Training and qualification type	Female (number)	Male (number)	Female (percentage)
National EnMS Experts Trained	11	45	20%
National EnMS Experts Qualified	6	32	16%
Total participants to EnMS USER training	49	632	7%
National ESO Experts Trained	8	77	9%
National ESO Experts Qualified	5	41	11%
Total participants to ESO USER training	24	406	6%

Source: IEE Indonesia (2016).

3.5.1 Results on gender mainstreaming

Evaluation criteria for D1) Gender mainstreaming	
- Did the project design adequately consider the gender dimensions in its interventions? Was the gender marker assigned correctly at entry? - Was a gender analysis included in a baseline study or needs assessment (if any)? Were there gender related project indicators? - Are women/gender-focused groups, associations or gender units in partner organizations consulted/ included in the project? - How gender-balanced was the composition of the project management team, the Steering Committee, experts and consultants and the beneficiaries? - Do the results affect women and men differently? If so, why and how? How are the results likely to affect gender relations (e.g., division of labour, decision-making authority)? - To what extent were socioeconomic benefits delivered by the project at the national and local levels, including consideration of gender dimensions?	
Summary of findings	
UNIDO's gender policy was issued after the Project began and was not included in the logframe retrospectively. Women comprised 7% of the participants in the EnMS and SO trainings.	
Rating	
D1) Gender mainstreaming	Moderately Satisfactory (MS)

4. Performance of partners

4.1 UNIDO

The UNIDO Project Manager provided excellent supervision and support to the PMU. It appears that the regional IEE National Project Coordinator (NPC) workshops were useful in learning best practices and innovative approaches and in sharing experiences from other IEE projects in South East Asia.

4.1.1 Results on performance of UNIDO

Evaluation criteria for E1) Performance of partners: UNIDO **Assessment of partners' roles and responsibilities engaged in the intervention: UNIDO.**	
- Mobilization of adequate technical expertise for project design - Inclusiveness of project design (with national counterparts) - Previous evaluative evidence shaping project design - Planning for M&E and ensuring sufficient M&E budget - Timely recruitment of project staff - Project modifications following changes in context or after the Mid-Term Review - Follow-up to address implementation bottlenecks - Role of UNIDO country presence (if applicable) supporting the project - Engagement in policy dialogue to ensure up-scaling of innovations - Coordination function - Exit strategy, planned together with the government - Review overall effectiveness of project management as outlined in the project document. Have changes been made and are they effective? Are responsibilities and reporting lines clear? Is decision-making transparent and undertaken in a timely manner? Recommend areas for improvement. - To what extent the project has a proper and operational governance system (e.g. PSC with clear roles and responsibilities)? - Review whether the national management and overall coordination mechanisms have been efficient and effective? Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfil its role and responsibilities (e.g. providing strategic support, monitoring and reviewing performance, allocating funds, providing technical support, following up agreed/corrective actions)? - The UNIDO HQ-based management, coordination, monitoring, quality control and technical inputs have been efficient, timely and effective (e.g. problems identified timely and accurately; quality support provided timely and effectively; right staffing levels, continuity, skill mix and frequency of field visits)?	
Summary of findings	
UNIDO provided excellent supervision and support to the Project.	
Rating	
E1) Performance of partners: UNIDO	Highly Satisfactory (HS)

4.2 National counterparts

Overall, the **National Counterparts** were well engaged in the supervision of the Project through the PSC. The Project tasks undertaken by each stakeholder are not well documented, but it appears that most of the Project work was carried out by the PMU. The PMU resided in the offices of the MEMR / DG NEEEC and there appears to have been a close working relationship with DG NEEEC staff.

The government co-financed the Project's work at a level of USD 964,660, which covered 31% of the Project's programme expenses (see Table 10). This co-financing amount was 44% of the amount estimated in the Project document. The expected co-finance, cited in the Project document, for implementation component investment coming from a private bank (83%) and the Government Investment Bank (PIP) (17%) did not materialize. The government portion, from PIP, was cancelled due organizational changes in the Ministry of Finance. The private banking part was not used either. This could be, because the EE financing training courses convinced companies that using their capital to fund the implementation projects was more cost-effective than using external financing. *On the other hand, it could also indicate that the industries are hesitating to get involved in the lengthy and complex process to take up a bank loan.* (IEE Indonesia, 2018).

Further government support was demonstrated by the adoption of the Indonesia National Competency Standards (SKKNI) for energy managers and auditors, and by the OJK's active promotion of the of the EE financing training courses to the banking and financial sector.

Table 10: Co-Financing from Stakeholders

Co-financer	Type	Estimated (USD)	Actual (USD)
Programmatic work			
Ministry of Energy and Mineral Resources (MEMR)	Cash & In kind	1,545,000	584,598
Ministry of Industry (MOI)	Cash & In kind	280,000	193,800
National Standardization Agency (BSN)	Cash & In kind	350,000	186,262
Total, programmatic work		2,175,000	964,660
Implementation investment			
BRI Bank (private sector)	Loan	10,000,000	0
Government Investment Bank (PIP)	Loan	2,000,000	0
Industry	Cash	0	4,880,522
BCA	Loan	0	3,043,435
Total, implementation investment		12,000,000	7,923,957

4.2.1 Results on performance of national counterparts

Evaluation criteria for E2) Performance of partners: National Counterparts **Assessment of partners' roles and responsibilities engaged in the intervention: National Counterparts**	
- Design: Responsiveness to UNIDO's invitation for engagement in designing the project - Implementation: Ownership of the project - Implementation: Counterpart funding - Implementation: Provide financial contribution as planned (cash or in-kind) - Implementation: Support to the project, based on actions and policies - Implementation: Internal government coordination - Implementation: Facilitation of the participation of Non-Governmental Organizations(NGOs), civil society and the private sector where appropriate - Implementation: Suitable procurement procedures for timely project implementation - Implementation: Engagement with UNIDO in policy dialogue to promote the up-scaling or replication of innovations - Implementation: Exit strategy, planned together with UNIDO, or arrangements for continued funding of certain activities	
Summary of findings	
National cooperating partners were well engaged in Project supervision via the PSC.	
Rating	
E2) Performance of partners: National Counterparts	Satisfactory (S)

4.3 Donor

The **Donor**, GEF, made disbursements as planned. Results on performance of donor

Evaluation criteria for E3) Performance of partners: Donor **Assessment of partners' roles and responsibilities engaged in the intervention: Donor**	
- Timely disbursement of project funds - Feedback to progress reports, including Mid-Term Review, if applicable - Support by the donor's country presence (if applicable) supporting the project for example through engagement in policy dialogue	
Summary of findings	
GEF disbursed funds as planned.	
Rating	
E3) Performance of partners: Donor	Satisfactory (S)

5. Factors facilitating or limiting the achievement of results

Frequent turnover of government officials – with the accompanying policy priority changes, institutional memory losses, and learning curve repetitions – slowed progress of the Project.
The MEMR Minister's recent regulation 14/2016 concerning ESCO's was annulled in 2017 due to legal uncertainty (MEMR, 2018). This decreased the options for IEE project financing.

5.1 Monitoring and evaluation

The Project's monitoring and evaluation (M&E) system adequately tracked all the SMART activity indicators contained in the logframe.

The Project conducted two follow-up surveys to gauge the outcomes and impacts of its work.

- A survey of EnMS user trainees to understand how their factories were progressing on implementing EnMSs. Finding that many facilities had not accomplished the energy review necessary to construct an EnMS plan, the Project designed and offered 2-day follow-up trainings on EnMS planning.
- An email and telephone survey, with some site visits, to check on the status (and GHG emission reduction and energy savings estimates) of demonstration/pilot plant SO project implementations.

5.1.1 Results on monitoring and evaluation

Evaluation criteria for D2) Monitoring & Evaluation

Refers to all the indicators, tools and processes used to measure if a development intervention has been implemented according to the plan (monitoring) and is having the desired result (evaluation).

M&E design

- Was the M&E plan included in the project document? Was it practical and sufficient at the point of project approval?
- Did it include baseline data and specify clear targets and appropriate indicators to track environmental, gender, and socio economic results?
- Did it include a proper M&E methodological approach; specify practical organization and logistics of the M&E activities including schedule and responsibilities for data collection;
- Does the M&E plan specify what, who and how frequent monitoring, review, evaluations and data collection will take place? Is the M&E plan consistent with the logframe (especially indicators and sources of verification)?
- Does it allocate adequate budget for M&E activities?

M&E implementation

- How was the information from M&E system used during the project implementation? Was a M&E system in place and did it facilitate timely tracking of progress toward project results by collecting information on selected indicators continually throughout

Evaluation criteria for D2) Monitoring & Evaluation **Refers to all the indicators, tools and processes used to measure if a development intervention has been implemented according to the plan (monitoring) and is having the desired result (evaluation).**	
the project implementation period? Did project team and manager make decisions and corrective actions based on analysis from M&E system and based on results achieved? - Are annual/progress project reports complete, accurate and timely? - Was the information provided by the M&E system used to improve performance and adapt to changing needs? Was information on project performance and results achievement being presented to the Project Steering Committee to make decisions and corrective actions? Do the project team and managers and PSC regularly ask for performance and results information? - Are monitoring and self-evaluation carried out effectively, based on indicators for outputs, outcomes and impact in the logframe? Do performance monitoring and reviews take place regularly? - Were resources for M&E sufficient? - How has the logframe been used for Monitoring and Evaluation purposes (developing M&E plan, setting M&E system, determining baseline and targets, annual implementation review by the Project Steering Committee…) to monitor progress towards expected outputs and outcomes? - How well have risks outlined the project document and in the logframe been monitored and managed? How often have risks been reviewed and updated? Has a risk management mechanism been put in place?	
Summary of findings	
The Project's M&E system adequately tracked all the SMART indicators in the logframe. All output-level indicators/targets were SMART; 5 of the 9 outcome-level indicators/targets were SMART; all impact-level indicators/ targets were SMART. Two follow-up surveys monitored progress on a SMART outcome-level indicator and several SMART impact-level indicators.	
Rating	
D2) Cross-cutting performance criteria: Monitoring & Evaluation - Design and implementation	Design: Satisfactory (S) Implementation: Satisfactory (S)

5.2 Results-based management

The PSC, with representation of all the national partners, was established to provide strategic guidance for the project, approval of progress reports, approval of major changes, ensuring sustainability, avoid duplication of activities, mobilize stakeholders and partners, and provide recommendations to the project in terms of specific priorities not foreseen in the original project document. The PSC met once a year (or six times) over the lifetime of the Project.

The project document (IEE Indonesia, 2011) focussed the Project on the textile and garment, pulp and paper, chemical, and food and beverage sectors. As the Project progressed, requests/demand for EnMS and SO training came from other sectors than the initial four and the PSC decided that it would be beneficial to also include other energy-intensive sectors given the capacity and funds available to achieve greater impact. And having first movers in other sectors was thought to increase the chances of replication within those sectors. All large energy-using plants (using more than 6,000 toe/year) – corresponding to those subjects to mandatory implementation of energy management systems under the Ministry of Energy Regulation No. 14/2012 on Energy Management – were added at the third PSC in 2014. The additional sectors primarily brought more training participants. Most, if not all, of the pilots were in the original 4 sectors.

At the request of the Indonesian government, the Project carried out four additional, but related tasks: on certification standards for energy managers and auditors, engaging universities in EnMS training and establishing EE Financing Guidelines.

The Project displayed at least two other examples of adaptive management. First, it supported the establishment of the YEI to institutionalize the trained national experts' network. YEI provides business-to-business services on energy management, system optimization and energy audits. YEI's first business-to-business project, with 7 NIKE vendors, involved five national experts with a contract value of over USD 100,000.

Second, the Project conducted a follow-up survey of EnMS user-level trainees to gauge progress towards its SMART outcome target of "150 factories adopted energy management plans and completed operational improvement projects". The results indicated that many of the EnMS users' facilities had not accomplished the energy review necessary to construct an EnMS plan. Based on this finding, the Project designed and offered 2-day follow-up trainings on EnMS planning implementation. The trained EnMS users could bring in their companies' real energy data and work with experts to construct an energy review, develop an energy plan and begin identifying energy conservation opportunities. Ultimately, 159 factories completed EnMS plans – 28 from demonstration/pilots; 41 from user-training without extra training; 90 from users who participated in the follow-up EnMS planning training sessions.

5.2.1 Results on results-based management

Evaluation Criteria for D3) Results-based Management

Assessment of issues related to results-based work planning, results-based M&E and reporting based on results.

Results-Based work planning

- Review any delays in project start-up and implementation, identify the causes and examine if they have been resolved.
- Are there any annual work plans? Are work-planning processes results-based? Has the logframe been used to determine the annual work plan (including key activities and milestone)?
- Examine the use of the project's results framework/ logframe as a management tool and review any changes made to it since project start.

Results-based monitoring and evaluation

- Verify whether an M&E system is in place and facilitated timely tracking of progress toward project objectives by collecting information on selected indicators continually throughout the project implementation period;
- Review the monitoring tool currently being used: Do they provide the necessary information? Do they involve key partners? Are they aligned or mainstreamed with national systems? Do they use existing information? Are they efficient? Are they cost-effective? Are additional tools required? How could they be made more participatory and inclusive?
- Do project team and manager make decisions and corrective actions based on analysis from M&E system and based on results achieved? Is information on project performance and results achievement being presented to the Project Steering Committee to make decisions and corrective actions? Do the project Team and managers and PSC regularly ask for performance and results information?

Results-based reporting

- Assess how adaptive management changes have been reported by the project management and shared with the PSC.
- Assess how well the project Team and partners undertake and fulfil donor and UNIDO reporting requirements (i.e. how have they addressed delays or poor performance, if applicable?)
- Assess how results and lessons derived from the adaptive management process have been documented, shared with key partners and internalized by partners.

Summary of findings

The Project was well managed, with good oversight by the Project Steering Committee (PSC) and carried out several adaptive initiatives not planned for in the project document.

Rating

D3) Results-based Management	Highly Satisfactory (HS)

5.3 Overarching assessment and rating table

5.3.1 Results on overall assessment

Evaluation Criteria F) Overall assessment	
- Overarching assessment of the project, drawing upon the analysis made under project performance and Progress to Impact criteria above but not an average of ratings	
Summary of findings	
Overall, the Project was relevant, effective, efficient, and well monitored and managed. It was relevant to Indonesia's industry and government – aligning with several Indonesian policies and initiatives that promote energy management and sustainable finance – as well as to UNIDO and GEF. Indonesia has adopted policies and initiatives that promote industrial energy managers and EnMS in recent years. These instruments were strengthened by the Project's work on establishing ISO 50001/50002 as national personnel competence standards (SKKNI) for energy managers/auditors. The Project also increased industry's technical capacity for implementing EnMS and SO through its training of energy managers and national experts. However, too few EE professionals, especially national experts, were trained given the potential needs of Indonesian industry. Additional national experts will need to be recruited and trained – in a market where few candidates have the necessary combination of education and skills to become national experts. The sustainability of the Project's benefits is assessed as likely.	
Rating	
F) Overall assessment	Satisfactory (S)

Table 11: Project evaluation criteria

#	Evaluation criteria	Justification of ratings	Rating in the Terminal Evaluation	Rating in the Mid-term Review
A	**Impact (or progress toward impact)**	**Direct Impacts**. The Project's achievements for GHG emission reductions (988.6 ktCO2/5 years), electricity saved (271.7 MWh/5 years) and fuel saved (4,096 TJ or 1,137.8 MWh/5 years) greatly exceeded the respective targets. **Capacity Building**. The Project increased industrial top management's interest in having in-house EnMS and SO expertise. It then developed that expertise in industrial energy managers, EE service providers and equipment vendors. It also developed EE project financing expertise in bankers and industrial energy managers. However, the Project did not measure or estimate the GHG emission reduction and energy savings impacts of this increased interest and expertise.	S	
B	**Project design**			
1	• **Overall design**	The Project's overall design was very similar to that of UNIDO IEE projects in other countries. Overall, the Project was well designed. The establishment of the Indonesia Energy Foundation (YEI) was an important mid-project adaptation.	S	HS
2	• **Logframe**	The Project logframe has a clear logic and is consistent with a realistic theory of change. The wide margin of overachievement of direct impact calls into question the project target-setting exercise. All output level indicators in the project document logframe were Specific, Measurable, Achievable, Relevant and Time-bound (SMART). There were too few outcome indicators – only some of which were fully SMART. The logframe could have benefited from additional SMART outcome indicators.	MS	

#	Evaluation criteria	Justification of ratings	Rating in the Terminal Evaluation	Rating in the Mid-term Review
C	**Project performance**			
1	• **Relevance**	The Project was well aligned to government requirements and targets promoting EnMS and energy managers. The Project is fully relevant to UNIDO and policies and relevant to the GEF focal area of climate change.	S	HS
2	• **Effectiveness**	The Project achieved all but one of its output-level targets and all its SMART outcome-level targets. It greatly exceeded its direct impact-level targets for the implementation of EnMS and SO projects (GHG emission reductions, electricity savings and fuel savings) and met its SMART outcome-level targets, in that it yielded: • Greenhouse gas (GHG) emission reductions: 988.6 ktCO2 / 5 years of project duration (target: 67.4 ktCO2 / 5 years of project duration) • Electricity savings: 271.7 GWh/ 5 years of project duration (target: 37.5 GWh/ 5 years of project duration) • Fuel savings: 4,096 TJ (or 1,137.8 GWh) / 5 years of project duration (target: 404 TJ (or 112.2 GWh) / 5 years of project duration) • Factories completing energy management plans: 159 factories (target: 150 factories adopting energy management plans and completing operational improvement projects) • Factories adopting full cycle of ISO 50001: 28 factories (target: 25 factories adopted and implemented ISO 50001) • System optimization assessments conducted (Output): 49; resulting in implemented projects (Outcome): 67 (targets: 60 systems assessments conducted (Output); leading to 35 completed systems optimization projects (Outcome))	S	S-HS

#	Evaluation criteria	Justification of ratings	Rating in the Terminal Evaluation	Rating in the Mid-term Review
		• Adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers • Adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors		
3	• **Efficiency**	The Project carried its work within budget. The implementation period was extended twice, with the project duration being 2 years greater than planned.	S	
4	• **Sustainability of benefits**	The resilience of the Project's outcomes and the pathways to their broader adoption to financial, socio-political, institutional framework and governance, and environmental risks are all likely.	L	L
D	**Cross-cutting performance criteria**			
1	• **Gender mainstreaming**	UNIDO's gender policy was issued after the Project began and was not included in the logframe retrospectively. Women comprised 7% of the participants in the EnMS and SO trainings.	MS	
2	• **M&E:** ○ **M&E design** ○ **M&E imple-mentation**	The Project's M&E system adequately tracked all the SMART indicators in the logframe. All output-level indicators/targets were SMART; 5 of the 9 outcome-level indicators/targets were SMART; all impact-level indicators/ targets were SMART. Two follow-up surveys monitored progress on a SMART outcome-level indicator and several SMART impact-level indicators.	S (design) S (imple-mentation)	S
3	• **Results-based Management (RBM)**	The Project was well managed, with good oversight by the Project Steering Committee (PSC) and carried out several adaptive initiatives not planned for in the project document.	HS	
E	**Performance of partners**			
1	• **UNIDO**	UNIDO provided excellent supervision and support to the Project.	HS	

#	Evaluation criteria	Justification of ratings	Rating in the Terminal Evaluation	Rating in the Mid-term Review
2	• **National counterparts**	National cooperating partners were well engaged in Project supervision via the PSC.	S	
3	• **Donor**	GEF disbursed funds as planned.	S	
F	**Overall assessment**	Overall, the Project was relevant, effective, efficient, and well monitored and managed. It was relevant to Indonesia's industry and government – aligning with several Indonesian policies and initiatives that promote energy management and sustainable finance – as well as to UNIDO and GEF. Indonesia has adopted policies and initiatives that promote industrial energy managers and EnMS in recent years. These instruments were strengthened by the Project's work on establishing ISO 50001/50002 as national personnel competence standards (SKKNI) for energy managers/auditors. The Project also increased industry's technical capacity for implementing EnMS and SO through its training of energy managers and national experts. However, too few EE professionals, especially national experts, were trained given the potential needs of Indonesian industry. Additional national experts will need to be recruited and trained – in a market where few candidates have the necessary combination of education and skills to become national experts. The sustainability of the Project's benefits is assessed as likely.	S	S-HS

Table 12: Project evaluation rating criteria

Score		Definition	Category
6	Highly satisfactory (HS)	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory (S)	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	
4	Moderately satisfactory (MS)	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory (MU)	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory (U)	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory (HU)	Level of achievement is negligible and there are severe shortcomings.	

Table 13: Project sustainability evaluation rating criteria

Score	Probability of continued long-term benefits is tied to the Project outcomes and their resilience to financial, socio-political, institutional framework and governance, and environmental risks.)
6	Highly likely (HL)
5	Likely (L)
4	Moderately likely (ML)
3	Moderately unlikely (MU)
2	Unlikely (U)
1	Highly unlikely (HU)

6. Conclusions, recommendations and lessons learned

6.1 Conclusions

Overall, the Project was well designed and well executed. It was relevant, effective, efficient, well monitored and managed. The sustainability of the Project's benefits is considered likely.

The Project's workplan, activities and outputs were relevant and realistic to Indonesia's needs.

The logframe contains SMART indicators and targets at the output level and at the outcome and impact levels for the direct implementation of EnMS and SO component. It lacks, however, SMART indicators and targets for three of the five outcomes of the capacity building components.

The Project was relevant to Indonesia's industry and government, as well as to UNIDO and GEF. It aligns with several Indonesian policies and initiative that promote energy managers and EnMSs. It fit well with the UNIDO IEE Programme's approaches and goals for improving industrial energy efficiency and GEF-4's Climate Change Focal Area strategic objectives and strategic programmes for Promoting Energy Efficiency in the Industrial Sector.

Government support was demonstrated by the adoption of the Indonesia National Competency Standards (SKKNI) for energy managers and auditors, and by the OJK's active promotion of the of the EE financing training courses to the banking and financial sector.

The Project met all but one of its output targets and all its SMART outcome targets – three output targets were not fully SMART and not directly assessed. It greatly exceeded its direct impact-level targets for the implementation of EnMS and SO projects (GHG emission reductions, electricity savings and fuel savings) and met its SMART outcome-level targets, in that it yielded:

- Greenhouse gas (GHG) emission reductions: 988.6 ktCO2 / 5 years of project duration (target: 67.4 ktCO2 / 5 years of project duration)
- Electricity savings: 271.7 GWh/ 5 years of project duration (target: 37.5 GWh/ 5 years of project duration)
- Fuel savings: 4,096 TJ (or 1,137.8 GWh) / 5 years of project duration (target: 404 TJ (or 112.2 GWh) / 5 years of project duration)
- Factories completing energy management plans: 159 factories (target: 150 factories adopting energy management plans and completing operational improvement projects)
- Factories adopting full cycle of ISO 50001: 28 factories (target: 25 factories adopted and implemented ISO 50001)
- System optimization assessments conducted (Output): 49; resulting in implemented projects (Outcome): 67 (targets: 60 systems assessments conducted (Output); leading to 35 completed systems optimization projects (Outcome)
- Adoption of ISO 50001 as SKKNI (national personnel competence standard) for energy managers
- Adoption of ISO 50002 as SKKNI (national personnel competence standard) for energy auditors

The progress to impact (at outcome or impact levels) of three of the five capacity building components was not measured or estimated in its own right. Achievements were reported only for the underlying output targets.

The Project carried its work within budget. The implementation period was extended three times, with the project duration being 2 years greater than planned.

The Project's monitoring and evaluation (M&E) system adequately tracked all the SMART indicators in the logframe. All output-level indicators/targets were SMART; 5 of the 9 outcome-level indicators/targets were SMART; all impact-level indicators/ targets were SMART. Two follow-up surveys monitored progress on a SMART outcome-level indicator and several SMART impact-level indicators.

The Project design did not consider gender mainstreaming. UNIDO's gender policy was issued in 2015 and has not been included as a part of Project activities retrospectively. Women comprised 7% of the participants in the EnMS and SO trainings.

The Project's capacity building activities created a good foundation for ongoing improvement in Indonesia's IEE, and the sustainability of the Project's benefits is considered likely.

The policy environment supporting EnMS and energy managers has been strengthening in recent years and was further strengthened by the Project's work of the adoption of ISO 50001/50002 as SKKNI (national personnel competence standards) for energy managers/auditors. The Project trained relatively few national experts, and despite the post-project knowledge management and sustainability strategy, it is not clear how additional experts will be recruited and trained. The extent to which MEMR's Training Centre for Electricity (PUSDIKLAT ESDM) will be given the mandate and funds to continue EnMS and SO training and how much the universities will incorporate EnMS topics into their curricula are not known.

Further, the Project highlighted that there are few candidates in the Indonesian market with the necessary combination education and skill to become national experts (IEE Indonesia, 2018):

- On EnMS national expert candidates: *The availability of good quality, interested national expert candidates is the main challenge in achieving this indicator. The interview selection process showed that out of 70 interested candidates, only a maximum of 25 candidates would qualify as potential experts. Strong energy background and sufficient knowledge in management system is a rare combination in Indonesian market.*
- On SO national expert candidates: *The recruitment process of expert candidates shows that currently there are very limited numbers of qualified energy consultants or experts available in Indonesia. Therefore, a massive effort is required to spearhead the education of young engineers in system optimization.*
- On availability and access to national experts: *The success of the market scale-up and availability of more experts will determine the sustainability of the project impact in the future. It will also determine the success of energy saving and CO2 reduction effort through energy management system and system optimization in Indonesia.*

The importance of external financing to industrial EE improvement depends on various factors, e.g. size of the EE project, financial capacity of the company. The Project observed that smaller, no-cost, low-cost EE projects – such as the early projects emanating from EnMSs and SO assessments. – can often be funded from internal company budgets. To prepare the market for instances where external financing of IEE projects may be important, the Project worked to

facilitate EE project financing through the establishment and adoption of EE investment guidelines and by training financial institution staff and industrial energy managers on EE financing. No information was reported on the extent to which the training led to increased financing of IEE projects. While very large high-cost projects can probably be rolled into major expansion/upgrade investments and funded through general corporate borrowing, project financing of IEE investments face three main obstacles: they are often too small to be of real interest to bank officers, they are difficult to collateralize and the environment for ESCOs in Indonesia is uncertain (with the recent annulment of the MEMR Minister's recent regulation 14/2016 concerning ESCO's). Until these issues are resolved, the banker's newly learned skills and insights into EE projects seem unlikely to result in much additional lending to EE projects.

6.2 Recommendations

6.2.1 Recommendations for Government of Indonesia

The evaluation team notes the many accomplishments of the Project, but it also sees room for additional work by the Indonesian government to build upon the Project's work.

- ***Project sustainability.*** Indonesia should establish a repository of the Project's peer-to-peer database, course materials and case studies, so that they are readily accessible to companies, institutions and trainers who might benefit from them. Indonesia Energy Conservation and Efficiency Society (MASKEEI), the Association of Energy Conservation Services Companies (APKENINDO) or the YEI might have roles in this repository service.

- ***Project sustainability.*** Indonesia should institutionalise large scale training and education – using the Project's training materials and methods on EnMS, SO and IEE project financing – of energy managers, energy auditors, EE equipment suppliers/vendors and EE consultants. It should also develop materials and courses on investment grade audits (IGA) and energy savings verification, as well as adopt SKKNI national personnel competence standards for professionals working in these fields.

  Indonesia is a large country with a large industrial sector. If industrial EE is to fulfil its great potential for emission reduction and energy savings, the country will need many more competent energy managers, energy auditors, EE equipment suppliers/vendors and EE consultants. The training courses developed by the Project will need to be offered on a much larger scale. There may be roles for MEMR's Training Centre for Electricity and for the YEI in delivering the necessary training. The government should also work with universities to get Project's EnMS, SO and finance materials integrated into engineering curricula. The training system should be designed with career (i.e. continuous improvement) pathways in mind. That is, there should be a structured pathway of learning and experience leading from initial EE training to working practice to EE expert services, so that trained people remain in the field.

  - *The government, together with the YEI, should create new expert training program to produce more national experts on EnMS and system optimization. The expert training could use the same modality as UNIDO EnMS and SO expert training. It is suggested that, rather than using international experts, the program should use trained national experts as mentors and facilitators.*

- *Expert trainings by YEI could be supported by MEMR or even potentially executed as purely private initiatives. Participants should cover the cost of training and the pilot company should pay for the services provided. YEI could work together with MASKEEI or APKENINDO or Engineer Association or industry associations in order to engage participants and pilot industries. An effective expert training should not be attended by more than 20 persons.*
- *Therefore, at least 2 batches of training are needed to have sufficient number of available and accessible national experts.*
- *The expert training could accommodate junior expert candidates, who are fresh graduates from engineering faculty. It can be a follow up action of the Goes to Campus activities by MEMR. The junior experts will provide the necessary support during consultation process for adopting ISO 50001, such as in data gathering and analysis.* (IEE Indonesia, 2018)

- ***Project sustainability.*** Indonesia should strengthen – through greater stringency and coverage and better compliance enforcement – its policies and initiatives that promote in EnMS in large energy-consuming industrial facilities. Indonesia has several important policies that promote in EE in large energy-consuming industrial facilities. The Project helped strengthen these policies through its work on the SKKNI national personnel competence standards for energy managers and auditors, and through advising MEMR's DG NREEC on policy matters. The government should continue to strengthen its existing IEE policies. First, it should follow through on the proposal to lower the threshold for the mandatory implementation of EnMS (under the Ministry of Energy Regulation No. 14/2012 on Energy Management) from 6,000 to 4,000 toe/year. This would increase the number of covered facilities from about 250 to about 1,250. Second, the government should better enforce compliance with the regulation.

  In addition, the government should explore ways to realistically adapt the EnMS concept to industrial SME's and to commercial and institutional buildings. Full compliance with ISO 50001 is costly and probably out of reach for most of these smaller energy-using facilities, but implementation of some aspects of EnMS could lead to important GHG emission reductions and energy savings in these sectors.

  The government should also, through its work on sustainable finance, improve the availability and terms of external financing for those companies lacking sufficient internal budgets for their IEE improvements. Though there are great potential GHG emission reductions and energy savings from implementing no/low cost IEE measures, the next levels of IEE projects will require significant funding. In some facilities, the necessary funding can come from internal resources. In others, external financial resources will be necessary. Currently, despite the Project's work on harmonized EE evaluation criteria and its finance training for bankers and energy managers, external financing of EE projects in Indonesia is currently blocked by collateral-based financing rules, typically small IEE project sizes and an uncertain environment for ESCOs.

- ***Project sustainability.*** The market for ISO 50001 certification is growing very slowly in Indonesia. To the extent that full ISO certification is a government priority, Indonesia should work with the certification bodies to strengthen their promotion of ISO 50001 certification by industrial companies.

6.2.2 Recommendations for UNIDO

- ***Theory of Change, logframe and M&E.*** UNIDO projects should:
  - Develop an explicit Theory of Change – including stakeholders; outputs; intended immediate, intermediate and higher-level outcomes; broader adoption pathways; and intended impacts – underlying the interventions.
  - Develop their logframes in a manner consistent with the Theory of Change.
  - Pay more attention to SMART outcome indicators (and the supporting M&E systems) in the logframe to better assess sustainability factors, broader adoption pathways and potential impacts, and to inform adaptive management.

  Constructing outcome-level indicators –SMART and consistent with an explicit Theory of Change – and monitoring them during the implementation timeframe would raise projects' attention to the sustainability of benefits. In particular, future projects should identify replication channels and monitor the strength of their outreach.

  Monitoring the outcome-level indicators would also support adaptive management. If poorer-than-expected outcomes are observed early enough, remedial actions and/or alternative future approaches can be taken. Better-than-expected outcomes could point to additional opportunities for advantageous actions.

  The Project conducted a follow-up survey of EnMS user-level trainees to gauge progress towards its SMART outcome target of "150 factories [having] adopted energy management plans and completed operational improvement projects". The survey results indicated that many of the trainees had not completed the energy reviews of their facilities necessary for developing EnMS plans. Based on this finding, the Project designed and offered follow-up training on EnMS planning implementation. Ultimately, 159 factories adopted EnMS plans – 28 demonstration/pilot plants; 41 user-trainee facilities without the follow-up course; 90 facilities whose trainees participated in the follow-up EnMS planning implementation sessions. The experience also led to an important learned lesson:

  > *The modified training modules in EnMS planning implementation showed more EnMS adoption result than the 2-days user training. The preparation of real energy data provided by the participated industries allowed them to get hands-on experience to complete energy planning. Subject to budget constraints, a 2-day training should be designed as an introduction training, followed up by the implementation training.* (IEE Indonesia, 2018)

- ***EnMS user-level training.*** UNIDO should consider delivering EnMS user-level training in two-parts:
  - the first session being an introduction to EnMS and the energy reviews (data collection/ analysis) needed for EnMS planning;
  - after a period of users' data collection/analysis and EnMS planning in their facilities, a second session on EnMS implementation.
- ***Broader adoption.*** Demonstration/pilot facilities should be selected, not only for their interest, commitment and potential GHG and energy impacts, but also for their ability and willingness to share their experiences publicly and through networks and to influence other companies in

their company group, sector or supply chain. Companies that have supply chain influence (e.g. NIKE), or that have influence within a larger corporate group (e.g. PT. Pupuk Kujang Cikampek), or that or are recognized national/regional/sectoral leaders, are better candidates for demonstration/pilot projects than companies that can do little to spread the EE concepts beyond their own factory.

The project has learned that supply chain approach can be a very effective and efficient approach to access a larger market for EnMS and system optimization. None of the 7 NIKE vendors participated in the project as pilot industries are 6000 TOE energy consumers. However, due to NIKE's policy, all 7 vendors were willing to implement ISO 50001. There are some other potential supply chain-based industries in Indonesia to be approached such as ASTRA International as the largest automotive group in the country. There are also Unilever, Nestle, Danone, Adidas and Panasonic. The supply chain approach potentially will provide larger market. (IEE Indonesia, 2018)

- ***Broader adoption.*** National experts should be recruited and trained as "on-the-ground" IEE champions and conduits for broad adoption of IEE practices and technologies in the post-project period. Their training should develop their technical skills, but also equip them to run sustainable advisory businesses, to teach others EnMS and SO skills, and to influence top industrial managers on IEE issues.

- ***Broader adoption.*** Efforts to mainstream the cadre of national experts – through encouragement, guidance and possibly other country-specific means – should start as early as is feasible given market conditions, while the Project's organizational capabilities are still in place. This not only nurtures the nascent market for commercial EE services, but provides a possible post-project institutional host for project materials, resources and on-going training. Starting early in establishing a network organisation gives time to learn important lessons for the local market.

  The Project's timely support for the establishment of the independent Indonesia Energy Foundation (YEI) network of national experts not only supported market for commercial EE services, but developed an institution that could provide post-project training services and serve as a repository for the Project materials and resources.

  Yayasan Energi Indonesia (YEI) was established in 2014 by trained national experts in EnMS and System Optimization. … The Project had supported the establishment of YEI to institutionalize the trained national experts network. … The YEI has 3 mandates as pool of experts, pool of knowledge and pool of services. … The [mid-term] reviewers recommended the Project to help YEI develop detailed business plans, including the scope of the mandate, the websites, their services and budget and financing of their operations. (IEE Indonesia, 2018)

  - ***Gender mainstreaming.*** UNIDO should increase its efforts to deploy female international experts into partner countries.

6.3 Lessons learned

- **Demonstration/pilot facilities selection.** Demonstration/pilot facilities have greater impact if they have the ability and willingness to share their experiences publicly and through networks and to influence other companies in their company group, sector or supply chain. (See Recommendations for Government of Indonesia section)
- **Efforts to mainstream the cadre of national experts** – as with the Project's establishment and support of the Indonesia Energy Foundation (YEI) network of national experts – should start early, while the Project's organizational capabilities are still in place. (See Recommendations for Government of Indonesia section)

- **Local language and local success stories** in briefings and trainings are important for widespread engagement of energy professionals and companies. National experts should be used as trainers and local success stories should be presented at briefings for top managers as early as possible in the project cycle.

  The important lesson learned from the trainings conducted in component 1 is language barrier. There are some limitations of English skills among some industry participants, which created hesitation in raising questions during the training. The project learned that availability of local experiences or success stories appeared to be more convincing rather than those from European or other countries. IEE Indonesia, 2018)

- **Strict control of the training conditions for national experts** helps maximize the success of this activity. Training of national experts represents a great investment, and conditions that jeopardise candidates' successful completion of the courses are costly. The Project found that lax rules concerning candidates' assessment work and lining up field work sites led to low success rates in the first batch of SO training. Tighter rules yielded better results in the second batch.

  The success rate of Batch 1 of steam system optimization was quite low compared to batch 2. The Batch 1 expert training allowed expert candidates to conduct assessment in a pilot company in tandem, which gave way to free rider candidates, therefore making it difficult to master the necessary knowledge and skill, and causing them to fail in the exam. The 1st batch of expert also allowed candidates without any indicative potential pilot company to participate in the 3-day expert training. In the end, the expert candidates failed to find a pilot industry and could not complete the training process. Learning from the 1st batch experience, the 2nd batch decided to only allow candidates with potential pilot company to participate in the expert training, which resulted in larger number of experts successfully completing the expert training. (IEE Indonesia, 2018)

- **External finance.** The real and perceived needs, and corporate predisposition, for external finance for IEE projects vary among enterprises in Indonesia. The Project observed that smaller, no-cost, low-cost EE projects – such as the early projects emanating from EnMSs and SO assessments. – can often be funded from internal company budgets, i.e. without external financing.

6.4 Good practices

- The Project's establishment and support of the Indonesia Energy Foundation (YEI) to mainstream the cadre of national experts not only nurtured the nascent market for commercial EE services, but developed an institution that could provide post-project training services and serve as a repository for the Project materials and resources.
- The Project's monitoring of several SMART outcome indicators/targets raised the attention to the sustainability of benefits, and informed important adaptive management.
- The Project helped establish the national personnel competence standards for energy managers (ISO 50001) and energy auditors (ISO 50002) to give the market confidence in the quality of the experts' skills.

Annexes

Annex I. Evaluation Terms of Reference

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE

Independent terminal evaluation of UNIDO project:

Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia

UNIDO Project ID: 103031

GEF ID: 3595

April 2018

Contents

I. Project background and context[4]

1. Project factsheet

Project title::	Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards
Project ID:	103031
GEF ID:	3595
Region:	EAP
Country:	Indonesia
Project donor(s):	GEF
Project approval date:	02-04-2011
Project implementation start date:	04-11-2011
Expected duration at project approval:	68 months
Expected implementation end date:	30-06-2018
Executing partners:	Ministry of Energy and Mineral Resources
Donor funding:	USD 2,180,380
Co-financing:	USD 14,175,000
Total project cost (USD)	USD 16,355,380
Mid-term review date:	April 2016
Planned terminal evaluation date	May - August 2018

(Source: Project document)

2. Project context

This independent terminal evaluation assesses the performance of the GEF-funded project *Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia*. Approved on April 2011, the project's implementation started in November 2011, and it is expected to be operationally completed in June 2018.

Rationale and origin of the projects:

The project builds upon the efforts made by the Indonesian Government to develop a comprehensive strategy on industrial energy efficiency, with the industrial sector being the largest energy-consuming sector within the country. With this regard, at the beginning of the new century Indonesia transitioned for the first time from a robust energy exporter to an importing nation concerned with growing domestic demand and rising costs of energy imports. At the same time, a general concern at the government level arose about the inefficiency of energy usage in the industry. Moreover, the increasing greenhouse gas emissions arising from fossil fuel combustion in industry and power generation and high fuel prices at the international markets constitute a threat to the environment and economy sustainability of the country. Among other measures to improve the competitiveness of the industry by reducing production cost and promoting sustainable and low-carbon development, the Government reacted through the adoption of ISO 50001 Energy Management System (EnMS) standard in 2012. UNIDO's intervention builds upon

[4] Data in this chapter is to be validated by the Consultant against the project document and any changes should be reflected in the evaluation report.

this background and aims to an improved systems optimization service to help identifying energy efficiency options.

3. Project objectives:

To address the key issues and to overcome the main barriers to the promotion of industrial energy efficiency, the project developed a complex intervention that can be divided into three categories, namely strengthening the policy, capacity development and demonstration of pilot projects.

The project outcomes and outputs are:

1. Introduction of Energy Management Systems and Capacity Building

The outcome from this component is to establish a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness. Outputs:

- Reinforced capacity of government institutions
- Training materials and tools developed
- National awareness campaign launched on ISO 50001
- Trained national experts & factory personnel on EM
- Peer-to-Peer network established between industrial enterprises

2. Capacity Building on System Optimization

The main outcome from this component is development of a cadre of energy efficiency professionals within industrial facilities as well as international experts and equipment suppliers to initiate a process to transform local markets effectively as to provide industrial systems optimization services. Outputs: · Training materials and tools developed

- Trained national experts/factory personnel on SO
- Equipment vendors & suppliers trained on SO

3. Financial capacity development to support energy efficiency projects in industry

The expected outcome from this component is the increased availability of financial and institutional support for industrial energy efficiency initiatives. Outputs:

- Project evaluation criteria developed and harmonized
- Training material developed and capacity of industrial enterprises built on bankable energy efficiency (EE) projects development
- Capacity of financial institutions and local banks built to promote and invest in industrial energy efficiency projects

4. Implementation of energy management and system optimization projects

The expected outcome from this component is the increased adoption of energy management standards and systems optimization energy efficiency projects by industries for higher energy savings on continuous basis. Outputs:

- EnMS implemented
- Documented industry demonstration projects
- Recognition program developed and implemented

4. Project implementation arrangements

The Ministry of Energy and Mineral Resources (MEMR) is responsible for the overall project's coordination. The MEMR will designate one of its high-level officers to the project Management Unit (PMU) as National Project Director (NPD) to guide the PMU in the implementation of the project. The

PMU will be fully responsible for day to day activities of the project and will report to the UNIDO Project Manager. UNIDO will recruit the international teams responsible for delivering the tools, material and trainings.

UNIDO and the MEMR in collaboration with the BSN and the MOI will assume responsibility for the following:

- Identification/approval of host factories to participate in the project and facilitate training sites
- Identification of trainees
- Recognition program
- National campaign to promote ISO energy management standards
- Delivery of the case studies, documenting the energy savings, and reductions in GHG emissions directly attributable to the project.

5. Budget information:

Table 1. Financing plan summary - Outcome breakdown[5]

Project outcomes/components	**Donor (USD)**	**Co-Financing (USD)**	**Total (USD)**
1 - Introduction of Energy Management Systems and Capacity Building	600,000	800,000	1,400,000
2 - Capacity Building on System Optimization	607,380	365,000	972,380
3 - Financial capacity development to support energy efficiency projects in industry	275,000	163,000	438,000
4 - Implementation of energy management and system optimization projects	400,000	12,325,000	12,725,000
Project management	218,000	502,000	720,000
Monitoring and evaluation	80,000	20,000	100,000
Total	**2,180,380**	**14,175,000**	**16,355,380**

Table 2. Co-Financing source breakdown

Name of Co-financier (source)	**Classification**	**Type**	**Total Amount (USD)**
Government contribution	National Government	**Cash & In-kind**	**2,175,000**
		Cash	*1,113,000*
		In-kind	*1,062,000*
Ministry of Energy and Mineral Resources		*Cash & In-kind*	*1,545,000*
Ministry of Industry		*Cash & In-kind*	*280,000*
Badan Standardisasi Nasional		*Cash & In-kind*	*350,000*
	Private sector		
BRI Bank	National	Loan	10,000,000
Government Investment Bank	Government	Loan	2,000,000
Mandiri bank*	National Government	Loan	
Total co-financing			***14,175,000***

Source : Project document

*The Mandiri Bank has issued co-financing commitment at the rate of USD10,000 - USD500,000 per enterprise. The co-financing for investment on energy efficiency projects has been secured more than expected requirements.

[5] Source: Project document.

Table 3. UNIDO budget execution (starting from 2012)

Item	2012	2013	2014	2015	2016	2017	Total Expenditure (USD)
Contractual Services			19,661.36	46,207.42	21,263.31	1,536.93	88,669.02
Equipment	190,554	2,211.87	3,329.66	10,359.62	12,882.61	15,068	234,405.76
International Meetings				3,611.56	19,309.43	23,907.32	46,828.31
Local travel	19,999	20,786.3	32,418.19	25,298.59	13,084	12,057.76	123,643.84
Nat..Consult./Staff	61,726	82,412.43	96,735.09	80,306.31	71,724.29	66,475.99	459,380.85
Other Direct Costs	18,401	5,766.48	2,536.65	5,281.61	19,196.65	17,311	68,493.39
Staff & Intern Consultants	142,532	264,897.4	304,462.14	183,530.63	31,224	5,953.86	932,600.03
Staff Travel	6,175	7,825.15	11,496.00	6,028.49	7,543.78	6,831.01	45,900
Train/Fellowship/Study	51,488	60,786.5	34,268.16	-29,452	565.79	-169.88	117,487.46
Grand Total	**490,875**	**444,683.1**	**504,905**	**331,172.23**	**196,793.86**	**148,971.99**	**2,117,408.66**

Source: UNIDO database, December 2017

II. Evaluation purpose and scope

The purpose of the evaluation is to independently assess the two projects to help UNIDO improve performance and results of future programmes and projects.

The evaluation has two specific objectives:

(i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact;
(ii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

The independent terminal evaluation (TE) will cover the whole duration of the projects from their starting date in 4/11/2011 to the estimated completion date in 12/31/2017.

III. Evaluation approach and methodology

The TE will be conducted in accordance with the UNIDO Evaluation Policy[6] and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[7].

The evaluation will be carried out as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the project will be informed and consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Independent Evaluation Division (ODG/EIO/IED) on the conduct of the evaluation and methodological issues. The evaluation will use a theory of change approach and mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning.

The theory of change will identify causal and transformational pathways from the project outputs to outcomes and longer-term impacts, and drivers as well as barriers to achieve them. The learning from this analysis will be useful to feed into the design of the future projects so that the management team can effectively manage them based on results.

1. Data collection methods

Following are the main instruments for data collection:

(a) **Desk and literature review** of documents related to the project, including but not limited to:
  - The original project document, monitoring reports (such as progress and financial reports, mid-term review report, output reports, back-to-office mission report(s), end-of-contract report(s) and relevant correspondence.
  - Notes from the meetings of committees involved in the project.

(b) **Stakeholder consultations** will be conducted through structured and semi-structured interviews and focus group discussion. Key stakeholders to be interviewed include: UNIDO Management and staff involved in the project; and Representatives of donors and counterparts.

(c) **Field visit** to project sites in Indonesia and project management in Vienna, UNIDO HQ.

(d) **Company-level survey**.

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

[7] UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

2. Evaluation key questions and criteria

The key evaluation questions are the following:

(a) What are the key drivers and barriers to achieve the long term objectives? To what extent has the project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long term objectives?

(b) How well has the project performed? Has the project done the right things? Has the project done things right, with good value for money?

(c) What have been the project's key results (outputs, outcome and impact, if possible)? To what extent have the expected results been achieved or are likely to be achieved against the project design? To what extent the achieved results will sustain after the completion of the project?

(d) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the project?

The evaluation will assess the likelihood of sustainability of the project results after the project completion. The assessment will identify key risks (e.g. in terms of financial, socio-political, institutional and environmental risks) and explain how these risks may affect the continuation of results after the project ends. Table 1 below provides the key evaluation criteria to be assessed by the evaluation. The details questions to assess each evaluation criterion are in annex 2.

Table 1. Project evaluation criteria

#	Evaluation criteria	Mandatory rating
A	**Impact (or progress toward impact)**	**Yes**
B	**Project design**	**Yes**
1	Overall design	Yes
2	Logframe	Yes
C	**Project performance**	**Yes**
1	Relevance	Yes
2	Effectiveness	Yes
3	Efficiency	Yes
4	Sustainability of benefits	Yes
D	**Cross-cutting performance criteria**	
1	Gender mainstreaming	Yes
2	M&E: ✓ M&E design ✓ M&E implementation	Yes
3	Results-based Management (RBM)	Yes
E	**Performance of partners**	
1	UNIDO	Yes
2	National counterparts	Yes
3	Donor	Yes
F	**Overall assessment**	Yes

3. Rating system

In line with the practice adopted by many development agencies, the UNIDO Independent Evaluation Division uses a six-point rating system, where 6 is the highest score (highly satisfactory) and 1 is the lowest (highly unsatisfactory) as per Table 2.

Table 2. Project rating criteria

Score		Definition	Category
6	Highly satisfactory	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	
4	Moderately satisfactory	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory	Level of achievement is negligible and there are severe shortcomings.	

IV. Evaluation process

The evaluation will be implemented in five phases which are not strictly sequential, but in many cases iterative, conducted in parallel and partly overlapping:

i. Inception phase: The evaluation team leader will prepare the inception report providing details on the methodology for the evaluation and include an evaluation matrix with specific issues for the evaluation; the specific site visits will be determined during the inception phase.
ii. Desk review and data analysis;
iii. Interviews, survey and literature review;
iv. iv. Field visits;
v. Data analysis and report writing.

V. Time schedule and deliverables

The evaluation is scheduled to take place from May to August 2018. The evaluation field mission to Indonesia is tentatively planned for June 2018. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project.

After the evaluation field mission, the evaluation team leader will visit UNIDO HQ for debriefing and presentation of the preliminary findings of the terminal evaluation. The draft TE report will be submitted to UNIDO 3 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO IEV, UNIDO Project Manager, the GEF and other stakeholders for comments and verification of factual and interpretation errors. The TE leader is expected to revise the draft TE report based on the comments received, edit the language and form and submit the final version in accordance with UNIDO ODG/EIO/IED standards.

Table 3. Tentative schedule

Timelines	Tasks
May 2018	Desk review and preparation of inception report
May 2018	Briefing with UNIDO Project Manager and experts based in Vienna – through Skype
June 2018	Field visits
End of June 2018	Debriefing in Vienna Preparation of first draft evaluation report
July 2018	Preparation of first draft evaluation report Internal peer review of the report by the UNIDO ODG/EIO/IED and other stakeholder's comments to draft evaluation report
August 2018	Final evaluation report

VI. Evaluation team composition

The project will be evaluated together with a package of a total of four Industrial Energy Efficiency projects covering Thailand, Indonesia, Iran and Egypt and will be part of the ongoing Impact Evaluation of UNIDOs Industrial Energy Efficiency related programmes. The team will be led by a senior evaluation expert with at least 15 years of relevant experience. The field missions will be conducted by evaluation team members selected by the team leader. The team members are expected to possess a minimum of 7 years of relevant strong experience and expertise on evaluation and industrial energy efficiency, and have relevant qualifications in economics, engineering, development or related disciplines. The team will be supported by a national evaluation consultant, who will be separately contracted by UNIDO in each country.

According to UNIDO Evaluation Policy, members of the evaluation team must not have been directly involved in the design and/or implementation of the project under evaluation.

An evaluation manager from UNIDO ODG/EIO/IED will provide technical backstopping to the evaluation team and ensure the quality of the evaluation. The UNIDO Project Manager and national project teams will act as resourced persons and provide support to the evaluation team and the evaluation manager. The UNIDO Project Manager and the project team will provide logistical and administrative support the evaluation team to prepare for the field visits. The project team will provide a proposed list of stakeholders (e.g. government officials, private sector representatives and other relevant individuals) to the evaluation team who will make the final decision on who to consult. The project team will arrange the meetings and prepare field visit schedule for the evaluation team, following their request, prior to the field visit.

The evaluation team will maintain close liaison with the representatives of UNIDO, other UN agencies as well as with the concerned national agencies, and with national and international project staff. The evaluation team is free to discuss with the authorities concerned anything relevant to its assignment. However, it is not authorized to make any commitments on behalf of the Government, the donor or UNIDO.

VII. Reporting

Inception report

This Terms of Reference (ToR) provides some information on the evaluation methodology, but this should not be regarded as exhaustive. After reviewing the project documentation and initial interviews with the project manager, the Team Leader will prepare, in collaboration with the team member, a short inception report that will operationalize the ToR relating to the evaluation questions and provide information on what type of and how the evidence will be collected

(methodology). It will be discussed with and approved by the responsible UNIDO Evaluation Manager.

The Inception Report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework ("evaluation matrix"); division of work between the team leader and team members; mission plan, including places to be visited, people to be interviewed and possible surveys to be conducted and a debriefing and reporting timetable[8].

Evaluation report format and review procedures

The draft report will be delivered to ODG/EIO/IED (the suggested report outline is in Annex 4) and circulated to UNIDO staff and national stakeholders associated with the project for factual validation and comments. Any comments or responses, or feedback on any errors of fact to the draft report provided by the stakeholders will be sent to UNIDO ODG/EVA for collation and onward transmission to the project evaluation team who will be advised of any necessary revisions. On the basis of this feedback, and taking into consideration the comments received, the evaluation team will prepare the final version of the terminal evaluation report. The evaluation team will present its preliminary findings to the local stakeholders at the end of the field visit and take into account their feed-back in preparing the evaluation report. A presentation of preliminary findings will take place at UNIDO HQ after the field mission.

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

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

VIII. Quality assurance

All UNIDO evaluations are subject to quality assessments by UNIDO ODG/EIO/IED. Quality assurance and control is exercised in different ways throughout the evaluation process (briefing of consultants on methodology and process of UNIDO ODG/EIO/IED, providing inputs regarding findings, lessons learned and recommendations from other UNIDO evaluations, review of inception report and evaluation report by UNIDO ODG/EIO/IED).

The quality of the evaluation report will be assessed and rated against the criteria set forth in the Checklist on evaluation report quality, attached as Annex 4. The applied evaluation quality assessment criteria are used as a tool to provide structured feedback. UNIDO ODG/EIO/IED should ensure that the evaluation report is useful for UNIDO in terms of organizational learning (recommendations and lessons learned) and is compliant with UNIDO's evaluation policy and these terms of reference. The draft and final evaluation report are reviewed by UNIDO ODG/EIO/IED, which will submit the report to the donor and circulate it within UNIDO together with a management response sheet.

[8] The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by the UNIDO ODG/EIO/IED.

Annex 1: Project Results Framework

The detailed Monitoring and Evaluation Plan, and Risk Assessment Plan, which were both developed and implemented for this project will be shared with the evaluation expert once recruited.

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Project Objective Promote industrial energy efficiency through systems optimization and ISO energy management standards	• Measurable reductions in electricity and fuel consumption by industry • Calculated GHG emissions reductions	No direct and indirect electricity and fuel consumption reductions Baseline values to be determined through data collection and discussions with industry	Electricity, fuel and GHG emissions savings of 37,484 MWh, 404,000 GJ and 67,442 tCO2 respectively (to be determined following technical assessments completed over participating industrial enterprises)	Terminal reports Peer-to-peer network End-of-project survey	Continuous support of concerned government authorities Active support driven by industry
Component 1: Introduction of energy management systems and capacity building					
Outcome 1: Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness					
Output 1.1: Reinforced capacity of government institutions on energy management	Number of government staff in the PMU Number of workshops/meetings Replication and scaling up plan developed	There is no energy management unit in place No long term energy management in the industrial sector plan exits	PMU created and operational with staff from the government Key government institutions participating in workshops/meetings Replication and scaling up plan handed to the government	• Staff allocation notes • List of participants • UNIDO experts reports	Continuous government support and participation
Output 1.2: Training material and tools developed	Training material on energy management provided to industrial enterprises.	Continued use of generic training material on energy management in industrial facilities.	Availability of translated, comprehensive training material and tools specifically supporting the development and implementation of energy management compatible with ISO 50001.	• UNIDO experts' reports • Project progress reports	Continuous government and industry sector support and participation

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 1.3: National awareness campaign launched on ISO 50001	National campaign provided information to industry to adopt ISO 50001	No national awareness campaign initiatives launched on ISO 50001 in the past.	Promotional literature distributed to industries in Indonesia promoting the adoption of ISO 50001.	• Awareness campaign report • Progress and annual reports	Sustained government support and participation
Output 1.4: Trained national experts/factory personnel on energy management	• Number of trained national experts • Number of trained factory personnel	Current/proposed training programs limited to generic aspects of energy management without comprehensive guidelines and not specifically addressing content of ISO 50001	Training on energy management in line with ISO 50001 of • 25 national experts • 300 factory managers (out of which 200 will be trained in energy management system implementation)	Reports of UNIDO's international experts and list of attendees	Sufficient commitment to energy management on the part of national experts and factory personnel
Output 1.5: Peer-to-Peer network established between industrial enterprises	Network established and used to support program recognition and present savings result from energy management	Government database only, no formal peer-to-peer discussion platforms on energy management exist.	All participating enterprises share their implementation plan on energy management on the network and learn from others' experience and results	Annual report on web-based participating facility results	Willingness to upload their experience with energy management (EE measures and projects undertaken)
Component 2: Capacity building on systems optimization					
Outcome 2: A cadre of energy efficiency professionals created within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively as to provide industrial systems optimization services					
Output 2.1: Training material and tools developed	Training material on systems optimization provided to industrial enterprises.	Continued use of generic IEE training material focusing on energy audits and specific sectors, but generic technology replacement opportunities.	Availability of translated, comprehensive training material and tools on systems optimization	• UNIDO experts' reports • Project progress and annual reports	Continuous government support and participation

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 2.2: Trained national experts/factory personnel on systems optimization	• Number of trained national experts • Number of trained factory personnel	Current/proposed training programs (both national and donor-supported) do not address systems optimization.	Training in systems optimization of: • 45 national experts • 300 factory managers (out of which 200 will be trained in the use of the UNIDO tools)	• Reports of UNIDO's international experts • List of training sessions attendees	Sufficient commitment to systems optimization on the part of national experts and factory personnel
Output 2.3: Trained Indonesian-based equipment suppliers on systems optimization	Number of trained Indonesian-based equipment vendors/suppliers	Continued exclusive focus by vendors on the sale of individual equipment items. Least purchase price continues to be the main driver for purchasers of steam boilers, pumps, and air compressors.	Training of 50 Indonesian-based suppliers of energy-efficient products in systems optimization	• Reports of UNIDO's international experts • List of training session attendees	Sufficient commitment to systems optimization on the part of equipment suppliers
Component 3: Financial capacity development to support energy efficiency projects in industry					
Outcome3: Increased availability of financial and institutional support for industrial energy efficiency initiatives					
Output 3.1: Project evaluation criteria developed and harmonized	Evaluation criteria are harmonized within financial institutions to help them select best EE projects.	Financial institutions continue to appraise EE projects without standards and recognized criteria using current bank projects evaluation criteria.	Criteria for evaluating EE projects are developed and harmonized by main financial institutions in Indonesia	• Project progress reports • UNIDO experts' reports	Sufficient commitment from financial institutions to change the way they currently evaluate EE projects

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 3.2: Training material developed and capacity of industrial enterprises built on bankable energy efficiency projects development	Training material relating to financing of energy efficiency project development are provided to industries. Number of trained facility managers/personnel in industrial energy efficiency project development.	No specific material existed to help industrial managers prepare financially sound proposals to mobilize the necessary funds from financiers and banks management. Continued use of generic methods, which do not properly consider the financial impact and opportunities of EE in facilities.	Availability of translated, comprehensive material and guidelines specifically supporting the development of financial proposal for EE projects Industrial facility managers/personnel have the capacity to analyse systems optimization and energy management projects and use energy and O&M costs reduction projects	• Project progress reports • UNIDO experts' reports • List of attendees	Sufficient commitment from facility managers to take action on project financial development
Output 3.3: Capacity of financial institutions and local banks built to promote and invest in industrial energy efficiency projects	Number of financial institutions and local banks personnel trained to understand main features of EE projects and better appraise EE projects proposals.	Weak capacity of financial institutions and local banks to understand and evaluate EE projects.	Strengthened capacity of financial institutions and local banks on EE projects evaluation	• Training sessions report • Project progress reports • Attendance list	Financial institutions and local banks are committed enough to build their capacity and invest in EE projects
Component 4: Implementation of energy management and systems optimization projects					
Outcome 4: Demonstrable energy savings in participating factories through systems optimization and energy management standards and increased adoption of energy management standards by industry					

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 4.1: Energy management systems implemented	• Number of factories with energy management plans • Number of case studies • Number of factories registered for peer-to-peer network	Limited implementation of energy management systems and ISO 50001 in Indonesia, leaving its (export) industry unprepared for potential market demand for energy-efficient production of goods for export.	• 150 factories adopted energy management plans and completed operational improvement projects • 25 factories adopted and implemented ISO 50001 • Participating factories registered with the peer-to-peer network report energy savings	• Case studies from national experts that have received training • Reports of UNIDO's international experts	• Continuous support from the National Standardization Agency and the government • Sufficient interest from industry • Successful introduction of peer-to-peer network
Output 4.2: Implemented and documented systems optimization demonstration projects	• Number of completed steam, pumping, and compressed air systems assessments • Number of completed systems optimization projects	Absence of local examples of successful optimization of industrial steam, pumping, and compressed air systems hindering nationwide uptake of good EE practices	• 60 systems assessments conducted of which 35 led to completed systems optimization projects • 20 case studies showing GHG emission reductions	• Case studies from national experts • Reports of UNIDO's international experts	Sufficient commitment from industrial enterprises to take action on systems optimization following systems assessment
Output 4.3 Recognition program developed and implemented	Recognition program for participating companies established based on successful achievements	Ad-hoc publicity for EE success stories from the industry.	Formal recognition of factories achieving power/fuel consumption reductions reflected in government reports	• Award ceremony highlighting successful projects • Project annual reports	Continuous government support for a recognition program

Annex 2: Detailed questions to assess evaluation criteria

The evaluation team will assess the project performance guided by the questions below. It should be noted that these are the guiding questions. In the inception report, the evaluator will specify key issues and key questions for the evaluation to focus on.

#	Evaluation criteria
A	**Progress to impact** ✓ Mainstreaming: To what extent information, lessons or specific results of the project are incorporated into broader stakeholder mandates and initiatives such as laws, policies, regulations and project? ✓ Replication: To what extent the project's specific results (e.g. methodology, technology, lessons and etc) are reproduced or adopted ✓ Scaling-up: To what extent the project's initiatives and results are implemented at larger geographical scale? ✓ What difference has the project made to the beneficiaries? ✓ What is the change attributable to the project? To what extent? ✓ What are the social, economic, environmental and other effects, either short-, medium- or long-term, on a micro- or macro-level? ✓ What effects are intended or unintended, positive or negative? The three UNIDO impact dimensions are: ✓ Safeguarding environment: To what extent the project contributes to changes in the status of environment? ✓ Economic performance: To what extent the project contributes to changes in the economic performance (finances, income, costs saving, expenditure and etc) of individuals, groups and entities? ✓ Social inclusiveness: To what extent the project contributes to changes in capacity and capability of individuals, groups and entities in society, including vulnerable groups, and hence generating employment and access to education and training?
B	**Project design**
1	□ Overall design ✓ The problem, need or gap to be addressed by the project is clearly identified, with clear target beneficiaries? ✓ The project design was adequate to address the problems at hand? ✓ Is the project consistent with the Country's priorities, in the work plan of the lead national counterpart? Does it meet the needs of the target group? Is it consistent with UNIDO's Inclusive and Sustainable Industrial Development? Does it adequately reflect lessons learnt from past projects? Is it in line with the donor's priorities and policies?

#	Evaluation criteria
	✓ Is the applied project approach sound and appropriate? Is the design technically feasible and based on best practices? Does UNIDO have in-house technical expertise and experience for this type of intervention? ✓ To what extent the project design (in terms of funding, institutional arrangement, implementation arrangements…) as foreseen in the project document still valid and relevant? ✓ Does it include M&E plan and adequate budget for M&E activities? ✓ Risk management: Are critical risks related to financial, social-political, institutional, environmental and implementation aspects identified with specific risk ratings? Are their mitigation measures identified? Where possible, are the mitigation measures included in project activities/outputs and monitored under the M&E plan?
2	Logframe Expected results: Is the expected result-chain (impact, outcomes and outputs) clear and logical? Does impact describe a desired long-term change or benefit to a society or community (not as a mean or process), do outcomes describe change in target group's behaviour/performance or system/institutional performance, do outputs describe deliverables that project will produce to achieve outcomes? Are the expected results realistic, measurable and not a reformulation or summary of lower level results? Do outputs plus assumptions lead to outcomes, do outcomes plus assumptions lead to impact? Can all outputs be delivered by the project, are outcomes outside UNIDO's control but within its influence? ✓ Indicators: Do indicators describe and specify expected results (impact, outcomes and outputs) in terms of quantity, quality and time? Do indicators change at each level of results and independent from indicators at higher and lower levels? Do indicators not restate expected results and not cause them? Are indicators necessary and sufficient and do they provide enough triangulation (cross-checking)? Are they indicators sex-disaggregated, if applicable? Are the indicator SMART? ✓ Sources of verification: Are the sources of verification/data able to verify status of indicators, are they cost-effective and reliable? Are the sources of verification/data able to verify status of output and outcome indicators before project completion? ✓ Are key assumptions properly summarized and reflecting the proper level in the results chain in the logframe?
C	**Project performance**
1	Relevance ✓ How does the project fulfil the urgent target group needs? ✓ To what extent is the project aligned with the development priorities of the country (national poverty reduction strategy, sector development strategy)? ✓ How does project reflect donor policies and priorities? ✓ Is the project a technically adequate solution to the development problem? Does it eliminate the cause of the problem? ✓ To what extent does the project correspond to UNIDO's comparative advantages?

#	Evaluation criteria
	✓ Are the original project objectives (expected results) still valid and pertinent to the target groups? If not, have they been revised? Are the revised objectives still valid in today's context?
2	□ Effectiveness ✓ What are the main results (mainly outputs and outcomes) of the project? What have been the quantifiable results of the project? ✓ To what extent did the project achieve their objectives (outputs and outcomes), against the original/revised target(s)? ✓ What are the reasons for the achievement/non-achievement of the project objectives? ✓ What is the quality of the results? How do the stakeholders perceive them? What is the feedback of the beneficiaries and the stakeholders on the project effectiveness? ✓ To what extent is the identified progress result of the project attributable to the intervention rather than to external factors? ✓ What can be done to make the project more effective? ✓ Were the right target groups reached?
3	□ Efficiency ✓ How economically are the project resources/inputs (concerning funding, expertise, time…) being used to produce results? ✓ To what extent were expected results achieved within the original budget and timeframe? If no, please explain why. ✓ Are the results being achieved at an acceptable cost? Would alternative approaches accomplish the same results at less cost? ✓ What measures have been taken during planning and implementation to ensure that resources are efficiently used? Were the project expenditures in line with budgets? ✓ Could more have been achieved with the same input? ✓ Could the same have been achieved with less input? ✓ How timely was the project in producing outputs and outcomes? Comment on the delay or acceleration of the project's implementation period. ✓ To what extent were the project's activities in line with the schedule of activities as defined by the Project Team and annual Work Plans? ✓ Have the inputs from the donor, UNIDO and Government/counterpart been provided as planned, and were they adequate to meet the requirements?
4	□ Sustainability of benefits ✓ Will the project results and benefits be sustained after the end of donor funding? ✓ Does the project have an exit strategy? ✓ To what extent the outputs and results have been institutionalized? *Financial risks:*

#	Evaluation criteria
	✓ What is the likelihood of financial and economic resources not being available once the project ends? *Socio-political risks:* ✓ Are there any social or political risks that may jeopardize the sustainability of project outcomes? ✓ What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? ✓ Do the various key stakeholders see that it is in their interest that project benefits continue to flow? ✓ Is there sufficient public/stakeholder awareness in support of the project's long-term objectives? *Institutional framework and governance risks:* ✓ Do the legal frameworks, policies, and governance structures and processes within which the project operates pose risks that may jeopardize the sustainability of project benefits? ✓ Are requisite systems for accountability and transparency and required technical know-how in place? *Environmental risks:* ✓ Are there any environmental risks that may jeopardize the sustainability of project outcomes? ✓ Are there any project outputs or higher-level results that are likely to have adverse environmental impacts, which, in turn, might affect the sustainability of project benefits?
D	**Cross-cutting performance criteria**
1	□ Gender mainstreaming ✓ Did the project design adequately consider the gender dimensions in its interventions? Was the gender marker assigned correctly at entry? ✓ Was a gender analysis included in a baseline study or needs assessment (if any)? Were there gender related project indicators? ✓ Are women/gender-focused groups, associations or gender units in partner organizations consulted/ included in the project? ✓ How gender-balanced was the composition of the project management team, the Steering Committee, experts and consultants and the beneficiaries? ✓ Do the results affect women and men differently? If so, why and how? How are the results likely to affect gender relations (e.g., division of labour, decision-making authority)? ✓ To what extent were socioeconomic benefits delivered by the project at the national and local levels, including consideration of gender dimensions?
2	○ M&E:

#	Evaluation criteria
	○ ***M&E design*** ○ Was the M&E plan included in the project document? Was it practical and sufficient at the point of project approval? ○ Did it include baseline data and specify clear targets and appropriate indicators to track environmental, gender, and socio economic results? ○ Did it include a proper M&E methodological approach; specify practical organization and logistics of the M&E activities including schedule and responsibilities for data collection; ○ Does the M&E plan specify what, who and how frequent monitoring, review, evaluations and data collection will take place? Is the M&E plan consistent with the logframe (especially indicators and sources of verification)? ○ Does it allocate adequate budget for M&E activities?
	○ ***M&E implementation*** ○ How was the information from M&E system used during the project implementation? Was an M&E system in place and did it facilitate timely tracking of progress toward project results by collecting information on selected indicators continually throughout the project implementation period? Did project team and manager make decisions and corrective actions based on analysis from M&E system and based on results achieved? ○ Are annual/progress project reports complete, accurate and timely? ○ Was the information provided by the M&E system used to improve performance and adapt to changing needs? Was information on project performance and results achievement being presented to the Project Steering Committee to make decisions and corrective actions? Do the Project team and managers and PSC regularly ask for performance and results information? ○ Are monitoring and self-evaluation carried out effectively, based on indicators for outputs, outcomes and impact in the logframe? Do performance monitoring and reviews take place regularly? ○ Were resources for M&E sufficient? ○ How has the logframe been used for Monitoring and Evaluation purposes (developing M&E plan, setting M&E system, determining baseline and targets, annual implementation review by the Project Steering Committee…) to monitor progress towards expected outputs and outcomes? ○ How well have risks outlined the project document and in the logframe been monitored and managed? How often have risks been reviewed and updated? Has a risk management mechanism been put in place?
3	○ Results-based management (RBM) *Results-Based work planning* o Review any delays in project start-up and implementation, identify the causes and examine if they have been resolved.

#	Evaluation criteria
	○ Are there any annual work plans? Are work-planning processes results-based? Has the logframe been used to determine the annual work plan (including key activities and milestone)? ○ Examine the use of the project's results framework/ logframe as a management tool and review any changes made to it since project start. *Results-based monitoring and evaluation* ○ Verify whether an M&E system is in place and facilitated timely tracking of progress toward project objectives by collecting information on selected indicators continually throughout the project implementation period; ○ Review the monitoring tool currently being used: Do they provide the necessary information? Do they involve key partners? Are they aligned or mainstreamed with national systems? Do they use existing information? Are they efficient? Are they cost-effective? Are additional tools required? How could they be made more participatory and inclusive? ○ Do project team and manager make decisions and corrective actions based on analysis from M&E system and based on results achieved? Is information on project performance and results achievement being presented to the Project Steering Committee to make decisions and corrective actions? Do the Project team and managers and PSC regularly ask for performance and results information? *Results-based reporting* ○ Assess how adaptive management changes have been reported by the project management and shared with the PSC. ○ Assess how well the Project Team and partners undertake and fulfil donor and UNIDO reporting requirements (i.e. how have they addressed delays or poor performance, if applicable?) ○ Assess how results and lessons derived from the adaptive management process have been documented, shared with key partners and internalized by partners.
E	**Performance of partners**
1	○ UNIDO ○ Mobilization of adequate technical expertise for project design ○ Inclusiveness of project design (with national counterparts) ○ Previous evaluative evidence shaping project design ○ Planning for M&E and ensuring sufficient M&E budget ○ Timely recruitment of project staff ○ Project modifications following changes in context or after the Mid-Term Review

#	Evaluation criteria
	○ Follow-up to address implementation bottlenecks ○ Role of UNIDO country presence (if applicable) supporting the project ○ Engagement in policy dialogue to ensure up-scaling of innovations ○ Coordination function ○ Exit strategy, planned together with the government ○ Review overall effectiveness of project management as outlined in the Project Document. Have changes been made and are they effective? ○ Are responsibilities and reporting lines clear? Is decision-making transparent and undertaken in a timely manner? Recommend areas for improvement. ○ To what extent the project has a proper and operational governance system (e.g. PSC with clear roles and responsibilities)? ○ Review whether the national management and overall coordination mechanisms have been efficient and effective? Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfil its role and responsibilities (e.g. providing strategic support, monitoring and reviewing performance, allocating funds, providing technical support, following up agreed/corrective actions)? ○ The UNIDO HQ-based management, coordination, monitoring, quality control and technical inputs have been efficient, timely and effective (e.g. problems identified timely and accurately; quality support provided timely and effectively; right staffing levels, continuity, skill mix and frequency of field visits)?
2	□ National counterparts □ ***Design*** o Responsiveness to UNIDO's invitation for engagement in designing the project □ ***Implementation*** o Ownership of the project o Provide financial contribution as planned (cash or in kind) o Support to the project, based on actions and policies o Counterpart funding o Internal government coordination o Exit strategy, planned together with UNIDO, or arrangements for continued funding of certain activities o Facilitation of the participation of Non-Governmental Organizations (NGOs), civil society and the private sector where appropriate o Suitable procurement procedures for timely project implementation

#	Evaluation criteria
	○ Engagement with UNIDO in policy dialogue to promote the up-scaling or replication of innovations
3	Donor ✓ Timely disbursement of project funds ✓ Feedback to progress reports, including Mid-Term Evaluation, if applicable ✓ Support by the donor's country presence (if applicable) supporting the project for example through engagement in policy dialogue
F	**Overall assessment** Overarching assessment of the project, drawing upon the analysis made under Project performance and Progress to Impact criteria above but not an average of ratings.

Annex 3- Outline of an in-depth project evaluation report

Executive summary (maximum 5 pages)

Evaluation purpose and methodology
Key findings
Conclusions and recommendations
Project ratings
Tabular overview of key findings – conclusions – recommendations

1. **Introduction**
   - 1.1. Evaluation objectives and scope
   - 1.2. Overview of the Project Context
   - 1.3. Overview of the Project
   - 1.4. Theory of Change
   - 1.5. Evaluation Methodology
   - 1.6. Limitations of the Evaluation
2. **Project's contribution to Development Results - Effectiveness and Impact**
   - 2.1. Project's achieved results and overall effectiveness
   - 2.2. Progress towards impact
     - 2.2.1. Behavioural change
       - 2.2.1.1. Economically competitive - Advancing economic competitiveness
       - 2.2.1.2. Environmentally sound – Safeguarding environment
       - 2.2.1.3. Socially inclusive – Creating shared prosperity
     - 2.2.2. Broader adoption
       - 2.2.2.1. Mainstreaming
       - 2.2.2.2. Replication
       - 2.2.2.3. Scaling-up
3. **Project's quality and performance**
   - 3.1. Design
   - 3.2. Relevance
   - 3.3. Efficiency
   - 3.4. Sustainability
   - 3.5. Gender mainstreaming
4. **Performance of Partners**
   - 4.1. UNIDO
   - 4.2. National counterparts
   - 4.3. Donor
5. **Factors facilitating or limiting the achievement of results**
   - 5.1. Monitoring & evaluation
   - 5.2. Results-Based Management
   - 5.3. Other factors
   - 5.4. Overarching assessment and rating table
6. **Conclusions, recommendations and lessons learned**
   - 6.1. Conclusions
   - 6.2. Recommendations
   - 6.3. Lessons learned
   - 6.4. Good practices

Annexes (to be put online separately later)

- Evaluation Terms of Reference
- Evaluation framework
- List of documentation reviewed
- List of stakeholders consulted
- Project logframe/Theory of Change
- Primary data collection instruments: evaluation survey/questionnaire
- Statistical data from evaluation survey/questionnaire analysis

Annex 4: Checklist on evaluation report quality

Project Title:
UNIDO project ID:
Evaluation team:
Quality review done by: Date:

	Report quality criteria	UNIDO IED assessment notes	Rating
a.	Was the report well-structured and properly written? (Clear language, correct grammar, clear and logical structure)		
b.	Was the evaluation objective clearly stated and the methodology appropriately defined?		
c.	Did the report present an assessment of relevant outcomes and achievement of project objectives?		
d.	Was the report consistent with the ToR and was the evidence complete and convincing?		
e.	Did the report present a sound assessment of sustainability of outcomes or did it explain why this is not (yet) possible? (Including assessment of assumptions, risks and impact drivers)		
f.	Did the evidence presented support the lessons and recommendations? Are these directly based on findings?		
g.	Did the report include the actual project costs (total, per activity, per source)?		
h.	Did the report include an assessment of the quality of both the M&E plan at entry and the system used during the implementation? Was the M&E sufficiently budgeted for during preparation and properly funded during implementation?		
i.	Quality of the lessons: were lessons readily applicable in other contexts? Did they suggest prescriptive action?		
j.	Quality of the recommendations: did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?'). Can these be immediately implemented with current resources?		
k.	Are the main cross-cutting issues, such as gender, human rights and environment, appropriately covered?		
l.	Was the report delivered in a timely manner? (Observance of deadlines)		

Rating system for quality of evaluation reports

A rating scale of 1-6 is used for each criterion: Highly satisfactory = 6, Satisfactory = 5, Moderately satisfactory = 4, Moderately unsatisfactory = 3, Unsatisfactory = 2, Highly unsatisfactory = 1, and unable to assess = 0.

Annex II. Project evaluation criteria definitions

#	Evaluation criteria	Definition
A	**Progress to impact**	**Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended, including redirecting trajectories of transformational process and the extent to which conditions for trajectory change are being put into place.**
B	**Project design**	**Formulation of the intervention, the plan to achieve a specific purpose.**
1	• **Overall design**	Assessment of the design in general.
2	• **Logframe**	Assessment of the logical framework aimed at planning the intervention.
C	**Project performance**	**Functioning of a development intervention.**
1	• **Relevance**	The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor.
2	• **Effectiveness**	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.
3	• **Efficiency**	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
4	• **Sustainability of benefits**	The continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.
D	**Cross-cutting performance criteria**	**Other important criteria that cut across the UNIDO intervention.**
1	• **Gender mainstreaming**	The extent to which UNIDO interventions have contributed to better gender equality and gender related dimensions were considered in an intervention.
2	• **M&E:** ○ **M&E design** ○ **M&E imple-mentation**	Refers to all the indicators, tools and processes used to measure if a development intervention has been implemented according to the plan (monitoring) and is having the desired result (evaluation).
3	• **Results-based Management (RBM)**	Assessment of issues related to results-based work planning, results based M&E and reporting based on results.
E	**Performance of partners**	**Assessment of partners' roles and responsibilities engaged in the intervention.**
1	• **UNIDO**	Assessment of the contribution of partners to project design, implementation, monitoring and reporting, supervision and backstopping and evaluation. The performance of each partner will be assessed individually, based on its expected roles and responsibilities in the project life cycle.
2	• **National counterparts**	
3	• **Donor**	
F	**Overall assessment**	**Overarching assessment of the project, drawing upon the analysis made under Project performance and Progress to Impact criteria above but not an average of ratings.**

Project evaluation rating criteria

Score		Definition	Category
6	Highly satisfactory (HS)	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory (S)	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	
4	Moderately satisfactory (MS)	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory (MU)	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory (U)	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory (HU)	Level of achievement is negligible and there are severe shortcomings.	

Project sustainability evaluation rating criteria

Score	**Probability of continued long-term benefits is tied to the Project outcomes and their resilience to financial, socio-political, institutional framework and governance, and environmental risks.)**
6	Highly likely (HL)
5	Likely (L)
4	Moderately likely (ML)
3	Moderately unlikely (MU)
2	Unlikely (U)
1	Highly unlikely (HU)

Annex III. List of documentation reviewed

GEF (2007). Focal Area Strategies and Strategic Programming for GEF-4, GEF Policy Paper, October 2007
IEE Indonesia (2011). Project document (CEO Endorsement document)
IEE Indonesia (2015). Independent Mid-Term Evaluation
IEE Indonesia (2016). Presentation: UNIDO EnMS Implementation Programme – Achievements and Lessons Learnt in Indonesia, Vienna Energy Management Expert Group Meeting, 23-27 May 2016, Vienna, Austria
IEE Indonesia (2018). Project Terminal Report, Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Indonesia
OECD / IEA (2017). Southeast Asia Energy Outlook 2017.
UNIDO (2018). Evaluation Manual, UNIDO Independent Evaluation Division, Vienna

Annex IV. List of stakeholders and interviewees consulted

Organisation/ Institution	Contact
National counterparts of Steering Committee and other government agencies	
Ministry of Minerals and Energy Resources (MEMR), Directorate General for New Energy, Renewable Energy and Energy Conservation (DG NREEC)	• Dr. Hariyanto Director of Energy Conservation • Ms. Gita Lestari Deputy Director of Cooperation and Technical Assistance
Ministry of Industry, R&D Center for Green Industry and Environment	Representatives, standing in for: • Mr. Teddy C. Sianturi Head of R&D Center for Green Industry and Environment • Mrs. Emmy Sundari Deputy Head of Energy Section
Standardization Organization (Badan Standardisasi Nasional - BSN)	• Ms. Konny Sagala Head of Center for Cooperation on Standardization (with 3-4 colleagues) • Mr. Nasrudin Head for Standardization Education and Socialization (with 1-2 colleagues)
Komite Akreditasi Nasional (KAN)	• Mr. Zul Amri Head for Environment Accreditation • 2 colleagues
Indonesian Financial Authority (Otoritas Jasa Keuangan - OJK)	• Mr. Edi Setijawan Sustainable Finance Director • Ms. Tri Widya Staff of the unit
PUSDIKLAT ESDM / Training Centre for Electricity	• Ms. Endang Widayati

Organisation/ Institution	Contact
Ministry of Environment and Forestry	• Ms. Laksmi Dhewanthi Senior Advisor to the Minister, Industry and Int'l Trade GEF Operational Focal Point
UNIDO National Project Coordinator	• Mr. Aris Ika Nugrahanto
UNIDO Representative	• Mr. Esam AlQararah UNIDO Representative for Indonesia and Timor Leste
Demonstration partner companies	
PT. Indah Kiat Pulp & Paper, Tangerang (Paper; EnMS & SSO)	• Mr. Kholisul Fatikhin MHO / Sustainability Head (and colleague)
PT. Indo Acidatama (Basic/agro chemicals; SSO with investment loan from bank)	• Mr. Andi Sasmita Ajie
PT. Clariant (Specialty chemicals; CASO)	• Mr. Ayi Hardiansyah Sr. Project Manager • Mr. Deden Herdianah Production Service Supervisor
PT. Pupuk Kujang Cikampek (Fertilizers, state-owned; EnMS)	• Mr. Maryono Director of Production • Mr. M. Badri Halim Process Evaluation Manager • ~5 colleagues
PT. Cheil Jedang (Bio-chemicals; EnMS)	• Mr. Imam Nachrowi General Manager • Mr. Warih Prabowo • Mr. Willy Satria • ~6 colleagues

Organisation/ Institution	Contact
Greenfields (Dairy products, CASO)	• Mr. Yuli Safangat Engineering Manager
NIKE vendors (7 suppliers) (EnMS and CASO)	• Lufaldy Ernanda NIKE Sustainability Manager • 1 colleague
Training recipients, project consultants, certification body	
Institute Energy Indonesia (Yayasan Energi Indonesia - YEI) foundation	• Mr. Gema K. Fitrika Secretary General (national expert EnMS and SO)
Agency for the Assessment and Application of Technology – BPPT	• Mr. Hari Yurismono (national expert EnMS and SO expert)
Ultrafilter (compressor vendor)	• Mr. Untung Semedhi (national expert CASO)
University Mercu Buana	• Mr. Yuriadi Kusuma Professor (national expert CASO)
PT. Energy Management Indonesia (EMI) (Persero)	• Mr. Singgih W. Mukti CRO (non-participant in program)
PT Bank Negara Indonesia (BNI)	• Mr. Leonard Panjaitan Sustainability Dept. (project trainer of EE finance)
TÜV NORD Indonesia (certification body)	• Ms. Eva Pitterling Marketing Advisor

Source: Terminal Evaluation Mission Plan.

Annex V. Project logframe, CEO Endorsement 2011

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Project Objective Promote industrial energy efficiency through systems optimization and ISO energy management standards	• Measurable reductions in electricity and fuel consumption by industry • Calculated GHG emissions reductions	No direct and indirect electricity and fuel consumption reductions Baseline values to be determined through data collection and discussions with industry	Electricity, fuel and GHG emissions savings of 37,484 MWh, 404,000 GJ and 67,442 tCO2 respectively (to be determined following technical assessments completed over participating industrial enterprises)	Terminal reports Peer-to-peer network End-of-project survey	Continuous support of concerned government authorities Active support driven by industry
Component 1: Introduction of energy management systems and capacity building					
Outcome 1: Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness					
Output 1.1: Reinforced capacity of government institutions on energy management	Number of government staff in the PMU Number of workshops/meetings Replication and scaling up plan developed	There is no energy management unit in place No long term energy management in the industrial sector plan exits	PMU created and operational with staff from the government Key government institutions participating in workshops/meetings Replication and scaling up plan handed to the government	• Staff allocation notes • List of participants • UNIDO experts reports	Continuous government support and participation
Output 1.2: Training material and tools developed	Training material on energy management provided to industrial enterprises.	Continued use of generic training material on energy management in industrial facilities.	Availability of translated, comprehensive training material and tools specifically supporting the development and implementation of energy management compatible with ISO 50001.	• UNIDO experts' reports • Project progress reports	Continuous government and industry sector support and participation

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 1.3: National awareness campaign launched on ISO 50001	National campaign provided information to industry to adopt ISO 50001.	No national awareness campaign initiatives launched on ISO 50001 in the past.	Promotional literature distributed to industries in Indonesia promoting the adoption of ISO 50001.	• Awareness campaign report • Progress and annual reports	Sustained government support and participation
Output 1.4: Trained national experts/factory personnel on energy management	• Number of trained national experts • Number of trained factory personnel	Current/proposed training programs limited to generic aspects of energy management without comprehensive guidelines and not specifically addressing content of ISO 50001	Training on energy management in line with ISO 50001 of: • 25 national experts • 300 factory managers (out of which 200 will be trained in energy management system implementation)	Reports of UNIDO's international experts and list of attendees	Sufficient commitment to energy management on the part of national experts and factory personnel
Output 1.5: Peer-to-Peer network established between industrial enterprises	Network established and used to support program recognition and present savings result from energy management.	Government database only, no formal peer-to-peer discussion platforms on energy management exist.	All participating enterprises share their implementation plan on energy management on the network and learn from others' experience and results	Annual report on web-based participating facility results	Willingness to upload their experience with energy management (EE measures and projects undertaken)
Component 2: Capacity building on systems optimization					
Outcome 2: A cadre of energy efficiency professionals created within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively as to provide industrial systems optimization services					
Output 2.1: Training material and tools developed	Training material on systems optimization provided to industrial enterprises.	Continued use of generic IEE training material focusing on energy audits and specific sectors, but generic technology replacement opportunities.	Availability of translated, comprehensive training material and tools on systems optimization	• UNIDO experts' reports • Project progress and annual reports	Continuous government support and participation

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 2.2: Trained national experts/factory personnel on systems optimization	• Number of trained national experts • Number of trained factory personnel	Current/proposed training programs (both national and donor-supported) do not address systems optimization.	Training in systems optimization of: • 45 national experts • 300 factory managers (out of which 200 will be trained in the use of the UNIDO tools)	• Reports of UNIDO's international experts • List of training sessions attendees	Sufficient commitment to systems optimization on the part of national experts and factory personnel
Output 2.3: Trained Indonesian-based equipment suppliers on systems optimization	Number of trained Indonesian-based equipment vendors/suppliers	Continued exclusive focus by vendors on the sale of individual equipment items. Least purchase price continues to be the main driver for purchasers of steam boilers, pumps, and air compressors.	Training of 50 Indonesian-based suppliers of energy-efficient products in systems optimization	• Reports of UNIDO's international experts • List of training session attendees	Sufficient commitment to systems optimization on the part of equipment suppliers
Component 3: Financial capacity development to support energy efficiency projects in industry					
Outcome3: Increased availability of financial and institutional support for industrial energy efficiency initiatives					
Output 3.1: Project evaluation criteria developed and harmonized	Evaluation criteria are harmonized within financial institutions to help them select best EE projects.	Financial institutions continue to appraise EE projects without standards and recognized criteria using current bank projects evaluation criteria.	Criteria for evaluating EE projects are developed and harmonized by main financial institutions in Indonesia	• Project progress reports • UNIDO experts' reports	Sufficient commitment from financial institutions to change the way they currently evaluate EE projects

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 3.2: Training material developed and capacity of industrial enterprises built on bankable energy efficiency projects development	Training material relating to financing of energy efficiency project development are provided to industries. Number of trained facility managers/personnel in industrial energy efficiency project development.	No specific material existed to help industrial managers prepare financially sound proposals to mobilize the necessary funds from financiers and banks management. Continued use of generic methods, which do not properly consider the financial impact and opportunities of EE in facilities.	Availability of translated, comprehensive material and guidelines specifically supporting the development of financial proposal for EE projects Industrial facility managers/personnel have the capacity to analyse systems optimization and energy management projects and use energy and O&M costs reduction projects	• Project progress reports • UNIDO experts' reports • List of attendees	Sufficient commitment from facility managers to take action on project financial development
Output 3.3: Capacity of financial institutions and local banks built to promote and invest in industrial energy efficiency projects	Number of financial institutions and local banks personnel trained to understand main features of EE projects and better appraise EE projects proposals.	Weak capacity of financial institutions and local banks to understand and evaluate EE projects.	Strengthened capacity of financial institutions and local banks on EE projects evaluation	• Training sessions report • Project progress reports • Attendance list	Financial institutions and local banks are committed enough to build their capacity and invest in EE projects
Component 4: Implementation of energy management and systems optimization projects					
Outcome 4: Demonstrable energy savings in participating factories through systems optimization and energy management standards and increased adoption of energy management standards by industry					

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 4.1: Energy management systems implemented	• Number of factories with energy management plans • Number of case studies • Number of factories registered for peer-to-peer network	Limited implementation of energy management systems and ISO 50001 in Indonesia, leaving its (export) industry unprepared for potential market demand for energy-efficient production of goods for export.	• 150 factories adopted energy management plans and completed operational improvement projects • 25 factories adopted and implemented ISO 50001 • Participating factories registered with the peer-to-peer network report energy savings	• Case studies from national experts that have received training • Reports of UNIDO's international experts	• Continuous support from the National Standardization Agency and the government • Sufficient interest from industry • Successful introduction of peer-to-peer network
Output 4.2: Implemented and documented systems optimization demonstration projects	• Number of completed steam, pumping, and compressed air systems assessments • Number of completed systems optimization projects	Absence of local examples of successful optimization of industrial steam, pumping, and compressed air systems hindering nationwide uptake of good EE practices.	• 60 systems assessments conducted of which 35 led to completed systems optimization projects • 20 case studies showing GHG emission reductions	• Case studies from national experts • Reports of UNIDO's international experts	Sufficient commitment from industrial enterprises to take action on systems optimization following systems assessment
Output 4.3: Recognition program developed and implemented	Recognition program for participating companies established based on successful achievements	Ad-hoc publicity for EE success stories from the industry.	Formal recognition of factories achieving power/fuel consumption reductions reflected in government reports	• Award ceremony highlighting successful projects • Project annual reports	Continuous government support for a recognition program